

Medical Faculty  
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# Annual Report 2020





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## Foreword

The University of Bern, founded in 1834, has included from the beginning a Faculty of Medicine. In the last 186 years, many personalities of our Faculty had a profound impact on modern medicine including the surgeon Theodor Kocher (Nobel Prize awardee in 1909), the internist Heinrich Quincke (discoverer of the lumbar puncture), the pathologist Theodor Langhans, the dermatologist Josef Jadassohn, the ophthalmologist Hans Goldmann, the physiologist Alexander von Muralt (founder in 1952 of the Swiss National Science Foundation), the orthopedist Maurice Müller (named internationally the orthopedic surgeon of the 20th century), and the anatomist Ewald Weibel. Today, the Faculty of Medicine offers a full program of study in Medicine and Dental Medicine, as well as Master studies in Biomedicine, Biomedical Engineering, Pharmacy and Artificial Intelligence in Medicine. Our faculty includes 39 clinics and 16 institutes, the largest number of medical students in Switzerland (1,800 in 2020), and 112 full and 164 associated professors. Our Faculty is ranked (Shanghai, 2020) in the top 34 in Europe and 76-100 world-wide.

All activities of our faculty were profoundly influenced by the COVID-19 pandemic, which officially started in Switzerland on February 25, 2020 with the first case reported in Ticino. Research had to officially be stopped in Bern for about 3 months. Patient research was additionally slowed by the engagement of several clinicians in the care of victims of the pandemic and by the reluctance of patients and healthy control subjects to engage in clinical trials. During the pandemic, members of our Faculty have been very active in the management of COVID-19 patients and in related research. Over 50 clinical, translational and experimental studies were started/are conducted with the support of international, national and intramural funding (including over 8 Million francs from the Swiss National Science Foundation, SNSF). As of today, over 200 papers have been published on this topic by our researchers. Four members of our Faculty also joined the Swiss National Task Force and one of them acted as its president. Within only a few weeks, our Faculty was able to offer almost 90% of our teaching duties virtually. Both virtual and (few selected) face-to-face examinations (e.g. practical tests) could efficiently be organized. The satisfaction from both students and teachers were above expectations with examination results better than in previous years.

Despite the pandemic, the Faculty of Medicine of Bern looks back at a very successfully academic year. A total of 2,235 original articles were published. Competitive fundings (including 14 EU and 2 NIH grants) in the height of 79 Million francs (29 from the SNSF) supported our research. Six out of the nine highly cited researchers (whose work ranks in the world-wide top 1% of cited scientific publications in their respective fields) of the University of Bern are members of the Medical Faculty.

A new BSL-3 biosafety laboratory from the Institute of Infectious Diseases was inaugurated in the Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel) building. The Medical Faculty also inaugurated the "Center for Artificial Intelligence in Medicine" (CAIM) which combines cutting-edge research, engineering, digitalization and artificial intelligence to develop new medical technologies for personalized patient care.

I hope that you will enjoy reading this report. I take the opportunity to thank all employees and partners of the Medical Faculty of Bern for their outstanding commitment and support during this challenging and unforgettable 2020. Special thoughts go to the patients, employees and families who have suffered the loss of loved ones or relatives and are fighting with the consequences of the COVID-19 pandemic.



Claudio Lino Alberto Bassetti  
Dean

(on behalf of the Board of the Faculty of Medicine)

# Highlights 2020

## January 2020

### 13.1.2020 - Reducing the risk of blood clots in artificial heart valves

People with mechanical heart valves need blood thinners on a daily basis, because they have a higher risk of blood clots and stroke. Researchers at the ARTORG Center of the University of Bern, Switzerland, now identified the root cause of blood turbulence leading to clotting. Design optimization could greatly reduce the risk of clotting and enable these patients to live without life-long medication.



[Website University of Bern, News](#)

### 16.1.2020 - Tumor Center at Inselspital receives certification again

Bern's cutting-edge medicine against tumors: People suffering from cancer deserve high-quality treatment. The Bern Tumor Center, also known as the University Cancer Center Inselspital (UCI), is independently audited every year and has been re-certified for its quality by the German Cancer Society.



[Website of the Inselspital, News](#)

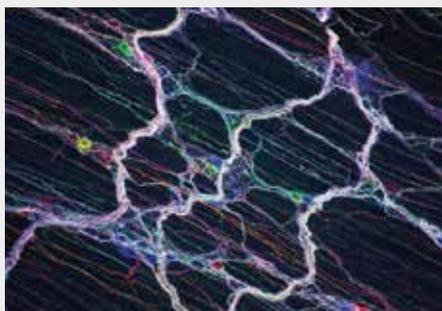
### 31.1.2020 - Coronavirus: Bern researchers calculate the spread

Epidemiologists at the University of Bern used computer simulations to describe the spread of the coronavirus that has recently appeared in China. They found out that one person infected with the virus infects on average two other people. This means that without strong control measures, a worldwide pandemic could occur.



[www.nextrain.org](http://www.nextrain.org)

## February 2020



### 5.2.2020 - Gut bacteria help control healthy muscle contraction in the colon

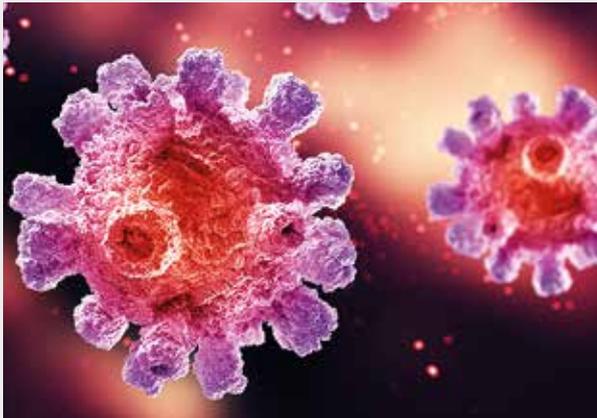
Microorganisms in the gut support healthy digestion by helping nerve cells within the intestine to regulate the contraction and relaxation of the muscle wall of the colon, according to new research from the Francis Crick Institute and the University of Bern.

[To the article](#)

## 6.2.2020 - Pfizer Prize 2020 for Bern Narcolepsy Research

For his research published in the Journal Nature on the role of the immune system in narcolepsy, PD Dr. med. Ulf Kallweit performed with Prof. Claudio Bassetti of the Neurology Department of the University Hospital Bern is awarded a Pfizer Research Prize 2020. He receives the prize together with Dr. Daniela Latorre from the Università della Svizzera Italiana.

[To the Pfizer Research Prize Foundation](#)



Designed by kjpargeter/Freepik

## 12.2.2020 - Algorithms for identifying new „cancer genes“

It is estimated that the number of cancer cases worldwide will double by 2040. This makes the search for genes that cause cancer even more important. A team of researchers from the University of Bern and Inselspital, University Hospital Bern, has now developed algorithms that massively simplify the hunt for „cancer genes“ in a poorly understood part of our genome.

<https://nccr-rna-and-disease.ch/>

## March 2020



## 9.3.20 - New endowed professorship for clinical pharmacy

Thanks to the support of the Swiss Association of Pharmacists pharmaSuisse, the University of Bern is able to establish an endowed professorship for clinical pharmacy. This will help to improve the safety of drug therapy for patients. It will be located in the Division of Clinical Pharmacology of the University Clinic for General Internal Medicine at the Inselspital, University Hospital of Bern.

[Clinical Pharmacology at the Clinic for General Internal Medicine](#)

## 10.3.2020 - Dental clinics of the University of Bern in the Top Ten of the world for the third time

The dental clinics of the University of Bern are world class: The global QS World University Ranking places Bernese dentistry among the top ten in its field worldwide for the third time in a row. There, the Dental Clinics are currently the only Swiss institution in the top ten.

[Website of the University of Bern, News](#)



## 14.3.2020 - Graduation Ceremony of the Medical Faculty



Due to coronavirus, the Federal Council has decreed that events with an amount of 1'000 or more people must be cancelled immediately and are prohibited until at least March 15 2020. The graduation ceremony of the Medical Faculty was as well affected by this constraint, so unfortunately, the Dean's Office had to cancel the event. However, following awards were granted:

### **Faculty awards for the three best dissertations of the year 2019**

1<sup>st</sup> price - Mr. Dr. Théo Arthur Perceval MEISTER for the Dissertation  
„Association of Assisted Reproductive Technologies with Arterial Hypertension During Adolescence“ under the direction of Mr. PD. Dr. E. Rexhaj, Department of Cardiology, Inselspital Bern

2<sup>nd</sup> price - Mr. Dr. Manuel Daniel KELLER for the Dissertation  
„Adverse prognostic value of PD-L1 expression in primary resected pulmonary squamous cell carcinomas and paired mediastinal lymph node metastases“ under the direction of Mrs. PD Dr. S.A. Berezowska and Mr. Prof. Dr. R. Langer, Institute of Pathology, University of Bern

3<sup>rd</sup> price - Mrs. Dr. Vanessa Jasmine Lisa BERGER for the Dissertation  
„Association of Intravitreal Injections With Blood Pressure Increase The Following Excitement and Anxiety Response Under Intravitreal Injection Study“ under the direction of Mr. Prof. Dr. M. Zinkernagel, Department of Ophthalmology, Inselspital Bern

### **Recognition Prize of the Dental Society SSO**

For outstanding achievements in the study of dentistry (awarded at the Master's Ceremony on September 11, 2019)  
Mr. med. dent. Daniel Jan TONEATTI

### **Prize of the Medical Society of the Canton of Bern**

For the best Federal examinations in human medicine 2019  
Best Candidate for CS Examination - Mr. Samuel Christoph Johannes SPYCHER  
Best candidate for the MC-exam – Mr. Marco Reto DÜRIG

### **CSL Behring Award**

For excellence in the Master program Biomedical Sciences  
Mrs. Melissa Phung-Kieu PITTON & Mrs. Nerea FERNANDEZ TRIGO & Mrs. Camila Anna GEMPERLI

### **Alumni Biomedical Sciences Award**

For the best Master's thesis in the Master program Biomedical Sciences  
Mrs. Fabienne BIRRER

### **The RMS Foundation Award**

For the best graduate in the Biomedical Engineering Master program  
Mr. Michel HAYOZ

### **Teacher of the Year 2020**

Mr. Dr. Pascal KÜPFER, Department of Chemistry and Biochemistry (DCB), University of Bern



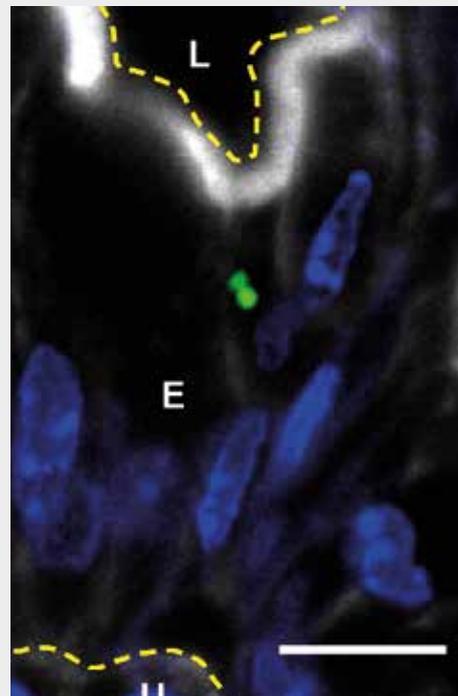
### 15.4.20 - Six Marie Skłodowska-Curie fellows are coming to the University of Bern

The University of Bern is welcoming six Marie Skłodowska-Curie fellows this year. The „Marie Skłodowska-Curie Individual Fellowships“, awarded annually by the European Commission, give experienced researchers the opportunity to enrich their scientific careers with a stay abroad. Two fellows are from the Medical Faculty: Dr. Hugo Guillen Ramirez with his project „Computational genomics of long noncoding RNA domains across metazoans (RNADOMAIN)“ and Dr. Tina Uroda with her project „Linking sequence to function of long noncoding RNAs with CRISPR-Cas9 (CRISPR-Locate)“.

[Marie Skłodowska-Curie Fellowships](#)

### 24.4.2020 – Study reveals promising mucosal vaccination strategy against diarrheal infections

Bacterial diarrheal diseases still claim many lives worldwide, including over half a million children under the age of 5 yearly. Now, researchers from the Institute for Infectious Diseases (IFIK) under the leadership of Prof. Siegfried Hapfelmeier revealed what properties make a live bacterial intestinal vaccine particularly effective. Their findings could lead the way to novel vaccines.



Salmonella  
Cells Nucleus  
Cell Surfaces

[nature communications](#)



[Living evidence on COVID-19](#)

### Reducing the effects of coronavirus with EU funding

As part of a European consortium, researchers from the University of Bern are investigating how the corona virus spreads, how dangerous it is and what measures are effective in containing the pandemic. The EU research framework program “Horizon 2020” is supporting the consortium’s project with a total of three million euros.



### 5.5.2020 - Winning project for the construction of the medical research and training center has been determined

The Canton of Bern is building a medical research and training center for the University of Bern on the Insel site. Now the winning project has been determined: "JANUS" has convinced the jury of the architectural competition under the direction of the Office for Land and Buildings (AGG) the most. A team of planners with four architectural offices is responsible for the project - three of them from Bern. The new center is a milestone in the development of Bern as a medical location.

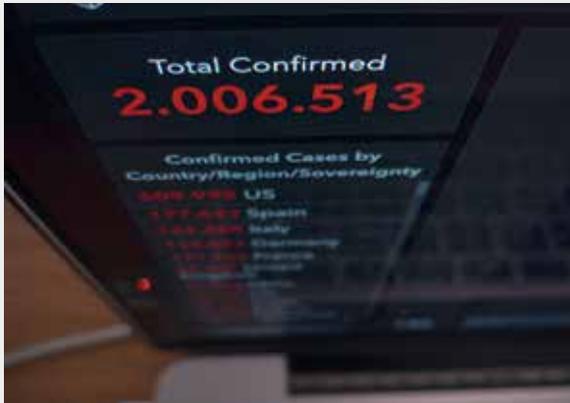
[Project website of the winning project "JANUS"](#)



### 14.5.2020 - Geography of childhood cancer in Switzerland studied

A research group under the direction of the Institute of Social and Preventive Medicine of the University of Bern has investigated the spatial distribution of childhood cancer risks in Switzerland for the period of 1985 – 2015. The group found evidence of increased risks in certain areas, particularly for brain tumors. The researchers demand that the search for the causes of brain tumors in children must be intensified.

[Article on the website of the ISPM](#)



### 20.5.2020 - Dynamic measures against the coronavirus examined

An alternating cycle of suppression interventions and relaxation could offer a pragmatic strategy – particularly for developing countries – to prevent health systems from being overloaded while reducing the economical and societal burden. This is illustrated by an international study with significant participation by the Institute for Social and Preventive Medicine (ISPM) at the University of Bern.

[Website of the University of Bern, News](#)

### 25.5.2020 - Even natural products can be harmful for the unborn child

Plant products ingested by pregnant women through their diet are broken down by the intestinal microbiota into chemical substances, some of which can cross the placental barrier and reach the fetus. These foreign substances can harm the unborn child, even if they are of „natural origin“. Therefore, Researchers at the Department for BioMedical Research (DBMR) at the University of Bern and Inselspital, University Hospital Bern, warn against underestimating the effects of such substances.

[Website of the University of Bern, News](#)





## 28.5.2020 - Fructose reduces the risk of Hypoglycaemia

Fructose reduces the risk of hypoglycemia for type 1 diabetes during exercise. Hypoglycemia is a risk for people suffering from type 1 diabetes, especially during physical activity. In a study published in *Journal Diabetes Care*, UDEM researchers led by Prof. Lia Bally and Prof. Christoph Stettler show that taking 20 g of fructose half an hour before exercise (1 hour cycling) significantly reduces the risk of hypoglycemia (by almost 90%). A simple and inexpensive measure can therefore make it easier for active people with type 1 diabetes to access sporting activities.

[Diabetes Care](#)

June 2020



## 2.6.2020 - Designing animal studies to improve research reproducibility and reduce animal use

At the invitation of the University of Bern, international experts worked out new recommendations for the design of animal studies. They encourage a paradigm shift to improve the reproducibility of scientific results and reduce animal numbers.

[Website of the University of Bern, News](#)

## 16.6.2020 - Unique biosafety laboratory in Switzerland up and running

The new BSL-3 biosafety laboratory at the University of Bern, Institute of Infectious Diseases (IfIK) went into operation today in the presence of the member of the Governing Council Christoph Ammann. The laboratory is located in the Swiss Institute for Translational and Entrepreneurial Medicine (sitem-in-sel) building. It is nationally one of the largest and the only BSL-3 laboratory in Switzerland to combine diagnostics, research and translation under one roof.



[Virtual tour](#)



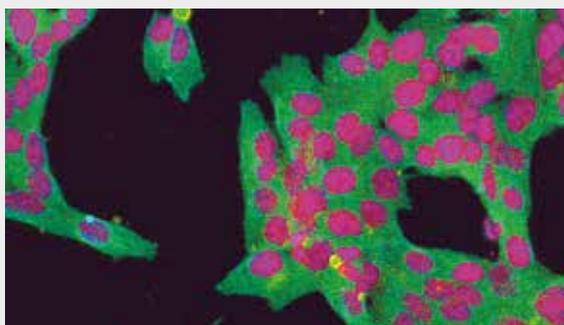
## 24.6.2020 - Glucose monitoring during abdominal surgery

The adjustment of blood glucose levels during surgical procedures is a major challenge in everyday clinical practice. Close meshed blood glucose measurements are personnel and time intensive. A joint study conducted by the UDEM, UVCM and the Department for Anaesthesia and Pain Medicine under the direction of Prof. Lia Bally showed that the new Dexcom G6® continuous glucose monitoring system can be reliably used for intraoperative blood glucose monitoring.

[Diabetes, Obesity and Metabolism](#)

### 30.6.2020 - Next-generation sequencing to provide precision medicine for rare metabolic disorders

Advances in next-generation-sequencing technology that allow researchers to look at billions of pieces of genetic information are changing the way a disease is diagnosed. Correct identification of changes in the human genetic code, which is responsible for rare metabolic disorders, provides scientists and physicians with fact-based guidelines for the treatment.

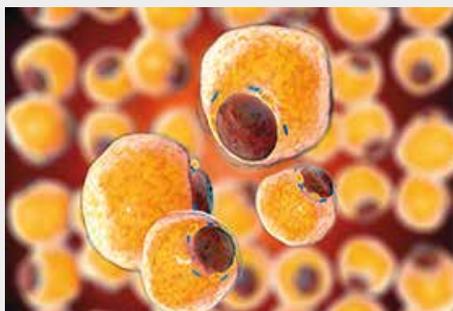


[Journal of Clinical Endocrinology and Metabolism](#)

## July 2020

### 6.7.2020 - Age-related impairments reversed in animal model

Frailty and immune decline are two main features of old age. Researchers from the University of Bern and Inselspital, University Hospital, Bern now demonstrate in an animal model that these two age-related impairments can be halted and even partially reversed using a novel cell-based therapeutic approach.



[Nature metabolism](#)

### 22.7.2020 - The Bernese anatomy «exists» in Sofia too

Professor Valentin Djonov of the Institute of Anatomy received the «Golden Laurel Branch», which is the highest award of the Bulgarian State Department. He is honored for his long-term commitment to medical exchange programs as well as charitable project.



[Uniaktuell](#)



[Website Inselspital, News](#)

### 23.7.2020 - RADAR - A smartwatch based dysglycaemia warning system for people with diabetes

Success for the Bernese research team led by Prof. Christoph Stettler, Dr. Thomas Züger and Vera Lehmann of the University Clinic for Diabetology, Endocrinology, Nutritional Medicine and Metabolism (UDEM), Inselspital, University Hospital, Bern: Together with researchers from ETH Zurich and the University of St. Gallen (Prof. Elgar Fleisch, Prof. Felix Wortmann) an Innosuisse grant was successfully secured for the development of an innovative smartwatch based glucose warning system.

## 30.7.2020 - Rapid test for the determination of antibodies against SARS-CoV-2

A Swiss-German team presents a test that determines the amount of neutralizing antibodies within a short period of time. The test was developed at the Institute of Virology and Immunology (IVI) of the University of Bern and the Swiss Federal Office for Food Safety and Animal Health, and evaluated in cooperation with colleagues from the Ruhr-University Bochum by using serum samples from COVID-19 patients.

[Vaccines](#)



## August 2020

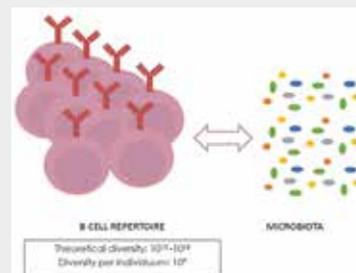
### 1.8.2020 - New Dean of the Medical Faculty

Claudio L. Bassetti is a full professor and since 2012, he has been Chariman and Head of the University Department of Neurology, Inselspital, University Hospital of Bern. Since 2018, he has also headed the interfaculty cooperation „Decoding Sleep“. From 2016 – 2020 he was Vice Dean Research of the Medical Faculty of the University of Bern.



### 5.8.2020 - Gut microbes shape our antibodies before we are infected by pathogens

Colonization with intestinal microbes is known to shape many body systems, especially the white blood cells that produce antibodies. Because the microbiota is so complex, containing hundreds of different bacterial species, it is not known how the presence of microbes in the intestine shaped the antibodies that are present even before we are challenged by an infection. Researchers at the Department for BioMedical Research (DBMR) of the University of Bern and the Inselspital, University Hospital of Bern, have now shown how these beneficial microbes reprogram the repertoire of white blood B cells that produce antibodies and how this helps countering infections.



Neuronal fibres labelled with rainbow fluorescence proteins. © Yuuki Obata und Álvaro Castaño, The Francis Crick Institute

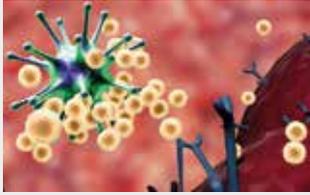
[Nature](#)



[Decoding sleep](#)

### 6.8.2020 - REM sleep tunes eating behavior

Despite our broad understanding of the different brain regions activated during rapid-eye-movement sleep, little is known about what this activity serves for. Researchers at the University of Bern led by Professor Antoine Adamantidis and the Inselspital, University Hospital of Bern have now discovered that the activation of neurons in the hypothalamus during REM sleep regulates eating behavior: Suppressing this activity in mice decreases appetite.



### 7.8.2020 - Young field of research establishes itself in Bern

Last week's publication "Memory CD8+ T cells balance pro- and anti-inflammatory activity by reprogramming cellular acetate handling at sites of infection" in the Journal Cell Metabolism received international attention. A young field of research is establishing itself in Bern.

[To the University of Basel's contribution to the publication](#)

### 10.8.2020 - Improving health care for migrant women

An international study led by the Institute for Social and Preventive Medicine (ISPM) at the University of Bern examined the access of migrant women to the Swiss health care system. Based on the patients' experiences, the researchers developed ten concrete recommendations to improve access to health services for previously underserved groups.

[Migrant Women's Health Care Needs](#)



### 25.8.2020 - Discovery of new genes that influence the success of cancer treatment

One of the great mysteries of cancer research is why certain patients respond better to radiation therapy than others. Researchers at the University of Bern have now discovered which genes play an important role in this. This discovery results in new findings for cancer treatment.

[Cell Reports](#)

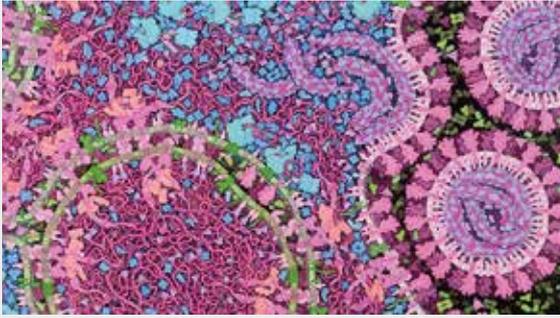
## September 2020

### 4.9.2020 - Four ERC Starting Grants for researchers from Bern

One of the four researchers from the University of Bern, who have received the coveted Starting Grants from the European Research Council (ERC) is physiopathologist Ziad Al Nabhani. He is investigating the influence of early childhood nutrition on the immune system.

[ERC Starting Grants](#)





### 14.9.2020 - Mechanism discovered how the coronavirus hijacks the cell

Researchers at the University of Bern and ETH Zurich have discovered a mechanism by which the coronavirus manipulates human cells to ensure its own replication. This knowledge will help to develop drugs and vaccines against the coronavirus.

[NCCR, RNA & Disease](#)



### 16.9.2020 - Covid-19 research receives 8.4 million francs in national funding

The Swiss National Science Foundation (SNSF) supports fifteen Bernese Covid-19 research projects totaling 8.4 million Swiss francs. These should contribute in helping to develop solutions to combat the pandemic in Switzerland. The projects deal with topics ranging from the effects of Covid-19 on the cardiovascular system to the use of artificial intelligence in the treatment of Covid-19 patients in hospital.

[Swiss research on Covid-19](#)



### 18.9.2020 - Increasing the effectiveness of immunotherapy against skin cancer

Researchers at the University of Bern have discovered a mechanism in the body's own immune system, which is responsible for the maturation and activation of immune cells. In the fight against skin cancer, the results have the potential to help immunotherapies succeed, even in patients for whom they have so far been ineffective.

[JCI Insight](#)

### 22.09.2020 - Most people infected with SARS-CoV-2 develop symptoms

Some people who fall ill with SARS-CoV-2 infection never show any symptoms. There is still disagreement about what proportion of the total number of infections these cases represent. A study by researchers from the Institute for Social and Preventive Medicine at the University of Bern published in the journal PLOS Medicine suggests that true asymptomatic cases of SARS-CoV-2 infections represent a minority of infections.



**27.10.2020 – Bernese researchers identify sleep as possible target to improve recovery after ischemic stroke**

Until today, neurorehabilitation is the only approach that promotes recovery after stroke. Laura Facchin and other researchers led by Prof. Antoine Adamantidis and Prof. Claudio Bassetti at the Department of Neurology of the University of Bern and Inselspital, University Hospital of Bern have provided first evidence that sleep could be targeted to improve post-stroke recovery.

[Website University of Bern, News](#)



**2.11.2020 - Successful network research is extended**

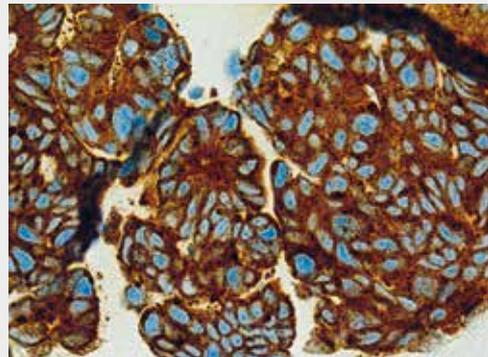
Sleep, religious conflicts and the health of the environment, plants, humans and animals: These are the topics of the three interdepartmental research cooperations at the University of Bern. The innovative network projects, which started in 2018, were very successful and will therefore be extended for two years.

[interfaculty research cooperations IFK](#)

**3.11.2020 - Significant vulnerability in prostate cancer detected**

Researchers at the University of Bern led an international team that has identified a novel vulnerability in advanced prostate cancer no longer responding to hormonal therapy. These findings could lead to the development of new treatment approaches for men suffering from the most aggressive form of prostate cancer.

[nature communications](#)

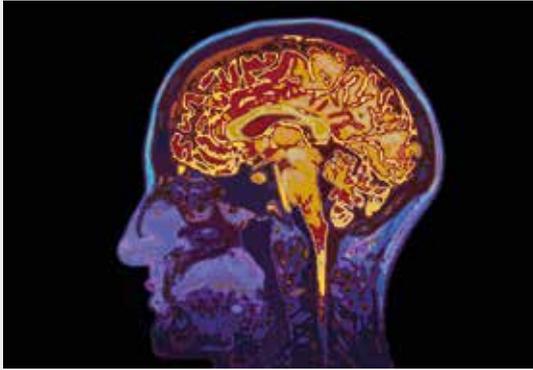


**4.11.2020 - Project on prostate cancer awarded**

This year's Johanna Dürmüller-Bol DBMR Research Prize of the Department for BioMedical Research (DBMR) of the University of Bern goes to Joanna Triscott. She is being honored for her research on metabolic processes of prostate cancer tumors. The junior research prize worth CHF 30,000 was awarded on the "Day of BioMedical Research" on Wednesday, 3 November 2020.

[Johanna Dürmüller-Bol Foundation](#)





### 9.11.2020 - Processing of emotion-free body language analyzed in the brain

Within the framework of an extensive international research project, brain networks for the perception of emotional and emotion-free body language were analyzed. The results show a significant involvement of the limbic system in the recognition of emotion-free, neutral body language.

[Website Inselspital, News](#)



### 5.11.2020 - 10 million euros for an optogenetic revolution

An interdisciplinary research project of the University of Bern (Prof. Sonja Kleinlogel), the Paul Scherrer Institute (PSI), the Humboldt Universität of Berlin (D) and the University of Manchester (UK) will be funded with 10 million euros by the European Research Council (ERC). Over the next six years, the SOL project intends to make cell activities in the entire body controllable by means of light pulses, thus opening new avenues of research opportunities and novel forms of therapy.

[Article in Uniaktuell about Sonja Kleinlogels spin-off Arctos](#)



[Website University of Bern, News](#)

### 17.11.2020 - Bern Center for Artificial Intelligence in Medicine

The University of Bern together with the Medical Faculty and the Inselspital are founding a "Center for Artificial Intelligence in Medicine" (CAIM) that combines cutting-edge research, engineering and digitalization. Using artificial intelligence, it will develop new medical technologies to enable tailor-made and efficient patient care. Partners of the new center are sitem-insel, the Swiss Institute for Translational and Entrepreneurial Medicine, and the Universitäre Psychiatrische Dienste (UPD).

### 19.11.2020 - How Particulate Matter injures airways and promotes exacerbation of pulmonary diseases

An international study led by the University of Bern has investigated the effects of ambient Particulate Matter (PM) from human and natural sources on human lung cells. Thereby, the researchers found damage to the cellular defense system of the lungs, which furthers the aggravation of pre-existing lung diseases like asthma or Cystic Fibrosis. Man-made PM components, among them from wood-burning fires and road traffic, are mainly responsible for the investigated health damaging effects.



[Website University of Bern, News](#)

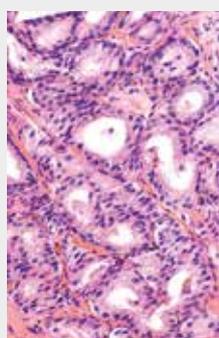
## 25.11.2020 - Insel Gruppe awarded with the German Future Prize

Great honor for Inselspital and the University of Bern at the German Future Prize: Prof. Andreas Raabe, Full Professor at the University of Bern and Director and Chief Physician of the University Department of Neurosurgery at Inselspital, was honored by Federal President Frank-Walter Steinmeier with a certificate and included in the “circle of the best” by the jury. He received the award together with two scientists from Carl Zeiss Meditec AG. The German Future Prize is the highest recognition for innovation in Germany and honors outstanding technical, engineering and scientific achievements.



[Website Inselspital, News](#)

## December 2020



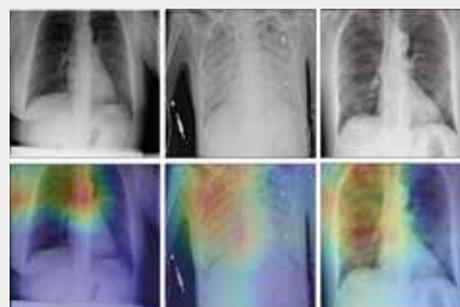
## 9.12.2020 - Cancer Research in Bern: Analysing and finding solutions to treatment resistance

A number of types of cancer are prone to adapt to targeted treatment, enabling resistance. Prof. Mark Rubin, Department for Biomedical Research and Bern Center for Precision Medicine, together with colleagues from the Weill Cornell Medicine and the University of Manchester have now published a ‘Perspective’ in the journal Molecular Cell. Using two different types of cancer as examples, they explore the challenges of a resistance with the goal of diminishing the most aggressive forms of cancer. The paper shows the importance of carrying out cancer research that is networked and coordinated across disciplines, as explained by the Tumorzentrum Bern (University Cancer Center Inselspital, UCI).

[Website University of Bern, News](#)

## 11.12.2020 - AI X-ray analysis detects Covid-19 more reliably

A team of researchers at Inselspital, Bern University Hospital, and the ARTORG Center for Biomedical Research at the University of Bern has developed a new chest radiography image analysis for the detection of Covid-19. In the process, they taught a computer algorithm various diagnoses based on 8000 X-ray images. The researchers compared this artificial intelligence (AI) with standard diagnostic annotation by radiologists. Especially for distinguishing Covid-19 from non-Covid-19 lung disease, AI provided significantly more reliable results.



[Website University of Bern, News](#)



## 18.12.2020 - A “weather forecast” for epileptic seizures

An international research team with participation from the University of Bern headed by Dr. Maxime Baud of the Neurology Department has developed a new method to predict epileptic seizures at an early stage. A device implanted in the brain records brain activity for at least six months. The evaluation of the recordings allows a reliable prediction of a possible next seizure over several days.

[Website University of Bern, News](#)

## Other Outstanding Publications

### Cardiology

Windecker S et al. Polymer-based or Polymer-free Stents in Patients at High Bleeding Risk. *N Engl J Med*. 2020

Pasupati S, Dangas GD, Backer OD, Windecker S. A Controlled Trial of Rivaroxaban after Transcatheter Aortic-Valve Replacement. Reply. *N Engl J Med*. 2020

### Department for Visceral Surgery and Medicine, Gastroenterology

Li H, Limenitakis JP, Greiff V, Yilmaz B, Schären O, Urbaniak C, Zünd M, Lawson MAE, Young ID, Rupp S, Heikenwälder M, McCoy KD, Hapfelmeier S, Ganai-Vonarburg SC, Macpherson AJ. Mucosal or systemic microbiota exposures shape the B cell repertoire. *Nature*. 2020

### Medical Oncology

Riether C, Pabst T, Höpner S, Bacher U, Hinterbrandner M, Banz Y, Müller R, Manz MG, Gharib WH, Francisco D, Bruggmann R, van Rompaey L, Moshir M, Delahaye T, Gandini D, Erzeel E, Hultberg A, Fung S, de Haard H, Leupin N, Ochsenbein AF. Targeting CD70 with cusatuzumab eliminates acute myeloid leukemia stem cells in patients treated with hypomethylating agents. *Nat Med*. 2020

### Rheumatology, Immunology and Allergology (RIA)

Reichenbach S, Felson DT, Hincapié CA, Heldner S, Bütikofer L, Lenz A, da Costa BR, Bonel HM, Jones RK, Hawker GA, Jüni P. Effect of Biomechanical Footwear on Knee Pain in People With Knee Osteoarthritis: The BIOTOK Randomized Clinical Trial. *JAMA*. 2020



## The Medical Faculty in Numbers

**2'089**  
students in  
2 Bachelor programs  
5 Master programs

**292**  
students  
in 30 CAS/DAS/MAS programs

**313**  
Final Master Degrees  
232 Medicine  
32 Dental Medicine  
12 MSc in Biomedical Sciences  
32 MSc in Biomedical Engineering  
5 Masters of Medical Education

**1** Faculty  
3 Organisations  
39 Clinics  
16 Institutes

**112** Full Professors  
19 Assistant Professors  
164 Associate Professors  
433 Lecturers

**419**  
Doctorate Degrees  
293 Dr. med.  
46 Dr. med. dent.  
71 from the Graduate School for Cellular and Biomedical Sciences  
9 from the Graduate School of Health Sciences

**188'545'980**  
Budget  
**29'070'343**  
from the Swiss National Science Foundation  
**50'624'034**  
third party funds for research

**2'235**  
Original Articles published  
**136'700**  
hours of teaching

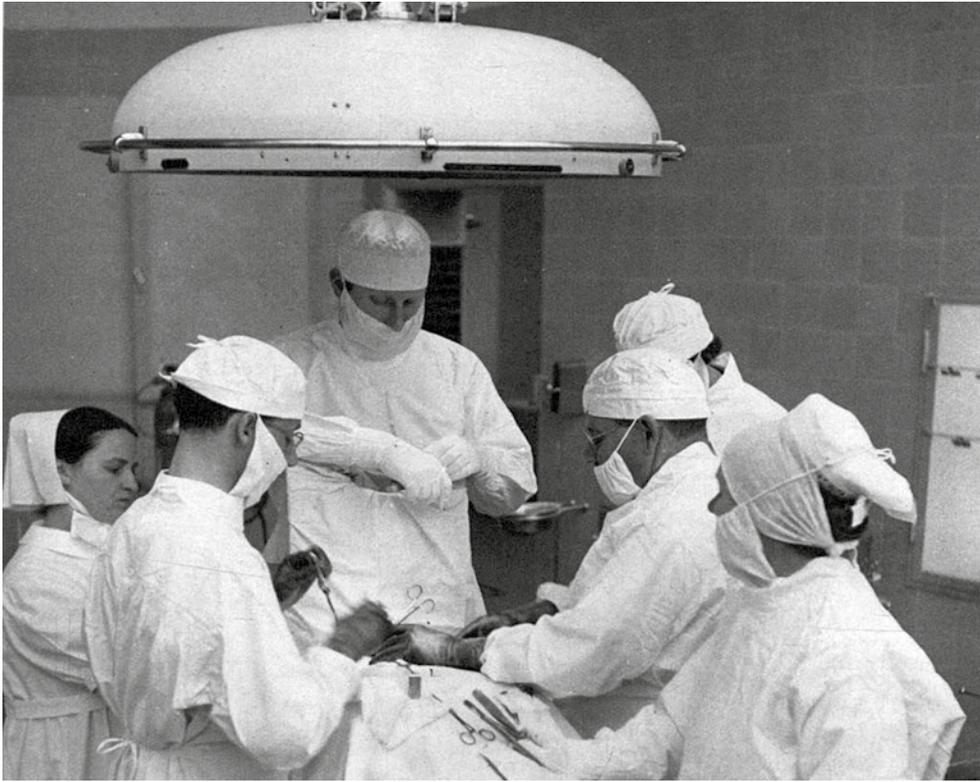




# Historical

Glimpses of the History of the  
Faculty  
Deans of the Medical Faculty





Fritz de Quervain operating in 1938 (with masks covering the mouth but not the nose)

## Glimpses of the History of the Faculty

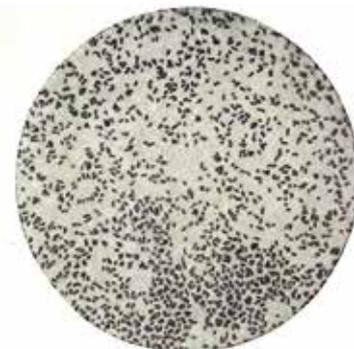
### The Spanish Flu in 1918: scientific discourse in a time of uncertainty

The Canton of Bern was hit hard by the Spanish flu of 1918/19. It struck in two main waves from July–August and October–February with smaller spikes in infection into June. It claimed 4,658 lives or 0.72 per cent of the population. The onset was quick: on 20 July 1918 the Inselspital already had to turn away patients; an emergency hospital was set up in the Brunnmatt school building, and women were publicly encouraged to assist the hospitals in providing care. Until 25 July, 136 people had died in the city of Bern alone, 18 of them the day before. In October, a second emergency hospital was established. Of course, protective measures were taken, such as bans on gatherings, school closures and the isolation of patients. But public discussion surrounding the flu was relatively limited and was overshadowed by the dominant coverage of the war and its political, economic and social impact. Nevertheless, we see from the daily newspapers and medical journals that there was uncertainty and that there were conflicting views among both the public and the medical profession about the nature of influenza and the measures that needed to be taken.

#### Is it a bacterium?

The Berner Intelligenzblatt stated on 21 October 1918 that the previous notion of Pfeiffer's bacillus (today's *H. influenzae*) as the causative organism was doubted

today. The latest reports would confirm that it was an ultraviolet pathogen. The members of our Faculty were more skeptical. The bacteriologist Georg Sobernheim argued that although Pfeiffer's bacillus had mostly not been detected at the beginning of the epidemic, it had appeared more frequently during its course. In some cases, the bacillus could also be detected in fresh test material although it could not be cultured. Sobernheim thus – as the majority of bacteriologists – assigned an etiological role to Pfeiffer's bacillus, but he was unable to define it more precisely. His colleague Hermann Sahli went one step further. He developed the theory of a so-called complex infection. He argued that the infection arose from an obligate composition of disease toxins, which was due to an alternating mixture of symbiotically associated influenza bacilli, pneumococci and streptococci. The alternating mixture was responsible for the wide range of clinical manifestations. Since the term virus was then understood in the sense of the



Culture of Pfeiffer's Bacillus influenzae (Sahli 1919)

„One imagines the ladies, equipped with muzzles,  
walking in the arbours and the laughs because  
of such pseudo-prophylaxis.“

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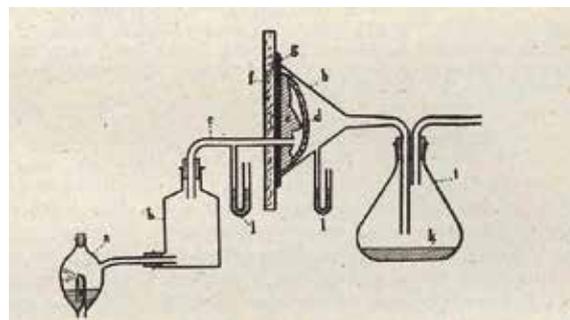
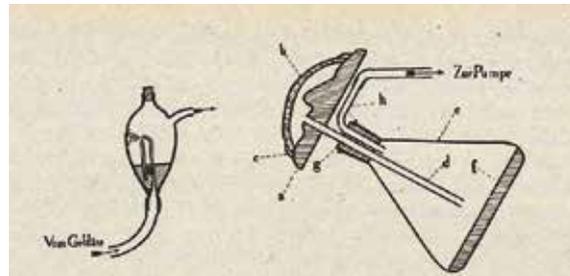
Latin virus = poison, he spoke of a complex virus form. This explanation gained some international currency, not least thanks to Sahli's renown. This and similar explanatory models lost their significance only with the discovery of the influenza virus in 1933.

### Should we wear a mask?

Also on 21 October 1918, the Berner Intelligenzblatt published an open letter by the Bern ophthalmologist PD Dr. Emil Hegg. He called on the Sanitary Directorate to consider making the wearing of masks compulsory at all times outside the home. The infection was obviously transmitted by respiratory droplets, he argued. Evidence for the effectiveness of masks so far worn by doctors and nursing staff had not been entirely clear, but it also depended very much on how strictly the rule was applied. Hegg's proposal earned few but clearly negative reactions. An anonymous reader wrote that the doctor apparently "believed in all seriousness that he could save the fatherland by allowing all residents to go out only decorated with masks. One imagines the ladies, equipped with muzzles, walking in the arbours and the laughs because of such pseudo-prophylaxis." In fact, masks were hardly to be found in Switzerland. In the military and a few hospitals, they were sometimes worn, but apparently only to a very limited extent.

In our Faculty, opinions on the efficacy of wearing masks were also divided. The disagreements were not carried out in the daily press, however, but in the Correspondenzblatt für Schweizer Ärzte. In addition to PD Hegg, those in favour of mask-wearing included the otorhinolaryngologist Prof. Adolf Schönemann; a simple handkerchief could be used for this purpose, tied at the back of the neck and covering one's face as a triangular scarf. Schönemann also recommended regular deep inhalation of the wound powder Vioform as an equally important prophylactic. Dr. Adolf von Salis, head of the so-called "non-clinical" department (i.e., without teaching activity) at the Inselspital, reported "that nursing staff wearing the protective mask fall ill less quickly than those who are unprotected and, exceptionally, not at all." In the arguments against, however, Hermann Sahli's voice was once more decisive. Rather than leaving it to conjecture, he had the permeability of masks tested by his assistant Dr. A. Lauterburg. He found that the commercially available masks were completely permeable, both by inspiration and expiration, even when glued to the face. He

also pointed out that despite the mask requirement, San Francisco did not have a lower mortality rate than other cities in the United States. In addition, he said, nurses and physicians for the most part objected to the "extraordinary annoyance" of the mask.



Testing the permeability of masks, inspiratory and expiratory setting (Lauterburg 1919)

It was not the inhaling and exhaling, but the coughing and spitting that were the problem for Sahli and his like-minded peers. This had already been argued in earlier discussions about surgical masks. Around the turn of the century, Theodor Kocher recommended wearing a mask only in cases of catarrh. However, he required every surgeon to thoroughly clean their mouth and teeth before operation. The aim was, as far as possible, to rid the mucous membrane of pathogens. In line with this idea, the Bernese Sanitary Directorate never called for the wearing of masks, but admonished citizens to regularly rinse their mouths and wash their faces and hands. The enduring adherence to this measure is shown by operation scenes from 1938 with Prof. Fritz de Quervain: protective masks cover the mouth but not the nose.

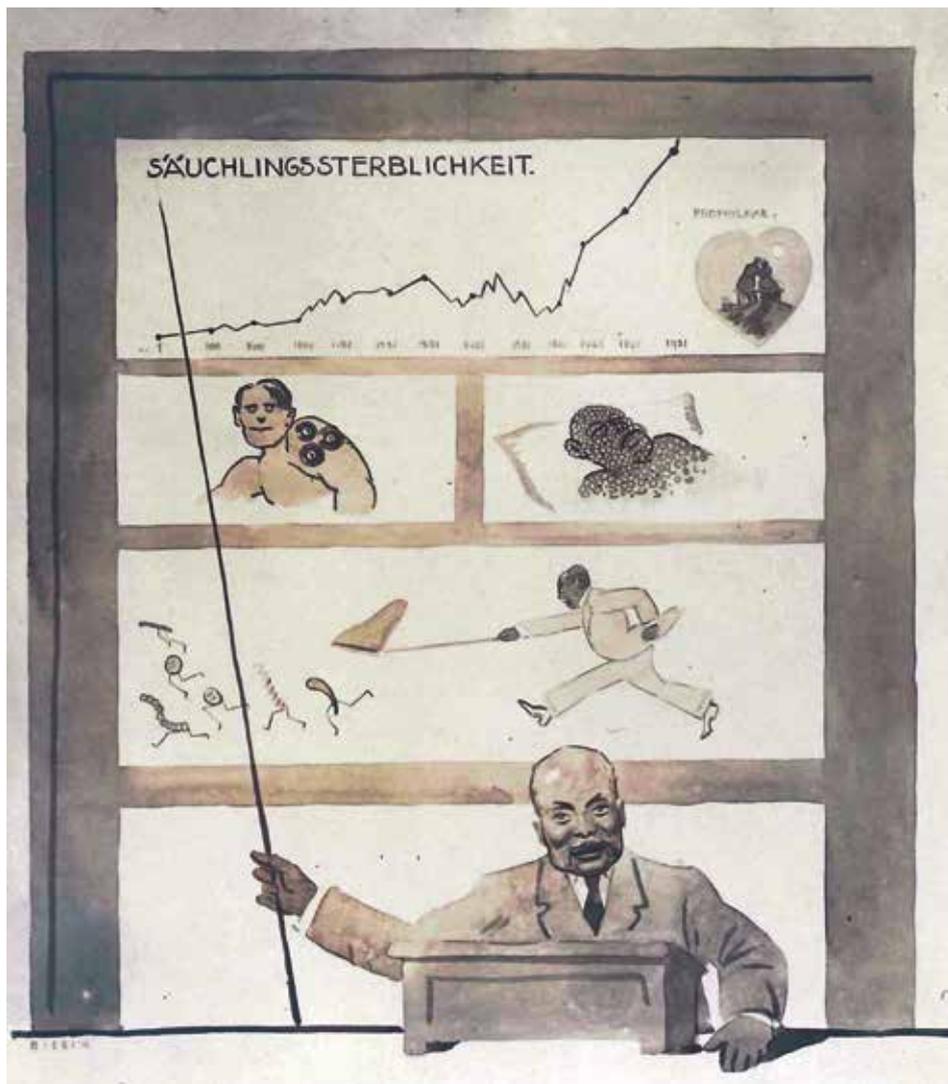
### How to develop a vaccine?

Uncertainty regarding the identity of the pathogen was a poor starting point for the development of a vaccine. But there was no hesitation. Sahli performed the first vaccinations based on a formulation that had been demonstrated to kill influenza bacilli already in 1918. This actually contradicted his theory of a complex infection, but he feared that a mixed vaccine might have unfavourable mixing ratios. Sobernheim, on the other hand, recommended a mixed vaccine and encouraged the school physician to conduct trials with children who had not yet been infected.

The results of these trials were inconclusive, with both favourable and negative outcomes. Sahli initially vaccinated all the patients in his department, and later only every second

one, in order to have a control group. But he soon realized: "We came too late with our experiments. The epidemic is on the wane; a large part of humanity is already naturally contaminated and immunized." The situation was similar for numerous researchers who carried out trials all over the world.

Some of our predecessors' strategies and actions may seem misguided or daring to us. But they resulted from an effort to gain new knowledge and save lives through critical examination and innovative research in a time of great uncertainty. In this sense, this was not much different from what we do today on the basis of our current provisional knowledge.



Caricature of Sobernheim by Fred Bieri, 1921

## Deans of the Medical Faculty

1834–1835	Hugo Mohl	1932–1934	Walther Frey
1835–1838	Hermann Askan Demme	1934–1936	Emil Bürgi
1838–1843	Wilhelm Philipp Friedrich Vogt	1936–1938	Paul Casparis
1843–1847	Gabriel Gustav Valentin	1938–1940	Jakob Klaesi
1847–1849	Friedrich Miescher	1940–1941	Hans Bluntschli
1849–1852	Friedrich Wilhelm Theile	1941–1943	Alexander von Muralt
1852–1857	Wilhelm Rau	1943–1945	Eduard Glanzmann
1857–1860	Wilhelm Philipp Friedrich Vogt	1945–1947	Hans Goldmann
1860–1861	Wilhelm Rau	1947–1949	Joseph Dettling
1861–1865	Gabriel Gustav Valentin	1949–1951	Curt Hallauer
1865–1867	Daniel Jonquière	1951–1953	Karl Lenggenhager
1867–1869	Christoph Theodor Aeby	1953–1955	Bernhard Walthard
1869–1871	Karl Emmert	1955–1957	Walther Wilbrandt
1871–1874	Georg Albert Lücke / Henri Dor	1957–1959	Erich Hintzsche
1874–1876	August Breisky / Th. Kocher	1959–1961	Walter Neuweiler
1876–1878	Heinrich Irenäus. Quincke	1961–1963	Hugo Aebi
1878–1880	Theodor Langhans	1963–1965	Adolf Zuppinger
1880–1882	Ernst Pflüger	1965–1967	Franz Escher
1882–1884	Ludwig Lichtheim	1967–1969	Johann Kuske
1884–1886	Marcellus Wilhelm von Nencki	1969–1971	Eugen Läubli
1886–1888	Hugo Kronecker	1971–1973	André Schroeder
1888–1890	Rudolf Demme	1973–1978	Jürg Hodler
1890–1892	Ernst Pflüger	1978–1981	Beat Roos
1892–1894	Hans Strasser	1981–1983	Herbert A. Fleisch
1894–1896	Hermann Sahli	1983–1985	Harald Reuter
1896–1898	Alexander Tschirch	1985–1987	Rudolf Berchtold
1898–1900	Theodor Kocher	1987–1989	Max Hess
1900–1902	Arthur Carl Wilhelm Heffter	1989–1991	Georg Eisner
1902–1904	Theodor Langhans	1991–1993	Alfred H. Geering
1904–1906	Josef Jadassohn	1993–1995	Hans-Rudolf Lüscher
1906–1908	August Siegrist	1995–1997	Bernhard H. Lauterburg
1908–1910	Wilhelm Kolle	1997–1999	Kurt Schopfer / H.-R. Lüscher
1910–1911	Emil Bürgi	1999–2004	Emilio Bossi
1911–1912	Leon Asher	2004–2008	Martin Täuber
1912–1914	Hans Strasser	2008–2016	Peter Egli
1914–1916	Hans Guggisberg	2016–2020	Hans-Uwe Simon
1916–1918	Leon Asher	2020–	Claudio Bassetti
1918–1920	Carl Wegelin		
1920–1921	Fritz de Quervain		
1921–1923	Georg Sobernheim		
1923–1924	Fritz de Quervain		
1924–1926	Friedrich Lüscher		
1926–1928	Emil Bürgi		
1928–1930	Hans Guggisberg		
1930–1932	Carl Wegelin		





## Key people and Institutions

Organigram

Board of Faculty

Institutional Overview

Structural Development of the Inselspital Area

Dean's Office

Dean's Office of Student's Affairs

Interview with Prof. Dr. med. et phil. Lia Bally

Interview with Prof. Dr. med. Matthias Egger

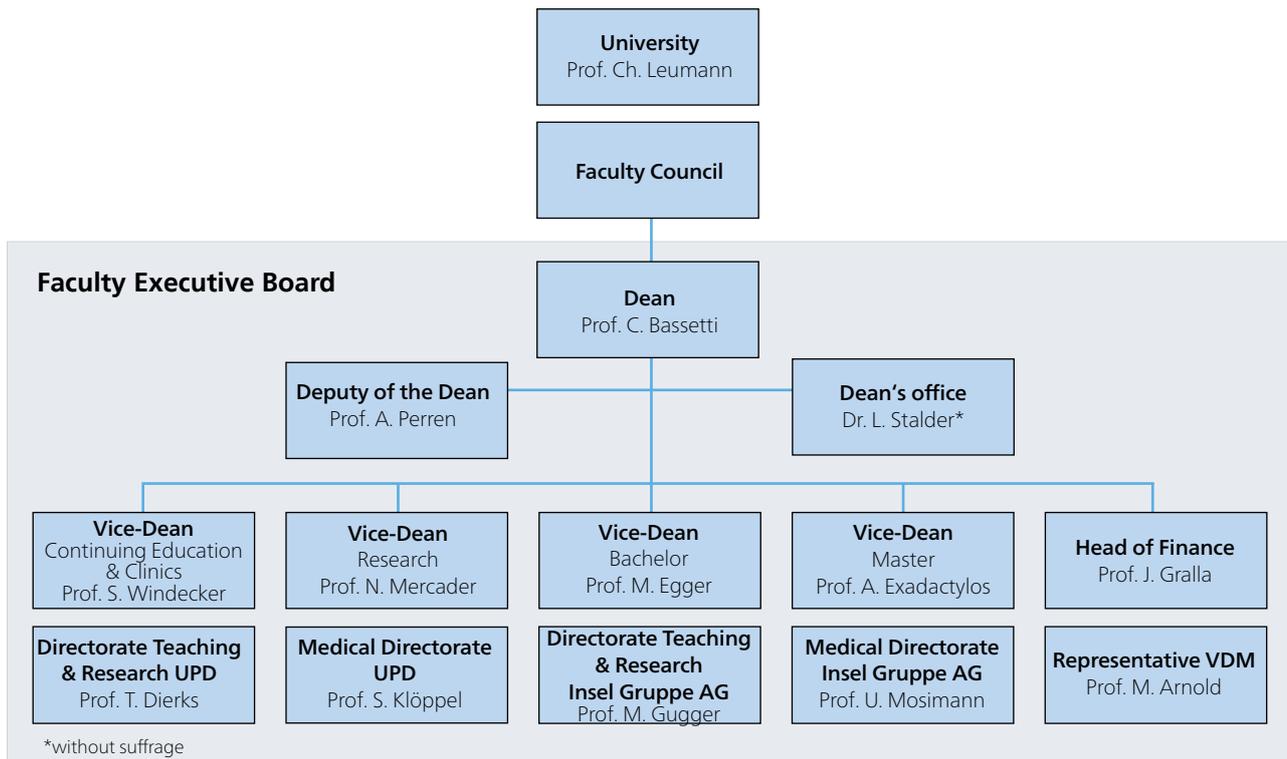
Doctoral Theses of the Medical Faculty

Highly Cited Researchers 2020

New Professors at the Medical Faculty

In Memoriam: Prof. Dr. Annette Draeger

# Organigram



University  
Prof. Ch. Leumann



Dean  
Prof. C. Bassetti



Deputy of the Dean  
Prof. A. Perren



Dean's office  
Dr. L. Stalder



Vice-Dean  
Continuing Education  
& Clinics  
Prof. S. Windecker



Vice-Dean  
Research  
Prof. N. Mercader



Vice-Dean  
Bachelor Study  
Prof. M. Egger



Vice-Dean  
Master Study  
Prof. A. Exadactylos



Head of Finance  
Prof. J. Gralla



Directorate Teaching &  
Research UPD  
Prof. T. Dierks



Medical Directorate  
UPD  
Prof. S. Klöppel



Directorate Teaching  
& Research  
Insel Gruppe AG  
Prof. M. Gugger



Medical Directorate  
Insel Gruppe AG  
Prof. U. Mosimann



Representative VDM  
Prof. M. Arnold

# Board of Faculty

Prof. Stephan Windecker  
Vice-Dean Continuing Education  
& Clinics and Internationalization

Prof. Aristomenis Exadaktylos  
Vice-Dean Master Study  
and Equality

Prof. Nadia Isabel Mercader Huber  
Vice-Dean Research and  
young Academics

Prof. Aurel Perren  
Deputy-Dean

Prof. Claudio Bassetti  
Dean

Prof. Marcel Egger  
Vice-Dean Bachelor  
Study



## Institutional Overview

### Uni Mittelstrasse

Institute for Medical Education (IML), Mittelstrasse 43  
Institute of Primary Health Care (BIHAM), Mittelstrasse 43  
Institute of Social and Preventive Medicine (ISPM), Mittelstrasse 43  
Department of Clinical Research (DCR), Mittelstrasse 43 and sitem-insel

### Uni Muesmatt

Institute of Anatomy, Baltzerstrasse 2  
Institute of Biochemistry and Molecular Medicine, Bühlstrasse 28  
Institute of Forensic Medicine, Bühlstrasse 20  
Institute for the History of Medicine, Bühlstrasse 26  
Institute of Physiology, Bühlplatz 5  
Library Medicine, Baltzerstrasse 4  
Microscopy Imaging Center (MIC), Freiestrasse 1  
Theodor Kocher Institute (TKI), Freiestrasse 1

### von Roll Area

Institute of Complementary and Integrative Medicine (IKIM), Freiburgstrasse 46 & Fabrikstrasse 8

### Insel Area

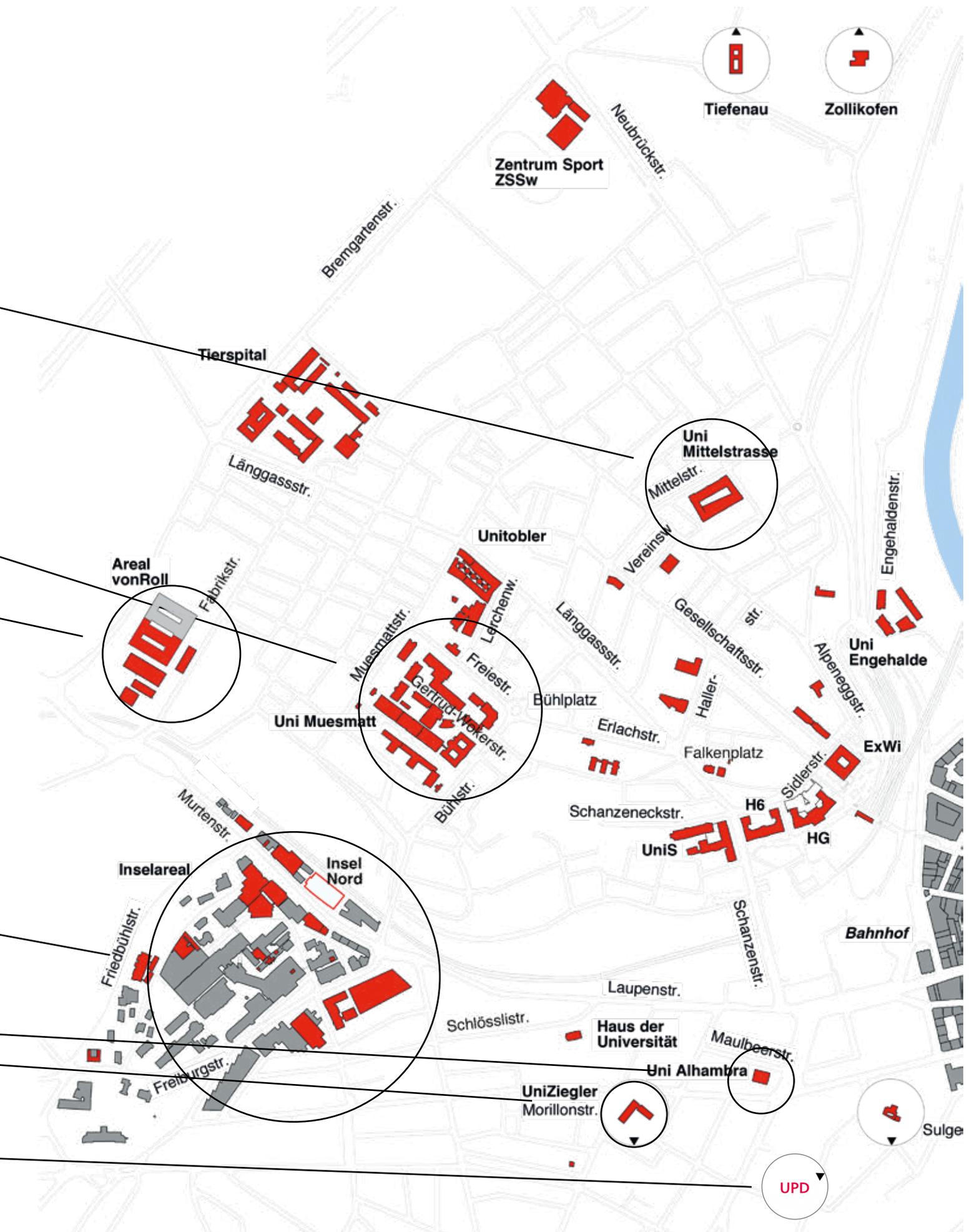
Clinics and Institutes at the University Hospital, Inselspital  
ARTORG Center for Biomedical Engineering Research, Murtenstrasse 50  
Dean's Office, Office of student's affairs, Murtenstrasse 11  
Department for BioMedical Research (DBMR), Murtenstrasse 35  
Department of Clinical Research (DCR), sitem-insel and Mittelstrasse 43  
Institute of Complementary and Integrative Medicine (IKIM), Freiburgstrasse 46 & Fabrikstrasse 8  
Institute for Infectious Diseases (IFIK), Friedbühlstrasse 51  
Institute of Pathology, Murtenstrasse 31  
Institute of Pharmacology, Inselspital, INO-F  
Learning Center, Murtenstrasse 17  
School of Dental Medicine zmk, Freiburgstrasse 7  
Swiss Institute for Translational and Entrepreneurial Medicine (sitem), Freiburgstrasse 18  
University Cancer Center, Freiburgstrasse 10  
University Neurocenter, Freiburgstrasse 16

### Teaching facilities

UniAlhambra  
UniZiegler

### UPD

Universitäre Psychiatrische Dienste, Bolligenstrasse 111





New main building: Giant images cover the construction site.

## Structural Development of the Inselspital Area

### The “intermediate building” in-between construction site 6.1 (Theodor-Kocher-Haus) and 7

In addition to the expansion of the Theodor-Kocher-Haus to the Organ and Tumor Center, a subterranean intermediate building to construction site 7 is currently being constructed on construction site 6.1. This “intermediate building”, which reaches three stories underground, will accommodate the radiation bunkers of the Department of Radio-Oncology. In about 6 months, it will already house treatment, examination and waiting rooms as well as technical rooms of the Tumor Center. Above ground, a street with avenue trees will be laid out. After its completion, the building will be accessible via Theodor-Kocher-Haus, while the connection to the Intensive Care, Emergency and Surgery Center (INO) as well as to the main entrance will be made via the underground connection INO-BB 6.1. The “intermediate building” is the first step for the Theodor-Kocher-Haus towards the expansion to the Organ and Tumor Center and it is an important milestone to achieve better networking and synergies between the specialist departments.

### Murtenstrasse 24-28: new medical research and service building for the Department for Biomedical Research (DBMR) and the Institute of Legal Medicine (IRM) soon opens its doors

North of the Insel site, between Murtenstrasse and the railway line, and adjacent to the Inselparking, the modern laboratory building can soon open its doors: The specialized planning of building services and their

implementation is highly complex and places great demands on all those involved. However, the end of 2020 marks the completion so that commissioning can take place in spring 2021. The new building will serve with its 13 stories as the site concentration for the Institute of Forensic Medicine IRM, which is currently spread over seven locations. As one of four main sites, it will complement the research areas of the Department of Biomedical Research DBMR. In addition to accommodating research groups in large laboratories, the new building will allow the central services of the DBMR, the CoreFacilities, to be concentrated in one location. The construction work is currently concentrating mainly on the interior fittings, while planning for the ELO project (Facility and Relocation Logistics) has started in parallel.

### Panel 12: the shell construction of the new main building is completed

On 19 November 2020, the shell construction of the new main building of Inselspital has been completed on schedule. This marks another milestone in the “Inselcampus master plan” and the “Insel Areal III development plan”. Symbolically, this great achievement was celebrated visually by the illumination of the top floor in the typical “Insel-green” on the evening of completion. Another visual feature strikes ones eye since October 2020: Two hidden object posters in the direction of the high-rise bed block and another strip of pictures in the direction of the INO. The gigantic images of each 28 x 28 m primarily intend to ensure



### **Murtenstrasse 24-28**

The new medical research and service building already presents its final shape.

### **Murtenstrasse 24-28**

The elaborate laboratory equipment can already be admired in the first sample.



the privacy of patients and staff in a creative manner, but at the same time, onlookers are invited to search and discover.

However, success in terms of construction work on panel 12 is not only visible above ground, but also happening invisibly below ground: The construction of the underground logistics link from INO U2 to BB12 started in April 2019 and could be completed in August 2020. In this context, the outer pedestrian connection from the high-rise bed block to the "Bauchzentrum" could also be reopened. The underground connection will be put into operation in 2023. After then, it will be the main connection for logistical supplies.

### **Renovating the Clinic for Obstetrics and Gynecology at Effingerstrasse**

In October 2020, the makeover of the building of the gynecological clinic at Effingerstrasse 102 started: This project includes a complete renovation of the existing building, the renewal of all building services as well as a new utilization concept. The construction period is expected to take approximately 2 years. After completion, the University Clinic for Ophthalmology will also move into the new facilities along with the Clinic for Obstetrics and Gynecology. The highlight of this reconstruction will be a photovoltaic system on the roof of the new building.

### **Panel 3: the new base camp for medical students**

In panel 03, the teaching and learning infrastructure for basic medical training for years 1-6 (Bachelor and Master) will be accommodated in the future. The main use of this training infrastructure will be teaching and seminar infrastructures (lecture halls, seminar and small group rooms), which will also be used for examinations, learning workstations for individual learning and learning in groups, a larger range of catering facilities, the medical faculty library and various organizational units responsible for the operation and management of the new training building. The feasibility study for panel 03 was completed at the end of 2019, the next step is now the architectural competition. The commissioning of the new medical training building is planned for 2029.



Photos on both pages: ARGE BB07



**Panel 7: "JANUS", the winning project for construction of medical research and training center**

The Canton of Bern is building a medical research and training center for the University of Bern on the Insel area. The winner project "JANUS" has convinced the jury of the architectural competition under the direction of the Office for Real Estate and Buildings (AGG) the most. Responsible for the project is a planning team with four architectural offices - three of them are Bernese offices. "JANUS" would provide an overall convincing response to the complex task, which was set and is characterized by a clear internal structure that allows a high degree of flexibility: The office zone is located along Friedbühlstrasse and can be subdivided into offices of different sizes, open-space areas, seminar rooms and meeting rooms. Further, a publicly accessible spiral staircase connects the floors and provides the six institutes their own address. The laboratory zone faces the island area and follows a clear development grid that meets the highest requirements for modern laboratory technology. In terms of urban planning, the compact building offers a harmonious image with the neighboring Theodor-Kocher-Haus.

As a next step, the team of architects will now further develop the project on the basis of the jury's recommendations and submit a preliminary project with estimated costs by around December 2021. The new center will allow research, teaching and clinical practice to be brought together under one roof, while it will be able to create contemporary research conditions. This project represents a huge step forward for Bern as a university medical location.



## Dean's Office



**Dr. Lukas Stalder**  
Head of the Dean's Office



**Dierk Matthäus**  
IT Project Manager



**Natalja Kreuzer**  
Assistant to the Dean



**Romano Hoenger**  
Assistant to the Dean



**Doris Häfelin**  
Assistant to the Head of the  
Dean's Office and Secretary



**Pia Jäggi**  
Finances



**Rita Meyer**  
Appointments, Habilitations



**Isabelle Salzmänn**  
Dissertations



**Gabriela Schaller**  
Dissertations, Diploms,  
Graduation Ceremony



**José Schranz**  
Annual Report, Teaching  
Capacities



**Nicole Peter**  
Quality Manager



**Dr. Marcel  
Wullschlegler**  
Course Evaluation



**Svea Lehmann**  
Gender Equality Coordinator



**Dr. Claudio Vallan**  
IT EAC



**Pham Lan**  
Finances / Human  
Resources Coordinator

not pictured: Sanche Schwab, Successions, IT Support

## Dean's Office of Student's Affairs



**Dr. Peter Frey**  
Head of Unit of Student's  
Affairs  
Study Coordinator 3<sup>rd</sup> Year



**Sarah Habegger**  
Student's Office



**Beatrice Ducret**  
Administration 1<sup>st</sup> Year



**Dr. Helena Röss**  
Study Coordinator 1<sup>st</sup> Year



**Franziska  
Schmidhauser**  
Administration PBL, Tutors



**Dr. Sandra Trachsel**  
Study Coordinator 2<sup>nd</sup> Year



**Sara Vaz**  
Administration Clerkships



**Barbara Rechsteiner**  
Administration Master in  
Pharmacy, Lectures and  
Electives Master in Medicine



**Regula Walther**  
Clinical Skills Training  
Courses 3<sup>rd</sup> Year



**Isabel Fahrni**  
Lectures and Seminars  
3<sup>rd</sup> Year



**Karin Erb**  
Administration Masterthesis,  
Courses EKP 4<sup>th</sup> Year



**Franziska Kolb**  
Administration 2<sup>nd</sup> Year  
Courses SK1 5<sup>th</sup> Year



## Interview with Prof. Dr. med. et phil. Lia Bally

**Head of Metabolic Science Research Group at the Department of Diabetology, Endocrinology and Clinical Nutrition & Metabolism (UDEM), University Hospital Inselspital Bern**

While Prof. Dr. Bally is a very successful and dedicated researcher and Assistant Professor, she acts as a notable role model to encourage and inspire other young female researchers.

### **What is your field of research and personal interest?**

My research covers the exploration of nutrition and metabolism at the intersection of modern technology and human physiology in endocrine disease (e.g. obesity, diabetes). I am investigating how nutrition and diet influence metabolism, hormones, and the interaction between different organs, how we can use novel technologies to better understand this complex interplay in order to deploy targeted therapeutic interventions.

### **Which is currently the hottest topic you are addressing?**

My focus lies on glucose metabolism in general and on specific diseases characterized by disruption of glucose regulation in particular. I am working on the application of modern technology to generate decision support tools, aiming at a reduced burden of metabolic diseases, thereby increasing independence in daily life, optimizing diabetes control, and improving long-term prognosis. The artificial pancreas (closed-loop insulin therapy) is a good example of this approach: These

systems permanently adjust insulin delivery according to real-time sensor glucose levels. This substantially reduces the burden of diabetes management and improves quality of life. Another important area of my research are decision support tools assisting people to manage their diet whilst empowering them to improve their food and nutritional literacy.

### **The impact of nutrition on our health seems to be enormous. How much mortality or severe morbidity can we prevent by good nutrition?**

This is a difficult question. Nutrition is indeed a fundamental component of human health. However, it is methodologically challenging to explore causal relationships between nutrition and health-relevant outcomes. Rigorously controlled interventional studies are needed to address such questions and advance human nutritional science. To achieve sufficient power, multi-center studies are essential and we currently plan such collaborations. So, while your question cannot be answered by a simple statement, it is beyond doubt that nutritional factors have an enormous impact on metabolic health.

### **When talking about novel technologies, SITEM comes to our minds: There are four new professorships coming thanks to the foundation of Diabetes Center Berne, founded by Dr. h.c. Willy Michel. What does diabetes technology, DCB and SITEM mean for your own research?**

SITEM is a unique environment and the DCB offers novel opportunities in the field of diabetes technology. The

In my eyes, it is essential to identify talents at a very early stage, already during medical studies, and to promote them with specific programs.

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newly established professorships will complement my expertise, which, in addition to technology, lies in the field of metabolism and physiology. In the course of my own research, I work with engineers to change health outcomes with technology. I think this is an excellent example of a fruitful interdisciplinary collaboration! Hence, it is important to attract skilled engineers and develop innovative solutions that benefit patient care.

**You are about to complete your CAS in Research Management soon. What is your motivation behind this?**

Whilst I was previously very focused on the scientific content, in my role as a research group leader, head of research of my department, I realized that leadership and managerial skills are important, too. Mastering these skills allows to proceed with in a targeted, productive manner with efficient use of resources. Management also includes early recognition of promising, but also of wrongful developments, and knowing how to intervene early appropriately, always to have a plan B, to optimize processes, and much more. All of this is extremely important because we need to act swiftly, allocate our resources efficiently and wisely, to generate an agile and dynamic research environment.

**If you look back in your young career: What was essential to promote you and who has inspired you the most?**

I have not been inspired by a single person, rather by several individuals – not only clinicians, but also people with a background in mathematics or biochemistry; it was the sum of this enthusiasm, of these different influences from various disciplines with dedication being the common denominator that inspired me the most. Specifically, I remember becoming very interested in research during my master thesis. At this time, I joined the neuro-infection group of Prof. Dr. Leib at the Institute of Infectious Diseases where I was involved in basic research, dissected brains, and cultivated hippocampal stem cells. This is where I developed enthusiasm for science and analytical thinking.

**What was important from the outside, like the surrounding or a faculty, and what is generally important to promote young researchers like you?**

In my eyes, it is essential to identify talents at a very

early stage, already during medical studies, and to promote them with specific programs. In my teaching activities, I am trying to reach out to enthusiastic students and bring across enthusiasm for science by providing interesting lectures, seminars, and topics for master theses. In my case, I enrolled in a MD-PhD program. In our department, we now promote these programs strongly and support fellows to combine them with a clinical career, which was also highly important for me. Additionally, the support I received from my private and professional environment was crucial, because it enabled me to find a way to combine the two aspects. Being both a clinician and a scientist is a substantial challenge, but it also allows me to satisfy my interest in both areas.

**Why did you choose the medical location Bern and what keeps you here?**

I spent some time at the University and University Hospital of Cambridge UK, which was extremely important for my personal and scientific development, it was probably the best thing I could do. Back then, I considered the option of staying there. I decided to come back because Bern offered a broad range of opportunities to further develop my career in the field of Endocrinology and Diabetes and Nutritional Metabolism. What is most attractive here in Bern, on a clinical as well as scientific level, is an environment that promotes the free exchange of ideas across different disciplines and the freedom to follow own interests.

**Compared to other medical faculties and universities, what do you think is extraordinary or unique in Bern?**

A major strength is the high clinical expertise across all medical fields. In my field of interest, Bern provides an array of world-class research expertise. Let me just give you one example – there are many more: Due to the technical possibilities (the 7 Tesla scanner) combined with longstanding scientific expertise in the field of magnetic resonance spectroscopy, and embedded in a strong interprofessional network, we are currently one very few centers in the world to develop cutting-edge approaches in Metabolic Imaging.

In my field of interest,  
Bern provides an array of  
world-class research expertise.

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**On the other hand, what is one point for Bern to improve compared to your experience in other places?**

In my view, there are currently strong developments to improve scientific visibility through both local expertise as well as through stronger international networking. I think this is highly important. Unfortunately, the institutional funding is rather on the lower side, for positions like the one I have. On the other hand, this stimulates scientists to make strong efforts in acquiring competitive third party funding. In this sense, such a shortcoming can also be an incentive to be competitive, and I think me and other young colleagues here in Bern are successful in doing so.

**What impact did COVID-19 have on your research, on your clinical activity and on you personally?**

As a scientist, I am used to be flexible. COVID-19

affected several ongoing clinical trials to different extents. However, time could be used for other scientific activities as well as for structural developments in our research department. In clinical practice, we faced both a challenge and an opportunity: We had to find new ways of delivering care with less physical interaction, but without compromising the quality of our services. A good example is the use of remote monitoring systems in diabetes care: e.g. monitoring blood glucose in hospitals by using continuous sensors. We also have ongoing closed-loop insulin studies in the perioperative setting, again minimizing physical contact. In parallel, we are currently developing novel micro sampling techniques using dried blood spot approaches for people to collect blood samples on their own at home, paving the way towards more virtual care concepts. Unfortunately, the COVID-19 pandemic and its associated constraints in social life also created a bit of a breeding ground for



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I also want to inspire young  
women for science.

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an unhealthy life style in many patients. Measures which were crucial to control the spreading (e.g. home-office, etc.) promoted a more sedentary behavior, at least in some people, including unhealthy dietary habits, and followed by increases in body weight and worsening of diabetes control. Overall, COVID-19 highlighted the importance of patient empowerment and education, as well as the importance of health care providers providing ongoing support via novel channels. The COVID-19 pandemic also unravelled important gaps in our system; and whenever you discover a gap, there is an incentive to push forward the technological development. In this sense, the pandemic, while cumbersome to many at this very moment, will also lead to important medical developments supporting people in the future.

**An outstanding career is always a combination of success and failure: Which has been your biggest achievement and one point where you somehow failed so far?**

My greatest success is the development of my own independent research track, resulting in an Eccellenza Grant by the Swiss National Science Foundation and, most importantly, in a position as an Assistant Professor with Tenured Track. In terms of failure, it is difficult to nail down one single situation. As a researcher, I am used to difficult moments. Sometimes, experiments or projects do not result in the expected outcomes and often, developments are not achieved fast enough. However, I have learned to analyze each situation properly, develop alternative measures, and not letting myself being blocked by unforeseen developments. Disappointment happens on a daily basis, in the end, what counts is what you are making out of it. By the way, I prefer the word 'challenge', rather than 'failure' – just like in sports!

**A successful career needs effective self-organization: How does your daily self-management at work look like?**

Since the very beginning of my career, I was used to multi-tasking; which is unavoidable as a clinician and researcher! I think it is important to start the week and every day with an overview of the tasks ahead and to prioritize – and to follow the plan, which then will need adaptations throughout the days due to upcoming and unforeseen events.

**How do you relax?**

A very important point: I try to disconnect from work. Even when you work a lot, you need moments where you can disconnect and relax. I have many hobbies: I like art, I paint myself and I like to be outside – Bern is a beautiful area to pursue outside activities!

**How many hours do you sleep at night?**

I am, very similar to my mother, rather a short-sleeper: I usually have 6 hours of sleep.

**Let us have a look into the future: What is your greatest ambition or goal in the upcoming years?**

My ambition is to contribute with my own work to the benefit of the patients, further expanding my international network, and thereby performing scientifically on an international level.

**Is there any other important point you would like to add?**

As a young female researcher, I also want to inspire young women for science. In the interest of science, it is important that the best scientists have the opportunity to pursue a career – and that it is not gender (or any other secondary characteristic) that determines the chances of success. In my situation, I have not felt disadvantaged for being a woman.

The interview was conducted by Prof. Claudio Bassetti, Dean



## Interview with Prof. Dr. med. Matthias Egger MSc FFPH DTM&H

Professor of Epidemiology and Public Health and Head of Research Group at the Institute of Social and Preventive Medicine (ISPM), University of Bern.

During his tenure as the director of ISPM, Matthias Egger has led the institute to international excellence. He is President of the Research Council of the Swiss National Science Foundation (SNSF), led the Swiss National COVID-19 Science Task Force and is a visiting professor at the University of Bristol, UK and Cape Town, South Africa.

### **Are you now only engaged in research management or are you still doing active research?**

I am still active in research and enjoy it a lot. As President of the Research Council, you have to get your hands dirty if you want to remain credible! The president needs to understand what the issues are in the Swiss research community. I have a grant from the National Institutes of Health (NIH) to look at issues around treatment and prevention of HIV-infection in southern Africa and a smaller grant from the SNSF. I am also involved in methodological research on evidence synthesis and meta-analysis – something we have been working on for many years at the ISPM. At the SNSF, I contribute to “Research on Research”, which looks at questions such as predatory journals, barriers to open access, and peer review. We are continually trying to improve our evaluation processes to make them fairer and less prone to bias.

### **What is currently your main hot topic when you talk about HIV treatment?**

We look at a range of questions in an interdisciplinary team. To pick an example: Just this morning, I had a phone call with colleagues from the University of KwaZulu Natal and Zürich regarding a project that grew out of the Swiss HIV Cohort Study. We are looking to what extent there is a threat to antiretroviral therapy due to the emergence of resistance to a new class of drugs, integrase inhibitors. We have seen this before, with other drug classes. We need to make sure that we are not about to make the same mistakes again. Similarly, we are looking at how to improve the diagnosis of drug-resistant tuberculosis. Another aspect is retention in care: A problem in sub-Saharan African countries is patients’ disappearance from care. We need to find out what happened to them and how best to bring them back to care.

### **Meta-analysis has become very popular, with many such papers published and multiple papers on similar issues with different conclusions. How can we solve this issue?**

Indeed, there is an “epidemic” of meta-analyses mechanically produced in large numbers and often of low quality. There is a lack of attention to the heterogeneity between different studies’ results and individual studies’ quality. Publication bias, where studies with statistically significant results are published while negative studies end in the dustbin, is also a threat. The problem is that

I think it is important to give people the opportunity to be mobile and spend time abroad as I did in the UK, the US and sub-Saharan Africa.

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meta-analysis in its simplest form is too easy – essentially a weighted average. Journals love to publish them because they are cited more than the original studies. We need to look at the people who do these meta-analyses. It is problematic if they do nothing else and become professional meta-analysts. A good scientist should also be involved in primary research. For example, in my field, you may help set up cohort studies, conduct randomized controlled studies, or get involved in methodological research. In my view, the attractiveness of the quick meta-analysis is a symptom of a sick system where long lists of publications and journal impact factors are valued more than the research's actual quality and impact.

#### **How do we measure excellent research?**

This is a question close to my heart. The SNSF is required by law to support excellent research! Clearly, "excellence" is a concept that incorporates several dimensions. At the SNSF, we identified three dimensions related to the research questions asked, the methods used, and, importantly, investigators' behavior. The research questions should, of course, be original, but there must also be space for important replication research. Methods should be rigorous, but also in line with open science principles. Behaviors should be collaborative, ethical and acknowledging. In other words, investigators should acknowledge all relevant contributions of members of the team. In the end, all these components come together to produce knowledge gains that in the short or long term improve our lives, and in one way or another are excellent.

#### **Who initially inspired you and how did your career start?**

Already as a medical student, I was interested in understanding disease not only at the individual, but also at the population level. After working as a resident in a small district hospital and at the University Children's clinic in Bern, I was lucky enough to obtain a British Council fellowship to study at the renowned London School of Hygiene and Tropical Medicine (LSHTM). Studying epidemiology at LSHTM really changed my life and thinking! I met many people who inspired me, for example Professor Geoffrey Rose, who proposed the "prevention paradox" in his classic book on "Sick

individuals and sick populations". Incidentally, the latter is now often invoked in the context of COVID-19. We were a small group of students and I still collaborate with some of my classmates, particularly with Professor George Davey Smith in Bristol. After this Master course, I knew I wanted to go into academic epidemiology.

#### **What can an institution do to promote people with an intrinsic motivation like you? What is essential?**

There should be mechanisms to identify and support gifted and motivated people to embark on an academic career early on. Still today, I feel that the process is often haphazard and unstructured. I had the privilege to receive a fellowship from the SNSF, which allowed me to spend time between Bern and the UK. Later, I moved to the UK, and I thought I had moved for good at the time. My academic career really developed in the UK: This country was one of the places to be in epidemiology. Switzerland back then was epidemiologically speaking a developing country. The COVID-19 crisis has now shown that, fortunately, this has changed. I think it is important to give people the opportunity to be mobile and spend time abroad as I did in the UK, the US and sub-Saharan Africa. Having said that, times have changed, and I acknowledge that similar to excellence, the concept of "mobility" has different dimensions, and nowadays, one can be digitally very "mobile" even while working from home.

#### **Regarding gender equity, we are still not where we should be at universities in Switzerland. What do you think is the essence of the problem?**

This is a complex issue and of great concern to me personally and to the SNSF. The situation is improving, but only slowly. We have a "leaky pipeline" in Swiss academia: Women drop out of research and academic careers faster than men. The pipeline is particularly leaky in the life sciences, social sciences and humanities. In STEM (science, technology, engineering, mathematics) the rate of dropout of women is less pronounced. Still, they are a minority from the start: Among PhD students, only about 20% are women, whereas in the social sciences, humanities and the life sciences the majority of doctoral students are women. However, at

## As President of the Research Council, you have to get your hands dirty if you want to remain credible!

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the level of the full professor, men dominate virtually everywhere. Several factors contribute to this situation. In Swiss society, the expectation is that mothers with young children work part-time if they work at all. The support structure in society for women who want to work is weaker than in many other countries. These factors will reduce women's research activity. Also, it is difficult for researchers with young children to spend time abroad; and this is still expected for career progression. The academic system in Switzerland is more hierarchical than in many other countries, with a strong bottleneck above the level of associate professor. Finally, the "publish or perish" culture does not appeal to many women (and men). There is debate on relative contributions to women's under-representation of structural factors, societal gender stereotypes that lead to institutionalized discrimination and sexism, or individual factors such as personal inclination, which are also influenced by societal expectations. I think there is a web of causes that is difficult to disentangle, but institutionalized discrimination and sexism are definitely part of it. A study of a Canadian research funder showed that the gender gap in grant funding was due to less positive assessments of women as principal investigators. In contrast, the quality of the proposed research was similar for women and men. We are looking into this at the SNSF at the moment. The question is, how much weight should we give to the track record of applicants compared to the proposed project's quality.

### **You eventually came back to Bern after ten years in the UK. What made you come back in 2002?**

Coming back to Bern was not at all straightforward. I was a full professor, had an interesting life, was part of the academic community, and enjoyed working at the University of Bristol. But we also knew that the position as director of ISPM would come up. My wife, Nicola Low, a British-born epidemiologist, favored moving. Like me, she enjoyed the opportunities and experiences of living abroad. For me, it was tempting to be in charge of an institute. So when that job opportunity, the successorship of professor Theo Abelin, was advertised, I applied. Today, I do not regret coming back to Bern, but it was, to some extent coincidence. The post came up at the right time.

### **What was the formula to build up the international reputation of ISPM?**

I think the recipe was simple: to attract good people, including young colleagues who could apply for one of the SNF fellowships. We were quite successful over the years, and these fellows made huge contributions to the ISPM, and several stayed on. Also, applying for grants from other sources, including the NIH and the European programs, was essential. This allowed us to build an interdisciplinary, diverse bunch of highly motivated researchers at ISPM and an atmosphere where people can strive, help each other, and focus on the quality of the research. I am delighted that my successor, Professor Oscar Franco, who came to Bern from Rotterdam, is very much upholding this spirit.

### **Which is one outstanding point for you here in Bern?**

There is no doubt that Bern is an excellent university in Europe and worldwide, providing access to state of the art research infrastructures and support, with many great people, in a city with an outstanding quality of life. It is also a university that takes gender equity seriously.

### **Is there an aspect you would suggest to improve in Bern?**

The University of Bern could do better putting itself into the international sphere, attracting even more international students and staff. Bern is not as well known internationally as other Swiss universities. The collaboration between faculties could be more intensive – too often, we work in smallish silos. The organization of universities in walled-in faculties and disciplines is old-fashioned and hinders interdisciplinary collaborations. Of course, narrow disciplinary research is critical, but I very much welcome the university's many initiatives that bridge faculties. For example, in our institute, we now have an exciting collaboration between mathematical modellers and astronomers.

## Setting up the COVID-19 Science Task Force was an incredibly interesting experience.

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### **You were leading the COVID-19 Science Task Force in the first half of 2020. Why did you decide to leave this responsibility?**

Setting up the COVID-19 Science Task Force was an incredibly interesting experience. I want to pay tribute to all the enthusiastic scientists, several from the University of Bern, who were prepared on short notice to devote a considerable amount of time to one of the ten working groups. Unfortunately, the task force was not very welcome initially and not listened to by politics. The lack of openness and exchange between science and politics contributed to the massive second wave in autumn. Of course, politicians have to take these very difficult decisions, not scientists. But I think there are lessons to be learned to make sure that Switzerland will be better prepared for such crises in the future. I stepped down after several months because leading the task force was just not compatible with my role as the president of the SNSF and as a group leader at ISPM.

### **Which was your academic highlight, and which your biggest failure?**

The 1996 BMJ paper on how to look at bias in randomized clinical trials had great impact in terms of citations and because it opened, with other papers, an entirely new research field. Interestingly, the method is now also used in genetic epidemiology. The biggest failure is more difficult to identify – many things that I have tried did not work out. What still haunts me is that we did not manage to set up a population-based cohort study. Switzerland needs such flagship studies, like the Rotterdam study or the Nurses Health Study at Harvard. The Swiss HIV cohort study is one example of a national collaboration that has put Switzerland on the map. The Swiss universities should join forces and provide core funding for such visionary, long-term projects.

### **How do you relax?**

My work-life balance is much better now than back at the time when I was still finding my way under a lot of pressure. I work less than I used to, and take at least every second weekend off. Today, I will go on a ski tour. I like spending time in the mountains. I ski, snowshoe and enjoy my electric mountain bike. In summer, my highlight is a small but beautiful catboat on the lake of Neuchâtel, built in Bern according to plans from a Boston shipyard.

### **How many hours do you sleep at night?**

Less than I used to, on average about six hours, with the problems sleeping through typical for my age.

### **What is your main ambition for the next few years?**

I was just re-elected as president of the SNSF for another four years. My goals are those of our multiannual plan, to promote high-quality research in Switzerland in all its diversity. At ISPM, we just got funded for another five years by the NIH, and I am really looking forward to taking this on – but also to slowly moving this large project onto other shoulders.

The interview was conducted by Prof. Claudio Bassetti, Dean





Prof. Dr. Albert Hofman, Honorary Doctor of the Medical Faculty, © Universität Bern, Photo: Luc Buthker

## Honorary Doctorate of the Medical Faculty

The Medical Faculty awards the honor of *Doctor medicinae honoris causa* to Mr. Prof. Dr. Albert Hofman, Boston, USA.

### Laudatio

Albert Hofman,

- who is globally one of the most influential researchers in the field of epidemiology;
- who has identified pathogenetic interrelations of neurological, cardiovascular and endocrinological diseases in extensive population based studies by means of new genetic and imaging methods;
- who has been supporting the exchange of junior researchers between the University of Bern and the Harvard School of Public Health for many years and enables the participation in advanced education and training programs for Bernese researchers in Boston.

### Curriculum Vitae

- born 1951 in Hardenberg, NL
- 1976 graduation from medical school, Groningen, NL
- 1983 PhD in epidemiology, Rotterdam, NL
- 1984–1988 associate professor, Rotterdam
- 1988–2015 chairman, Department of Epidemiology, Rotterdam
- 1992–2015 science director of the graduate school Netherlands Institute for Health sciences (Nihes) NL
- 1998–2015 professor (adjunct) at Harvard School of Public Health, USA
- 2016 to date chairman of the Department of Epidemiology as well as Stephen B. Kay Family Professor of Public Health and Clinical Epidemiology, Harvard University

## Highly Cited Researchers 2020

Researchers at the University of Bern are among the most cited scientists in the world. The annually published list of "Highly Cited Researchers" includes researchers whose scientific publications in the respective field belong to the top percent of the most cited papers.

In 2020, the following Bernese researchers belong to this top group:



**Prof. Dr. Mark A. Rubin**  
Department for BioMedical Research (DBMR) and Bern Center for Precision Medicine (BCPM), University of Bern, Category Molecular Biology and Genetics



**Prof. Dr. Andrew Macpherson**  
Department for BioMedical Research (DBMR), University of Bern, and Department for Visceral Surgery and Medicine, Inselspital, Category Immunology



**Prof. Dr. Matthias Egger**  
Institute for Social and Preventive Medicine, University of Bern, Category Cross-Field



**Prof. Dr. Georgia Salanti**  
Institute for Social and Preventive Medicine, University of Bern, Category Cross-Field



**Prof. Dr. Stephan Windecker**  
Department for BioMedical Research (DBMR), University of Bern and Department of Cardiology, Inselspital, Category Clinical Medicine



**Prof. Dr. Oscar H. Franco**  
Institute for Social and Preventive Medicine, University of Bern, Category Cross-Field

## New Professors at the Medical Faculty



### **Yvonne Döring**

Since 1 January 2020 Assistant Professor with Tenure Track for Translational Angiology at the University Clinic for Angiology

Yvonne Döring grew up in Germany and earned her bachelor's degree in cell biology at the University of Osnabrück in 2004 and her master's degree in biomedicine at the Johannes Gutenberg University in Mainz in 2006. In 2007, she joined the DFG Research Group 809 at the RWTH Aachen University as a PhD student and completed her PhD studies in 2011 in the field of atherosclerosis research. Thereafter, she started a postdoc at the Institute of Cardiovascular Prevention at the LMU Munich to investigate molecular interactions and pathophysiological functions of chemokines and their receptors in cardiovascular diseases. In 2013, she did an internship at the Division of Translational Medicine and Human Genetics (University of Pennsylvania, USA). Returning to Munich, she became a group leader and a Principal Investigator within the SFB 1123 where she focused on immune cell interactions in atherosclerosis and vascular inflammation. Since 1 January 2020, she is now working at the University Clinic for Angiology & DBMR in the field of translational angiology where she continues her research on vascular inflammation, particularly paying attention to lower extremity arterial disease.



### **Katja Odening**

Since 1 January 2020 Professor for Translational Cardiology at the University Clinic for Cardiology and the Institute of Physiology

Katja Odening (41) grew up in Germany and studied human medicine in Heidelberg and Lyon. After completing her medical doctorate at the University of Heidelberg in 2004, she began her clinical specialist training in internal medicine and cardiology and established her scientific focus in the field of cardiac electrophysiology. From 2006 to 2009, she pursued a postdoctoral fellowship at the Cardiovascular Research Center at Brown University (USA), where she is appointed adjunct professor since 2012. In 2012, she habilitated in internal medicine and was appointed senior physician in charge of the Department of Genetic Arrhythmia Disorders at University Heart Center Freiburg. In 2016, she was appointed adjunct professor and became head of the section „Translational Medicine“ at the Institute for Experimental Cardiovascular Medicine Freiburg. Katja Odening researches genetic arrhythmia disorders. Her focus is on molecular determinants of the individual risk for sudden cardiac death. As a cardiologist combining basic and translational research and clinical work, she aims to integrate mechanistic findings from her research into the personalized treatment of patients.

### **Reto Auer**

Since 1 February 2020 Professor of Primary Health Care, Member of the Board of Directors at the Bern Institute of Primary Health Care (BIHAM)



Reto Auer (42) grew up in Lausanne where he obtained his human medicine diploma in 2004. In 2010, he received the FMH title in general internal medicine and completed a master in advanced studies (MAS) at the University of California, San Francisco in 2013. Since August 2016, he has been working as an assistant professor with tenure track at the University of Bern at the Bern Institute of General Practitioners' Medicine (BIHAM), while also working part-time in a general practice in Bern and as Médecin Agréé at Unisanté at the University of Lausanne. Reto Auer received the Prix d'Excellence de Jeune Chercheur of the Medical Faculty of Lausanne in 2010 for his dissertation, followed in 2013 by a prize from the Swiss Society for Internal Medicine (SGIM) as well as a prize by the Swiss Aerosol Group Award in 2017.

Reto Auer's main research interests are the prevention and screening interventions in primary health care. In particular, he is currently leading one of the world's largest multicenter study on the efficacy, safety and toxicology of nicotine-containing e-cigarettes for smoking cessation. He is also leading studies on the promotion of participatory medicine in colorectal cancer screening decisions.

### **Wanda Kukulski**

Since 1 May 2020 Professor for Biochemistry at the Institute of Biochemistry and Molecular Medicine (IBMM) and Member of NCCR TransCure



Wanda Kukulski (40) grew up in Visp and graduated in Biology II at the University of Basel in 2002. She received her PhD in biophysics from the Biocenter in Basel. As a postdoctoral researcher, she carried out interdisciplinary research at the European Molecular Biology Laboratory in Heidelberg (D), among other things with fellowships for advanced researchers from the Swiss National Science Foundation. Since 2015, Wanda Kukulski has headed a research group at the MRC Laboratory of Molecular Biology in Cambridge (GB). In 2019, she was also elected into the EMBO Young Investigator Programme.

Wanda Kukulski researches at the interface of cell and structural biology. She is particularly interested in the molecular architecture of cellular membranes. How different cell membranes are constructed and how fundamental cellular processes are enabled are central questions of her research. In order to image membranes and their components inside the cell, she develops innovative combinations of fluorescence and electron microscopy.



### **Sven Streit**

Since 1 May 2020 Professor to the newly created position in Primary Care and member of the BIHAM Management Board.

Sven Streit (39) grew up near Aarau and completed his medical studies at the University of Bern in 2008. After receiving his doctorate in 2009, he became a specialist in general internal medicine in 2014 and began his research at the Berne Institute of General Medicine (BIHAM), focusing on elderly people with chronic diseases and polypharmacy. In 2016, supported by the Swiss National Science Foundation (SNSF), he began a PhD at the Department of Public Health and Primary Care at Leiden University in Holland and completed a Master of Science in Epidemiology at the London School of Hygiene and Tropical Medicine in 2017 by distance learning. Upon his return, he was appointed Head of Junior Researcher Development at BIHAM and led a team that, among other things, is responsible for the cantonal program "Practice Assistance". In his SNSF-funded research, he is investigating ways to optimize polypharmacy. In 2018, he habilitated at the University of Berne, completed his PhD and was appointed assistant professor.

Sven Streit is committed to interprofessional primary care with enough young people in the professions involved and works himself in a family practice in Konolfingen, which he and his wife run jointly.



### **Sebastian Walther**

Since 1 April 2020 Professor for Psychiatric Neuroscience

Sebastian Walther (43) grew up in Germany and graduated from medical school at the University of Jena in 2003. He completed his clinical training at the Charité Berlin as well as at the University Hospitals for Psychiatry and Neurology in Bern. Since 2009, he has been working as a senior physician and since 2013 as head physician at the University Clinic for Psychiatry and Psychotherapy in Bern. He habilitated in psychiatry and psychotherapy in 2014 and in 2017, he was appointed as assistant professor with tenure track in psychiatric neuroscience at the University of Bern. His research projects are funded by the SNF and the NIH.

Sebastian Walther researches the causes and modern treatment options for psychiatric disorders. He is investigating non-verbal communication, movement disorders and other symptoms. Based on his understanding of altered brain function, he derives a targeted, individual treatment for those affected. Currently, he is developing a combination of psychotherapy and non-invasive brain stimulation for communication problems.

### **Alice Panchaud**

Since 1 June 2020 Professor to the newly created position in Primary Care Pharmacy and member of the BIHAM Management Board.



Alice Panchaud (44) is a certified clinical pharmacist and clinical pharmacologist with a PhD in Clinical pharmacology and Clinical nutrition. She performed her clinical training at the Department of Clinical Pharmacology at the CHUV as Chief Pharmacist of the Swiss Teratogen Information Service (STIS) (2006-2012), at the Sickkids hospital in Toronto (2009) and the Hospital St-Justine in Montreal (2016). In 2012, she joined the School of Pharmaceutical Sciences of the University of Geneva as research associate. Since pharmacoepidemiology is the cornerstone of her research area, she completed a two-year research fellowship in the Pharmacoepidemiology Program at the Harvard T.H. Chan School of Public Health in Boston (2015-17), where she worked with large administrative and registry databases. In 2018, she habilitated at the University of Lausanne. Her research interests focus on the safety and efficacy of drugs in the real-world setting, with special attention to vulnerable populations and the development of digital tools to support health professionals and patients in the use of drugs.

### **Matthias Kopp**

Since 1 June 2020 Full Professor of Pediatrics and Director of the University Hospital of Pediatrics



Matthias Kopp (54) was born in Mannheim and grew up and went to school in Weingarten and Karlsruhe. He completed his studies as well as his training as a pediatrician at the Albrecht-Ludwigs-University of Freiburg and at the Center for Pediatric and Adolescent Medicine at the University Hospital of Freiburg. After a research stay in Vienna, he habilitated in 2004. In 2008, Matthias Kopp was appointed to the professorship for pediatric pneumology in Gießen and Lübeck. In 2009, he moved to Lübeck where he established the Section for Pediatric Pneumology and Allergology. In addition to patient care, Matthias Kopp has been very involved in university teaching and research for many years.

In the German Center for Lung Research (DZL) he is actively involved in several projects with focus on bronchial asthma and cystic fibrosis. The aim of his work is to identify biomarkers that allow statements about the course of the disease and the response to therapy in various forms of bronchial asthma. Currently, Matthias Kopp is president of the trinational Society for Pediatric Pneumology (GPP e.V.).



### **Fiona Burkhard**

Since 1 July 2020 Professor for the newly created position Functional Urology and Head Physician at the Department of Urology

The Executive Board of the University of Bern has elected Fiona Burkhard as Professor of Functional Urology with effect from July 1. At the same time, she is Chairwoman and Head of Functional Urology at the Department of Urology of the University Hospital, Inselspital.

Fiona Burkhard grew up in Los Angeles and Schaffhausen and completed her medical studies at the University of Zürich in 1990. During her training as a specialist in urology, she completed a SNSF-funded fellowship in functional urology at Southwestern Medical School in Dallas, Texas and began basic research on bladder function. She was the first female urologist to habilitate in Switzerland at the University of Bern in 2006 and received an associate professorship in 2009. Since 2010, she has been a senior physician and since 2017, chair for functional urology at the Department of Urology, including neurology with a special focus on bladder reconstruction, incontinence and female urology.

Fiona Burkhard's research focuses on bladder function, both at the molecular and genetic level as well as on the development of medical devices to support bladder function.



### **Martin Zinkernagel**

Since 1 July 2020 Full Professor for Ophtalmology and Co-Director at the University Clinic for Ophtalmology

Martin Zinkernagel grew up in Australia, the USA and Zürich and completed medical school at the University of Zürich where he also received his doctorate. After specialist training in ophthalmology in Zürich and St. Gallen, he completed a PhD in ocular immunology at the University of Western Australia in Perth. He completed several fellowships in vitreoretinal and cataract surgery in Perth and later at the University of Oxford in the UK. After his return to Switzerland in 2012, he obtained the *venia docendi* at the University of Bern in 2013 and since then, he has been working as a vitreoretinal specialist and head of outpatients department at the Department of Ophthalmology of the University Hospital, Inselspital.

Martin Zinkernagel's research focuses on retinal diseases, including age-related macular degeneration. A major focus in a clinical research collaboration with ARTORG is the application of artificial intelligence in retinal imaging and decision-making for the treatment of retinal diseases. His lab group investigates inflammatory processes in retinal diseases, with a special focus on microglia and the role of the gut microbiome in retinal diseases.

## **Christiane Zweier**

Since 1 September 2020 Full Professor for Human Genetics and Director and Head Physician at the University Clinic for Human Genetics



Christiane Zweier (41) was born and raised in Germany and graduated in medicine at the Friedrich-Alexander-University Erlangen-Nuremberg in 2004. She received her doctorate at the Human Genetics Institute there in 2004 and began her specialist training. From 2008 to 2009, she spent a guest research stay at the Department of Human Genetics at Radboud University in Nijmegen (Netherlands), where she completed a second doctorate in 2014. Since 2009, Christiane Zweier has been head of the research group at the Institute of Human Genetics in Erlangen. She obtained her specialist title in human genetics in 2012 and habilitated one year later with a thesis on the clinical, genetic and functional characterization of mental retardation. In 2017, she was appointed early as an associate professor and in 2018, she became a senior physician at the Human Genetics Institute.

Christiane Zweier is scientifically engaged in the clinical, genetic and functional characterization of developmental disorders. She uses the latest methods of genomic sequencing and in the functional characterization, she uses the fruit fly as model organism.



Prof. Dr. med. Annette Draeger, 21.01.1959 - 02.10.2020

## In memoriam: Prof. Dr. Annette Draeger

**At the end of 2020, the Institute of Anatomy lost one of its most prominent members - Prof. Dr. med. Annette Draeger.**

Annette was born in Hamburg and studied medicine in Aachen, Hamburg, Lausanne and Melbourne. After her graduation, she worked with Alan Weeds in Cambridge. Then, she moved to Munich and worked as a postdoc at the Department of Pathology of the Ludwig-Maximilians-University. From 1987 to 1995, she was a postdoc and then a group leader at the Institute for Molecular Biology of the Austrian Academy of Sciences in Salzburg where she habilitated too. At that time, she was among the pioneers of the confocal microscopy and studied the organization of actin in smooth muscle cells.

In 1995, Annette joined the Institute of Anatomy in Bern as a professor and Head of department Cell Biology. Her research focused on the proteins of the annexin family, both as physiological components in muscle contraction and as factors in membrane repair.

In her recent work, Prof. A. Draeger had unraveled hitherto unknown mechanisms responsible for the repair of plasmalemmal lesions elicited by bacterial pore-forming exotoxins. This research had culminated in a pioneering approach to combat antibiotic resistant pathogens, in which artificial liposomes are used as decoy targets to disarm pathogens by neutralizing their exotoxins. The liposomal compound has recently successfully completed a Phase I/II clinical trial (ClinicalTrials.gov Identifier: NCT02583373; Laterre et al., *Lancet Inf. Dis.*, 2019). We hope that this meaningful discovery can soon be deployed in the clinic.

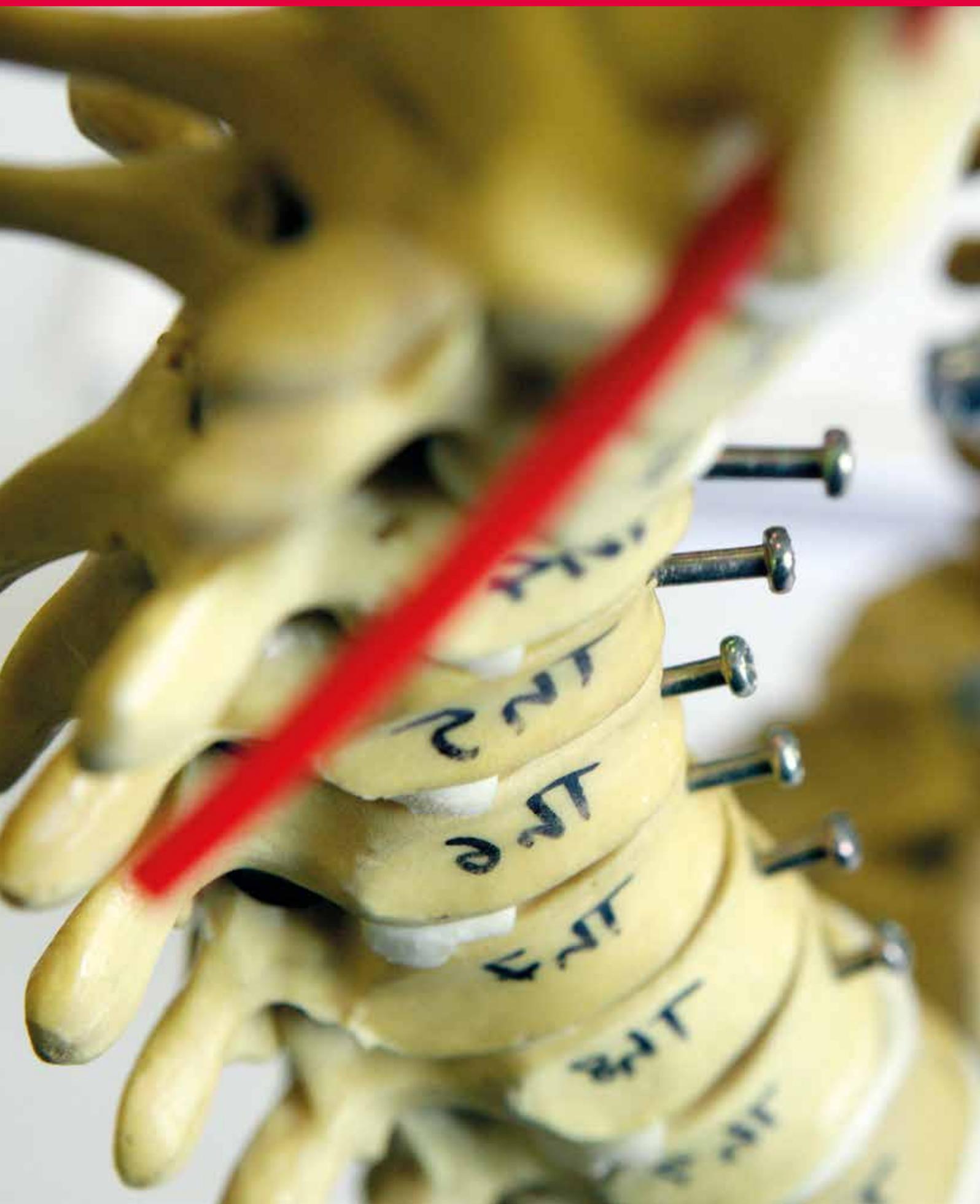
Annette Draeger was a dedicated teacher; even in her last year, already marked by her illness, she was involved in 550 hours of lectures, histology and dissection courses. She was a chairperson of the dissertation committee of the Medical Faculty.

She was the organizer and the soul of the Institute's yearly commemorative service organized to honor the body donors.

Annette Draeger enjoyed classical music and the works of Shakespeare. She will be remembered as a warm-hearted, curious, passionate and very open person.

Report in the science magazine NANO:  
[Tinyurl.com/3bn6crcd](https://tinyurl.com/3bn6crcd)





## Teaching

School of Human Medicine  
School of Dental Medicine  
Local Student Committee of Bernese Medical Students  
~~Student of the Year 2020 Bernese Medical Students~~  
~~Student of the Year 2020 Bernese Medical Students~~  
Bachelor and Master Program in Pharmacy  
Master Program in Artificial Intelligence in Medicine  
Master Program in Biomedical Sciences  
Master of Science in Biomedical Engineering





Empty lecture hall

## School of Human Medicine

Physicians and medical doctors have been trained at the Medical Faculty in Bern for more than 200 years. The Bern Faculty is currently the second largest institution for the education of medical professionals in Switzerland.

### Profile

- Undergraduate and postgraduate Training of physicians for more than 200 years
- 2<sup>nd</sup> largest institution of Switzerland for the education of medical professionals
- High practical relevance and patient-orientated training
- Increasing the number of study places by 100 in the third year of Study
- Bachelor program based on the educational approach of problem-based learning
- Master program offers subject-specific and practice-oriented study model with a high emphasis on bedside teaching in hospitals and in general practices
- Comprehensive training at the Inselspital in more than 50 disciplines
- Learning objectives according to PROFILES, which forms the basis of the Federal examinations

### 2020 - Studies under Covid

The year 2020 was shaped by the measures due to the COVID-19 pandemic with major effects on our teaching activities: In spring, teaching took almost exclusively place in virtual space. As an effect, students did not feel comfortable and satisfied with their new online studies as this included insecurities and communication problems. Therefore, the development of online scenarios for all the courses took place in summer - unfortunately, these came into use in autumn. The ever-changing pandemic situation brought an increased workload to the Dean's Office of student's affairs while already being highly engaged with the transition to plus 100 students in the 3rd year.

While Master's lectures had already been available as podcasts for 10 years, new options were developed by the means of live streaming and interactive Zoom lectures, particularly for collective activities in small groups new online formats were tested and successfully put into practice too. Only the Clinical Skills Training, especially the clinical examination, still had to take place "mask-to-mask" in classroom teaching of groups of max. 5 students.

### Empty lecture halls

At beginning of the term in september lectures were held in the 4th year only for 50 of 250 students. One month later the lecture halls were empty.

## Figures

### Bachelors of Medicine

Study places HUM and DENT 2020	360
Starters HUM bachelor program 2017	237
Ending with bachelor degree 2020	198
Drop out 2017-2020	16.4%

### Master of Medicine

Study places 2020	260
Starters master program 2017	245
Ending with master degree 2020	234
Drop out in the master program	4.5%

### Federal exam Human Medicine 2020

Multiple choice exam:

233 candidates

232 passed

0.4% missing

Clinical skills exam was cancelled (Covid-19)



### Problem based learning activities in hybride mode

The small group activities in the 3th year were performed more and more in online or hybride mode. On this picture the half of the student group is in the teaching room, the other half at home. On the screen of the laptop are the Home-Students. On the chair in background is a camera situated.



### Clinical Courses in the Master study

Clinical courses in the ORL with patients were also transmitted live by the software 'zoom' to more than hundred students at home. They could ask questions to the teachers in the clinical investigation unit.

### School of Human Medicine

Murtenstrasse 11, 3007 Bern

[https://www.medizin.unibe.ch/studium/index\\_ger.html](https://www.medizin.unibe.ch/studium/index_ger.html)



## School of Dental Medicine

The zmk bern is one of the few schools of dental medicine in the world to offer an **integrated interdisciplinary synoptic program based on problem based learning and clinical case studies. Evidence-based treatment concepts ensure the high quality of teaching. The course of studies is based on the detailed national curriculum for dental medicine. The Bachelor and the Master programs in Dental Medicine at the University of Bern were accredited in December 2018 by the Rectors' Conference of the Swiss Universities based on the recommendation of the Swiss Center of Accreditation and Quality Assurance in Higher Education and is compliant with the Bologna process.**

The bachelor studies in dental medicine (B Dent Med) comprise the first two years together with the studies in Human Medicine and one year at the zmk bern with dedicated dental propaedeutic courses with a final examination. The B Dent Med degree does not qualify for the acquisition of the Swiss dental license. As part of the master program (M Dent Med), candidates are tested on their ability to correctly and independently perform interdisciplinary treatment on patients as well as on their theoretical and analytical competence. The master thesis may comprise

- an academic discussion of a topic relevant to dentistry
- an extended case study involving a discussion based on a systematic literature review
- a report of academic research (e.g. clinical trial protocol), or
- a fully elaborated e-learning case.

### Swiss national examination in dental medicine

Upon completion of the M Dent Med degree, candidates must take the Swiss National Examination in dental medicine in order to qualify for obtaining the Swiss dental license. Since 2011, the examination is based on a uniform standardized multiple-choice test that is conducted simultaneously nationwide in the two main languages German and French.

After successful completion of the M Dent Med degree and the Swiss National Examination in dental medicine, the graduates may apply to a dental license in one of the Swiss cantons in order to work independently as dentist. The Swiss dental degree is recognized equivalent in the European Union. Furthermore, it is a prerequisite to apply for formal post-graduate training in one of the recognized federal dental specialties.

### Teaching in the first Corona Year 2020

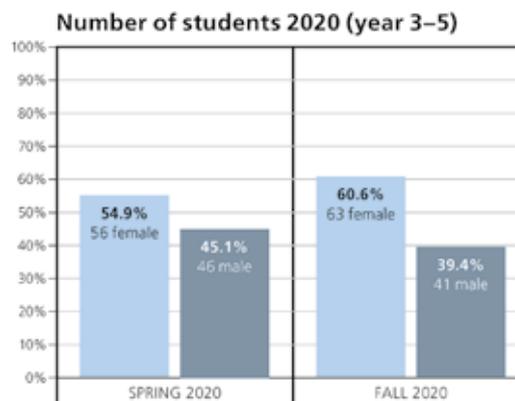
At the start of the spring semester on 27th January 2020, hardly anyone expected the impact on the teaching of the upcoming events. The nationwide lockdown that started on 16th March 2020 brought the clinical courses to a standstill until 27th April 2020. Subsequently, as part of the medical faculty special permission, the clinical courses in dental medicine could be taken up again under a strict hygiene regime. The autumn semester started under less strict conditions in September 2020, but again from mid-October all theoretical courses had to be held again digitally. As the courses in dental medicine are very practically oriented and based on training and case discussions in small groups, the impossibility to have face-to-face teaching was a big challenge for both students and faculty members.

Nevertheless, the entire staff of the zmk bern was very

active and creative in order to minimize the impact of the lockdowns on the quality and quantity of the teaching. Students were very thoughtful and disciplined in this special situation. The missed clinical course time (5 weeks) was caught up during after-hours and during the semester breaks. There were no fatal illnesses among staff and students during the first corona year. The number and grades of graduates in 2020 was not different from "normal" years.

In 2020 31 candidates successfully passed the Master exam and 30 candidates the Swiss National Examination in dental medicine. The numbers of students at the zmk bern (both

bachelor and master studies) as well as the gender ratios are listed in the table below.



Face-to-face lectures were not possible due to the lockdown-related restrictions. Theoretical courses were organized digitally and made available through the open source central teaching and learning platform of the University of Bern (ILIAS).

Phantom course



**School of Dental Medicine**

Freiburgstrasse 7, 3010 Bern

[www.zmk.unibe.ch](http://www.zmk.unibe.ch), [www.facebook.com/zmkbern](https://www.facebook.com/zmkbern)



FSMB Executive Board at the General Assembly in Fall 2020

## Local Student Committee of Bernese Medical Students

### The fsmb (Fachschaft Medizin der Universität Bern)

- is created by students for students
- is the official representative of Bern's medical students
- has seats in various committees
- aims to facilitate and optimize studies and to represent the interests of medical students
- offers several services for the students and organizes many events in pandemic-free years

### Education Commission since 2019

Since the end of 2019, the Fachschaft executive board has established the Education Commission (Bildungskommission, BK). This separation is to serve a clearer division of tasks. As an organ of fsmb, the BK deals with all issues and topics related to education and studies. We meet at least twice a semester to discuss current issues in medical education from a student perspective. Permanent members are our delegates in the various committees and commissions of the medical faculty of the University of Bern, the swimsa delegates and representatives and speakers of each academic year.

### Yearly representatives

With the introduction of the Education Commission, representatives and speakers in each academic year (Jahressprecher\*innen) were also introduced. The yearly representatives are members of the fsmb executive board, who form the link between the board and the students of years 1 to 6. They are the first point of contact for problems, questions and concerns of the students, and pass all the upcoming on to the fsmb executive board, the Dean's Office, the Faculty or other contact points.

### The year 2020

For us, as for everyone on earth, 2020 was a little different from other years: Things got cancelled, events needed to be reorganized or postponed. But we kept our heads held up high and focused on the positive. We would like to tell you about some things that did not get cancelled this year but a little rearranged. We also include stories from students and their experiences of what it was and is like to study during a pandemic.

## 2020 - a little different

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### **National swiss medical students' association (swimsa)**

Medical students connect on an international level. The national swiss medical students' association (swimsa) is a member of the international federation of Medical Students' Associations (IFMSA) and due to that every year swiss medical students are joining international events. This year a lot did not take place in person but online.

One of these online events was the General Assembly of the IFMSA and one delegate from Bern shares her experience:

August meeting 2020, I didn't know exactly what to expect. Now, after five afternoons of discussing medical education, I can safely say that my expectations were clearly exceeded. As a delegate to the Standing Committee on Medical Education (SCOME) I was extremely impressed by the worldwide commitment to more effective and relevant medical education. Zoom calls with more than 80 delegates from all regions of the world, all of them motivated to make tomorrow's medical education better, leave a lasting impression. This motivation was particularly evident in the small working groups. Several aspects that were addressed, such as the social responsibility of universities or the politics behind medical education will certainly accompany me in the upcoming years.

Many thanks to the whole delegation who, despite the online GA, managed to experience "dance" moments together!

### **Skiweekend 2020 in the Aletsch Arena**

Every year in February, 60 lucky students join the fsmb for a fun- and action-filled Skiweekend in the Aletsch

Arena. This year however, the attending students were even luckier than they could have possibly imagined: the Skiweekend was the first – and at the same time last – normal event organised and carried out by the fsmb before Covid-19 started to affect Switzerland. We can therefore give a brief and proud overview over our only event in 2020 (this far, fingers crossed):

Early Saturday morning, the students arrived in Fiesch by train. Everyone, except for a few latecomers, was given their ski-ticket, some part of the luggage that needed to be carried (mainly food and beverages for the next two days) and up the mountain they went. The luggage was stored away in our rooms at the Berghaus Kühboden which is situated right in the middle of the ski area. A short group-picture-session later, everyone was off skiing or snowboarding in the over 100km of slopes. After an exhausting day, the dinner provided by the Berghaus team was excellent – as always – and even included tasty vegan options. The communal dinner was followed by games, drinking and good conversations between students from years 1 to 4. Sometime around 4 in the morning even the last few people went to bed, only to get up again at 7 for some early-morning yoga. After a short breakfast and preparation of lunch packs, everyone enjoyed the rest of the day in the mountains and left for home whenever they were ready.

We look back on an amazing weekend where friendships and even relationships were formed that would otherwise never have been. Sun, fun and snow combined with a dash of sport: ideal combination for a perfect little memory to brighten up the rest of 2020 from home.





## Student's experiences under CoViD-19

We asked some students questions about their experiences with CoViD-19 and during the pandemic mainly focusing on the studies.

### How was it for you to start your studies in Fall 2020?

Janis Stoffel, 1<sup>st</sup> year student: To be perfectly honest it was probably one of the biggest disappointments in my life. It really wasn't easy after having hyped my expectations during my gap year. In my opinion studying at a university doesn't just mean you study your specific field of expertise, but also that you get to enjoy the luxury of a students life; going out, getting to know new people, experience new sports, discover new interests and overall being excited to start a new chapter in life with your best mates next to you, ready for a laugh. Unfortunately, it obviously didn't quite work out the way I or any other student hoped it would. However I'm still optimistic that we might just be able to live out our dreams and expectations during summer 2021 and going into the 3. Semester.

### How were you doing in March (e.g. changes under the lockdown)?

Arlette Journeaux, 2<sup>nd</sup> year student: It was a crazy time. Suddenly, instead of lectures, we only had podcasts, which I didn't see as a particular limitation, but when all the tutorials and Fachpraktika were held online, I felt that the situation was very serious. I no longer went to Bern to live in my WG, but stayed at home in Uri and continued studying from my kitchen table. Sometimes it was very difficult to keep up the daily structure and maintain discipline, and above all I missed my colleagues from university. Nevertheless, I suddenly had a lot more time for my family and for myself and was able to slow down a bit, which was definitely positive.

### As a Medicine Student, do you get asked about CoViD19 a lot? What do they ask?

Anusha Manikantan, 3<sup>rd</sup> year student: Yes of course! As the pandemic hit, I was confronted with many questions regarding CoViD-19 by friends and family. All wanted to know how the virus gets transmitted, how long one would be sick, what were the symptoms and how one could prevent the spread of the virus. Many people also enquired whether we discussed this topic in our lectures. After the initial phase of CoViD-19 and the lockdown, people were curious to know to what extent preventive measures taken were useful and whether a vaccination against the virus was in sight. Recent questions asked are doubts focused on the reliability of the vaccines, who the primary recipients should be and what the long-term effects are.

### What was the biggest change for you since February?

Susan Plüss, 4<sup>th</sup> year student: The outbreak of the Corona pandemic had a major impact on my everyday life at university. I find it a particular pity that practical lessons at the patient's bedside were cancelled, but the lack of exchange with fellow students was hard too. In addition to that, the compensation period during my studies got shortened, because, for example, the university sports programme is not offered. That's why I'm all the more pleased about attractively designed podcasts and "Ersatz-Fachpraktika" via zoom that we have during the second wave.



Dr. Pascal Küpfer was selected as Teacher of the Year 2020

## Teacher of the Year 2020: Pascal Küpfer

### About the 5-year plan and other coincidences

When you study medicine, you enter a world of planning. For the first time you see the timetable, hear about complicated therapy plans and the always full surgery schedules. You try to remember and understand everything and at the same time plan your free time as efficiently as possible. Then you put together a neatly worked out learning plan and if it fails, you sit completely aimlessly before the exam.

Recha Suter, representing fsmb, has discussed why planning, but also coincidences are so important for us with our Teacher of the Year 2020. Because if our Teacher of 2020 had been told as a child that he was studying chemistry and would thus be standing in front of hundreds of students as a lecturer, so successfully that they would nominate him Teacher of the Year, then he probably wouldn't have had this on his agenda.

Dr. Pascal Küpfer is our Teacher of the Year 2020! Growing up in Interlaken, he saw himself as a child in the role of a policeman or a locomotive driver, but then discovered in grammar school that he was not so averse to chemistry. He studied chemistry at the

University of Berne and did his doctorate in bioorganic chemistry on a topic that he hadn't planned to do in such a way that he slipped in anyway, turned out to be a win-win situation. As a result, he occasionally took on lectures and later also found his way into teaching. Since 2016, he has been 100% active in teaching and tries to hold his lectures as he would like to have the subject explained to him.

He himself has not had a classical career following a 5-year plan and this is a good thing. He has always tried to be open to new things and is happy that things have turned out the way they did today. Therefore, he would like to tell students and graduates that ideas and plans are important, but that very often you don't end up where you saw yourself 5 years ago.

"Therefore, stay curious and be open to change, go without it and you will find your niche!"

On behalf of the entire student council, we congratulate Dr. Küpfer on his Teacher of the Year 2020!

Stay curious and be open to change,  
go without a 5-year plan and  
you will find your niche!

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The Bachelor and Master Program in Pharmacy combines natural and biomedical sciences with clinical and patient-oriented training  
Photo: pharmaSuisse

## Bachelor and Master Program in Pharmacy

### Profile

- Bifacultary study programme with the Bachelor course in Pharmaceutical Sciences at the Natural Sciences Faculty and the Master course in Pharmacy at the Medical Faculty
- Upon completion of the Master of Science in Pharmacy, the Federal Exam in Pharmacy has to be passed to have the right to work as a pharmacist
- In close collaboration with institutes of the Medical Faculty (most prominently the BIHAM), clinics of the Inselspital, and practising pharmacists we aim at developing a high-quality, patient-oriented education of our future generations of pharmacists.

### Appointment of two Professors

In early 2020, Alice Panchaud was appointed "Professor in Primary Healthcare in Pharmacy" and Sven Streit was appointed "Professor in Primary Healthcare in Medicine". The shared professorship is dedicated to promote interprofessional collaboration between pharmacists and physicians. Besides their responsibility for the clinical and patient-oriented education of the Master students in Pharmacy, Prof. Panchaud and Prof. Streit are developing a joint research programme. In addition, Prof. Panchaud works as hospital pharmacist and Prof. Streit in his GP practice.

### Opening of the Master in Pharmacy Program

The semester start on the 14th September 2020 marked the official opening of the new Master in Pharmacy Programme at the Medical Faculty. This special occasion was celebrated with a small opening ceremony. Rector Prof. Leumann and Dean Prof.

Bassetti welcomed the 26 Master students, and the professors and lecturers involved in the first Master year introduced themselves.

### Successful completion of the first Master semester

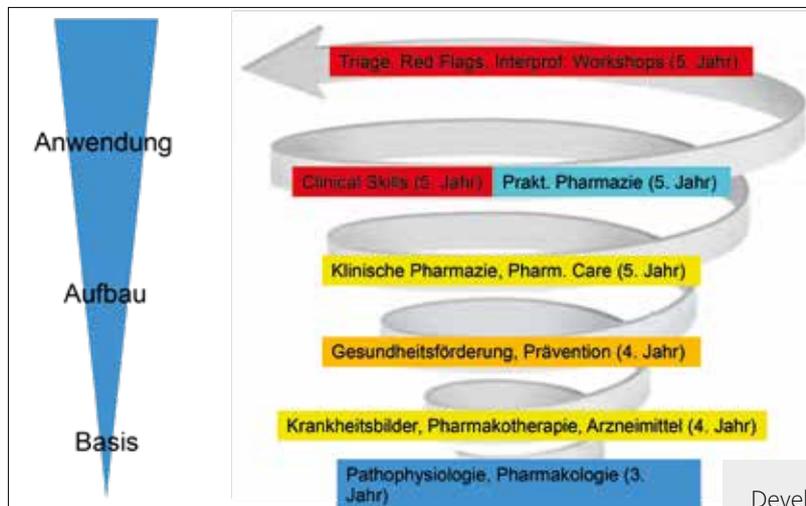
Despite the difficulties posed by the Coronavirus pandemic, the first Master semester was successfully completed. Teaching on site during the first 6 weeks allowed lecturers and students to get to know each other. After the switch to online teaching, lectures were provided via Zoom or as prerecorded podcasts. The three module exams, in the form of multiple choice exams on tablets, took place as planned just before Christmas.



Photo: pharmaSuisse

## Bachelor and Master Program in Pharmacy

Bachelor Program of the Natural Sciences Faculty		Master Program of the Medical Faculty	
Bachelor year 1&2	Bachelor year 3	Master year 1	Master year 2
Natural sciences (e.g. chemistry, physics, cell biology) and biomedical sciences (e.g. biochemistry, anatomy, physiology, microbiology, plant biology)	Pharmaceutical sciences (pharmaceutical technology, pharmaceutical chemistry, pharmaceutical biology, pharmacology, epidemiology, clinical chemistry, nutrition, biotechnology, quality management)	Diseases and pharmacotherapy, health promotion and disease prevention, the Swiss health system, pharmacoconomics, scientific methodology; Master thesis (6 months)	Clinical pharmacy and pharmaceutical care, clinical skills, vaccination, business management, law, manufacturing of medicines in the public pharmacy; Practical training in a public pharmacy (30 weeks)



Development of clinical competences in diagnosis and therapy during the Master course in Pharmacy.



Shared Professorship:  
Prof. Alice Panchaud and Prof. Sven Streit

**Administration Office Bachelor**  
Freiestrasse 3, 3012 Bern  
**Administration Office Master**  
Murtenstrasse 11, 3008 Bern



Starting in fall 2021

## Master of Science Program in Artificial Intelligence in Medicine

Do you want to develop engineering solutions to unmet medical challenges? Our master's program is your path to a successful career in medical technology innovation. In Bern, biomedical engineers, AI experts and clinicians work together to bring better treatments to patients.

### Profile

- Two-year full-time program in English
- Admission with bachelor's degrees in a variety of STEM subjects
- Rotations in university hospital departments to be instructed in medical specialties
- Fundamental and applied courses in AI
- Master's thesis project (one semester)
- Study at the Swiss medical technology hub with strong ties to industry and the clinic

### Program

The MSc Artificial Intelligence in Medicine (AIM) is an interdisciplinary, two-year, full-time master's program. Throughout the MSc AIM program students will gain a solid background in artificial intelligence (AI) and machine learning. In parallel, the program acquaints the students with basic concepts of biology and medicine and provides consolidated core biological, medical and clinical knowledge. During a period of two semesters, regular visits to the hospitals of the Insel Group will encourage students to dive deeply into clinical procedures and medical routines, in order to identify those processes and procedures that can benefit from AI.

The MSc thesis project (4th semester) will be conducted in collaboration with world-famous physicians from Bern University Hospital (Inselspital), internationally acknowledged researchers in the field of AI from the University of Bern and leading Swiss and international companies.

### Master of Science in Artificial Intelligence in Medicine

Murtenstrasse 50, 3008 Bern  
[www.caim.unibe.ch/msc\\_aim](http://www.caim.unibe.ch/msc_aim)

## Study Structure

### Semesters 1 - 4

#### AI Module 20 ECTS

Students will gain deep knowledge in artificial intelligence and machine learning through a series of mandatory courses, such as Machine Learning, Artificial Intelligence, Deep Learning and Reinforcement Learning.

#### Medicine Module 18 ECTS

Clinical and medical courses such as Physiology, Principles of Human Medicine and „Omics“ (from genomes to metabolomes) will allow students to understand the complexity of medicine. The mandatory course «Data Science in Clinics» via a system of rotations at different hospital departments, will allow them to become acquainted with the different medical specialities.

#### Foundations Module 20 ECTS

The selection of courses from the Foundations Module depends on the students' individual scientific background. The courses will act as bridge between the Bachelor and the MSc Artificial Intelligence in Medicine studies.

#### Applications Module 20 ECTS

Several mandatory courses will allow students to explore and understand the existing applications of artificial intelligence in domains like medical image processing, computer vision, natural language processing and medical decision support systems.

#### Electives 20 ECTS

#### MSc Thesis 30 ECTS





## Master Program in Biomedical Sciences

**Swiss Academic Institutions and Research Companies are faced with considerable problems when trying to recruit young biomedical scientists in Switzerland. Having the goal to ease this situation, educational opportunities in life sciences and biomedicine have multiplied in recent past.**

Among these efforts, the Biomedical Science Studies of the Universities of Fribourg (Bachelor) and Bern (Consecutive Master) have played a pioneering role. Established in 2006, the harmonized curriculum of the two universities remains unique in Switzerland as it is focused on exposing the students to a translational teaching environment involving both basic and medical sciences as well as insights into clinics. To achieve a comprehensive translational knowledge in biomedical sciences, the first year of the bachelor studies is dedicated to form a firm foundation in natural science while, in the second year, students share the curriculum of medical students thereby acquiring a comprehensive knowledge in human anatomy, physiology and biochemistry. During the third and the fourth year, students acquire a systematic knowledge of the pathophysiology of all organ systems with lecturers being associated with basic research institutions, the university hospital and pharmaceutical companies. The Master Thesis is conducted in a laboratory of choice and includes collaborative projects with the industry. Based on the specific design of the curriculum, graduates in biomedical sciences have an exquisite and broad portfolio of both knowledge and skills at the interface between basic sciences and clinical research that endorses them to engage successfully in basic, translational and clinical research including emerging new research fields in human medicine like artificial intelligence and precision medicine.

### Profile

- Direct admission with a BSc in Biomedical Sciences of the University of Fribourg or a Bachelor in Human Medicine
- 1 1/2 year full time study program
- Human pathophysiology is lectured by basic researchers and clinicians
- Courses include practical work in research laboratories and training in modern experimental techniques
- Two laboratory internships (3 weeks each) in research fields chosen by the students
- Opportunities for conducting the master thesis in the industry
- Broad portfolio of systematic knowledge and skills at the interface between basic sciences and clinical research
- Graduates are in high demand for doctoral positions in academia and for research positions in the industry

### Figures

- Diplomas since 2011: 199
- Presently enrolled students: 31
- Gender (f/m): 3/1
- 21 biomedical sciences graduated in 2020

### CSL Behring Prize 2020

The CSL Behring Prize 2020 for the best Master degrees went to:

1. Rank: Melissa Pitton \*5.80\*
2. Rank: Nerea Fernandez Trigo \*5.73\*
3. Rank: Camila Gemperli \*5.53\*



Melissa Pitton



Nerea Fernandez Trigo



Camila Gemperli



Left to right: Näf Pascal, Zünd Mirjam, Birrer Fabienne, Dommann Noëlle

### Alumni Biomedical Science Prize 2020

The prize for the best Master Thesis 2020 sponsored by the Alumni Organization went to Fabienne Birrer for her study on "The LIM protein Ajuba promotes a metastatic phenotype in colon cancer cell".

### Master Program in Biomedical Sciences

Bühlplatz 5, 3012 Bern

[www.medizin.unibe.ch/studium/studienprogramme/master\\_in\\_biomedical\\_sciences/index\\_ger.html](http://www.medizin.unibe.ch/studium/studienprogramme/master_in_biomedical_sciences/index_ger.html)



## Master of Science in Biomedical Engineering

The master's program in biomedical engineering is a full-time study program offered in cooperation with the Bern University of Applied Sciences. It aims at training multidisciplinary engineers to deliver scientific-founded, sustainable and cost-effective solutions for biomedical problems in academia, medical care and industry.

### Profile

- Admission with BSc (FH/HES/SUP/Uni/ETH)
- International program in English
- Affiliated to a leading medical faculty hospital (Inselspital)
- Two-year full-time program but compatible with 40% working time
- Oriented towards clinical applications
- Attractive, central location
- Excellent career perspectives

### Figures

- 162 students were enrolled in the fall semester
- 57 regular and 4 exchange or guest students joined in 2020
- 18% of new students are female
- 31 biomedical engineers graduated over the year 2020

### Online Teaching

What has clearly shaped university life the most in 2020 is distance learning due to the Sars-CoV-2 pandemics. Despite the major challenges, most students can look back on a successful 2020. Many thanks go to our resilient students, motivated faculty and staff and last but not least the continuous support of the Faculty of Medicine and numerous university departments, who reacted quickly and provided us with software and many useful hints and assistance.

### Swiss Medtech Award 2020

BME alumnus Andreas Hogg is co-founder and CEO of CoatX, a startup specializing in novel multilayer thin-film coatings. CoatX received the prestigious Swiss Medtech award 2020 in partnership with Rheon Medical, which developed the worldwide first non-invasive pressure equalization system to treat glaucoma. The coating technology of CoatX was key to this success, protecting the system's main component from bodily fluids.

### RMS Award 2020

In 2020, the RMS Award went to Michel Hayoz for his outstanding grade point average (GPA) of 5.89/6.0. Each year, the Robert Mathys Stiftung (RMS), an independent service laboratory and research institute located in Bettlach, offers it to the BME student with the highest GPA.

### Prix Retina 2020

Thomas Kurmann, BME graduate and current PhD student at the ARTORG Artificial Intelligence in Medical Imaging lab, received the Prix Retina 2020. The Prix Retina is awarded by the SRVG (Swiss VitreoRetinal Group), a section of the Swiss Society of Ophthalmology (SSO). He and his team developed an Artificial Intelligence (AI) tool for rapid interpretation of OCT (Optical Coherence Tomography) images, assisting ophthalmologists with comprehensive image analysis during a consultation with the patient.

### BME Club Award 2020

Giuditta Thoma received this year's BME Club award for the best master's thesis abstract entitled "Lung-Alveoli-on-Chip: Mechanical Characterization of a New Biological Membrane". The Biomedical Engineering Club (BME Club) of the University of Bern brings together the biomedical engineering alumni of the University of Bern, currently enrolled students, and representatives from the medical technology industry.



**Online Teaching**

One of the most typical images in 2020 – online lecture via Zoom in the course «Biomedical Instrumentation»

**Swiss Medtech Award 2020**

Andreas Hogg (right) at the award ceremony. Nikos Stergiopoulos (left) is founder and CEO of Rheon Medical.



**Prix Retina 2020**

Thomas Kurmann discussing with Prof. Dr. Sebastian Wolf, Head of the Inselspital Ophthalmology Department (Photo: Pascal Gugler © Insel Gruppe)

**BME Club Award 2020**

Giuditta Thoma



**RMS Award 2020**

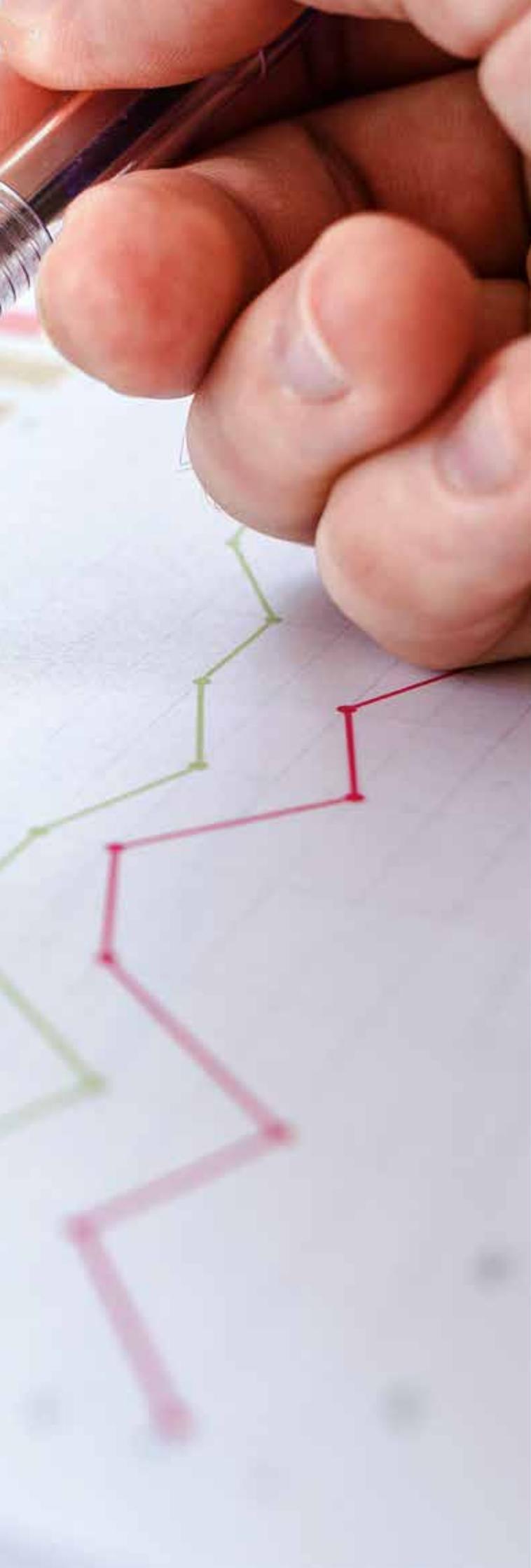
Michel Hayoz



**Master of Science in Biomedical Engineering**

Freiburgstrasse 3, 3010 Bern  
[www.bme.master.unibe.ch](http://www.bme.master.unibe.ch)





## Promotion of young academics

sitem-insel School for Translation and  
Entrepreneurship in Medicine  
CAS, DAS and MAS Degree Programs  
PhD Education  
Commission for Equality  
Grants



Kick off lecture at the MAS /DAS / CAS Translational Medicine and Biomedical Entrepreneurship

## sitem-insel School for Translation and Entrepreneurship in Medicine

sitem-insel School aims to promote researchers and train specialists in the fields of translational medicine and biomedical entrepreneurship. Lecturers and supervisors of the school are representatives from research and development-oriented private companies, scientists from universities, clinicians, collaborators from regulatory agencies, and financial experts.

### Profile

sitem-insel School

- aims to promote researchers and train executives in the fields of translational medicine and biomedical entrepreneurship
- aims to teach students practice-oriented high-quality knowledge
- aims to facilitate a strong network between people involved in the translational process
- offers training recognized by the University of Bern

Vision and aims

- Strengthen the School's national and international reputation and visibility in the field of translational medicine, biomedical entrepreneurship, AI in healthcare
- Increase number of national and international students

### Launch of new study program «Medical Device Regulatory Affairs and Quality Assurance»

On 01.09.2020 the newly created MAS/DAS in "Medical Device Regulatory Affairs and Quality Assurance" started with the kick off of the module 1 "R & D" and module 2 "EU Medical device regulation part A". Students around the world participated either coming to Bern or connecting via video conference.



New MAS/DAS «Medical Device Regulatory Affairs and Quality Assurance»

**MAS /DAS / CAS « Translational Medicine and Biomedical Entrepreneurship »**

Despite the Covid-19 situation, the study program started with a large cohort in september 2020 including many startups and projects with the goal to bring innovation to the patient.

Participants come from a.o. the Diabetes Center Berne (DCB), Retinai, Lumendo, Anavo, SpheroBiotics, MachineMD, MyLeg, ETHZ-Department of Biosystems Science and Engineering (D-BSSE), University Hospital Basel, University of Geneva, Johannes Gutenberg University of Mainz

**Symposium 2020 «Artificial Intelligence in Medical Imaging»**

As part of the CAS «Artificial Intelligence in Medical Imaging», the sitem-insel School organised the symposium in September 2020.

Various aspects of AI in clinical medical imaging were covered including cardiovascular imaging; deep learning in medical image processing; AI & radiology; machine learning in nuclear medicine; radiomics and radio-genomics and AI applied to digital pathology. Speakers featured top experts and leaders in the AI imaging field such as Ben Glocker, Imperial College London, Pallavi Tiwari, Case Western Reserve University), Erik R. Ranschaert, Elisabeth-TweeSteden Ziekenhuis (ETZ), Andreas Maier, University of Erlangen-Nuremberg, Anne Martel, University of Toronto, Steffen Petersen, Queen Mary University of London, Vitor Pereira, Toronto Western Hospital), Kim Mouridsen, Aarhus University and Jens R. Opalka, Mediaire GmbH, Berlin, Germany.



Symposium as part of the kick off of the CAS «AI in Medical Imaging»

**Launch of new study program «Medical Device Regulatory Affairs and Quality Assurance»**

On 01.09.2020 the newly created MAS/DAS in “Medical Device Regulatory Affairs and Quality Assurance” started with the kick off of the module 1 “R & D” and module 2 “EU Medical device regulation part A”. Students around the world participated either coming to Bern or connecting via video conference.



Study programs of the sitem-insel School  
 TMBE: Translational Medicine and Biomedical Entrepreneurship  
 AI in MI: Artificial Intelligence in Medical Imaging  
 MDRQ: Medical Device Regulatory Affairs and Quality Assurance



Milestones of the sitem-insel School

**sitem-insel School**  
 Freiburgstrasse 3  
<https://sitem-insel.ch/en/minds>



## CAS, DAS and MAS Degree Programs

The Medical Faculty offers over 30 programs of advanced studies. All programs are held by teachers of the faculty who transmit practice-oriented and state of the art knowledge. They are addressed to professionals with a tertiary education.

### Advanced study programs of the Medical Faculty

- Experimental and Translational Nephrology (CAS/DAS ETN Unibe)
- Hepatology (CAS/DAS HEP Unibe)
- Sleep, Consciousness and Related Disorders (CAS, DAS, MAS SCD Unibe USI)
- Clinical Nutrition (CAS)
- Spiritual Care (CAS SpC Unibe)
- Interprofessional Specialist Palliative Care (CAS PallCare Unibe)
- Swiss Exercise Therapy in Sports and Medicine (CAS/DAS SwissETSM Unibe)
- Swiss Cardiovascular and Diabetes Therapy (CAS SwissCDT Unibe)
- Exercise and sports therapy for mental illness (CAS PSY Unibe)
- Exercise and sports therapy in orthopedics, rheumatology and traumatology (CAS ORT Unibe)
- Public Health (CAS/DAS/Master in Public Health)
- Sex and Gender Specific Medicine
- Leadership in Health Care Organisations (CAS LHCO Unibe)
- Clinical Research in Health Care Organisations (CAS CRHCO Unibe)
- Managing Medicine in Health Care Organisations (CAS MMHCO Unibe)
- Translational Medicine and Biomedical Entrepreneurship (CAS/DAS/MAS Unibe)
- Artificial Intelligence in Medical Imaging (CAS AIMI Unibe)
- Master of Medical Education (MME Unibe)
- MAS in Leading Learning Health Care Organisations (MAS LLHCO Unibe)
- Master of Advanced Studies in Implant Dentistry (MAS IMPUnibe)
- Master of Advanced Studies in Orthodontics and Dentofacial Orthopedics (MAS ORTHO Unibe)
- Master of Advanced Studies in Cariology, Endodontology and Pediatric Dentistry (MAS REST Unibe)
- Master of Advanced Studies in Oral and Implant Surgery (MAS ORALSURG and IMPSURG Unibe)
- Master of Advanced Studies in Periodontology and Implant Dentistry (MAS PER and IMP Unibe)
- Master of Advanced Studies in Reconstructive and Implant Dentistry (MAS REC and IMP Unibe)
- DAS in Medical Device Regulatory Affairs and Quality Assurance (DAS MDRAQA)
- DAS in In-Vitro Diagnostic Medical Device Regulatory Affairs and Quality Assurance (DAS IVDMDRAQA) (planned)
- MAS in Medical Device Regulatory Affairs and Quality Assurance (MAS MDRAQA)
- MAS in In-Vitro Diagnostic Medical Device Regulatory Affairs and Quality Assurance (MAS IVDMDRAQA) (planned)

All study programs can be found on our website:

[www.medizin.unibe.ch/weiterbildung/cas\\_das\\_mas/index\\_ger.html](http://www.medizin.unibe.ch/weiterbildung/cas_das_mas/index_ger.html)

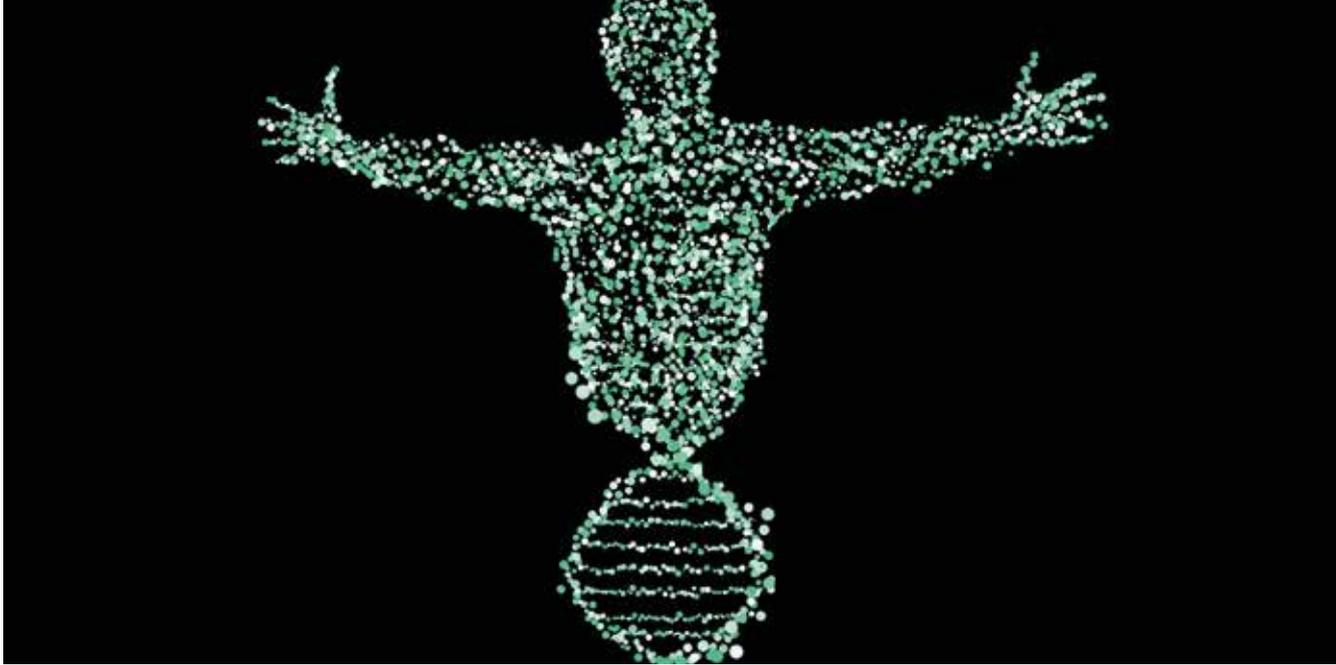
## New advanced study programs



DAS/MAS in Medical Device Regulatory Affairs and Quality Assurance

The continuing education program of the “School for Translation and Entrepreneurship in Medicine, sitem-insel” meets the new regulations of the EU in the field of medical devices (Medical Devices Regulation, MDR). On the one hand, specialists are familiarized with the new regulations and, on the other hand, so-called regulatory affairs specialists are trained who are responsible for compliance with the regulatory provisions within a company. The program consists of one DAS (min. 37 ECTS) and one MAS (min. 60 ECTS).





## PhD Education

The GCB and GHS offer research-oriented curricula with a wide choice of courses and special workshops and practical courses tailored to the individual needs of PhD candidates. The emphasis is on high-quality training and support in research methods and study design to direct the candidates towards independent scientific work and enable them to assume scientific responsibility.

### Profile of the Graduate School of Health Sciences GHS

The GHS offers a research-oriented-curricula on psychological and physiological factors that determine the health of individuals and groups in their social contexts and physical environments.

The requirement for the program is a master's degree in Psychology, Medicine, Biomedicine, Epidemiology, Geography, Sport Science or other fields depending on the respective research project.

There are three expert committees for the PhD program structure:

- FK I: Preventive and Social Medicine, Public Health, Medical Education, Psychology, Rehabilitation and Patient-Related Studies
- FK II: Neurosciences
- FK III: Clinical Sciences

Each candidate is supported by a thesis committee consisting of thesis advisor, co-referee and a member of an expert committee as mentor (only in FK III).

Awarded PhD title is:

- PhD in Health Sciences (specialist area) Curricula for medical doctors
- PhD in Clinical Sciences: 50:50 model: Patient-oriented research and clinical career.
- Graduates receive the title: PhD in Health Sciences (Clinical Specialty)

### Profile of the Graduate School of Cellular and Biomedical sciences GCB

The GCB offers training in experimental research with state-of-the-art methods in molecular life sciences, biomedical sciences and biomedical engineering. Research areas include Cell Biology, Biochemistry, Molecular Biology, Immunology, Genetics, Biomedical Sciences, Epidemiology as well as Tissue Engineering and Computer-Assisted Surgery.

There are three areas of specialization:

- Cutting-Edge Microscopy
- Stem Cell Research in Regenerative Medicine
- Cell migration

The requirement for the program is a master's degree in Molecular Life Sciences, Biomedicine, Medicine, Biomedical Engineering or a related field depending on the project.

There are five expert committees

- Biological Systems
- Biomedical Sciences
- Cell Biology
- Molecular Biology & Biochemistry
- Biomedical Engineering

Each candidate is supported by a thesis committee consisting of a supervisor, a co-advisor and a member of an expert committee as a mentor.

The curricula of the MD-PhD program for medical doctors focuses on basic sciences, but the PhD candidates can spend 20% of their time in the clinic.

Graduates receive one of the following titles:

- MD-PhD (Doctor of Medicine and Philosophy)
- DDS-PhD (Doctor of Dentistry and Philosophy)
- DVM-PhD (Doctor of Veterinary Medicine and Philosophy)

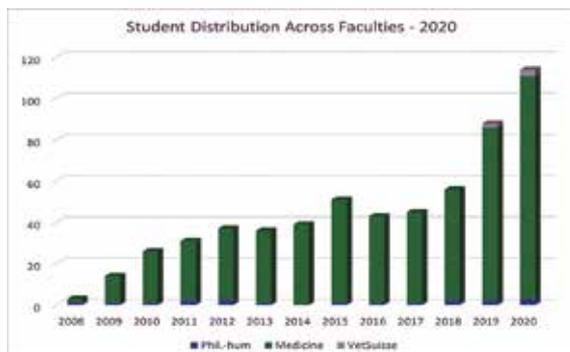
The graduate schools were fully functional throughout 2020 with no interruption despite the Covid-19 pandemic. GCB and GHS thank the Medical Faculty and the other associated faculties, together with the GHS/GCB office and students, committee members/mentors and supervisors for helping attain this achievement.

### Highlights, important events at GHS

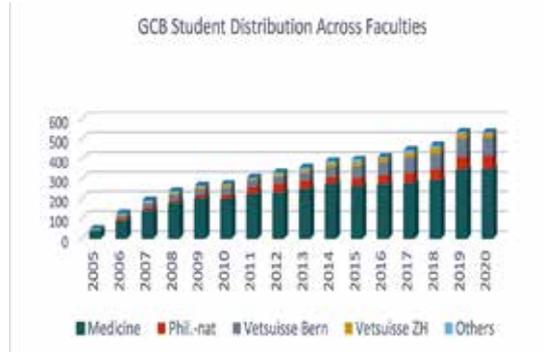
- 30% Increase students from 88 to 114
- GHS Symposium in a virtual format, scaled down from its original size, technically supported Prof. Dr. Tobias Nef and Dr. Stephen Gerber was very successful and the participation was high
- Changes in the Steering Committee: Prof. Roland Seiler retired and was thanked for his contribution, and Prof. Claudio Nigg was nominated as his successor
- Welcomed four incoming medical faculty expert committee members, and thanked two outgoing
- First GHS Annual Report was published
- Very proud to announce that the Swiss Academy of Medical Sciences (SAMS/SAMW) to Philipp Zens

### Highlights, important events at GCB

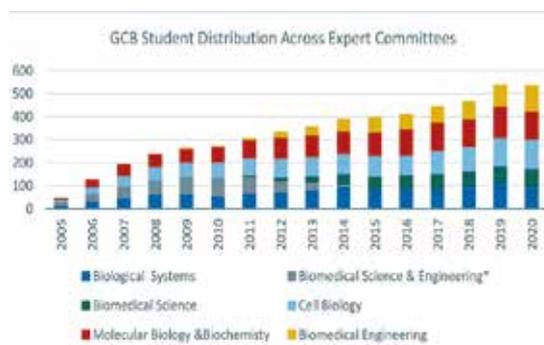
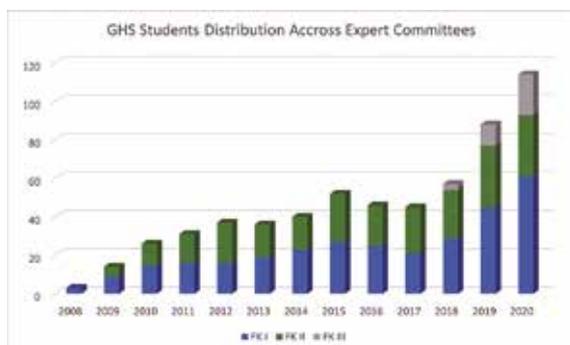
- New PhD regulations, effective February 1, 2020, were seamlessly implemented
- One-third of the total number of thesis defenses that took place in 2019 took place in 2020 between March and June while the university was on lock-down
- Admission Applications – there were 127 in 2020 compared to 141 in 2019.
- Welcomed 9 incoming medical faculty Mentors and thanked two outgoing
- Very proud to announce that the Swiss Academy of Medical Sciences (SAMS/SAMW) granted two fellowships to: Mey Boukenna and Sandro Christensen
- Preparation of the fully virtual GCB Symposium 2021 with maximum resources



114 total students in 2020, double number of students compared to 2018  
95% of GHS students are pursuing PhD degrees within the Medical Faculty



GCB total number of students in 2020: 534 registered, (which excludes 108 theses defended, and includes the 127 new applications in 2020)  
46 GCB Students are pursuing MD-PhD degrees



### Graduate Schools GCB & GHS

Mittelstrasse 43, 3012 Bern

[www.gcb.unibe.ch](http://www.gcb.unibe.ch) & [www.ghs.unibe.ch](http://www.ghs.unibe.ch)



## Commission for Equality

The Medical Faculty Commission for Equality (Innerfakultäre Kommission für die Gleichstellung, IFKG) supports the Medical Faculty in realizing measures ensuring effective equality and diversity throughout the whole medical faculty. Together with the decision-makers of the institutes and clinics, the IFKG for example aims to improve conditions that facilitate the decision for women to pursue an academic career.

The immediate aim of the Commission for Equality is an increase of the number of women in leadership positions in the Medical Faculty and to increase diversity. Among other measures, the IFKG aims to illustrate career options that improve working conditions such that they allow both women and men to combine their family life with their academic career pathway.

### Profile

- Mentoring 4 Women
- Ensuring implementation of equal opportunities in search committees and in the work environment of the Medical Faculty
- Contact point for all equal opportunity and diversity topics
- Contact point in case of discrimination
- External partners: Coordinator of the Office for Equality of the University Zürich, Coordinator of the Office for Equality of the University Hospital
- Tight interaction with HR Insel and the Office for Equality of the University Bern

### September 2020 – Novel Vice-Dean for Equality

In order to enhance visibility of the work of the Commission of Equality and give it a direct voice in the Faculty Board the Dean assigned a “Vice-Dean for Equality”.

Prof. Aristomenis Exadaktylos accepted this position and thus joins as a novel member the Commission for Equality. He will represent topics of equality and diversity in the Faculty Board.



Prof. Aristomenis Exadaktylos:

“In Switzerland, gender equality has been enshrined in the Federal Constitution since 1981 and obliges the legislator to ensure equality. In 1996, the Gender Equality Act came into force; it concretizes the constitutional mandate for working life, prohibits direct and indirect discrimination in all employment relationships and aims to ensure equal opportunities in working life. Since 2020, the vice dean for equality helps to enforce this fundamental right in everyday life in the Medical Faculty. This must not be an academic fig leaf, but must become an institution that proves itself in time and again, which networks with the already proven structures around gender equality and diversity and represents them passionately in the faculty leadership. I am looking forward to this challenge and hope to be able to set an example together with my colleagues from the commission for equality and our faculty.”

### March 2020 - Expansion of the Commission for Equality

In springtime, the Commission for Equality said WELCOME to four new members in the commission!

The aim of this expansion was to include representatives of all areas of the Medical Faculty.

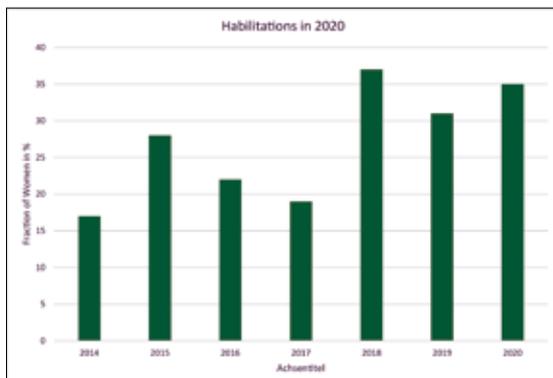
The Faculty Board elected the following additional areas and members to the Commission:

- Medical Education: Prof. Ursula Wolf, Institute for Complementary and Integrative Medicine (IKIM)
- Center of Competence – ARTORG Center for Biomedical Engineering Research: Prof. Dominik Obrist
- Center of Competence - Bern Center for Precision Medicine (BCPM): Prof. Eliane Müller, Clinic for Dermatology and DBMR
- Universitäre Psychiatrische Dienste (UPD): Prof. Sebastian Walther, Centre for Translational Research of the University Hospital for Psychiatry and Psychotherapy



### Figures

- The Medical Faculty aims for a fraction of 40% women when hiring professors. In 2020 from a total of 14 professors and associate professors recruited 8 are women which is a fraction of 57%. This underscores that the recruitment measures established by the Commission of Equality are successful.
- The rate of more than 30% women amongst the junior researchers achieving the “Habilitation” was stabilized in 2020:



### Gleichstellungsplan 2021-2025

Prioritäre Massnahmen:



### Equality Plan 2021 -2025 – Development and Implementation

Over the last 8 months, the Commission for Equality has been working intensively on the new Equality Plan for the next 4 years. In autumn, it was approved by the Faculty of Medicine and the University of Bern and is now entering the implementation phase.

There are many exciting projects in the pipeline for the coming years and volunteers are more than welcome to support us in these endeavors.

The Faculty of Medicine has set itself the following priorities, among others:

- Real protected research time for academic clinicians– RPRT
- Prohibiting sexual harassment in hospitals  
The Commission for Equality has launched a program to inform students about sexual harassment. Novel teaching units are implemented in the curriculum already this year informing the students on the different forms of sexual harassment and on what to do if one is affected.
- Family-friendly working environment  
In close cooperation with the Inselspital, the need for a flexible day nursery is to be examined in the near future. Therefore, an E-mail address “kinderbetreuung@insel.ch” has been set up to carry out a survey amongst employees about their specific needs for flexible childcare. Aim is a flexible low-cost irregular childcare for a few hours, for example for meetings of part-time staff on “free” days, for research activities, etc.
- Equality delegates in each clinic/institute
- Flexible part-time models for almost all positions 60-100%  
The Medical Faculty is participating in a cooperation project on the topic of alternative employment and working models to promote equal opportunities and diversity among the next generation of academic managers in medicine.

### Commission for Equality

Murtenstrasse 11, 3008 Bern

[www.medizin.unibe.ch/ueber\\_uns/gleichstellung/index\\_gor.html](http://www.medizin.unibe.ch/ueber_uns/gleichstellung/index_gor.html)

# Grants

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## **Graduate School in Health Science (GHS)**

3 options: Health Sciences; Cognitive Neurosciences and Clinical Sciences

Career stage: young MD's (open to other health professionals, psychologist, biologists, engineers)

Duration: 3 – 5 years

Number of calls per year: for Clinical Sciences 1x per year, otherwise continuously

Funding source: Medical Faculty

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## **Graduate School for Cellular and Biomedical Sciences (GCB)**

Career stage: biologists, engineers, MedVet, MD's

Duration: 3 – 4 years

Number of calls per year: continuously

Funding source: Medical Faculty

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## **CTU Grants**

Career stage: MD's before Habilitation

Duration: 1.5 year

Number of calls per year: 2x

Funding source: University Hospital

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## **Uni Bern Initiator Grant**

Career stage: postdocs and young PI

Number of calls per year: 2x

Funding source: University

Additional information: open to all disciplines; support for proposals for third-party funded career schemes (SNF mobility fellowships, Ambizione, SNSF-professorship; EU Marie-Curie-S. fellowships, ERC grants, etc)

---

## **Numerous Foundations**

Career stage: during BSc or MSc

Duration: 1 – 5 years

Number of calls per year: 1x

Funding source: Foundations

Additional information: open for students registered at the University of Bern in academic years 2 - 6

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## **Travel Grants**

Career stage: during BSc or MSc

Duration: 1 – 6 years

Number of calls per year: continuously

Funding source: Dean's office

Additional information: open for students registered at the University of Bern in academic years 1 - 6

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## **Protected Research Time**

Career stage: Doctoral Students at the Graduate School for Health Sciences, Senior Physicians

Duration: 2 – 4 years

Number of calls: approx. once per year

Funding source: Dean's office

Additional information: open for doctoral students at the GHS or Senior Physicians with an academic degree, working at least 6 months at the Insel hospital, UPD or Service Institute of the University, >40 years old and not habilitated

Women are explicitly encouraged to apply





# Centers and Platforms



ARTORG Center for Biomedical Engineering Research  
Bern Center for Artificial Intelligence (CAIM)  
Bern Center for Precision Medicine (BCPM)  
Department for BioMedical Research (DBMR)  
Department of Clinical Research (DCR)  
Microscopy Imaging Center (MIC)  
Swiss Institute für Translational and Entrepreneurial Medicine  
(sitem-insel)  
University Cancer Center (UCI)  
University Neurocenter

# ARTORG Center for Biomedical Engineering Research

Murtenstrasse 50, 3008 Bern  
[www.artorg.unibe.ch](http://www.artorg.unibe.ch)



Prof. Raphael Sznitman  
AIMI



Prof. Stefan Weber  
IGT



Prof. Philippe Zysset  
MSB



Prof. Tobias Nef  
GER



Prof. Olivier Guenat  
OOC



Prof. Dominik Obrist  
CVE



Prof. Stavroula Mouggiakakou  
AIHN



Prof. Laura Marchal-Crespo  
MLN



Prof. Mauricio Reyes  
MIA



Prof. Philippe Buechler  
CBE



Dr. Francesco Clavica  
UGE



Dr. Wilhelm Wimmer  
HRL

## Profile

- Interdisciplinary Center of Excellence for medical technology between the University of Bern, Inselspital and industry
- With its clinical partners ARTORG tackles unmet clinical needs in diagnosis, monitoring and treatment
- Longstanding experience in translation, clinical validation and commercialisation of MedTech research in Bern and beyond, including various start-up spinouts
- 12 independent research groups, 5 of them at sitem-insel, covering AI, Biomechanics, Organs-on-Chip, Rehabilitation, Robotics, Surgical Technologies, Virtual and Augmented Reality
- Services for projects at the intersection between medicine, engineering and microbiology: Biomechanics Laboratory, Clinical Research Databases, Medical Rapid Prototyping Core Facility, Organs-on-Chip Facility (biomicrofabrication), Scientific Computing, ARTORG workshop Mechanical Design and Production
- Teaching: master's program in Biomedical Engineering, postgraduate program Cellular and Biomedical Sciences, electives in Digitalization and AI for medical students, specialist courses for clinicians with sitem-insel, networking events with industry
- Collaborations: Inselspital; UPD; Imperial College; Universities of Nottingham, Oxford, Rutgers, British Columbia; Helmholtz Center; Universities of Freiburg, Stuttgart; Vienna University of Technology; EMPA; EPFL; ETHZ; HUG; University Zurich; BFH; UniBE (Center for Space and Habitability, Psychology, ZMK)

## Grants

- Swiss National Science Foundation, SNSF; SNSF BRIDGE; SNSF Sinergia
- Innosuisse
- Horizon 2020 (Marie Skłodowska-Curie)
- JDRF / Stiftelsen Promobilia / NCCR Robotics / 3RCC / SPHN / PASC HPC-PREDICT / Schweiz. Herzstiftung / Krebsforschung Schweiz / ERC Starting Grant / UniBE ID Grants

## Highlights

### Impedance-based CI Insertion Depth Estimation

A team from the Hearing Research Laboratory of the ARTORG Center and the Inselspital ENT Department have developed a new method that enables surgeons to quickly estimate the insertion depth of a cochlear implant (CI) based on impedance telemetry. The method is a valuable alternative for objectively assessing the surgical outcome, especially when resources are not available for postoperative computed tomography scans. Philipp Aebischer et al., IEEE Trans Biomed Eng. 2020 Jul 3.

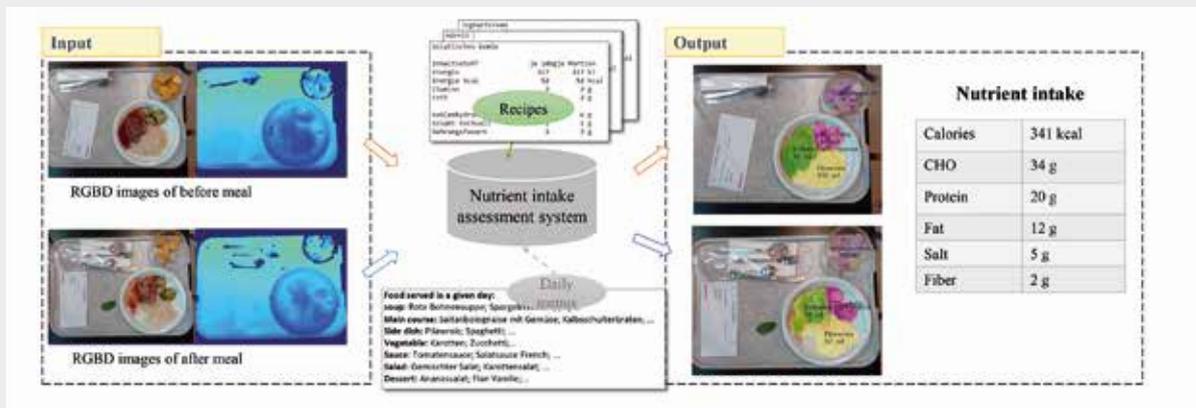
Philipp Aebischer with the setup for automated cochlear implant insertion experiments.



## AI to Tackle Malnutrition in Hospitalized Patients

The nutrient intake of hospitalized patients, who are at risk of malnutrition, needs to be continuously monitored. To assist health care professionals with this task and to achieve higher monitoring accuracy, researchers from ARTORG's Artificial Intelligence in Health and Nutrition Laboratory in collaboration with Inselspital have developed an AI-based system to automatically assess nutrient intake of inpatients. Experimental results of the system demonstrate promising performance against ground truth and outperform existing techniques.

Ya Lu et al., IEEE Trans. Multimedia, 2020.



Interface of the in-lab developed segmentation tool

## URODEA is Best Health Venture 2020

The spinoff of the ARTORG Urogenital Engineering group was awarded best Venture Health & Nutrition startup 2020. URODEA has developed a novel and simple solution for underactive bladders and prostate enlargements in collaboration with Prof. Fiona Burkhard, Chairwoman Urology Department Inselspital: a small battery-powered device that patients can discreetly carry in a pocket and use in the toilet to empty the bladder completely. The non-invasive technology avoids pain, bleeding and urinary tract infection associated with current standard treatments. Its safety and efficacy will soon be tested in a first in man clinical trial.



The URODEA Team from left to right: Dominik Obrist, Francesco Clavica and Lukas Bereuter.

## Stereotactic Image-guided Microwave Ablation

Ablation plays an important role in the treatment of hepatocellular carcinoma (HCC). Because image-guided navigation technology has recently entered the clinical setting, the Inselspital Departments of Visceral Surgery and Radiology together with the ARTORG Center conducted a study to analyze its safety, therapeutic and procedural efficiency. The retrospective study found that stereotactic image-guided microwave ablation is a safe and efficient treatment for HCC, avoiding open surgery and reaching lesions not detectable on conventional imaging.

Anja Lachenmayer et al., Liver Intl. (2019) Vol 39 issue 10.



Image-guided navigation allows the interventional radiologist to ablate carcinoma in the liver minimally-invasively.

# Center for Artificial Intelligence in Medicine (CAIM)

Murtenstrasse 50, 3008 Bern  
[www.caim.unibe.ch](http://www.caim.unibe.ch)



Prof. Raphael Sznitman  
 Director



Prof. Stavroula Mougialakou  
 Digitalization & AI Education



Prof. Roland Wiest  
 Digitalization & AI Education



Prof. Mauricio Reyes  
 Network & Outreach



Prof. Alexander Leichtle  
 Computational Facilities

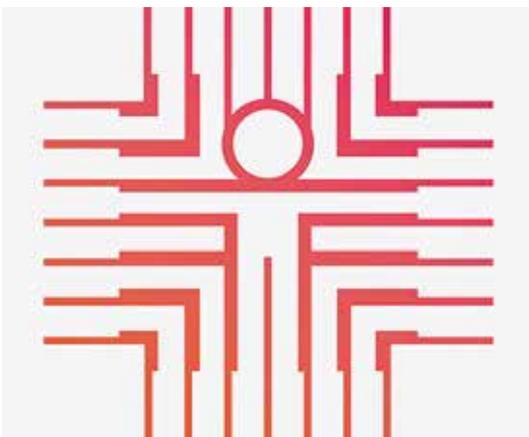


Prof. Kuangyu Shi  
 Research Project Fund



Prof. Inti Zlobec  
 Research Project Fund

## Origin and Aim



Digital technologies like Artificial Intelligence (AI) and robotics are steadily becoming everyday tools in clinical reality. Both the University and University Hospital and the Canton of Bern have major, strategic digitalization in healthcare goals. To take leadership in research and development of AI in Medicine, the University of Bern and the Inselspital together with partners from sitem-insel, the Swiss Institute for Translational and Entrepreneurial Medicine, and the Universitäre Psychiatrische Dienste (UPD) have founded the Center for AI in Medicine "CAIM" in January 2021.

CAIM connects world-class engineers, physicians and scientists in the area of AI in Medicine with collaborators in industry, patient advocacy and medical ethics. It provides researchers with resources and access to infrastructure to promote advanced AI and robotic technologies with a clear translation path into the clinic.

As the newest member of the Bern Biomedical Engineering Network, CAIM capitalizes on the strong expertise in medical digital technologies development and healthcare digitalization education to bring forward a new generation of AI-based diagnostics, treatment and intervention tools with positive impact for patients. The Center will foster commercialization of AI technologies and create sustained value by supporting start-up incubation.

## Structure

CAIM's activities are organized on four pillars:

Pillar I:

Digitalization & AI Education



EDUCATION

CAIM provides tailored AI in Medicine education for medical doctors and engineers through a portfolio of competitive and purposefully designed post-graduate programs to equip participants for Healthcare 4.0.

Pillar II:

Network & Outreach



INFORMATION

CAIM transmits trustworthy knowledge on AI in Medicine. This supports policy makers, educators and the general public by shaping the current debates on AI in Medicine with evidence-based information.

Pillar III:

Computational Facilities

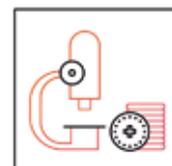


INFRASTRUCTURE

CAIM facilitates access and availability to computer infrastructure, computational and data resources to support advanced digitalisation and AI research within the Bern Medical Hub.

Pillar IV:

Research Project Fund



RESEARCH FUND

CAIM promotes technological innovation by funding projects with strong potential to be groundbreaking clinical approaches and a realistic pathway towards patient benefit.

## Profile

- Research, teaching and translation platform
- Investigates AI medical technologies that can facilitate the work of doctors and nurses and bring better care to patients
- Capitalizes on the strong network of scientific, healthcare and medical technology industry players in the Swiss capital
- Virtual Center of the University of Bern's Medical Faculty and the Inselspital
- In partnership with the Universitäre Psychiatrische Dienste (UPD) and sitem-insel

## AI in Medicine – Research and Translation

In the age of digitalization and data-based healthcare, artificial intelligence (AI) is an indispensable tool for analyzing large amounts of health data and rendering it into easy-to-use form to support diagnosis, treatment decision and disease management.

Various fields of AI in Medicine are currently being explored in Bern. Some examples include:

- Quantitative biosignal processing
- Biomarker identification in medical imaging
- Clinical data exploration with deep learning
- Monitoring of chronic disease progression
- Precision medicine (e.g. oncology)
- Real-time surgical navigation
- Surgical and rehabilitation robotics

CAIM connects all researchers within the Bern Medical Hub and provides support through funding and resources for competitive, collaborative, bottom-up driven research projects that address clinical challenges.

The Center provides important insights, evaluation and perspective for introducing novel AI technologies into clinical care by translating cutting-edge research into tools for clinicians and healthcare professionals.



AI for Biosignals and Robotics



AI for Precision Medicine



AI for Surgical Navigation

## AI in Medicine – Education

Targeted educational programs and courses of the University of Bern provide AI researchers and clinicians with cutting-edge know-how and qualifications in the field. This includes courses in "Digitilization and AI" for medical students, a dedicated AI in Medicine Master's program for engineers as well as AI in healthcare-related postgraduate training and further education offers.

Master's programs:

- MSc AI in Medicine (starts fall 2021)
- MSc Bioinformatics and Computational Biology
- MSc Biomedical Engineering

Certificates of Advanced Studies (CAS):

- CAS AI in Medical Imaging
- CAS Applied Data Science
- CAS Advanced Machine Learning
- CAS Biomedical Entrepreneurship



AI in Medicine Education

## Department for BioMedical Research (DBMR)

University of Bern, Murtenstrasse 35, 3008 Bern  
[www.dbmr.unibe.ch](http://www.dbmr.unibe.ch)



Prof. Mark  
Rubin  
Director DBMR



Prof. Robert  
Rieben  
Directorate  
Coordinator  
Murtenstrasse  
40/50  
Augenklinik



Prof. Willy  
Hofstetter  
Directorate  
Coordinator  
M.E.M.-Haus  
Pathologie



PD Dr. Manfred  
Heller  
Coordinator  
Kinderklinik



Prof. Peter  
Vermathen  
Coordinator  
SITEM



PD Dr. Monique  
Vogel  
Coordinator  
Sahli-Haus 1+2

### Structure

The DBMR is split up in 5 different divisions. With 47 research groups (41) from clinics of the Inselspital, Bern University Hospital), the Department for BioMedical Research (DBMR) promotes an integrative perspective to clinical research with a strong emphasis in the development of translational approaches. The groups of the department are supported by central services responsible for administration, informatics, technical support and bioinformatics. Additionally, the DBMR is also responsible for operating state-of-the-art Technology and Animal Core Facilities that also serve the broader research community of the University of Bern.

### Profile

- Research Department in Biomedicine of the Faculty of Medicine of the University of Bern
- Place where the researchers of the Inselspital research
- Aim: to bridge laboratory-based and biomedical patient-oriented clinical research
- Organizing networking platforms as progress reports, seminars and research conferences
- Teaching in the Programs: Master of Biomedical Engineering, Master of Biomedical Sciences, Bachelor of Human Medicine, Graduate School of Cellular and Biomedical Science
- External partners include: Catholic University of Louvain (BE); CSL Behring AG (CH); EPFL, Lausanne (CH); ETH Zurich (CH); Geneva University Hospital (CH); Novartis (CH); Roche (CH); RMS Foundation (CH); University of Basel, Basel (CH); University of Lausanne (CH); University of Zurich (CH); Ludwig Maximilian University of Munich (DE); Technical University of Dresden (DE); Technical University of Munich (DE); Aarhus University (DK); The Institute of Gustav Roussy, Paris (FR); Stanford Burnham Prebys Medical Discovery Institute (USA) / Weil Cornell Medicine (USA) / Ulsan National Institute of Science and Technology (Korea)

### Grants

- Dr. Anke Augspach: 2020 SAKK / Astellas GU-Oncology Award, CHF 30K
- PD Dr. Fabian Blank: Efficient pulmonary mucosal allergen immunotherapy in allergic airways disease employing, virosomes as nanocarriers for antigen and adjuvant, LungenLiga Bern, CHF 50K
- Prof. Manfred Heller: Matching Fonds R'Equip SNF and Directorate Teaching and Research, Inselspital for Project Ion mobility enabled ion fractionation in the gas phase for deeper prote-ome characterization, CHF 140K
- Dr. Alina Naveed: Investigating the cellular function of the NEAT1\_1 lncRNA in castration-resistant prostate cancer / Engelhorn Foundation, Postdoc Fellowship, CHF 178K
- Prof. Robert Rieben: Developing a next-generation targeted anti-fibrotic therapy for heart failure in a porcine model Innosuisse / Project partner: HAYA Therapeutics SA, CHF 835K
- Prof. Robert Rieben: Unravelling consequences of SARS-CoV-2 mediated inflammatory immune responses in heart and vasculature Project Grant 4078PO\_198297, SNF NFP, Co-PI, CHF 375K
- Prof. Robert Rieben: Forschungsgrant Microfluidic Culture of Endothelial Cells, CSLB, CHF 100K
- Prof. Robert Rieben: SNF Sinergia, Xeno2Cure- advanced engineering and testing of organ donor pigs Co-applicant, CHF 2'656K
- Dr. Nicoletta Sorvillo and Prof. Robert Rieben: Research Acceleration Initiative Grant, CSLB RAI, CHF 200K
- Dr. Antonio Rodriguez: Molecular pathology-artificial intelligence approach to therapy response prediction for castration resistant prostate cancer / Prostate Cancer Foundation Young Investigator Award, \$ 225K

- Prof. Mark A. Rubin: Ex vivo modeling and therapeutic targeting of NF1 loss in human prostate cancer / Novartis Foundation, Research Grant, CHF 60K
- PD Dr. Marianna Kruihof: Development of a platform for GU cancer patient-derived organoids /3RCC, Open Call 2019, Co-applicant Prof. Mark A. Rubin, CHF 395K
- Prof. Mark A. Rubin: Towards a new taxonomy for advanced prostate cancer, Krebsliga / Co-applicant: Salvatore Piscoglio (Uni. Basel), Silke Guilleßen (Oncology Institute of Southern Switzerland, IOSI), CHF 374K
- Dr. Johanna Triscott: Johanna Dürmüller-Bol DBMR Research Award 2020, CHF 30K

## Highlights

### Day of BioMedical Research 2020

Each year, the DBMR organizes the Day of BioMedical Research to provide a forum for the DBMR members to showcase and highlight their latest research. Since the first implementation 21 years ago, this year this event was held online. More than 140 posters were submitted, from which three were selected for the DBMR Poster Prizes. It was a great privilege to have Prof. Caroline Dive (Univ. of ZZZ), an expert on lung cancer, as the keynote speaker. Other highlights include the special session dedicated to COVID-19 related projects developed by DBMR researchers and the presentation of Dr. Johanna Triscott, the recipient of the Johanna Dürmüller-Bol DBMR Research Award 2020, on exploiting metabolic vulnerabilities in advanced prostate cancer.



### COVID-19 Research

Recognizing the challenge posed by the emergence of the new virus and the health crisis, the DBMR rapidly restructured its resources to make them available for translational research on SARS-CoV-2 and for the establishment of a scalable testing pipeline to cope with the by then limited commercial options. This pipeline is running over than 30 weeks now. Approximately 3800 swabs have been tested up to November.

### New internal Research Group on Cardiac Development and Reprogramming

Prof. Marco Osterwalder, a 2019 recipient of an SNF Eccellenza Grant entitled “Regulatory dynamics of heart formation and in vivo cardiac reprogramming”, started in April 2020 his research group. Prof. Osterwalder’s group complements other pre-clinical cardiac and genomics-oriented research groups at the DBMR.



### New Research Group on Translational Angiology

In January 2020, Prof. Yvonne Döring has started her research group. As part of the division of Angiology, Inselspital, Dr. Döring’s group focus on the pathophysiology of atherosclerosis paying particularly attention to lower extremity arterial disease.



### Professorship for Computational Medicine at DBMR

Reflecting the importance of -omics based research in the biomedical field, the Faculty of Medicine approved the establishment of a Professorship for Computational Medicine at the DBMR in 2021. In line with DBMR’s vision of fostering translational approaches and interdisciplinary team science, this new professorship focussing on bio-informatical analysis of -omics data, including the establishment of new methods/pipelines and analyses for new problems, will bring the DBMR to the forefront of computational medicine research.

## Bern Center for Precision Medicine (BCPM)

Murtenstrasse 40, 3008 Bern  
[www.bcpm.unibe.ch](http://www.bcpm.unibe.ch)



Prof. Mark Rubin  
Director



Prof. Carlo Largiadèr  
Vice-Director



Prof. Claudia Kühni  
(until Oct 2020)



Prof. Tosso Leeb  
(until Oct 2020)



Dr. Rémy Bruggmann



Prof. Nadia Mercader Huber  
Chair of the Scientific Review Board



Prof. Anne Angelillo-Scherrer



Prof. Sven Rottenberg



Prof. Christiane Zweier

### Structure

The Bern Center for Precision Medicine (BCPM) is an interdisciplinary center in support of precision medicine. It is composed of the management board, a scientific review committee, and the operational office. The center offers a platform for the researchers and educators of both the University and Inselspital, with the goal to promote and establish precision medicine. In 2020, the first executive board elections took place. Headed by Prof. Mark Rubin, the center currently has 72 members and more than 20 running research projects.

### Profile

- The BCPM strengthens the national and international position of the University of Bern and the Inselspital in the area of precision medicine.
- It aims to develop new medications and methods, increase the quality of treatment for patients, and relieve the healthcare system with more efficient therapies.
- The BCPM is active in research, education, networking, and outreach. External partners include other universities such as the ETH Zurich, cantonal hospitals, and international contacts such as Weill Cornell Medicine in New York.

### Grants

- SNF 192479: Prof. Christoph Schlapbach
- Innosuisse: Dr. Konstantinos Nirgianakis
- Swiss Cancer League: Prof. Stephan von Gunten
- ERC Advanced Grant: Prof. Sven Rottenberg

### Highlights



#### Biobank

The Liquid Biobank Bern (LBB) is one of the 10 technical platforms that BCPM unites. At the LBB, blood and urine samples are processed, frozen and stored in a fully automatic way. As of September 2020, samples from more than 500 Covid-19 patients had been collected at the LBB. These samples are now being used for Covid-19 research, some of which has been organized and funded by the BCPM.



The winners of the BCPM Covid-19 project round

### Project call on Covid-19 and SARS-CoV-2

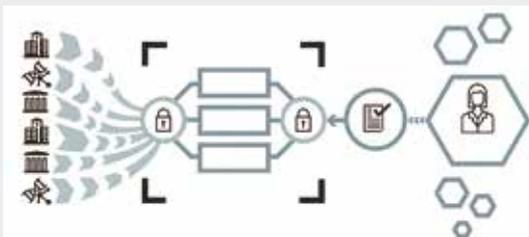
When the Coronavirus hit Switzerland in the spring of 2020, the BCPM issued a special call to fund projects aiming at advancing the knowledge on the disease, with an emphasis on precision medicine and local synergies. Six winning projects were selected, with their focus spanning from Covid pathogenesis to new treatment options, efficient patient care, and health system management.

### Genome Sequencing Infrastructure

In 2018, the BCPM and the Insel Group co-financed a genome sequencing infrastructure. Ever since, this infrastructure has increasingly been used by the researchers from the medical and science faculties, as well as by the clinicians from the Insel. In spite of the lockdown, the volume of processed data increased to 80 Terabyte per year, which represents about 25'000 human genomes. The infrastructure has also been pivotal for Covid research.



Novaseq 6000 sequencing



SPHN Infrastructure for Secure Data Exchange

### Swiss Personalized Health Network (SPHN)

The future of medicine lies in the analysis of individual genomic data in the context of large data sets. The goal of the Swiss Personalized Health Network (SPHN) is to create a secure framework to share genomic data between clinicians and medical researchers of different Swiss institutions, thus facilitating data exchange beyond cantonal borders. The BCPM has extensive ties with SPHN, especially via its cancer project (SOCIBP, with a volume of 2.3 Mio CHF), thus showing the value of data exchange in science.

## Department of Clinical Research

Mittelstrasse 43 and Freiburgstrasse 3 (sitem-insel), Bern  
[www.ctu.unibe.ch](http://www.ctu.unibe.ch)



PD Dr. Sven Trelle  
Director ad  
interim DCR and  
Director CTU



Prof. Urs Fischer  
Deputy Director



Christina Huf  
Head Quality  
Management



Miriam  
Wegmann  
Head Data  
Management



Muriel Helmers  
Deputy  
Head Data  
Management



Dr. Andreas  
Limacher  
Head  
Statistics and  
Methodology



Dr. Felix Rintelen  
Head Monitoring  
and Regulatory  
Affairs



Ulf Schreiber  
Head Clinical  
Research  
Coordinator

### Structure



Complexity of clinical research has been growing steadily. The Faculty of Medicine and Inselspital acknowledges the importance of patient-oriented clinical research projects. Therefore, CTU Bern was moved under a larger umbrella in 2020: the Department of Clinical Research. This new department will strengthen the clinical research activities at the Faculty of Medicine especially at Inselspital. It will be led by a full professor of clinical research. The units within the department will continue to provide support for clinical research projects. But the department will also be conducting own research projects and it will be responsible for education, especially promotion of young clinical researchers. CTU Bern will remain with its offices at Mittelstrasse 43. The other parts of the department will be located at the sitem-insel building on the Inselspital campus. A major focus there will be clinical investigation which will run an outpatient clinic for clinical research projects.

### Profile

- To provide the scientific, regulatory, and technical expertise needed to conduct patient-oriented clinical research at all stages, from conception to completion and dissemination
- Support is provided in a modular fashion and ranges from advice and general support to full development of the design and conduct of clinical studies. In 2020 we conducted more than 350 consultings and supported more than 330 clinical research projects
- Clinical Investigation (CI) moved into its new facilities of sitem-insel. The new environment offers fully equipped state-of-the-art examination and treatment rooms for the conduct of study visits
- Staff contributes to undergraduate teaching for medical, pharmacy, and biomedical sciences students
- Postgraduate teaching activities involve contribution to various Certificate/Diploma/Master of Advanced Studies courses
- Research ethics and Good Clinical Practice (GCP) training form an important part of our teaching activities and are supplemented by special courses and the monthly CTU lecture
- Research partners encompass all clinical departments and institutes of the Faculty of Medicine/Inselspital, members of the Swiss Clinical Trial Organization CTU network, and several Swiss cantonal and private hospitals as well as international partners such as the World Health Organization

### Grants, received as center/platform

- Four grant applications to the Swiss National Science Foundation for randomized-controlled trials with heavy involvement of CTU Bern received funding (three within the SNSF IICT call and one in the regular project funding scheme)

## Highlights



SARS-CoV-2 virus: the epidemic negatively affected also CTU Bern but also brought interesting new projects (Image by Gerd Altmann from Pixabay)

### Clinical study projects in relation to SARS-CoV-2

The SARS-CoV-2 pandemic also affected project activities at CTU Bern. CTU Bern has supported multiple projects including clinical trials. In spring, a multicenter randomized-controlled trial in patients with advanced COVID-19 was planned and started at record speed within a few weeks. We are also supporting the World Health Organization in their Solidarity trial program by providing Central Data Monitoring for the therapy trial and reporting and statistical analysis for the planned vaccine platform trial.

### New teaching activities

Further education and teaching remains an essential part of CTU Bern's mission. To this end, a new concept for a GCP Refresher course was developed, approved by Swissethics, and the first series successfully completed with more than 100 participants. CTU Bern also contributes to the new pharmacy master level program within the lecture series on drug development.



Teaching via Zoom: the new standard also at CTU Bern

### Quality management

Risk and quality management become more and more important when conducting clinical trials. This year, the quality management division started to reach out beyond CTU Bern itself: the division was heavily involved in a pilot project of the Swiss Clinical Trial Organization and performed external audits and provided consulting for clinical research infrastructures outside the university/Inselspital. With the move of Clinical Investigation into the new sitem-insel building, processes within the unit required a complete revision. Within a six month project, a new quality management system was implemented.

ISO 9001:2015 certificate



### Swiss Health Study

The Swiss Health Study aims to study the health of the Swiss population and influencing factors. It is planned as a large-scale population-based cohort study. For preparation, a pilot study was set-up, with Bern as one of two study sites. The start was bumpy because of the SARS-CoV-2 epidemic but the first participant was eventually enrolled in November this year.

## Microscopy Imaging Center (MIC)

c/o Theodor Kocher Institute, Freiestrasse 1, 3012 Bern  
[www.mic.unibe.ch](http://www.mic.unibe.ch)



Prof. Britta Engelhardt  
 Chair,  
 Representative  
 of the Medical  
 Faculty



Prof. Michael Stoffel  
 Representative  
 of the Vetsuisse  
 Faculty



Prof. Olivier Pertz  
 Representative  
 of the Faculty of  
 Science



Prof. Ruth Lyck  
 MIC coordinator

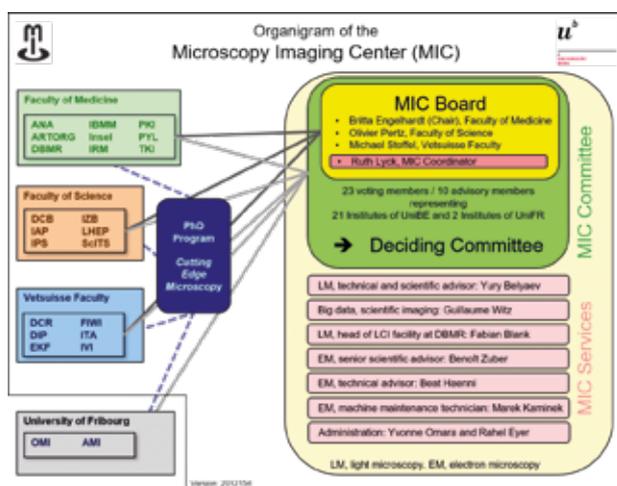


Dr. Guillaume Witz  
 scientific  
 assistance  
 BiImaging and  
 BigData



Dr. Yury Belyaev  
 scientific  
 assistance  
 Light Microscopy

### Structure



The MIC is the center of excellence for high-end microscopy in the life sciences at UNIBERN. Experts in microscopy from the Medical, Science and Vetsuisse Faculties of the Universities of Bern and Fribourg have joined forces to support high-end microscopy. A tight collaboration with Science IT support (SciTS) of UNIBERN ensures high quality support in data handling and image analysis. In 2020, the MIC Committee counted 23 voting and 10 advisory members. Amongst the 75 instruments registered at the MIC are 21 confocal light microscopes, 9 electron microscopes, two atomic force microscopy systems and one micro computed tomography (micro-CT) instrument. This equipment was used by 380 researchers in 2020.

### Profile

- Mission: Provide and disseminate expert knowledge and technical support. Implementation of new technologies; Central access to high-end microscopy
- Teaching and events: Lecture series on Advanced Microscopy. MIC workshops; MIC trainings; PhD program Cutting Edge Microscopy (CEM). In 2020, the MIC organized a 1-day summer school and a 2-day visit of the Institute for Research in Biomedicine (IRB) in Bellinzona
- Portfolio: From live imaging of whole organisms to organs, cells and subcellular dynamics; from 2D to 4D; High throughput setups; Light microscopy, electron microscopy, micro computed tomography and atomic force microscopy
- Service: Image analysis; Handling and processing of large data sets; Sample preparation; Training; Newsletter
- Internal activities: The MIC Committee convened at four regular meetings
- External partners: Swiss Society for Optics and Microscopy (SSOM); Life Sciences Switzerland (LS2), Intersection Microscopy; Scientific Volume Imaging b.v. (SVI); Swiss Microscopy and Imaging Core Facility Network; Science IT Support Unit of the University of Bern

### Grants, received as center/platform

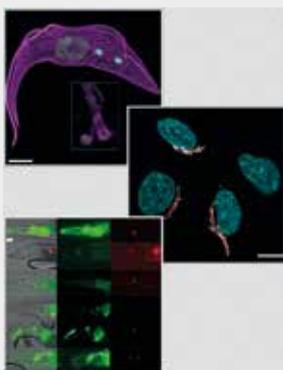
- SNSF Sinergia CRSII5\_198543 to the MIC committee member Prof. Volker Heussler Institute of Cell Biology, Science Faculty, with Prof. Deborah Stroka, Medical Faculty, and Prof. Sven Rottenberg, Vetsuisse Faculty
- SNSF R'Equip 316030\_198524/1 to the MIC committee members Prof. Wanda Kukulski, Institute of Biochemistry and Molecular Medicine, and Prof. Benoît Zuber, Institute of Anatomy

## Highlights

### 8th Swiss Microscopy Core Facility Day

On September 2, 2020, the MIC organised the Swiss microscopy core facility day as a hybrid-meeting with 40 attendees present in Bern and 30 attendees joining via ZOOM. Topics were "Challenges in managing and financing an imaging facility" and "Sample preparation as service in imaging facility".

#### 8th Swiss Microscopy Core Facility Day



### Highlights Science Faculty

Using "expansion microscopy", the cellular ultrastructure of the parasite *T. brucei* is seen at a resolution previously only achievable by electron microscopy. Ana Kalichava, Ochsenreiter laboratory. *JCS*, 10.1242/jcs.254300.

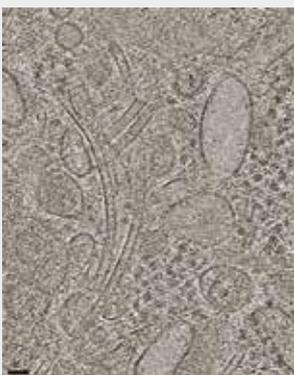
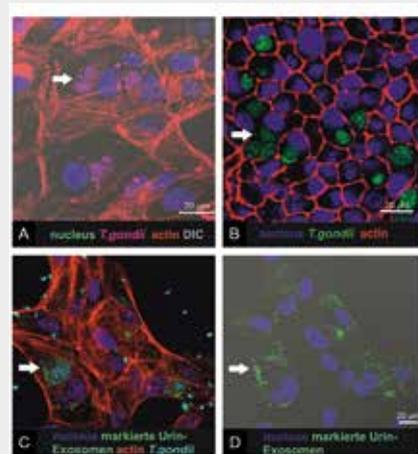
Infected cells use different ways to eliminate intracellular liver stage malaria parasites. Annina Bindschedler, Heussler laboratory. *Cellular Microbiology*, 10.1111/cmi.13271. In vivo microscopy validated a molecular footprinting technique to determine expressed genes in single cell types of the *C. elegans* without cell sorting. Meister and Glauser (UniFr) laboratories, *Genetics*, 10.1534/genetics.120.303774.

Top: *T. brucei*. Middle: Plasmodium parasites infecting host cells. Bottom: heads of *C. elegans*. Bars 10  $\mu$ m

### Highlight Vetsuisse Faculty

Exosomes are small vesicles secreted by many cells. Could they be used for targeted delivery of therapeutics? This question was investigated in vitro in relation to Ocular toxoplasmosis. Primary pigment epithelial cells of the retina (A) and stem cell-derived pigment epithelial cells (B) were infected with the parasite *T. gondii* (green). The parasites form intracellular cysts (arrows). Exosomes were labeled with a green fluorescent dye and presented to the infected cells. The exosomes were taken up and were located very close to the parasites (C and D, arrows). *International Journal of Molecular Science*, DOI: 10.3390/ijms21113799.

Functionalized exosomes as targeted delivery vehicles



### Highlight Medical Faculty

In May 2020, Wanda Kukulski relocated to the Institute of Biochemistry and Molecular Medicine of the University of Bern. The Kukulski group is interested in the architecture and function of cellular membranes. The group's particular expertise is in correlative light and electron microscopy and cellular electron cryo-tomography. The interactive and fostering environment of the MIC will permit building up a strong and sustainable pool of expertise in cutting-edge cryo-electron microscopy methods for cell and structural biology.

Slice through an electron cryo-tomogram of a HeLa cell, revealing its molecular landscape. Scale bar 50 nm

# Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel)

Freiburgstrasse 3, 3010 Bern  
[www.sitem-insel.ch](http://www.sitem-insel.ch)



Dr. Simon  
Rothen  
CEO



Dr. Julie Risse  
CBO



Dr. Christian  
Rosser  
Director sitem-  
insel Centralised  
Services



Prof. Juergen  
Burger  
Director sitem-  
insel School



Prof. Rudolf  
Blankart  
Director sitem-  
insel Promoting  
Services

## Structure

sitem-insel's strategy of "bringing innovation to the patient – by connecting people" is based on three pillars.



## Profile

- National Center of Excellence for Translational Medicine that professionalizes translation research for the benefit of patients, society and science
- Research and development infrastructure in a state-of-the art building catalyzes a multidisciplinary collaborative approach to unlocking 'bench to bedside' innovation
- Reducing silos by bringing together clinic and industry, research and education. Together, we are sitem-insel
- The competencies of private companies, the University of Bern, Inselspital and a number of startups are bundled as so-called "platforms" under one roof
- Non-profit public-private partnership in close cooperation with the University of Bern, the Inselspital, industry and start-ups
- More than 100 partners in the sitem-insel network
- 95% occupancy in platform facilities. 60% Medical devices, 30% medicinal and biotech products, 10% diagnostics
- 5 onsite regulatory support agencies
- Continuing education in Translational Medicine and Biomedical Entrepreneurship, Regulatory Affairs & Quality Assurance, Artificial Intelligence in Medical Imaging, Biomedical Entrepreneurship and Diagnostic AI Medical Systems – in development
- 24 modules taught by more than 100 lecturers from industry, academia and authorities
- More than 23 start-ups and companies in incubator phase since the beginning of sitem-insel School in 2017
- Over 10 shareholders from private and public sector

## Grants, received as center/platform

- «Development of Innovative Composite Multilayers Encapsulation Solutions in Orthopedic and Trauma Surgery», Innosuisse Projekt 41363.1 IP-LS, collaboration with Empa, CSEM, Coat-X S.A.
- «Remask – Atemschutzmasken für die Schweiz» Project in the frame of the national COVID-19 Science Task Force (NCS-TF), Economic-, energy- and environmental directorate of the canton of Bern

- “Development of the international master’s program MAS «Diagnostic AI Medical Systems» with international collaboration such as TU München”, Economic-, energy- and environmental directorate of the canton of Bern
- «Thin-film Multilayer encapsulation of smart microelectronic devices» Partnership Grants with China, Japan, South Korea and the ASEAN region, collaboration with OSG Corporation, Toyokawa, Japan & Coat-X, La Chaux-de-Fonds, Switzerland
- «International CAS „Artificial Intelligence for Medical Imaging” - Joint study program with TU München», Zentrum für universitäre Weiterbildung, ZUW, University of Bern
- «User-Centred Innovation in Medtech», Innosuisse NTN Innovation Booster, collaboration between sitem-insel, University of Bern, Berner Fachhochschule BFH, FH OST (Ostschweizer Fachhochschule, Health Tech Cluster Switzerland, Swiss Medtech Center SMTC Biel/Bienne

## Highlights



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### Opening of the new BSL-3 laboratory

The new biosafety laboratory within the sitem-insel building was completed on time despite the corona crisis and is now going into operation as planned. The biosafety-level 3 laboratory offers several advantages, as it combines state-of-the-art infrastructure for research and diagnostics. The laboratory is operated by the Institute for Infectious Diseases of the University of Bern. Within the biosafety laboratory, sitem-insel provides 2 lab units to all projects in translational medicine requiring BSL-3 classification, both public and private. These may be universities, universities of applied sciences, start-ups or companies, both in Switzerland and internationally.

### Completion of Executive Committee

On September 1<sup>st</sup> 2020, we complemented our executive board and welcomed Dr. Julie Risse as sitem-insel’s new Chief Business Officer. Within the executive committee, Julie is the first point of contact for our partners and will continue to expand the business activities of sitem-insel.



### Physical and digital events at sitem-insel

In February 2020 the annual media conference of the government council Christoph Ammann (including approximately 15 media representatives) took place at sitem-insel. Just one week later the distinguished delegation of the “Berner Runde” met at sitem-insel to analyze the idea and tasks of this research center in the overall context of the medical location of Bern. Until then many meetings and gatherings were held with the premises of sitem-insel. It became a place to connect and network. Of course, the Covid-19 pandemic also forced us to organize meetings and activities digitally to keep up the sitem-spirit and connect people. We were fortunate to switch to digital or hybrid events very swiftly and to continue our event series “learn@lunch” and launch our new event series the “InnoForum” successfully. We’ve held a total of 17 events with both series.



### out.of.the.box.box

Art produces thinking. It is not the mechanics or technical skill that create art – the secret lies within the process of introspection and different levels of contemplation that generate it. At sitem-insel we are using the space in our Atrium A (our so called out.of.the.box.box) to allow artists to show their work and trigger the introspection as well as unfamiliar perspectives of the viewer. On display throughout 2020 and 2021 are the works of various artists, some of which are featured through a collaboration between sitem-insel and Galerie SOON.

# University Cancer Center (UCI)

Inselspital, Bern University Hospital, Freiburgstrasse 10, 3010 Bern  
[www.tumorzentrum.insel.ch](http://www.tumorzentrum.insel.ch)



Prof. Daniel M. Aebersold  
 Chairman  
 and Board of  
 Directors



Prof. Michael Müller  
 Vice-Chairman  
 and Board of  
 Directors



Prof. Adrian Ochsenbein  
 Board of  
 Directors



Prof. Aurel Perren  
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Prof. Andreas Raabe  
 Board of  
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Prof. Ralf Schmid  
 Board of  
 Directors



Prof. George Thalmann  
 Board of  
 Directors



Prof. Jörg Beyer  
 Managing  
 Director

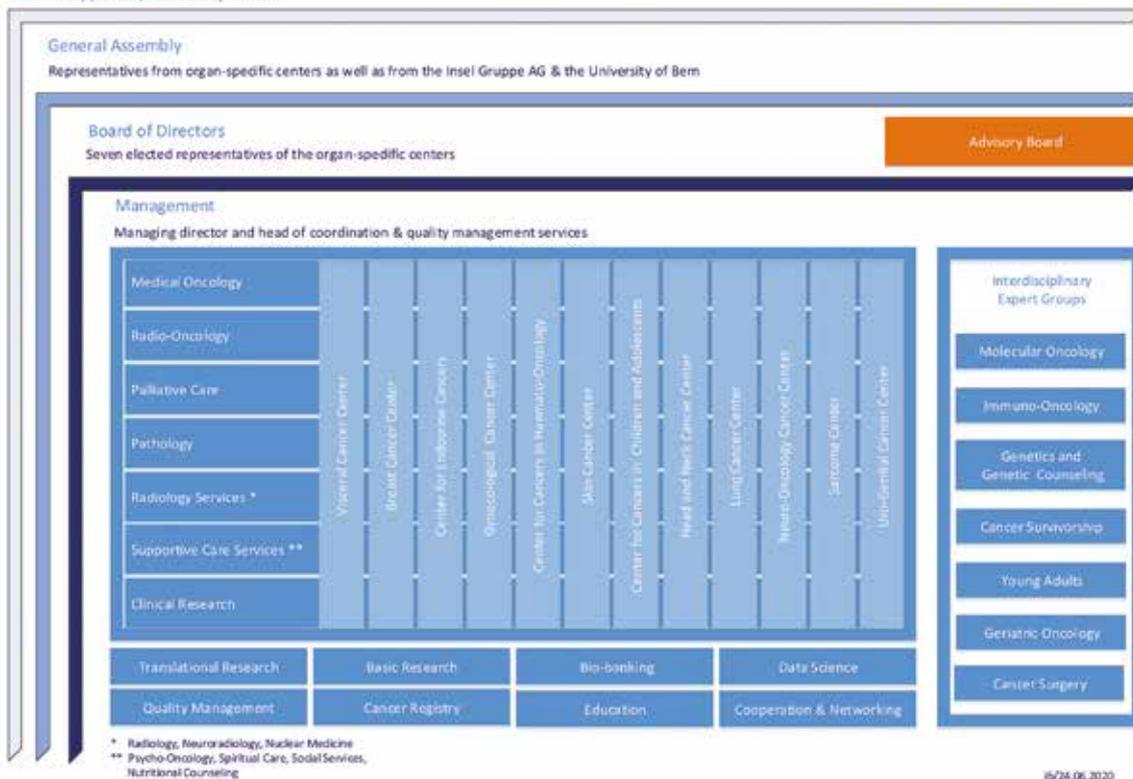


Sybille Meyer-Soltys  
 Head  
 Coordination  
 and Quality  
 Management

## Structure

### University Cancer Center Inselspital (UCI)

Inselspital / University of Bern



The structure of the UCI is outlined in figure 1. Twelve organ-specific cancer centers constitute the core of the UCI – supported by interdisciplinary services and expert groups focusing on special aspects of cancer care.



# University Neurocenter

Inselspital, 3010 Bern

[www.insel.ch/de/das-inselspital/universitaeres-neurozentrum-bern](http://www.insel.ch/de/das-inselspital/universitaeres-neurozentrum-bern)

## Structure



The University Neurocenter Bern, representing the clinical and scientific cooperation of the University Clinics for Neurology, Neurosurgery and the Institute of Diagnostic and Interventional Neuroradiology as well as Neuropediatrics and Psychiatry was founded in 2012. With 400 beds, >1'400 collaborators, >60'000 ambulatory patients, >8'000 stationary patients, and >3'500 operations/interventions/angiographies each year and a budget of > 350 Mio CHF it is the largest of its kind in Switzerland, and leading in Europe.

## Profile

Research areas and platform with strong transdisciplinary approaches/interactions within the Neurocenter include the following:

- Stroke, including complex neurovascular diseases
- Sleep-wake-epilepsy, including epilepsy surgery including epilepsy surgery and biomedical research (NeuroTec)
- Advanced neuroimaging, intraoperative imaging, post-processing and clinical implementation of machine learning
- Movement disorders, including functional neurosurgery for Parkinson's disease, neurological and psychiatric disorders
- Neurorehabilitation including computer-assisted systems and robotics
- Neuroimmunology including basic experimental approaches, translational concepts and clinical studies
- Neurodegeneration/dementia
- Intraoperative surgical technologies: Neuromonitoring, robotics, augmented reality navigation associated developments, targeted procedures and 3D printing and simulation techniques
- Systems neuroscience and psychopathology
- Ultra-High Field MRI

External Partners: Universities and large hospitals in Switzerland; Centre Suisse d'Electronique et de Microtechnique (CSEM); European Stroke Organisation Trials Alliance; McGill University, Canada; University Claude Bernard Lyon, France; University Medical Center Goettingen; Ruhr University Bochum; Medical University Vienna, Austria, University of Pennsylvania, Philadelphia, USA; Royal Children Hospital Melbourne and Institute of Child Health London, UK

## Grants

Neurology:

- SNSF: 20 grants (2 grants awarded in 2020: 197009, 197709. 18 running grants: 169975, 175615, 172952, 172793, 179929, 179436, 176985, 179595, 185362, 188761, 173081, 179667, 189077, 172676, 179277, 179565, 175984, 180365)
- Horizon 2020: 5 grants (1 grant awarded in 2020: MSCA-ITN-2020 956977. 4 running grants: ERC Consolidator Grants (725850 and 725825); Eurostars-2 (E! 12034/18/Q); MSCA-ITN-2019 860035)
- Others: Swiss Heart Foundation, Swiss Academy of Medical Sciences, Innosuisse, Bangerter-Rhyner Foundation, Baasch Medicus Foundation, Parkinson Schweiz

Neuroradiology:

- SNSF grants 170060, 182569, 190817 195801, 189136, 160107, SINERGIA CRSII5\_180365
- Horizon 2020 INSPIRE MED (Marie Sklodowska-Curie grant 813120)
- Others: SPHN Driver Project IMAGINE, Innosuisse 43087.1 IP-LS, SISF Grants, Swiss Heart Foundation, Medtronic

Neurosurgery:

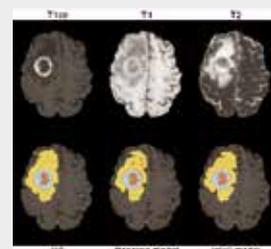
- SNSF grants: SNF Grants: Bridge (176498), Mapping and modeling of Deep Brain Stimulation (186142)
- Others: Innosuisse 36538.1, Swiss Heart Foundation, Hanela Stiftung, Parkinson Schweiz, CTU-Forschungsgrant, Bangerter--Rhyner Foundation

Neuropediatrics:

- SNSF grants: 33IC30-193039: PASTA trial
- Others: Schweizer Krebsliga and Schweizer Krebsforschung: Brainfit study; Jacobsfoundation Onset Study

### Artificial intelligence solutions for neuromedicine

Researchers of the SCAN (Institute for Diagnostic and Interventional Neuroradiology) have been ranked 1st worldwide in 2 of 3 categories in the international Brain Tumor Segmentation Challenge (BRATS) at the virtual MICCAI 2020 congress in Peru. The Bernese Deep SCAN algorithm has also been successfully adopted for MS segmentation and brain morphometry and is currently in use among world-wide research projects as the Federated Tumor Segmentation Initiative (FeTS) and within the framework of our newly established rapid validation unit (RVU) for clinical testing and consulting in the domain of clinical neuroimaging.



Fully automated tumor segmentation using Deep Learning

### NeuroTec

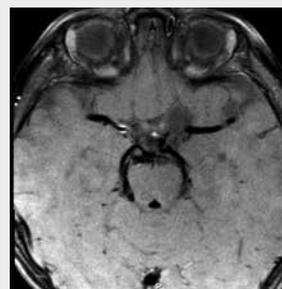
Many neurological disorders such as epilepsy, sleep-wake disorders, Parkinson's, multiple sclerosis, Alzheimer's or stroke are chronic or cause chronic sequelae with fluctuating dynamics. However, current hospital- and appointment-based patient care provides «snap-shot»-like information only, thereby strongly undersampling the time course of a disease. At NeuroTec, a newly founded research and development platform located at the Swiss Institute for Translational and Entrepreneurial Medicine (sitem) and run by the Department of Neurology in close collaboration with ARTORG, an interdisciplinary team of physicians, engineers and data scientists strives at closing this information gap. New devices and methods are tested that will allow to record digital biomarkers in the everyday out-of-hospital life of patients. The goal is to monitor the individual course of a patient's disease and thus enable personalized diagnostics and therapies on an unprecedented scale. As a concrete example the ULTEEM system, developed in collaboration with the Centre Suisse d'Electronique et de Microtechnique (CSEM) and sponsored by the European Space Agency (ESA) is shown on the left. This minimally obtrusive system integrates dry electrodes, amplifier and memory and is so small that it may be attached to the frame of glasses. The ULTEEM allows to record non-invasively the electric brain activity generated by the temporal lobes, as has been successfully tested at NeuroTec.



Ultra-Long-Term-EEG Monitoring System (ULTEEM)

### PASTA (Paediatric Arteriopathy Steroid Aspirin) TRIAL

Focal cerebral arteriopathy of the inflammatory type (FCA-i) is one of the most frequent aetiologies of childhood stroke. Two thirds of these children are left with significant neurological and/or neuropsychological long term sequelae. The parainfectious inflammatory pathophysiology has stimulated many neuro-paediatrician to try to improve arterial stenosis as well as outcome by steroid treatment. However, there is no evidence for such a treatment. The SNF has now financed the PASTA ICT trial – a randomized controlled trial with blinded outcome. This international multicentre trial in cooperation with Neuroradiology and Neurology is beside studies on treatment of vascular problems in children with sick cells, worldwide the first treatment trial in childhood stroke – recruitment of patients will start in 2021!



Focal cerebral arteriopathy with marked stenosis at T junction with sign of inflammation by hyperintensity in dark blood imaging



# Institutes at the University of Bern

Institute of Anatomy

Institute of Biochemistry and Molecular Medicine (IBMM)

Institute for the History of Medicine (IMG)

Institute of Pharmacology (PKI)

Institute of Physiology

Institute of Social and Preventive Medicine (ISPM)

Theodor Kocher Institute (TKI)

Institute for Infectious Diseases (IFIK)

Institute of Pathology

Institute of Forensic Medicine (IRM)

Institute of Dental Medicine (ZMK)

Institute of Primary Health Care (BIHAM)

Institute of Complementary and Integrative Medicine (IKIM)

Institute for Medical Education (IML)



# Institute of Anatomy

Baltzerstrasse 2, 3012 Bern  
[www.ana.unibe.ch](http://www.ana.unibe.ch)



Prof. Valentin Djonov  
Director



Prof. Nadia Mercader Huber  
Co-Director



Prof. Benoît Zuber  
Co-Director



Prof. Johannes Schittny  
Group Leader



PD Dr. Edik Babychuk  
Group Leader



PD Dr. Elisabeth Eppler



PD Dr. Gudrun Herrmann  
Group Leader



PD Dr. Ruslan Hlushchuk  
Group Leader



PD Dr. Asparouh Iliev  
Group Leader



PD Dr. Rene Köffel  
Group leader



PD Dr. Stefan Tschanz  
Central Services  
Leader

## Profile

- Teaching: The Institute of Anatomy is responsible for the comprehensive teaching of preclinical medical students (Human and Veterinary Medicine, Dentistry) and students of related paramedical fields (Biomedical Sciences, Pharmacy, Biomedical Engineering, Physiotherapy, Osteopathy) in subjects such as Gross Anatomy, Histology, Embryology and Cell Biology. In addition, postgraduate education and advanced surgical training is provided for medical graduates specializing in a large variety of surgical fields. We also educate postgraduate medical students (Master/MD) as well as PhD students at the Graduate School for Cellular and Biomedical Sciences (GCB), including the Interfaculty Cutting Edge Microscopy PhD Specialisation Course (responsible: Prof. N. Mercader Huber)
- 10 research groups with various research topics: novel radiotherapy approaches (e.g., microbeam radiation therapy); cellular damage control and liposomal nanotraps against bacterial toxins; cardiac development and regeneration; ultrastructure and function of synapses, protein structure; pulmonary development; structure and function of cilia; neuroinflammation and brain infections; microCT-based imaging
- External research partners: Australia: Australian Synchrotrone, University of Melbourne, Monash University, University of Sydney. Denmark: University of Copenhagen. Finland: Biomedicum Helsinki. France: French National Centre for Scientific Research, European Synchrotron Radiation Facility, University Hospital Henri Mondor, Institut du Fer à Moulin. Germany: University Clinic Lübeck, University of Erlangen-Nürnberg, Max Planck Institute for Heart and Lung Research, University of Giessen, University of Göttingen, Evangelisches Krankenhaus Göttingen-Weende, German Center for Neurodegenerative Diseases (DZNE), Max Planck Institute for Biochemistry, University of Münster, University of Halle--Wittenberg, University of Magdeburg. Israel: Hebrew University. Latvia: University of Latvia. Slovenia: University of Ljubljana. Spain: Centro Nacional de Investigaciones Cardiovasculares CNIC. Sweden: Lund University. Switzerland: Idiap Research Institute, Anapath Services AG, University of Basel, Institut Straumann AG, Fumedica AG, Kantonsspital St. Gallen, University of Zurich, Paul Scherrer Institute, Lascco SA, ETH Zürich, Lausanne University Hospital, University of Fribourg. UK: University of Birmingham, Diamond Light Source

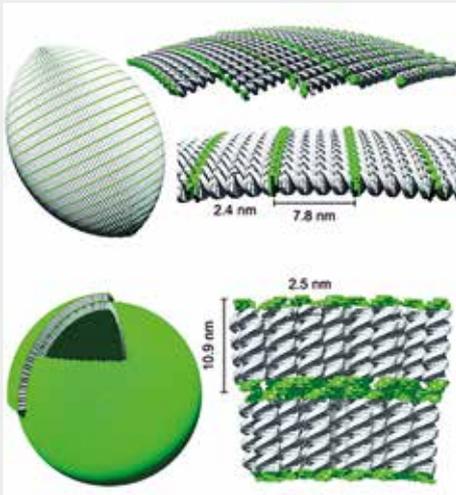
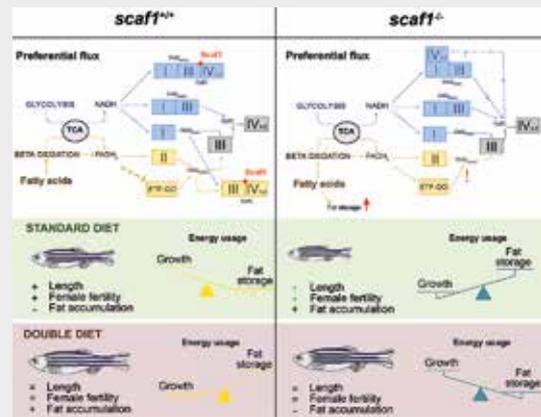
## Grants

- 7 SNF grants, 4 EU grants, 47 international/3rd party grants

### Scaf1 promotes metabolic efficiency

Scaf1 promotes respiratory supercomplexes and metabolic efficiency in zebrafish. A CRISPR/Cas9 mutant zebrafish model revealed that superassembly of mitochondrial respiratory complexes provides metabolic fitness. While the absence of CIII-CIV superassembly does not lead to severe pathology, animals tend to accumulate adipose tissue and require more nutrients to build up muscle mass compared to controls. Thus, the incorporation of CIV into SCs through Scaf1 provides metabolic fitness allowing the organism to adapt to changing environmental energy supply or energy demands.

García-Poyatos et al., EMBO Reports 2020.



### Supramolecular assembly of DNA-constructed vesicles

In a collaboration with Prof. Häner (Dept. of Chemistry and Biochemistry, UniBE), we have resolved the molecular structure self-assembled DNA hybrids vesicles by cryo-electron microscopy and found that two types of arrangement exist. The type of packing has a significant effect on the accessibility of the DNA, as evidenced by intercalation and light-harvesting experiments. DNA-constructed vesicles of the kind shown here represent versatile intermediates that are amenable to further modification for tailored nanotechnology applications.

Rothenbühler S, Iacovache I, Langenegger S, Zuber B, Häner R. Nanoscale, 2020

### In memoriam

At the end of 2020, the Institute of Anatomy lost one of its most prominent members – Prof. Dr. Annette Draeger. Annette was born in Hamburg and studied medicine in Aachen, Hamburg, Lausanne and Melbourne. After her graduation, she worked with Alan Weeds in Cambridge. Then, she moved to München and worked as a postdoc at the Department of Pathology of the Ludwig-Maximilians-University. From 1987 to 1995, she was a postdoc and then a group leader at the Institute for Molecular Biology of the Austrian Academy of Sciences in Salzburg. She habilitated there too. At that time, she was among the pioneers of the confocal microscopy and studied the organization of actin in smooth muscle cells.

In 1995, Annette joined the Institute of Anatomy in Bern as a professor. Her research focused on the proteins of the annexin family, both as physiological components in muscle contraction and as factors in membrane repair. This interest had further evolved towards research into the repair mechanisms after membrane damage by bacterial toxins. Her laboratory developed the concept of the intelligently-designed liposomes as “decoy flares” for scavenging bacterial pore-forming toxins. They proved to be highly effective in the treatment of sepsis (Nature Biotechnology (2015) and Lancet Infectious Disease (2019)).

Annette Draeger was a dedicated teacher. Even in her last year, already marked by her illness, she was involved in 550 hours of lectures, histology and dissection. She was a chairperson of the dissertation committee of the Medical Faculty. She was the organizer and the soul of the Institute’s yearly commemorative service organized to honor the body donors. Annette Draeger enjoyed classical music and the works of Shakespeare. She will be remembered as a warm-hearted, curious, passionate and very open person. All her colleagues and friends at the Institute of Anatomy miss her.

# Institute of Biochemistry and Molecular Medicine (IBMM)

Bühlstrasse 28, 3012 Bern  
[www.ibmm.unibe.ch](http://www.ibmm.unibe.ch)



Prof. Christiane Albrecht



Prof. Wanda Kukulski



PD Dr. Jin Li  
Ambizione  
Group Leader



Prof. Christine Peinelt  
Co-Director



Prof. Hugues Abriel  
Co-Director  
Head NCCR  
TransCure



Prof. Peter Bütikofer



Prof. Dimitrios Fotiadis  
Managing  
Director



PD Dr. Charles Roch-Philippe  
Lecturer



Prof. Jürg Gertsch  
Deputy Director



PD Dr. Martin Lochner  
Lecturer

## Profile

- Basic and specialized teaching in biochemistry, molecular and pharmaceutical biology, and molecular medicine, teaching activities in the faculties of Medicine, Natural Science and Vetsuisse to pre- and postgraduate students (GCB)
- Ten research groups
- Interdisciplinary research on structure, function, and pharmacology of membrane proteins (transporters, ion channels, and receptors), with a strong emphasis on the roles of these membrane proteins in human diseases such as cancer, neuropsychiatric and cardiac disorders, pre-eclampsia and pathogen infection
- Aim: Unravel molecular working mechanisms of selected membrane proteins, discover new therapeutic targets
- Leading House of NCCR TransCure - Excellence in Membrane Transport Research
- D-BSE & D-CHAB, ETH Zürich, Switzerland, Swiss Institute of Bioinformatics, University of Geneva, School of Medicine, University of Nottingham, UK, Department of Pharmacology, University of Cambridge, UK, MRC MLB Cambridge, UK, Novartis Institutes of Biomedical Research, Basel, Switzerland, Max-Planck- Institute, Munich, Germany, Laboratory of Molecular Electron Microscopy, The Rockefeller University, New York, USA, PeterMac Institute, Melbourne, Australia, NIH, NIAAA, Rockville, USA, Institute for Research in Biomedicine (IRB Barcelona), University of Barcelona, Spain

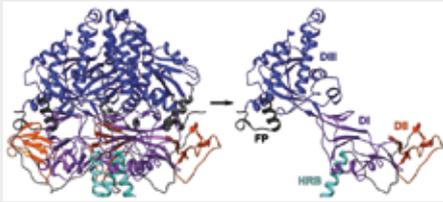
## Grants

- Swiss National Science Foundation NCCR TransCure (leading house), NCCR Molecular Systems Engineering
- SNSF project grants No. 31003A\_173155, 310030\_184783, 31003A\_162581, 31003A\_176175, 31003A\_163359, 310030\_184980, 31003A\_169355, 310030\_189220
- SNSF Sinergia grants No. CRSII5\_183481, CSRII5\_180326/1, CRSII5\_170923
- National Research Program Covid-19 (NRP 78) from the SNSF, grant No. 198314
- Lindenhof Foundation Bern, Swiss Cancer League, Gebert Rüt Foundation, Scherbarth Foundation, InnoSuisse grant 47109, R3 grant OC-2019-019, Swiss Heart Foundation FF20124
- Ambizione Fellowship PZ00P3\_173961, SNSF Spark CRSK-3\_190182, MD-PhD 01/20 SNSF 323530\_199381

## Highlights

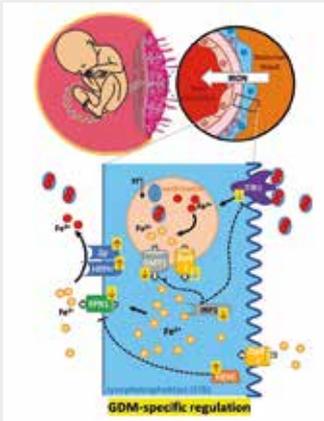
### Cryo-electron microscopy structure of the canine distemper virus fusion protein ectodomain

Canine distemper virus (CDV) is a close relative of measles virus that infects animals frequently inducing severe disorders in the central nervous system. CDV has expanded its host range to non-human primates, thus representing a potential future human pathogen. We have solved the structure of the CDV fusion protein ectodomain in the



prefusion state. This structure offers new opportunities to engineer the protein and achieve high-quality immunogens for next-generation vaccines and the structure-based design of desired antiviral drugs. Kalbermatter et al., *J. Struct. Biol* 2020 : 4, 100021.

Side view of the CDV fusion protein ectodomain trimer (left) and monomer (right). Structural domains are differently coloured and labelled.



### Gestational diabetes mellitus affects placental iron homeostasis: Mechanism and clinical implications

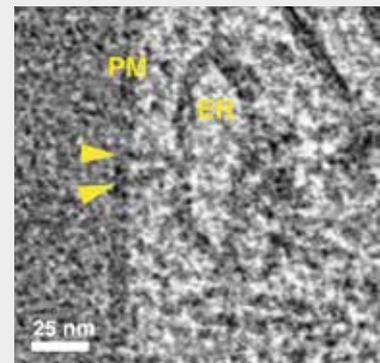
Hyperglycemia in gestational diabetes mellitus (GDM) patients leads to dysregulated placental iron homeostasis. Differential regulation of iron transporters and receptors, iron sensors, iron regulators and oxidoreductases in GDM affected placentae were described. Moreover, alterations in cellular morphology, differential iron transporter expression, and reduced Fe<sup>3+</sup>-uptake as well as oxidative stress were factors that contributed to the reduced placental iron transport under hyperglycemic conditions. These adaptations could represent a protective mechanism preventing the oxidative damage for both fetus and placenta caused by highly oxidative iron. Zaugg et al., *The FASEB J.* 2020 : 34, 7311–7329.

Molecular mechanisms of gestational diabetes mellitus.

### New IBMM Professor Wanda Kukulski studies cellular membrane architecture

In spring 2020 Prof. Dr. Wanda Kukulski started as a new IBMM group leader and NCCR TransCure PI. Previously she was a group leader at the MRC LMB in Cambridge, UK, and she is an EMBO Young Investigator. Wanda Kukulski is a cell and structural biologist. Her group aims to understand how membranes and proteins organise into functional assemblies that drive fundamental cellular processes. The group employs cutting-edge correlative microscopy and cryo-electron tomography methods, complemented by live imaging and biochemistry, to obtain mechanistic insights into membrane biology.

Visualising proteins bridging endoplasmic reticulum (ER) membrane and plasma membrane (PM) in situ (Hoffmann et al., *Dev Cell* 2019.).



### Endocannabinoid plasticity in *C. elegans*

In eukaryotes, the C<sub>20:4</sub> polyunsaturated fatty acid (PUFA) arachidonic acid (AA) plays important roles as a phospholipid component, signaling molecule and precursor of the endocannabinoid-prostanoid axis. Employing liquid chromatography mass spectrometry (LC-MS/MS), the biosynthesis of endocannabinoid-like ethanolamine and glycerol derivatives of juniperonic acid and ω-3 arachidonic acid was elucidated in Δ6 deficient *C. elegans*. The study suggests that different eicosatetraenoic acids share similar biological functions. This biosynthetic plasticity of eicosatetraenoic acids observed in *C. elegans* uncovers a possible biological role of new mammalian PUFAs in Δ6 desaturase deficiencies. Guha et al. *Cells* 2020 : 9, 2127.

### IBMM Spin-off Synendos Therapeutics rises 20 Mio CHF

A NCCR TransCure project on endocannabinoid cellular membrane transport from the group Gertsch goes translational. The selective endocannabinoid reuptake inhibitors (SERIs) developed in the group will be developed in phase I clinical trials. The IBMM spinout Synendos Therapeutics has concluded a Series A financing round, raising 20 million Swiss francs. The startup will use the funds to advance the pre-clinical research and clinical development on molecules for treating anxiety-related neuropsychiatric conditions.

## Institute for the History of Medicine (IMG)

Bühlstrasse 26, 3012 Bern  
[www.img.unibe.ch](http://www.img.unibe.ch)



Prof. Hubert  
Steinke  
Director



Dr. Pascal  
Germann



Stefan  
Hächler  
Head of Archive



Manuel Kaiser  
Head of  
Collection



Bruno  
Müller  
Head of Library

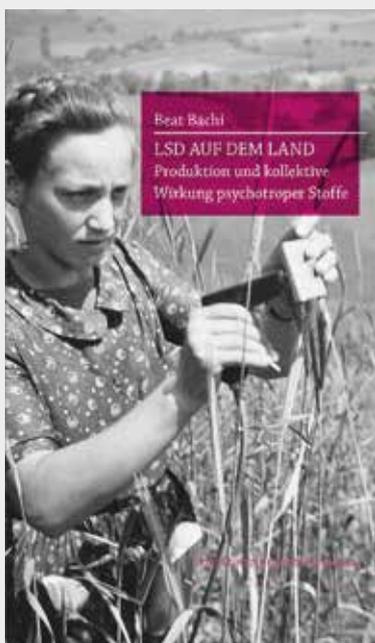
### Profile

- Teaching students of medicine at the Universities of Bern, Basel and Fribourg, master students at the pharmacy and the biomedical engineering program as well as history students at the Philosophical Faculty and health professions students at the Bern University of Applied Sciences
- 1 professor, 1 assistant and further scientists in SNSF-funded projects
- Rich library (100,000 vols.), archive documenting local and Swiss medicine (paper and digital), large collection of medical objects from University and University Hospital
- Research on medical theory and practice 18th to 20th century, Albrecht von Haller and the 18th century Republic of Letters, history of medical ethics, history of the quality of life concept
- External partners: Institute of History and Institute of Germanic Languages and Literatures, University of Bern; Institute of Biomedical Ethics and History of Medicine, University of Zurich; Institute for the History of Medicine and Health, University of Lausanne; Institute for Philosophy, TU Münster; Center for the History of Science, Technology and Medicine, Manchester; Institute for the History and Ethics of Medicine, Erlangen; History Department, Maastricht University

### Grants

- Swiss National Science Foundation (grants No. 100011\_184880; 10FE15-157963; 159614)
- Leibniz-DAAD Research Fellowship
- Canton of Aargau, Department of Health

### Highlights



#### LSD in the countryside

As main result of a SNSF funded project, Beat Bächi published “LSD auf dem Land” (Konstanz University Press, 2020). The book shifts the perspective from consumption to production, from individual to collective effects and from mental to material dimensions of psychotropic substances. It describes the entanglement of the practices of ergot culture in Switzerland with anthropological, missionary, linguistic, biological and mycological fieldwork in the Sierra Mazateca in southern Mexico. The focus on materiality allows us to see how psychotropic substances alternate in their function as a remedy in psychiatry, as indigenous medicine, as hippie drugs or even as military warfare agents.



## Quality of Life

Pascal Germann stayed as a Leibniz Fellow at the Leibniz Centre for Contemporary History in Potsdam. As part of his research project “Health and Welfare after the Boom: A History of Quality of Life Knowledge, 1960-2000”, he published the paper „The Quality of Life Turn: The Measurement and Politics of Wellbeing in the 1970s” in „Know”, a Chicago Journal focussing on the formation of knowledge.

## Archives of FMH

In the last five years, the Institute has advised the Swiss Medical Association (FMH) in the management and digitization of their archives, dating back to its foundation in 1901. The IMG now preserves and maintains the digital archives and grants access to its one million pages in 3440 units according to the Bernese laws on archiving. These hitherto inaccessible but essential sources will allow for new research projects on medicine and health policies in 20th century Switzerland.



Screenshot of the inventory of the digital FMH archives at the IMG



## Connecting Sciences

In 2018, the University’s Collegium Generale organized a lecture series “Alexander von Humboldt: Wissenschaften zusammendenken” (thinking sciences together). The lectures have now been published in a book, co-edited by Hubert Steinke. Experts from various scientific disciplines analyze the Humboldtian approach to science and its impact on their own area of research.

## Institute of Pharmacology (PKI)

Inselspital, INO-F, 3010 Bern  
[www.pki.unibe.ch](http://www.pki.unibe.ch)



Prof. Hans-Uwe  
Simon  
Director



Prof. Andrea  
Huwiler  
Deputy Director



Prof. Thomas  
Kaufmann



SNF Prof. Georgia  
Konstantinidou



Prof. Stephan  
von Gunten



Prof. Shida  
Yousefi



Prof. Uwe  
Zangemeister-Wittke

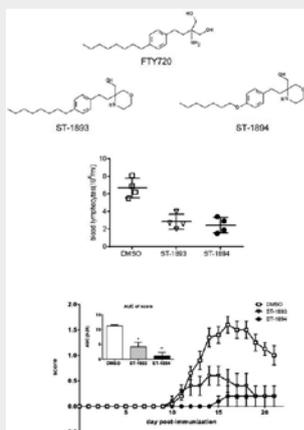
### Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- 7 research groups
- Investigation of pathophysiological processes that contribute to inflammation and tumor diseases
- Aim: Discovering new drug targets
- External Partners: Institutes of Biochemistry, Experimental Immunology and Molecular Cancer Research, University of Zürich, Zürich, Switzerland; Department of Pharmacology, Toxicology and Clinical Pharmacy, Institute of Pharmacy, University of Tübingen, Tübingen, Germany; Pharmazentrum Frankfurt/ZAFES, University Hospital and Goethe University, Frankfurt/Main, Germany; Department of Medicine, University of Toronto, Toronto, Canada; Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, USA; Department of Clinical Immunology and Allergology, Sechenov University Moscow, Russia; Swiss EoE Research Group, Olten, Switzerland.

### Grants

- Swiss National Science Foundation (grant No. 310030-166473; 310030\_184816; 310030-175561; 31003A\_173215; 31003A\_149387; 310030-146215; 310030E-132762; 310030A-138201; 31003A\_170134; 310030\_184757; 31003A\_173006)
- Swiss Cancer League (KFS-3941-08-2016; KFS-4958-02-2020)
- HORIZON 2020 (Marie Skłodowska-Curie Action): MEL-PLEX
- Novartis Foundation for Biological-Medical Research
- SNSF Professorship (PP00P3\_194810/1)
- Bern Center for Precision Medicine (BCPM) Grant
- Innosuisse-Swiss Innovation Agency #40922.1 IP-LS
- Helmut Horten Stiftung

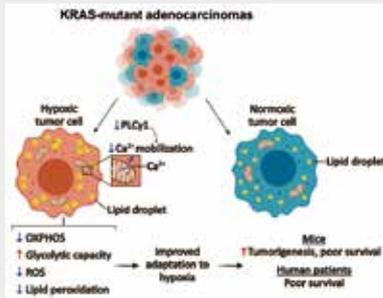
### Highlights



Validation of morpholino deriva-  
tives in vivo

### Morpholino analogues of fingolimod as novel and selective S1P1 ligands with in vivo efficacy in a mouse model of EAE

We have synthesized two novel morpholino derivatives of the immunomodulatory fingolimod (FTY720), ST-1893 and ST-1894. We have characterized these compounds as selective S1P1 receptor agonists and functional antagonists. They show in vivo activity in mice where they reduce the lymphocyte number in blood. They also exert a protective effect in a mouse model of multiple sclerosis, the experimental antigen induced encephalomyelitis (EAE). Due to their S1P1-selective nature, we propose that these compounds will exhibit less adverse effects and have an advantage over fingolimod in multiple sclerosis but also in other autoimmune diseases. Stepanovska B et al., Int. Journal of Molecular Sciences (2020), doi: 10.3390/ijms21186463.



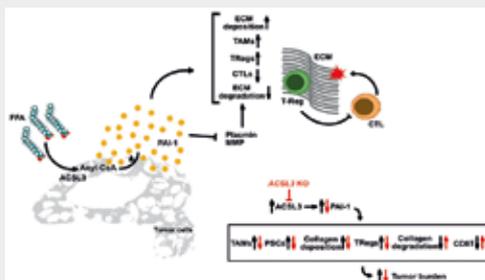
Working model for the improved adaptation of cancer cells to hypoxia by PLCy1 suppression

## PLCy1 suppression promotes the adaptation of KRAS-mutant lung adenocarcinomas to hypoxia

Mutant KRAS modulates the metabolic plasticity of cancer cells to confer a growth advantage during hypoxia. We found that PLCy1 is suppressed during hypoxia in KRAS-mutant human lung adenocarcinoma cells. Suppression of PLCy1 in hypoxia promotes a less oxidative cancer cell metabolism state, reduces the formation of mitochondrial reactive oxygen species and switches tumour bioenergetics towards glycolysis by impairing Ca<sup>2+</sup> entry into the mitochondria. Our work reveals a mechanism of cancer cell adaptation to hypoxia with potential therapeutic value. Saliakoura M et al., Nat Cell Biol 22 (2020), 1382–1395.

## ACSL3–PAI-1 signaling axis mediates tumor-stroma cross-talk promoting pancreatic cancer progression

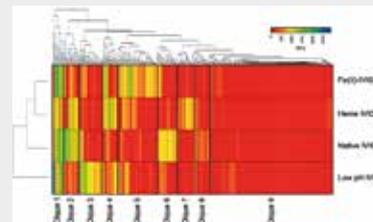
Pancreatic ductal adenocarcinoma (PDAC) is characterized by marked fibrosis and low immunogenicity, features that are linked to treatment resistance and poor clinical outcomes. We found that the acyl-CoA synthetase long-chain 3 (ACSL3) – plasminogen activator inhibitor-1 (PAI-1) signaling axis is upregulated in PDAC. ACSL3-PAI-1 suppression hinders PDAC progression, markedly reduces tumor fibrosis and tumor-infiltrating immunosuppressive cells and increases cytotoxic T cell infiltration. Our results unveil ACSL3–PAI-1 signaling as a requirement for PDAC progression with druggable attributes. Rossi Sebastiano M et al., Science Advances 6 (2020), doi: 10.1126/sciadv.abb9200.



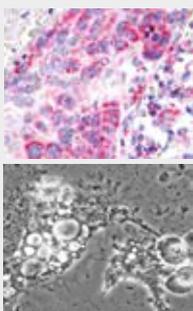
ACSL3 controls collagen deposition and immunosuppression by regulating PAI-1 signaling

## Modification of intravenous immunoglobulin (IVIg) by ferrous ions enhances death effects on neutrophils

Intravenous immunoglobulin (IVIg) exhibits anti-inflammatory effects and is therapeutically used in certain autoimmune and inflammatory conditions. In previous work we reported that IVIg reduces the lifespan of neutrophil granulocytes, which are key players in inflammatory disorders. Using glycan-array technology we showed that the IVIg antibody repertoire can be dramatically influenced by modification by ferrous ions, heme or low pH exposure. We found that IVIg modification by ferrous ions further shortens the lifetime of neutrophils under inflammatory conditions, which might enhance the therapeutic effects of IVIg. Graeter S et al., Front Immunol (2020), doi: 10.3389/fimmu.2020.00973.



Changed antibody repertoires upon chemical modification of IVIg



Lung cancer

Cells undergoing oncosis

## Characterizing ATG12 as a novel drug target in cancer

ATG12 is known as an essential autophagy-regulating protein. We observed that cancer cells with reduced ATG12 expression undergo an oncotic cell death, owing to reduced mitochondrial biogenesis and function. Inducing oncosis by imposing an ATG12 deficiency in solid tumors might represent a novel anti-cancer therapy. Left panel: Immunohistochemistry. High ATG12 expression in lung cancer. Right panel: Downregulation of ATG12 in lung cancer cells results in oncosis characterized by vacuolization and blister formation. Liu H et al., Cell Death Differ 27 (2020), 1965-1980.

# Institute of Physiology

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Director



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PD Dr. Sonja  
Kleinlogel



Ass. Prof.  
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Ass. Prof.  
Jean-Pascal  
Pfister



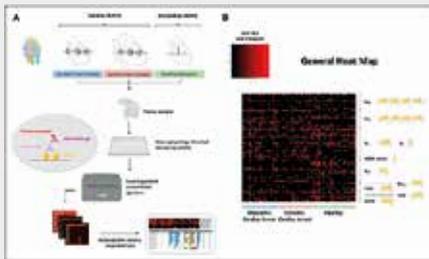
PD Dr. Shankar  
Sachidhanandam

## Profile

- The Department of Physiology performs basic and translational research in cardiac- and neurophysiology.
- The five research groups in cardiac physiology investigate mechanisms that lead to heart failure and arrhythmias. They use state-of-the-art electrophysiology and imaging techniques and computer simulations to elucidate basic mechanisms of action potential generation, propagation and excitation-contraction coupling on the subcellular, cellular, tissue and organ level in health and disease. The research projects are importantly supported by developments of novel experimental methods at the nano- to the whole organ scale.
- The common theme of the six research groups in neurophysiology is to understand neuronal network dynamics in the brain in health and disease. New strategies to cure retinal degeneration, to treat chronic pain, and to enhance spinal cord regeneration are developed. The formation of emotional memories, anxiety, depression and perceptual vision are studied from molecules to single cells and neuronal networks with electrophysiological, two-photon imaging, optogenetic and behavioral approaches. The computational neuroscience groups develop probabilistic models of brain function at different levels ranging from single synapses to cognition.
- The Department of Physiology is predominantly engaged in the education of students of human and dental medicine. We cover the entire field of human physiology with lectures and practical courses. Lecturers of our institute also participate in the training of students in veterinary medicine, pharmacy and the "Master in Biomedical Engineering". Our institute coordinates the master program in Biomedical Sciences (BMSc) and contributes to the BeNeFri program in Neuroscience and other interfaculty lecture series.
- Research partners: Humboldt University, Neurocure Cluster of Excellence, Berlin, Germany; Department of Pharmacy and Drug Science, University of Bari Aldo Moro, Bari, Italy; Department of Medicine, Wisconsin Institutes for Medical Research, University of Wisconsin, USA; Kirchhoff Institute of Physics, University of Heidelberg, Heidelberg, Germany; Medizinische Hochschule Hannover, Germany.

## Grants

- ERC Consolidator Grant (Nevian)
- ERC Starting Grant (Ciochi)
- SNF Professorship Grant (Ciochi, Pfister)
- Bertarelli Foundation Catalyst (Kleinlogel)
- Human Brain Project (Senn)
- SNF Synergia Grant (Senn)
- IFK Decoding Sleep (Nevian, Senn)
- European Joint Program - Rare Disease Grant (Odening)
- ERC Synergia Grant (Kleinlogel)
- overall additional 14 SNF research grants



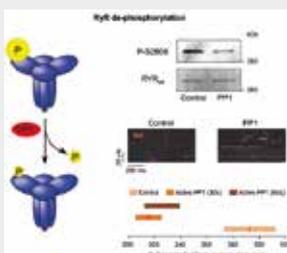
Schematic representation of the peptide microarray assay and general heat map of the autoantibody response profiles

### Autoantibody signature in cardiac arrest

Sudden cardiac arrest (SCA) is a tragic event that causes one death every 90 seconds worldwide. 5-10% of SCA remain unexplained. Because increasing evidence suggests the involvement of autoantibodies in arrhythmogenesis, we here performed a large-scale autoantibody screening in patients with SCA. The autoantibody targeting the L-type Ca<sup>2+</sup> channel was identified as biomarker of otherwise unexplained SCA. Functional studies on human induced pluripotent stem cell-derived cardiomyocytes demonstrated the proarrhythmogenic effect of the autoantibody. It reduces the action potential duration through calcium current inhibition. This is the first study identifying an autoantibody signature specific to SCA. Maguy A, Tardif JC, Busseuil D, Ribi C, Li J. Autoantibody Signature in Cardiac Arrest. *Circulation* 2020;141 :1764-1774.

### Fight or Flight Response in Cardiac Muscle

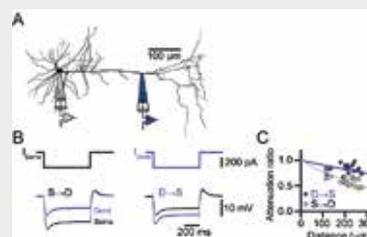
For cardiac Ca<sup>2+</sup> signaling, phosphorylation of the ryanodine receptor (RyR2) is an important regulatory (e.g. during stress) and disease related post-translational modification. The degree of RyR2 phosphorylation is governed by the balance of kinase and phosphatase (PP1) activities. Elevated PP1 activity has been observed in various cardiac diseases. Contrary to expectations, our studies suggest a more pronounced Ca<sup>2+</sup> sensitivity of RyR2 channels upon de-phosphorylation by PP-1. Furthermore, using transgenic mice we confirmed the RyR2-S2808 phosphorylation site as a target for PP1 and as a link between RyR2 modulation and the cardiomyocyte response. Potenza DM, Janíček R, Fernandez-Tenorio M, Niggli E. Activation of endogenous protein phosphatase 1 enhances the calcium sensitivity of the ryanodine receptor type 2 in murine ventricular cardiomyocytes. *J. Physiol.* 2020;598:1131-.



Biochemical and functional changes resulting from ryanodine receptor de-phosphorylation

### Electrical properties of dendrites of layer 5 pyramidal neurons in the anterior cingulate cortex

Understanding cortical computation requires the understanding of its fundamental computational subunits. Layer 5 pyramidal neurons are the main output neurons of the cortex, integrating synaptic inputs across different cortical layers. Their elaborate dendritic tree receives, propagates, and transforms synaptic inputs into action potential output. We found good coupling of slow subthreshold potentials like NMDA spikes or trains of EPSPs from the distal apical dendrite to the soma in pyramidal neurons in the ACC, which was significantly better compared with S1. This suggests that frontal pyramidal neurons use a different integration scheme compared with the same cell type in somatosensory cortex, which has important implications for our understanding of information processing across different parts of the neocortex. Marti Mengual U, Wybo AM, Spierenburg LJE, Santello M, Senn W, Nevian T Efficient low-pass dendro-somatic coupling in the apical dendrite of layer 5 pyramidal neurons in the anterior cingulate cortex. *J. Neurosci.* 2020; 40:8799-8815.



Simultaneous somatic and dendritic recordings revealed very good propagation of electrical signals from dendrite to soma

# Institute of Social and Preventive Medicine (ISPM)

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Dr. Eliane Rohner



Prof. Georgia Salanti



Dr. Adrian Spoerri



PD Dr. Ben Spycher



Dr. Ana Maria Vicedo-Cabrera



Dr. Per von Groote



Brigitte Wanner

## Profile

- ISPM participates in University teaching programs for students of medicine, pharmacology, biomedical engineering and biomedicine (including students from the University of Fribourg). It engages in PhD and postgraduate programs of the University of Bern and SSPH+ and offers three CAS.
- 14 research groups
- ISPM's research profile covers health areas from cardio-metabolic to HIV, cancer, childhood and adolescents, NCDs to environmental influence, with the tiers of development of new methods and lifestyle and behavior reaching across all fields.
- In 2020 members of the institute provided their expertise in outbreak analysis to the government and authorities as members of the Swiss National COVID-19 Science Task Force. A taskforce, which was co-founded and lead initially by Prof. Egger from ISPM. Prof. Zwahlen is a member of the Taskforce Knowledge-Management COVID-19, a joint venture between Inselspital and the University of Bern.
- External partners: Oeschger Center for Climate Change Research; Paraplegieforschung Schweiz, Center for Space and Habitability of the University of Bern, Clinics of the University Hospital Bern; Schulich School of Medicine&Dentistry, University of Western Ontario, Canada; Fundacion Universitaria de Ciencias de la Salud, Colombia; Federal State Budgetary Organization National Cardiology Research Center of the Ministry of Health of the Russian Federation; Harvard University.

## Grants

- 6 new SNSF (31CA30\_196046/ 32473B\_185008 / IZSTZO\_190277 / 4078PO\_198418 / 320030\_197831 / 320030B\_192804)
- Horizon 2020 (EU\_900009 / EU\_101003688)
- Swiss Cancer Research (HSR-4951-11-2019)

## Highlights



### Early research and modelling & Covid 19

Members of ISPM have made significant contributions to the understanding of the SARS-CoV-2 pandemic from early on. In late January, Dr. Riou and PD Dr. Althaus published one of the first estimates of the basic reproduction number and on superspreading, which considerably impacted the global discourse on the risk for a pandemic. In a number of subsequent modeling studies, members from ISPM also provided a detailed description of the

Global spread of SARS-CoV-2

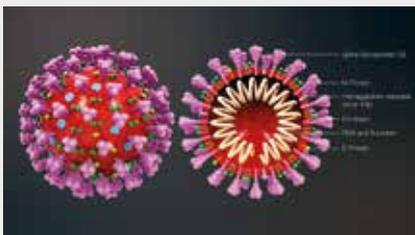
effect of different intervention strategies and age-specific estimates of the infection fatality ratio (IFR) of SARS-CoV-2 for several regions. The latter were prominently used by the US Center for Disease Control and Prevention (CDC) for their pandemic projections.

### Mental Health & Covid 19

In this project, we aim to provide reliable large-scale evidence about mental health during the COVID19 pandemic and examine how the changes in mental health state of the societies depend on the lockdown measures put in place worldwide.

### Living systematic Review & Covid 19

Our living systematic review estimates that 20% (95% confidence interval 17-25%, prediction interval 3-67%) to determine the proportion of people with SARS-CoV-2 infection, who are truly asymptomatic. Regular updates of this review are powered by the COVID-19 Open Access Project, led by Prof. Low and Dr. Counotte. As of 12.11.2020, we have indexed 88,172 publications in a searchable living evidence database (<https://ispmbern.github.io/covid-19/>). The database is updated every day with publications indexed in Pubmed, EMBASE, bioRxiv and medRxiv, is openly available and uses machine-learning techniques to help international teams of researchers speed up their review processes.

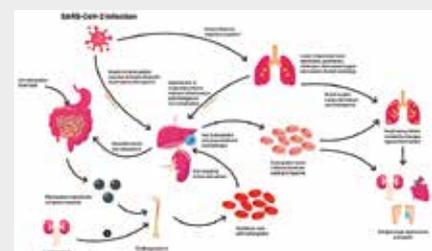


3D medical animation SARS-CoV-2

### Anaemia, iron & Covid 19

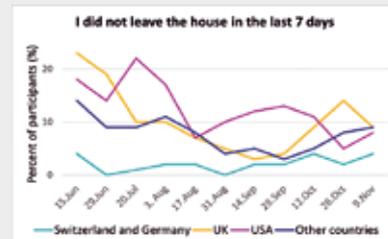
The Cardiometabolic Research Group published two systematic reviews and meta-analysis on the role of anaemia and iron metabolism in Covid-19, and on prevalence, risk factors, clinical characteristics, and outcomes of Covid-19 among health care workers. We also published an editorial about SARS-CoV2 vaccine development.

Anemia in SARS-CoV-2



### Rare diseases & Covid 19

Prof. Kuehni set up a participatory study on PCD for people suffering from Primary Ciliary Dyskinesia, a rare chronic lung diseases. At the start of the pandemic, there were little data on risk and natural course of COVID-19 in people with rare diseases, leading to anxiety among patients. She was asked by patient support groups from Switzerland, Germany, the UK, the US and Australia to set up an international study. Results are published weekly on the study website (<https://covid19pcd.ispm.ch/>) and submitted to peer-reviewed journals.



Covid 19 and PCD

### Social determinants & Covid 19

Researchers from the Social Environment Group early on pointed to challenges that come with the social determinants of health in the current pandemic. Papers on the importance of appropriate communication with the public, the role of individuals' health literacy and the active participation of the population groups were published. The particular challenges for LMIC nations were addressed and published in English, German, French, Spanish and Italian.

### Anti-IL-6R biological therapy & Covid 19

Prof. Villiger and Reichenbach together with the CTU Bern set up the CORON-ACT trial, a multicenter, double-blind, randomized, controlled phase II trial on the efficacy and safety of tocilizumab in the treatment of coronavirus induced disease (COVID-19), which started April 28th. This was a multicenter study together with the University Hospitals of Zurich, Lausanne and Lugano.

# Theodor Kocher Institute (TKI)

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Leader



Prof. Ruth Lyck  
Research Group  
Leader



Dr. Urban  
Deutsch  
Research  
Group Leader



Dr. Gaby  
Enzmann  
Principal  
Investigator



Dr. Giuseppe  
Locatelli  
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Leader



Dr. Steven  
Proulx  
Research Group  
Leader

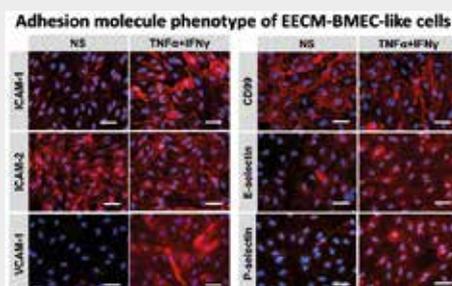
## Profile

- The TKI hosts 5 research groups studying central nervous system immunity in health and disease with a focus on multiple sclerosis, stroke, Alzheimer's disease and brain metastasis of tumors by employing advanced in vitro and in vivo imaging approaches
- TKI staff is involved in teaching bachelor and master students of the Medical, Science and Vetsuisse Faculties in lectures and practical classes in immunology, vascular and cell biology, transgenic mouse technologies as well as in advanced microscopy and image analysis. TKI staff also educates graduate students of the Graduate School for Cellular and Biomedical Sciences (GCB) and coordinates the national PhD program "Cell Migration" and the local PhD program "Cutting Edge Microscopy"
- External partners: Renaud Du Pasquier, CHUV, Lausanne; Harm-Anton Klok, EPFL, Lausanne; Michael Detmar, ETH Zurich; Thorsten Buch, University of Zurich; Vartan Kurtcuoglu, University of Zurich; Tobias Dick, Heidelberg, Germany; Martin Kerschensteiner, LMU Munich, Germany; Gianluca Matteoli, KU Leuven, Belgium; Marco Prinz, University Hospital Freiburg, Germany; Nicholas King, University of Sydney, Australia; Yann Decker, University of the Saarland, Germany; Eric Shusta, University of Madison-Wisconsin, Madison, USA; James McGrath, University of Rochester, NY, USA; Anne Astier and Roland Liblau, INSERM, Toulouse, France; Eric Thouvenaut, Montpellier, France

## Grants

- SNSF (310030E\_189312; 310030\_189080; 310030\_189226; 4078PO\_198297); NIH R61/R33, Fidelity Bermuda Foundation, Horizon 2020 ITN ENTRAIN, Swiss MS Society, ARSEP, Bern Center for Precision Medicine; UniBE ID grant (with Prof. Paola Luciani, DCB), Swiss Heart Foundation, Synapsis Foundation, Heidi-Seiler Stiftung; Scherbarth Foundation, Italian Multiple Sclerosis Foundation

## Highlights



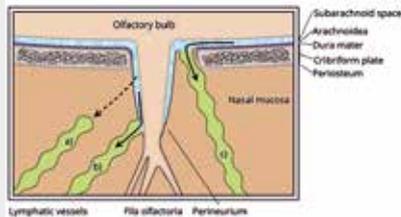
EECM-BMEC-like cells express cell adhesion molecules in a constitutive and cytokine inducible manner. Immunofluorescence stainings are shown. Nuclear stain blue, adhesion molecule red. Bar = 50  $\mu$ m

### Advancing human induced pluripotent stem cell-derived blood-brain barrier models for studying immune cell interactions

Current human induced pluripotent stem cell (hiPSC)-derived blood-brain barrier (BBB) models are not suited to study immune cell migration across the BBB in vitro. In a fruitful collaboration with the teams of Renaud Du Paquier (CHUV, Lausanne) and Eric Shusta (University of Madison Wisconsin, USA) we have established the novel extended endothelial cell culture method (EECM), which differentiates hiPSC-derived endothelial progenitor cells to brain microvascular endothelial cell (BMEC)-like cells with BBB properties. EECM-BMEC-like cells display functional expression of endothelial adhesion molecules mediating immune cell interaction under physiological flow. EECM-BMEC-like cells are the first hiPSC-derived BBB model with a mature immune phenotype.

## Mapping the outflow of cerebrospinal fluid

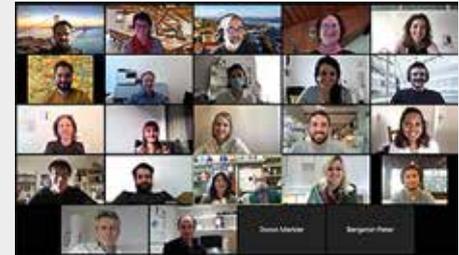
Our group has recently shown that cerebrospinal fluid (CSF) clearance from the central nervous system occurs through lymphatic vessels in mice. However, the exact anatomical routes of egress remain to be elucidated. We have established decalcification protocols in transgenic fluorescent reporter mice to demonstrate the anatomical pathways of CSF tracer clearance through the cribriform plate of the skull. Consistent with some historical reports, we have determined that pathways exist along the olfactory nerves as they penetrate through the cribriform plate towards the olfactory epithelium. Lymphatics within the nasal mucosa then drain the tracers to the deep cervical lymph node.



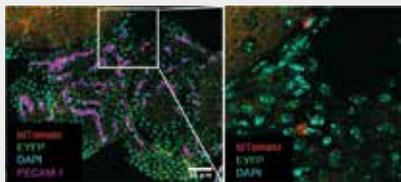
Scheme of proposed models of CSF outflow

## Success stories during pandemic times

We have tried to efficiently use the extra homeworking time during 2020 to organize the Young Investigator Meeting, bringing together leading scientists from 11 different Swiss laboratories investigating the pathology of Multiple Sclerosis in humans and animal models.



A salute from the YIM participants



Choroid plexus from an iNOS-Arginase double transgenic reporter mouse model during neuroinflammation

## Activated macrophages within the mouse choroid plexus

We investigated the trafficking and functional properties of macrophages within the Central Nervous System during autoimmune CNS inflammation, with a specific focus on the choroid plexus within brain ventricles. By using reporter mouse models expressing fluorescent proteins in distinct pro- and anti-inflammatory macrophages, we could thus describe increased trafficking of blood-derived macrophages and functional polarization of macrophages within the choroid plexus.

## Ruth Lyck: Associate Professor

Ruth Lyck has been nominated Associate Professor of the University of Bern. Focusing her research originally on immune cell migration across the blood-brain barrier, Ruth has recently shifted her research focus on melanoma cell migration across tissue barriers. Ruth has worked part time during her entire career and is thus an excellent female role model for scientists in the future.



## The PhD programs Cutting Edge Microscopy (CEM) and Cell Migration coordinated by Ruth Lyck and Britta Engelhardt, respectively, had the chance to organize in person meetings in 2020

In February, PhD students of the CEM program visited the Institute for Research in Biomedicine in Bellinzona. In July, the core event of the MIC Summer school, the CEM Students' Day with scientific presentations, could take place under strict Covid-19 pandemic measures. The 8th Annual retreat of the Cell Migration Program took place from September 22-23, 2020 at the Seminarhotel Hirschen in Eggwil in the Emmental. Despite the Covid-19 pandemic implemented measures, the students and their supervisors greatly enjoyed the direct interactions and discussions and had a wonderful time.



Activities of the PhD programs

# Institute for Infectious Diseases (IFIK)

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Dr. Katharina Summermatter  
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Prof. Ronald Dijkman



Prof. Andrea Endimiani



Prof. Bruno Gottstein



PD Dr. Lucy Hathaway



PD Dr. Markus Hilty



PD Dr. Andreas Kronenberg  
Head anresis.ch



PD Dr. Christoph Niederhauser



Dr. Alban Ramette



Prof. Parham Sendi



PD Dr. Meret Ricklin  
Head of Biorisk Management Network @ sitem-insel

## Profile

- The ifik covers the entire spectrum of microbiology integrated in research, education and diagnostic services, including virology, bacteriology, mycology, parasitology, molecular diagnostic and infection serology.
- Certified by Swissmedic and accredited for patient care in public hospitals by ISO/IEC 17025 (STS 0363).
- Home to the Swiss National Centre for Antibiotic Resistance (anresis.ch) and the Swiss National Reference Centre for Pneumococci, both mandated by the Federal Office of Public Health.
- Twelve research groups in the fields of antimicrobial resistance, biosafety, central nervous system infection, diagnostic innovation, experimental virology, microbial genomics host-microbiota interaction, mucosal infections and parasitology.
- Teaching programs for students of medicine, dental medicine, pharmacology, biomedical sciences, and biology and for candidates of the FAMH postgraduate training in Clinical Microbiology.
- National Partners: Swiss Agency for Development and Cooperation; EPFL; ETHZ, University of Lausanne, Swiss Tropical and Public Health Institute, Basel; Medical Microbiology, Spiez Laboratory, Swiss Federal Office for Civil Protection; Institute of Virology and Immunology (IVI), University of Bern; University Hospital Basel; Department of Microbiology and Molecular Medicine, University of Geneva
- International Partners: Department of Neurology and Neonatal Brain Disorder Center, University of California, San Francisco, USA; Centre for Respiratory Diseases and Meningitis, National Institute for Communicable Diseases, South Africa; Department of Genetics, University of Leicester, UK; School of Life Sciences, University of Nottingham, UK

## Grants

- Swiss National Science Foundation: 196062, 196644, 197083; 192067; 189136; 179260; 169791; 170063; NRP 72 grants 177452; 177378; 177386; Sinergia grant 180317; Bilateral programme South Africa grant 170844, NCCR "Microbiomes" (<https://nccr-microbiomes.ch/>)
- Innosuisse: 36198.1 IP-LS
- University of Bern: Interfaculty Research Cooperations "One-Health" and "Decoding Sleep"
- SRC Sars-CoV-2 special grant

## Highlights



### Diagnostics: COVID-19 pandemic in CH

The surge in COVID-19 testing brought swift changes to lab processes, workflow, workspaces and personnel. Within a few weeks we have established a COVID19 high-throughput

High throughput platform for SARS CoV-2 PCR testing, ifik

diagnostic using three different platforms with up to 1000 samples per day. This enables us to provide an 18 hour COVID-19 diagnostic service for the Insel Gruppe AG hospital and in addition we are less dependent on individual supply chains.

## Biosafety Center

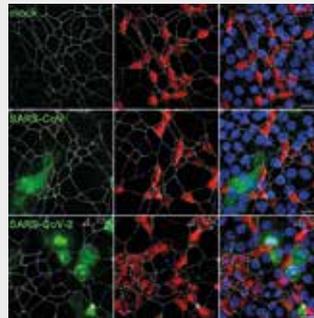
At the end of June, the ifik successfully put into operation the newly built Biosafety Level 3 laboratory at sitem-insel. Now a state-of-the-art unit is available for both diagnostics and research on the joint campus of Inselspital and University. The Biosafety Center is in charge of managing this unit. The app „Biorisk Manager“ (<https://www.bio-risk.ch/en>) was launched together with the clinic for emergency medicine and provides valuable information about the managing of biological risks. For the first time, a module on „Biological Risk Management in Health Care“ was organized within the CAS „Medicines and Medical Devices in Emergency and Disaster“.



Inauguration of a new BSL3

## SARS-CoV-2 Research

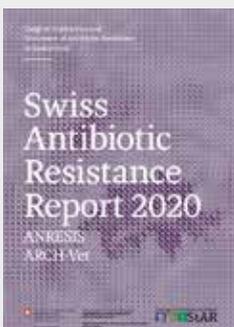
Since January 2020, the Experimental Virology research group is actively involved in various international research activities on SARS-COV-2, such as the generation of a synthetic clone, and characterization of crucial virus-host interactions. Additionally, the research group provides support in both molecular and cell culture-based diagnostic activities at the ifik, as well as performing applied research on novel therapeutic intervention strategies against SARS-CoV-2 with several academic and commercial stakeholders. Prof. Dr. Ronald Dijkman successfully acquired, as co-applicant, two grants during the Swiss National Science Foundation's special call on Coronaviruses.



Primary human airway epithelial cell cultures infected with SARS-CoV or SARS-CoV-2, and stained for immunofluorescence analysis using markers to detect infected cells (Nucleocapsid, green), tight junctions (ZO-1, white) and cilia (Tubulin, red).

## Latest report on antibiotic resistance

On behalf of the FOPH, ifik hosts the Swiss Centre for Antibiotic Resistance ANRESIS, which biennially, in association with Veterinary Medicine, describes in detail the current antibiotic resistance situation in Switzerland. The report can be downloaded from [www.anresis.ch](http://www.anresis.ch). The ANRESIS website has been comprehensively updated (<https://www.anresis.ch/>). In addition to the tabular presentation of the most important resistance data, information for the lay public and interactive graphics are now available.



Current report on antibiotic resistance

## Innosuisse Project "Personalized Antibiotic Therapy"

The global drive to eradicate tuberculosis with the help of new drug regimens is faced with a lack of rapid and precise diagnostics to direct therapy. ifik is a development partner in a university/industry partnership project to develop the first diagnostic test enabling optimal use of old and new tuberculostatic antibiotics directly from patient samples within 24 hours. Based on a highly multiplexed PCR with >900 amplicons the test will use next-generation sequencing and machine learning models to generate a personalized antibiogram. The project is co-founded by Innosuisse (Swiss Innovation Agency), University of Bern and Clemedi AG, Schlieren.



Innosuisse project "Personalized Antibiotic Therapy"

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Head of TRU

## Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedicine and biology as well as graduate students at the Graduate School for Cellulare and Biomedical Sciences (GCB)
- 8 research groups in experimental and clinical pathology
- External Partners: Div. of Hematology, University Hospital, Zurich; Institute of Immunobiology, Cantonal Hospital St. Gallen; Signal Processing Lab, EPFL; Radboud Medical Center, Nijmegen, (NL); Members of the International Tumor Budding Consortium; Universitätsklinikum Essen, Germany; Dept. of Biomedicine, University of Basel; Roche Pharma Research & Early Development F. Hoffmann-La Roche Ltd., Basel; Neurology and Neurosciences, Stanford University Medical Center, USA; Sanquin Research, Amsterdam; Charité, University Hospital, Berlin; Surgery Dep., San Raffaele, Milan, Italy; David Geffen School of Medicine, Dermatology, UCLA, Los Angeles; Centre de Recherches en Cancérologie de Toulouse - CRCT, Toulouse, France; Biotechnology and Cell Signaling, University of Strasbourg, France; Brigham Young University, Provo UT, USA

## Grants

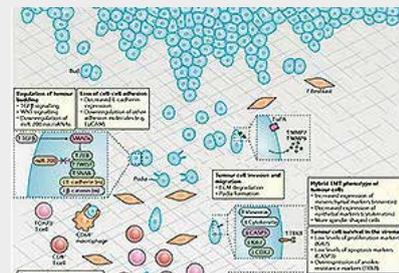
- Swiss National Science Foundation (10x)
- Rise Tide Foundation
- Uniscientia Stiftung
- Wilhelm Sander Stiftung
- Swiss Cancer Research/Swiss Cancer League: (6x)

## Highlights

### Tumour budding in solid cancers

Our colorectal Cancer (CRC) research group organized in 2016 the "International Tumour Budding Consensus Conference (ITBCC)" which led to the implementation of tumour budding in the TNM/WHO classifications and in the NCCN (National Comprehensive Cancer Network), CAP (College of American Pathologists) and ESMO (European Society for Medical Oncology) guidelines. In CRC, tumour budding along with other clinic-pathological parameters is supportive for the patient management especially in two clinical scenarios: first, in pT1 CRC tumour budding is associated with presence of local lymph node metastases and therefore a potential indicator for an oncologic resection; second, in stage II CRC tumor budding is an independent prognostic factor and adjuvant therapy should be considered.

In Nature Reviews Clinical Oncology we summarize the clinical scenarios of tumour budding in solid cancers, and review the molecular and biological aspects and the association with EMT (epithelial-mesenchymal transition) and TME (tumour microenvironment).



Key processes involved in the tumour budding phenotype (from Lugli et al, Nat Rev Clin Oncol 2020).

## Digital pathology and machine learning

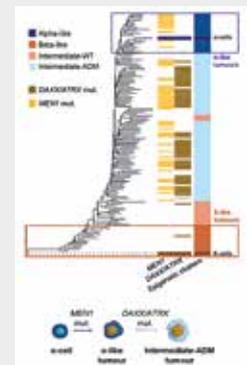
Our group uses digital pathology and machine learning to investigate clinically relevant scenarios in colorectal cancer and the tumor budding/microenvironment using histopathological images and ngTMA®. We apply deep learning to identify genotype-phenotype correlations (post-doc work by Dr. HG. Nguyen) and develop algorithms for future validation and use in diagnostic routine (PhD project A. Khan). Together with the lab of Prof. J.-P. Thiran (EPFL), we develop computational methods for prognosis classification (PhD project C. Abbet) and with Prof. A. Fischer (UniFribourg/HESO) apply graph-representations and geometric deep learning to understand the tumor microenvironment (PhD project L. Studer). Our numerous Master students in Bioinformatics (MSc) and Medicine (MMed) work on interdisciplinary projects, all on the basis of histological images.



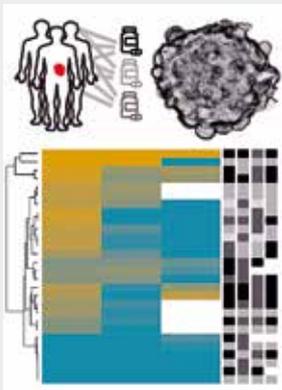
Example of digital p53 analysis in an endometrial cancer within an ngTMA experiment

## Epigenetic changes in PanNETs

Almost, half of Pancreatic Neuro-endocrine Tumors (PanNETs) shows mutation in MEN1, DAXX or ATRX. All the three genes encode for proteins involved in epigenetic regulation. Based on DNA methylation we identified subgroups of PanNETs with: specific cell of origin, genetic background and clinical outcome. Notably, we demonstrated that MEN1/DAXX/ATRX mutated tumors originated from alpha pancreatic cells and that they have an increased risk of relapse (DiDomenico et al, Nature Comm Biol 2020).



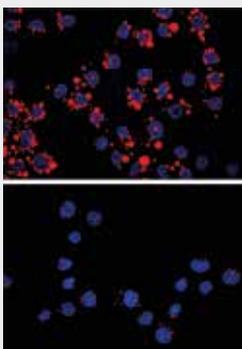
Philoepigenetic tree of PanNET indicates two cells of origine



## Precision medicine approach for PanNET treatment

Up to date, no therapy prediction based on specific molecular profile is possible for PanNET patients. We recently established patient-derived tumoroid cultures from PanNET patients which resemble features of original tumor tissue and which can be used for in vitro drug screenings. We are currently assessing the utility of PanNET tumoroids to predict patient therapy response and to identify novel epigenetic treatment options. Also, we aim at identifying specific molecular profiles through DNA sequencing, methylation- and gene expression analysis to predict therapy response in vitro and on the patients.

Patient-derived Tumoroids from PanNET patients for in vitro pharmacotyping



## TREM-1 as an amplifier of inflammation in immunosurveillance and immunopathologies

TREM-1 (Triggering Receptor Expressed on Myeloid Cells-1) is an activating innate immune receptor on neutrophils and monocytes/macrophages. We previously described a critical pathogenic role for TREM-1 not only in acute, but also in chronic inflammation, notably, in inflammatory bowel diseases. We generated a Trem1<sup>-/-</sup> mouse to determine the Trem1 mediated effects in the pathogenesis of atherosclerosis (Zysset et al., Nat Comms 2016). Current research interests include the involvement of TREM-1 in neurological disorders, such as stroke (Liu et al., Nat Immunol 2019), neurodegenerative disorders, and in infections with intracellular pathogens such as Listeria monocytogenes.

TREM-1-activation on monocytes leads to an enhanced lipid uptake (red droplets)

## Institute of Forensic Medicine (IRM)

Bühlstrasse 20, 3012 Bern  
[www.irm.unibe.ch](http://www.irm.unibe.ch)



Prof. Christian Jackowski  
Director



Prof. Wolfgang Weinmann  
Deputy Director,  
Forensic Toxicology  
and Chemistry



Prof. Michael Liebreuz  
Forensic  
Psychiatric  
Services



PD Dr. Sandra Lösch  
Physical  
Anthropology



Dr. Matthias Pfäffli  
Traffic Medicine



PD Dr. Antoine Roggo  
Medical Law



Prof. Christian Schyma  
Forensic  
Medicine and  
Imaging (F&E)



Dr. Silvia Utz  
Forensic Molecular  
Biology



PD Dr. Wolf-Dieter Zech  
Forensic Medicine  
and Imaging (DL)

### Profile

- Research: Each of the seven departments conducts research projects within the context of forensic sciences. The department of Forensic Medicine and Imaging, the department of Forensic Toxicology and Chemistry, the department for Physical Anthropology and the Forensic Psychiatry Service received external fundings. The Institute of Forensic Medicine in Bern is world leading in forensic physics and ballistics, forensic imaging and alcohol consumption markers. Furthermore forensic genetic projects and traffic medicine projects have been successfully performed.
- Teaching: The Institute of Forensic Medicine in Bern (IRM) is responsible for the training and continuing education of students of medicine and jurisprudence, medical personnel and the institutions of the administration of justice and the police.
- External Partners: Institute of Legal Medicine, University of Bonn, Germany; Institute of Legal Medicine, University of Schleswig-Holstein Kiel, Germany; Center for Medical Image Science and Visualization, CMIV, Linköping University, Sweden; Institute of Forensic Medicine, University Medical Center Freiburg, Germany; Department of Chemistry and Biochemistry, University of Bern; Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital, University of Zürich; Institute for Mummies and the Iceman - EURAC research, Bozen, Italy; Max-Planck Institut für evolutionäre Anthropologie, Leipzig, Germany; Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Verona, Rovigo e Vicenza, Italy

### Grants

- Swiss National Science Foundation (grant No. 320030\_179466/1; 10531FL\_197103; IZSEZO\_195382/1)

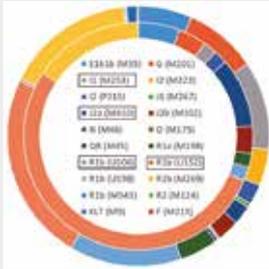
### Highlights



### Number 1 forensic research institute in the world!

In 2020, the Institute of Forensic Medicine, University of Bern reached an exceptional success in publishing high quality papers. How can we tell? The top international journal in the field of Legal Medicine is the International Journal of Legal Medicine. In the beginning of 2020 the journals statistics presented the University of Bern as the leading contributing organization worldwide. In other

words, over the past 3 years there was no other institution worldwide, which got more papers accepted in the field's top journal. Over the 3-year period, our institute published 27 papers in the highest ranked legal medicine journal and was thereby the world's most successful research institute in legal medicine.



Y haplogroups in Switzerland north (outer circle) and south (inner circle) of the Alps. Rectangles: haplogroups with significant distribution differences

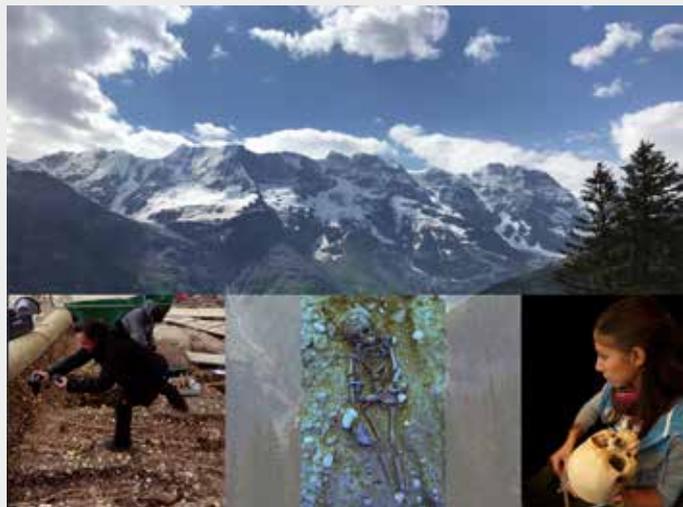
### Y-chromosomal haplogroups in Switzerland

Y-STR DNA profiles are frequently established in the context of sexual assault, when excess female DNA is expected from genital swabs. In addition to this forensic application, we can use the Y chromosome as lineage marker to trace back historical events of human migration. We analyzed a sample of 606 individuals from five different regions in Switzerland. We could reveal significant intra-national differences in the haplogroup distributions from Ticino compared to the sampled areas north of the alpine divide. The Y-chromosomal landscape of the present day Swiss population therefore still reflects this historical migration barrier. R1b-U152, a relatively recent haplogroup possibly associated with Celtic cultures in northern Italy, is the most frequent haplogroup in Switzerland, with a significant enrichment in Ticino.

Zieger M, Utz S. The Y-chromosomal haplotype and haplogroup distribution of modern Switzerland still reflects the alpine divide as a geographical barrier for human migration, *Forensic Sci Int Genet* 48 (2020) 102345.

### Violence and rituals among steppe nomads of Siberia

Ancient historiographers described steppe nomads as violent people dedicated to warfare and plundering. Until now, little scientific data are available regarding violence in these communities during the early centuries CE. We performed a forensic anthropological analysis of skeletal trauma from the archaeological site of Tunnug 1 in Siberia, dating to the 2nd until 4th c. CE. Our data show that violence in this nomadic society was not only associated to combat, but also involved the performance of ritual killings.



Milella M, Caspari G, Kapinus Y, Sadykov T, Blochin J, Malyutina A, Keller M, Schlager S, Szidat S, Alterauge A, Lösch S. 2020. Troubles in Tuva: Patterns of perimortem trauma in a nomadic community from Southern Siberia (second to fourth c. CE). *American Journal of Physical Anthropology* (online version). <https://doi.org/10.1002/ajpa.24142>.



### Face mask vs. telepsychiatry: Maintaining psychiatric care during the COVID-19 pandemic

Maintaining therapeutic care of psychiatric patients during the COVID-19 pandemic requires changes to the way in which sessions are being conducted. We ran a study at two outpatient clinics in Zurich and Bern to explore the impacts of the therapist wearing a face mask during on-site sessions compared to telepsychiatric sessions on patients' session experience and on therapeutic alliance. Therapeutic alliance has thereby found to be one of the strongest predictors of treatment outcome. Preliminary results with adult ADHD patients (Zurich sample) suggest that there are few differences between the two types of sessions; both approaches seem valid options to continue treatment during a situation such as the current pandemic.

## Institute of Dental Medicine (ZMK)

Freiburgstrasse 7, 3010 Bern

[www.zmk.unibe.ch](http://www.zmk.unibe.ch), [www.facebook.com/zmkbern](https://www.facebook.com/zmkbern)



Prof. Anton Sculean  
Executive  
Director and  
Director of the  
Department of  
Periodontology



Prof. Vivianne Chappuis  
Director of the  
Department of  
Oral Surgery and  
Stomatology



Prof. Hendrik Meyer-Lückel  
Director of the  
Department  
of Restorative,  
Preventive  
and Pediatric  
Dentistry



Prof. Christos Katsaros  
Director of the  
Department of  
Orthodontics  
and Dentofacial  
Orthopaedics



Prof. Urs Brägger  
Director of the  
Department of  
Reconstructive  
Dentistry and  
Gerodontology



Prof. Martin Schimmel  
Head of the  
Division of  
Gerodontology

### Profile

- Undergraduate dental curriculum (for 3rd, 4th and 5th year students) with theoretical and practical courses leading to B Dent Med and M Dent Med degrees
- Postgraduate curriculum (3–4 years) leading to federal recognized dental specialities and / or MAS degrees
- Continuing Dental Education Courses
- Basic-, translational- and clinical research covering most aspects in dentistry
- WHO Collaborating Centre for Epidemiology and Community Dentistry, Milan, Italy; Department of Cariology, Institute of Odontology, Salhgrenska Academy, University of Gothenburg, Sweden; Department of Operative Dentistry, Periodontology and Preventive Dentistry RWTH Aachen, Germany; Department of Odontology, School of Dentistry, University of Copenhagen, Denmark; University of Texas Health, USA; University of Oslo, Norway; University of São Paulo – FOUSSP / FOB, Brazil; Indiana University, USA; Federal University of Minas Gerais, Brazil; Ohio State University, USA; Harvard School of Dental Medicine, USA; Department of Prosthodontics, University of Greifswald, Germany; Federal University of Goiás, Brazil; Karolinska Institute, Gotenburg, Sweden; Eastman Dental Institute, UK
- Tertiary treatment center for the prevention and treatment of oral diseases with treatment on-site and in satellite clinics (Penal institution Hindelbank, Bern Geriatric Hospital Center BESAS Gümliigen)

### Grants

- Endowed professorship for preventive dentistry and oral epidemiology of the Lutz Zürrer Foundation
- International Team for Implantology – ITI Foundation
- Nakao Foundation
- Research Internships Abroad – São Paulo Research Foundation
- Swiss Dental Association
- Swiss National Science Foundation
- Innosuisse 26940.1 PFLS-LS (until Oct 2020) - Laboratory of Oral Microbiology

### Highlights



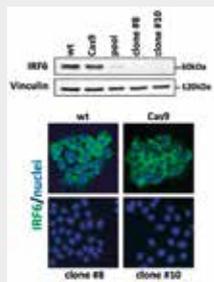
Design of the intraoral appliance

#### Caries prevention without or with high fluoride dentifrices

In this clinical in situ study, not only for enamel but also for dentin a fluoride dose-response on sound, lowly and highly demineralized dentin specimens could be observed. Furthermore, both fluoride-free dentifrices, one containing nanohydroxyapatite, did not hamper demineralization. These data highlight that fluoride is one key factor to prevent and reverse coronal and root caries. Wierichs RJ, Musiol J, Erdwey D, Esteves-Oliveira M, Apel C, Meyer-Lueckel H. J Dent 2020. 94: 103305.

## Reliability and comparability of methods for assessing oral function: chewing, tongue pressure, and lip force

The assessment of orofacial hypofunction and oral frailty relies on data and instruments available solely in Japan. In this study we demonstrated that the instruments available in Europe are comparable to the Japanese standard with normalized values. This research will allow us to continue the search for predictors of orofacial hypofunction in European cohorts. Arakawa I, Abou-Ayash S, Genton L, Tsuga K, Leles C R, Schimmel M. *J Oral Rehabil.* 2020. 47: p 862-71.



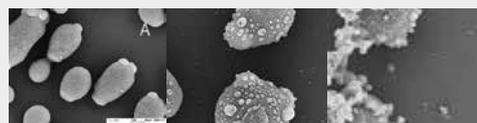
## Laboratory for Oral Molecular Biology

The transcription factor Interferon Regulatory Factor 6 (IRF6) regulates epidermal proliferation and differentiation and plays a major role in craniofacial development. In humans, IRF6 disruption is causal for syndromic clefts, and associated with non-syndromic orofacial clefts. To elucidate its role in human cells, we used CRISPR/Cas9 to generate IRF6 knock-out keratinocytes derived from postnatal oral mucosa and skin, which allows us to study IRF6 function as well as to appreciate tissue-specific differences for or a better understanding of orofacial cleft-related complications. Degen M, Girousi E, Feldmann J, Parisi L, La Scala GC, Schnyder I, Schaller A, Katsaros C. *Front Cell Dev Biol.* 2020 Sep 29;8:583115.

CRISPR/Cas9 has been used to knock-out IRF6 in postnatal human keratinocytes. Absence of IRF6 is confirmed using immunoblots (top) and immunofluorescent stainings (bottom) for IRF6 (clone #8 and clone #10).

## Laboratory of Oral Microbiology

The laboratory evaluates in vitro new treatment options for periodontal and peri-implant therapy. Both standard microbiological methods as well as different biofilm models are used. Within the Innosuisse project, the laboratory investigated in detail potential components of oral health care products (alternatives or supplements to chlorhexidine digluconate). Supported by the Association for Dental Infection Control, the antimicrobial activity of three different propolis was evaluated. A collaborative project together with two Fraunhofer institutes in Halle/Saale (Germany) and with the Martin-Luther University Halle/Saale on a new topical antibiotic formulation was finalized and showed the potential of the formulation for long-lasting antimicrobial activity. Schmid et al., *Pharmaceutics.* 2020 Apr 13;12(4):352.



Candida albicans without (A) and with European (B) and Brazilian (C) propolis.

## Laboratory of Oral Cell Biology

Our lab performs translational research focused on the cellular and molecular mechanisms of bone and soft tissue regeneration in the oral cavity. Our most recent studies have utilized cell-based assays, proteomics and genomics approaches to assess the biological potency of hyaluronan, bone-conditioned medium (BCM), recombinant growth factors, and diverse biomaterials intended to be used in periodontal regenerative and implant surgery.

Asparuhova MB et al., *Clin Oral Investig* 2020 : 24(11), 3923-3937. Parisi et al., *Clin Oral Investig* 2020 : Sep 1.



3D model for studying the role of BCM-coated bone substitute material (DBBM) on oral cellular behavior.

## Research on Periodontal Regeneration

For the first time, a preclinical study has provided histologic evidence that a biomaterial consisting of a collagen-elastin scaffold, originally developed for soft tissue augmentation, supported periodontal regeneration. Significantly more cementum ( $p=0.009$ ) and bone ( $p=0.03$ ) formation occurred in the test group with the biomaterial than in the control group without the biomaterial. The junctional epithelium was shorter in the test group ( $p=0.16$ ).

## Institute of Primary Health Care (BIHAM)

Mittelstrasse, 43, 3012, Bern  
[www.biham.unibe.ch](http://www.biham.unibe.ch)



Prof. Nicolas Rodondi  
Director



Prof. Alice Panchaud  
Pharmacy  
Primary Care



Prof. Reto Auer  
Substance Use



Prof. Sven Streit  
Inerprofessional Primary  
Care



PD Dr. Martin Feller  
Research  
Coordination



Dr. Cinzia Del Giovane  
Methodology  
and Biostatistics



Dr. Elisavet Moutzouri  
Research  
Coordination



Dr. Patricia Chocano  
Ageing



Dr. Roman Hari  
Teaching



Dr. Manuel Blum  
Research Career  
Development

### Profile

- Research in primary health care, epidemiology and public health
- Promote evidence based, high value, safe and patient centered health care
- Training next generation of primary care physicians and strengthen the development of primary care at cantonal and national level
- New Master's program in Pharmacy
- External Partners: Leiden University Medical Center, The Netherlands; Department of Medicine & Epidemiology and Biostatistics, UCSF, CA, USA; Department of Epidemiology, McGill University, Montreal, Canada; The Thyroid Studies Collaboration on 5 continents, University General Medicine and Public Health Centre (Unisanté), Lausanne University, Switzerland; Institute of Primary Care Zurich, University of Zurich, Switzerland; Italian Cochrane Centre, University of Modena and Reggio Emilia, Modena, Italy; Centre on Ageing and Mobility, University of Zurich and Zurich University Hospital; Division of Pharmacoepidemiology and Pharmacoeconomics, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA

### Grants

- STREAM-75 – Discontinuing Statins in Multimorbid Older Adults without Cardiovascular Disease – a Randomized Non-Inferiority Clinical Trial (SNF)
- ESTxENDS – SNSF, Swiss Cancer Research, Tobacco Prevention Found
- OPERAM – European Union's HORIZON 2020 & Long Term (SNF)
- CONSIGN - Study on impact of COVID-19 infection and medicines in pregnancy
- Swiss National Science Foundation (five ongoing projects)
- Claims data colorectal cancer – Swiss Cancer Research
- KHM - Kollegium für Hausarztmedizin, „Starthilfegeld“, 2020-2021
- Swiss Academy of Science, Young Talents in Clinical Research Program

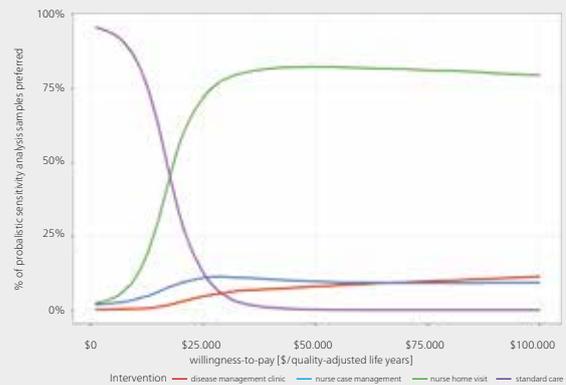
### Highlights

#### New Team of Pharmacy and Master in Pharmacy

At BIHAM, we welcome a new and interprofessional group in primary health care under the lead of Prof. Alice Panchaud (pharmacist) and Prof. Sven Streit (general practitioner). The team teaches for the new master program in pharmacy ([https://www.medizin.unibe.ch/studium/studienprogramme/master\\_pharmazie/index\\_ger.html](https://www.medizin.unibe.ch/studium/studienprogramme/master_pharmazie/index_ger.html)) and conducts inter-professional research to optimize care with a special focus on patient needs and preferences.

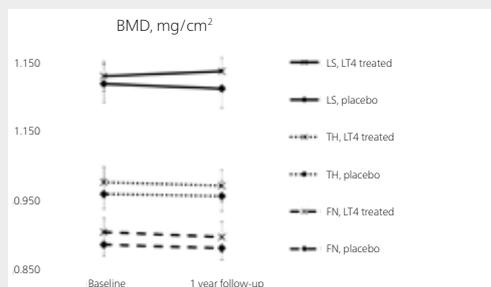
## Cost-effectiveness of Transitional Care Services (TCS) in older patients with heart failure (HR)

TCS aim at lowering the risk of death and re-hospitalization in older patients with HF discharged from hospital. In a decision-analytical microsimulation, we assessed the cost-effectiveness of several post-discharge HF TCS in HF patients  $\geq 75$  years, compared to standard care. We found TCS to be more cost-effective than standard care, with nurse home visits dominating the other TCS interventions (incremental cost-effectiveness ratio of USD 19,570 per quality-adjusted life year gained). Blum et al., Ann Intern Med 2020.



## No bone loss with levothyroxine replacement therapy in elderly with subclinical hypothyroidism (SHypo)

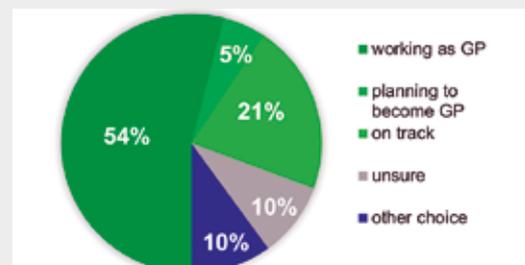
SHypo, a mild dysfunction of the thyroid, is common among older adults and often treated with levothyroxine, but there were concerns that this therapy might lead to accelerated bone loss. Among 196 adults with SHypo aged  $\geq 65$  years randomized to levothyroxine or placebo, yearly change in bone mineral density were similar between groups. These findings from the largest trial on this issue provide reassurance regarding the skeletal safety for patients treated with levothyroxine. Gonzalez Rodriguez R. & Rodondi N., JCEM 2020.



One-year change in bone mineral density (left) at lumbar spine (continuous line), total hip (dotted line), and femoral neck (broken line), in placebo (diamonds) and LT4-treated (cross) patients. Abbreviations: BMD, bone mineral density; LS, lumbar spine; TH, total hip; FN, femoral neck; LT4, levothyroxine therapy.

## Evaluating 10 years of state-funded GP training in GP offices in Switzerland

The Canton of Bern provides funds to support GP training in GP practices since 2008. At BIHAM, we followed 165 former GP trainees to understand which career choices they took after completion of the program. More than 80% decided to become GP or were on track to become one. More than 40% took over the GP practice or started to work as a GP where they completed training and since the program is organized by BIHAM where we also respect to fund GPs from regions with a more pronounced GP shortage. Therefore, GPs are highly needed in these regions and the program is a crucial step to support them. Baumann K. & Streit S., PlosOne 2020.



## Patient-centeredness of medical students increases during primary care clerkships – but no additional benefit of a home-based interview: a randomized trial

Patient-centered care improves patient outcomes but is difficult to teach. We investigated in a clinical trial whether first-year medical students who had a structured home-based interview with a chronically ill patient became more patient-centred than those who had a sham intervention ( $n=317$ ). The interview had no effect on patient-centred attitudes, but patient-centeredness scores increased in both groups. This is in contrast to other studies, which may be due to the primary care clerkships by the BIHAM. Harris M & Hari R., BMC Med Educ. 2020.

# Institute of Complementary and Integrative Medicine (IKIM)

Inselspital, Freiburgstrasse 46, 3010 Bern; von Roll Campus, Fabrikstrasse 8, 3012 Bern  
[www.ikim.unibe.ch](http://www.ikim.unibe.ch)



Prof. Ursula Wolf  
Director



PD Dr. Stephan Baumgartner  
Deputy Director



PD Dr. Johannes Fleckenstein

## Profile

- Teaching students of human and dental medicine
- 3 research groups
- Patient centered translational and clinical research in complementary and integrative medicine. Investigating pharmacological and non-pharmacological therapies, developing of new methodology
- Investigation of efficacy, effectiveness and mode of action of pharmaceutical preparations as used in Complementary and Integrative Medicine
- Investigation of underlying physiological mechanism; implementation of Chinese Medicine / Acupuncture technique into clinical routine
- External partners: Paracelsus Spital Richterswil, Switzerland; Hospital of Fribourg (HFR), Fribourg, Switzerland; Swiss Group for Clinical Cancer Research SAAK, Breast Cancer Group, Switzerland; Empa, St. Gallen, Switzerland; NTB Buchs, Switzerland; Neuchâtel Platform of Analytical Chemistry, University of Neuchâtel, Switzerland; Society for Cancer Research, Arlesheim, Switzerland; Children's Hospital of Eastern Switzerland, St Gallen, Switzerland; Institute of Integrative Medicine, University of Witten/Herdecke, Germany; Department of sports Medicine, Goethe-University Frankfurt, Germany; Department of Clinical Pharmacology, University of Regensburg, Germany; Department of Anaesthesiology, University of Greifswald, Germany; ISS Inc.y Champaign, IL, USA; Multidisciplinary Laboratory of Pharmaceutical Sciences, Faculty of Pharmacy, Federal University of Rio de Janeiro, Brazil

## Grants

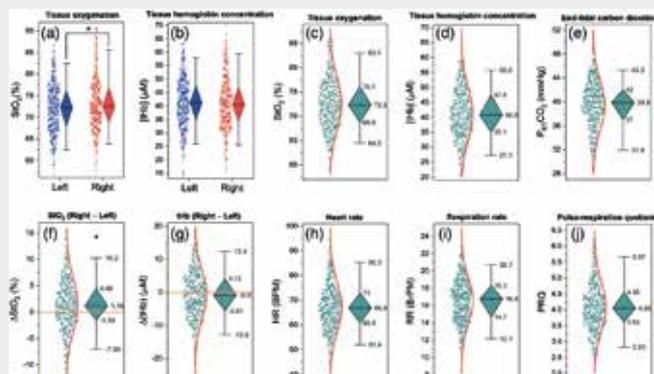
- Swiss National Science Foundation: SNF Bridge Discovery 20B2-1\_180983 / 1
- Swiss Cancer League, Cancer Research Switzerland: 4259-08-2017
- Software AG Foundation (BA-P11425, SE-P12117, BA-P12916)
- Swiss State Secretariate for Education, Research, and Innovation / Leading House for the Latin American Region (University of St. Gallen): SMG 1928

## Highlights

### Frontal cerebral oxygenation asymmetry: intersubject variability and dependence on systemic physiology, season, and time of day

Our study reveals that frontal cerebral oxygenation asymmetry (FCOA), i.e. a difference in the oxygenation between the right and left prefrontal cortex (PFC), is a real phenomenon in healthy human subjects at rest.

Zohdi H, Scholkmann F, Wolf U. Neurophotonics, 2020.

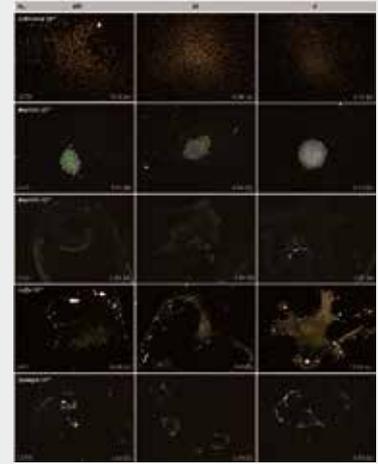


Frontal cerebral oxygenation asymmetry

## Impact of succussion on pharmaceutical preparations analyzed by means of patterns from evaporated droplets

Pharmaceutical preparations of different origin as used in Complementary and Integrative Medicine were exposed to mechanical succussion strokes. Patterns from evaporating droplets of these preparations were evaluated by means of computerized image analysis regarding grey level distribution, texture, and fractality. For all investigated preparations, significant differences were found between succussed and unsuccussed samples. The results reveal the relevance of a potential influence of mechanical energy on pharmaceutical preparations, calling for mechanistic studies to further study the effects induced.

Kokornaczyk MO, Würtenberger S, Baumgartner S. Springer Nature, Scientific Reports, 2020, 10:570.

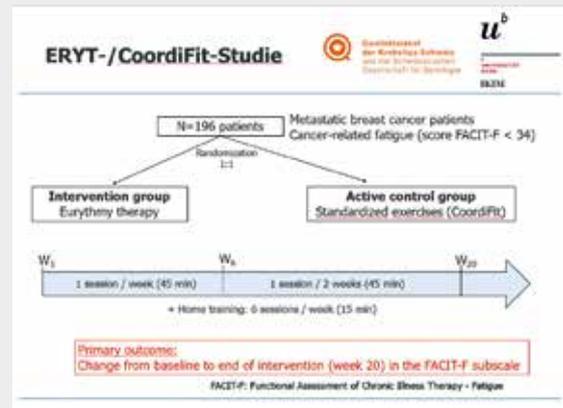


Examples of patterns formed in evaporating droplets of unsuccussed or succussed pharmaceutical preparations

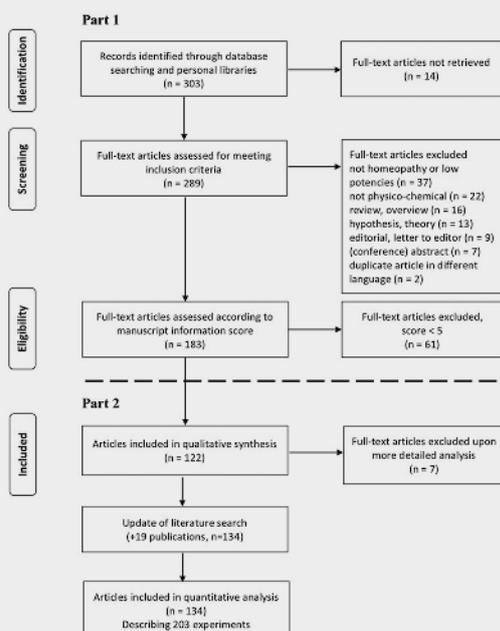
## Eurythmy therapy versus slow movement fitness in the treatment of fatigue in metastatic breast cancer patients: study protocol for a randomized controlled trial

Cancer-related fatigue (CRF) is the most taxing symptom for many breast cancer (BC) patients, even after therapy and in metastatic patients, the prevalence is > 75%. There is no gold standard to treat CRF. Physical activity can reduce CRF but may be too burdensome for metastatic patients. The study assesses the effect of eurythmy therapy (ERYT) versus movement fitness (CoordiFit) on CRF in metastatic BC patients.

Meier-Girard D, Ribl K, Gerstenberg G, Ruhstaller T, Wolf U. Trials, BioMed Central, 2020.



Study design. Study has Swiss Cancer League label for an interventional study.



## Physicochemical profiling of pharmaceuticals used in integrative medicine

In a systematic review we analysed the methods used for physicochemical characterization of potentized pharmaceutical preparations. Investigations with nuclear magnetic resonance relaxation as well as spectroscopic methods yielded empirical evidence for specific properties of such preparations. These results call for the development of adequate theoretical models.

Tournier A, Würtenberger S, Klein SD, Baumgartner S. J Alt Compl Med 2020 (in press).

Flowchart of the systematic review process

## Institute for Medical Education (IML)

Mittelstrasse 43, 3012 Bern  
[www.iml.unibe.ch/en/iml](http://www.iml.unibe.ch/en/iml)



Top row: Prof. Sissel Guttormsen, Director IML; Dr. Philippe Zimmermann, Department Head ASCII; Dr. Sandra Trachsel, Department Head MME  
Lower row: Prof. Sören Huwendiek, Department Head AAE; Dr. Kai Schnabel, Department Head AUM

### Profile

- Competence centre for medical education, supporting development of competency in health professionals aiming at optimal patient care. Serving the medical faculty in Bern and other medical schools and institutions nationally and internationally
- During the pandemic-year: Increasing the electronic and on-line assessment possibilities, as well as broad opportunities for on-line learning; extending our existing services
- Partners: Swiss medical faculties; several German speaking medical faculties, and various partners internationally: <https://tinyurl.com/examic-partners>; <https://tinyurl.com/research-cooperations>

### Grants

- EU-Project: «Developing, implementing, and disseminating an adaptive clinical reasoning curriculum for healthcare students and educators», Project coordinator: University of Augsburg, Project head: PD Dr. Inga Hege. Project partner IML: Prof. Sören Huwendiek, MME, Dr. Felicitas Wagner
- ERS (European Respiratory Society)/PhD-Grant: «How to improve continuing professional development to foster physician's competencies and patient treatment». PhD Advisor: Prof. S. Huwendiek, MME, Sai Sreenidhi Ram (PhD)
- NFP 74, Smarter HealthCare «Spiritual Care in Chronic Pain»: The significance of the spiritual dimension in medical treatment/nursing will be investigated in chronic pain patients and an appropriate surveying tool as well as an e-learning tool will be developed to improve the communication. Project head: Prof. S. Peng Keller, Theological Faculty, University of Zürich. Project partner: Prof. S. Guttormsen, Institute for Medical Education (Lead project C)
- Swiss Cancer League: «Communication with cancer patients and their families about approaching death: Scaffolding conceptual and practical learning for health professionals». Project head: Prof. Sissel Guttormsen. Project partner: Prof. Steffen Eychmüller, University Centre for Palliative Care, Inselspital, University Hospital Bern
- Health 2030: «Precision Medicine for FRONTLINERS», a multi-support learning platform for the daily practice of frontline care professionals. Project head: Idris Guessous HUG/UNIGE. Project partners: Profs. S. Guttormsen, J. Cornuz, Unisanté/UNIL, G. Waeber, CHUV/UNIL <https://www.frontliners.ch>
- Förderung innovativer Lehre (Promotion of innovative education) project «Aus Fehlern lernen - Verbesserung kommunikativer Fähigkeiten» («Learning from erroneous examples – Improving communication skills»). Project head: Prof. S. Guttormsen. Project coordinator: Dr. med. U. Woermann, MME. Project partner IML: Dr. med. N. Lüthi, MME. Other Partners: Prof. N. Eglhoff, University of Bern, cand. med. C. Ueltschi, Dr. med. R. Ott

## The challenge of holding examinations during the Covid-19 pandemic

How can exams take place during the Covid-19 pandemic? As a recognised competence centre, the IML has dealt with the challenges that arose suddenly due to the Covid-19 pandemic. <https://tinyurl.com/yypjgaan>

Exams in 2020 (Photo Peter Frey)



## Precision Medicine for FRONTLINERS

In this project we support the development of a learning platform on Precision Medicine for the daily practice of frontline care professionals. We aim to translating the growing evidence of precision medicine (PM) into high value medicine for the patients and the society. <https://tinyurl.com/y9a9gktr>



## Communication training in Corona times

When face-to-face classes at the University of Bern were discontinued in 2020, several courses organized by the IML were also affected, including communication training with the simulated patients. Thanks to the University's video conferencing system, these were nevertheless still held. <https://tinyurl.com/yyo6pdjw>



Communication training via video conference (Photo IML)

## Master of Medical Education in Corona times

Running the MME study program with international teachers and health professionals as participants was a big challenge during the Corona pandemic. Still, we successfully managed to organize 2 modules onsite in Bern (Setting the Stage and Learning Environment) and 3,5 modules online (Communication, Project Management, Assessment and Scholarship). <https://tinyurl.com/y52krjvg>

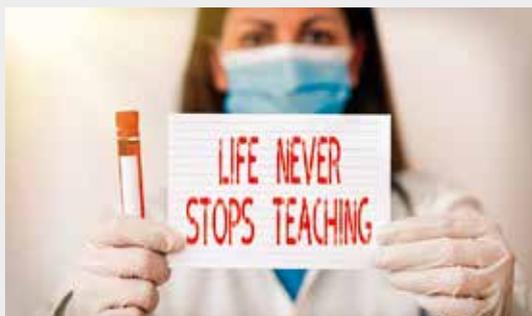


Photo Francois Poirier – stock.adobe.com

## BiSS recognised as a «Certified Skills Lab» according to the APF standard

The Association for Medical Education GMA (Committee for Practical Skills APF) awards the Bern Interprofessional Skills and Simulation Personnel Center (BiSS), including its simulation person program, accreditation as a certified skills lab. <https://tinyurl.com/y4bbxfvs>



Photo Artur – stock.adobe.com



# Clinics at the University Hospital, Inselspital

Department of Anaesthesiology and Pain Medicine  
Department of Angiology  
Department of Cardiology  
Department of Cardiovascular Surgery  
Department of Clinical Chemistry  
Department of Cranio-Maxillofacial Surgery  
Department of Dermatology (DERK)  
Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UEM)  
Department of Diagnostic and Interventional Neuroradiology  
Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)  
Division of Magnetic Resonance Spectroscopy and Methodology (MRM)  
Department of Emergency Medicine  
Department of ENT, Head and Neck Surgery  
Department of General Internal Medicine  
Department of Geriatrics  
Department of Hematology and Central Hematology Laboratory  
Department of Human Genetics  
Department of Infectious Diseases  
Department of Intensive Care Medicine  
Department of Medical Oncology  
Department of Nephrology and Hypertension  
Department of Neurology  
Department of Neurosurgery  
Department of Nuclear Medicine  
Department of Obstetrics and Gynecology  
Department of Ophthalmology  
Department of Orthopedic Surgery and Traumatology  
Department of Osteoporosis  
Department of Pediatrics  
Department of Pediatric Surgery  
Department for Plastic and Hand Surgery  
Department for Pulmonary Medicine  
Department of Radiation Oncology  
Department of Rheumatology, Immunology and Allergology (RIA)  
Department of Thoracic Surgery  
Department of Urology  
Department for Visceral Surgery and Medicine



# Department of Anaesthesiology and Pain Medicine

Inselspital, 3010 Bern  
[www.anaesthesiologie.insel.ch](http://www.anaesthesiologie.insel.ch)



Prof. Frank Stüber  
Director and Chair



PD Dr. Lutz Lehmann  
Vice Chair



Dr. Nadja Fisler  
Head of HR



PD Dr. Martin Luginbühl  
Chair Spital Tiefenau



Reto Thomann  
Head of Nursing



PD Dr. Markus Lüdi  
Head of Research

## Profile

- Our close clinical ties to our surgical and interventional partners allow us to add value to all our stakeholders in perioperative medicine, with benefits for many aspects of acute care.
- Building on the role of modern anaesthesiology as a provider of services for patients and surgeons alike, we evaluated the effects of decreasing the perioperative impact on organ systems, developing sustainable policies for human resources staffing, and benefiting from shared decision making.
- Our research covered a broad range of topics, with the aim of contributing significantly to precision medicine in the fields of anaesthesiology and perioperative care.

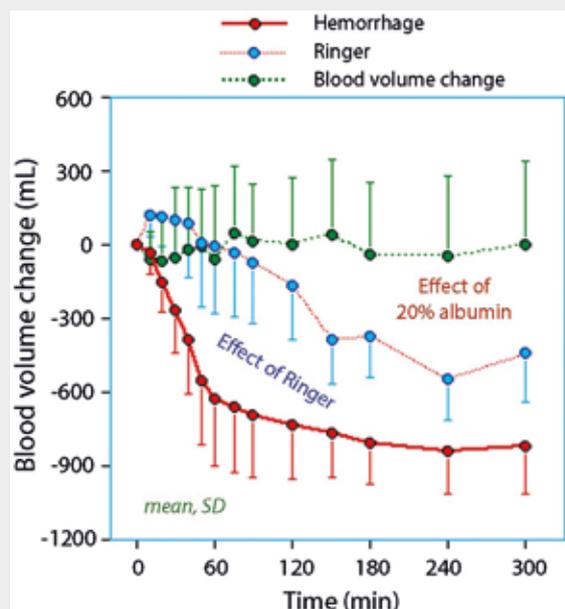
## Grants

- Laerdal Foundation, Norway (to Dr. Anja Levis)
- Biärsch Foundation, Switzerland (to Dr. Joana Berger)
- Swiss Society of Paediatric Anaesthesiology, Switzerland (to Dr. Thomas Riva)

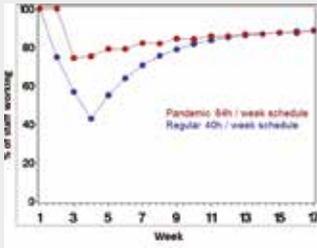
## Highlights

### New methodology for estimating plasma volume

Traditional approaches to estimating plasma volume fail to assess beneficial effects of 20% albumin in patients undergoing major surgery. This is because data can be significantly skewed by the often very diverse mixture of infused substances and ongoing intraoperative blood loss. We designed a single-centre feasibility study to assess potential plasma expansion upon infusion of 20% albumin during major urologic surgery with significant risk of perioperative haemorrhage. In 23 patients undergoing radical cystectomy with urinary diversion, we found blood volume expansion of roughly twice the infused volume of 20% albumin. This effect was long lasting and five times stronger than for the lactated Ringer's solution alone, leading us to conclude that 20% albumin can be used for long-term volume expansion. Löffel LM et al. *Anesth Analg* 2020; Online ahead of print.



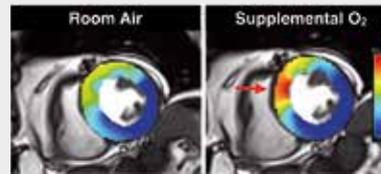
Blood volume change as the result of the plasma volume expansion of the Ringer solution and 20% albumin, derived from changes in haemoglobin measurement.



Comparison of a schedule with respect to the percentage of healthy work force.

## Modelling predicts benefits of pandemic-adjusted staffing

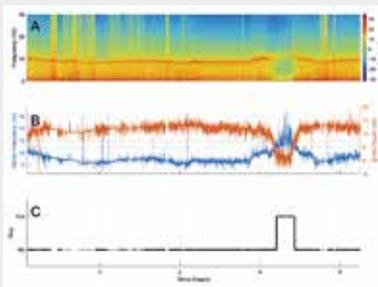
The safety and availability of health care workers in a pandemic is of extreme importance, especially in acute care medicine, where highly specialised staff are difficult to replace. In this epidemiological study we modelled the effect of assigning intensive care unit staff to epidemiology-adjusted shifts, and compared the results with our regular staffing model. We concluded that pandemic-adjusted staffing could significantly reduce workforce shortages in acute care medicine, promoting staff health and the functioning of health care facilities. Mascha EJ et al. *Anesth Analg* 2020; 131, 24-30.



Functional cardiovascular MRI of a patient suffering from significant RVIA stenosis and circumferential shortening patterns

## Effect of hyperoxia on myocardial oxygenation and function

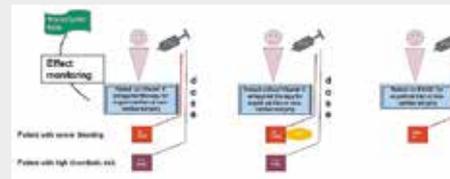
Traditionally, patients have received almost unrestricted amounts of supranormal oxygen in acute care to putatively improve cardiopulmonary safety. The latest evidence has shown significant disadvantages of this traditional approach, however. Due to conflicting data and a lack of high-quality studies, the European Society of Cardiology recently changed its guidelines for administering oxygen in patients suffering from acute coronary syndrome. In an observational study we examined the effect of supranormal inspired oxygen fractions on myocardial contractility in subjects suffering from coronary artery disease, and found that this caused deoxygenation in affected myocardium. The group concluded that individuals presenting with pre-existing myocardial injury and coronary artery disease react with strain abnormalities as a result of supranormal oxygenation and are susceptible to hyperoxia-induced deterioration of myocardial physiology. Guensch D et al. *JAMA* 2020; Online ahead of print.



EEG patterns reminiscent of those seen during awakening from general anaesthesia.

## Awareness during cardiopulmonary bypass

Intraoperative awareness is known to be increased during cardiac surgery, and is thought to be associated with higher risk during periods of initiation and weaning from cardiopulmonary bypass. Every effort must be made to avoid such episodes. Therefore we conducted a prospective trial with data from 1002 patients who underwent two-channel bi-hemispheric frontal EEG. Fifty-five patients (5.5%) showed emergence-like EEG activity at least once during surgery. We concluded that 1 in 20 patients undergoing cardiac surgery with the use of cardiopulmonary bypass and volatile anaesthesia has a sustained EEG pattern during surgery, which is often seen with emergence from general anaesthesia. Monitoring the frontal EEG may identify these events and potentially reduce the incidence of unintended awareness. Kaiser HA, et al. *Br J Anaesth.* 2020; 125, 291-297.



Pictorial abstract of the European consensus statement on the use of four-factor prothrombin complex concentrate.

## Guidelines for the use of four-factor prothrombin complex concentrate

Prof. Dr. Dr. Gabor Erdoes contributed as first author to consensus guidelines of the European Association of Cardiothoracic Anaesthesiology on the use of four-factor prothrombin complex concentrate in cardiac and non-cardiac surgical patients. These modern concentrates are increasingly being used in a variety of clinical scenarios, including bleeding due to coagulopathy or medication with vitamin K agonists, as well as major surgery or trauma. Evidence from prospective, controlled, randomised studies is limited, and dosing strategies vary significantly. Thus these consensus guidelines provide valuable guidance for anaesthesiologists. Erdoes G et al. *Anaesthesia* 2020; Online ahead of print.

## Department of Angiology

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Prof. Iris Baumgartner  
Director



Prof. Yvonne Döring  
Head of Research



PD Dr. Marc Schindewolf  
Consultant Physician



Dr. Ulrike Hügél  
Senior Physician



Dr. Jörn Dopheide  
Senior Physician



Dr. Alexander Rosenov  
Senior Physician



Dr. Jessica Laine  
Molecular Epidemiologist



Györgyi Hamvas  
Clinical Study Manager

### Profile

- Teaching programs, student lectures and courses (clinical skills), weekly internal & DHGE lectures
- Research projects comprise analysis, classification and computational hemodynamic modeling of congenital vascular malformations, risk factor analysis and risk factor modulating therapies in peripheral artery disease, basic atherosclerosis research, integration of omics technologies in research of vascular malformations and atherosclerosis, drug therapy and endovascular management of venous thromboembolism
- External Partners: Switzerland: Departments of Angiology from University Hospital Basel & University Hospital Zürich; Luzerner Kantonsspital; Clinics of Vascular Surgery, Kantonsspital St.Gallen; Germany: Institute for Cardiovascular Prevention, University Hospital LMU Munich; Westdeutsches Morbus Osler Zentrum, University Hospital Essen; Clinic for Vascular and Endovascular Surgery, TUM Munich; Center of Cardiology & Angiology, University Medical Center Mainz; USA: Heart and Vascular Center, University Hospital Denver, Colorado; Italy: Department of Pharmacological and Biomolecular Sciences, University of Milan; United Kingdom: Cardiovascular Strategic Research Initiative Institution, University of Cambridge; Canada: Department of Human Genetics, McGill University, Montreal; Belgium: De Duve Institute, University of Louvain, Brussels

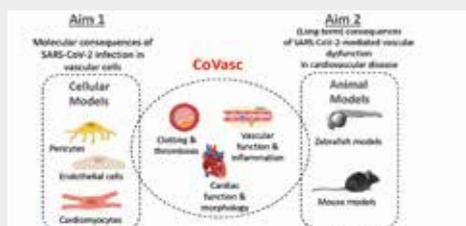
### Grants

- SNSF IICT Project "Immediate revascularization versus standard of care alone in patients with diabetic foot ulcer and non-critical peripheral artery disease: a randomized controlled trial", Prof. I. Baumgartner, PD. Dr. M. Schindewolf, Prof. C. Stettler, Dr. A. Haine, PD. Dr. V. Makaloski, Prof. F. Krause, Prof. D. Staub, Prof. F. Dick, Dr. U. Benecke, Dr. T. Bieri, Prof. T. Zeller, Prof. D. Scheinert, PD. Dr. S. Trelle, Prof. C. Espinola-Klein, Prof. J. Donzé, Dr. A. Czock
- SNSF SINERGIA Project "Disease-targeted next-generation sequencing panel (VASCSequ) for detection of somatic-mosaic mutations in congenital vascular malformations to enable further advances in personalized therapeutic decision making", Prof. I. Baumgartner, Prof. J. Rössler, Prof. H. von Tengg-Kobligk, Prof. M. Vikkula, PD. Dr. U. Amstutz
- SNSF NRP 78 Project "Unravelling consequences of SARS-CoV-2 mediated inflammatory immune responses in heart and vasculature", Prof. Y. Döring, Prof. B. Engelhardt, Prof. N. Mercader Huber, Prof. R. Rieben
- SNSF Project Grant „Molecular mechanism and translational relevance of the atypical chemokine receptor ACKR3 in atherosclerosis“, Prof. Y. Döring
- Boston Scientific International "Criteria to predict mid-term outcome after stenting of chronic iliac vein obstruction", Dr. U. Hügél

### Highlights

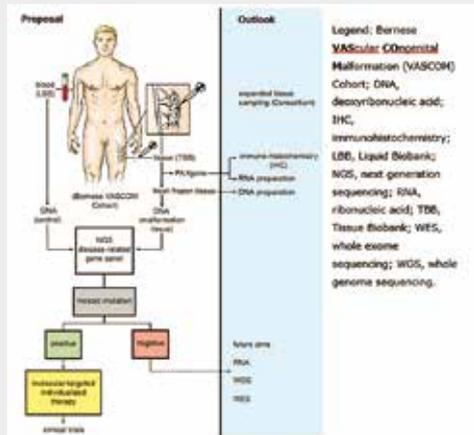
#### SNSF NRP 78: Unravelling consequences of SARS-CoV-2 mediated inflammatory immune responses in heart and vasculature (Acronym: CoVasc)

COVID-19 is a global public health challenge, with rapid spread, high reproductive rates, and until now a lack of specific treatment. Severe cases are significantly affected by cardiovascular disease (CVD) and kidney failure as well as symptoms of the central nervous system. Underlying mechanisms of non-pulmonary tissue



CoVasc aims at discovering entirely novel avenues for therapeutic Interventions in COVID-19 by targeting the vasculature

damage in COVID-19 and associated coagulopathies are poorly understood. Within CoVasc we combine our complementary expertise in cardiovascular biology to study if disease progression is dependent on the cell type infected. Analysis of in vitro and animal models will allow us to study acute but also long-term outcome of infection, which is currently completely unknown.

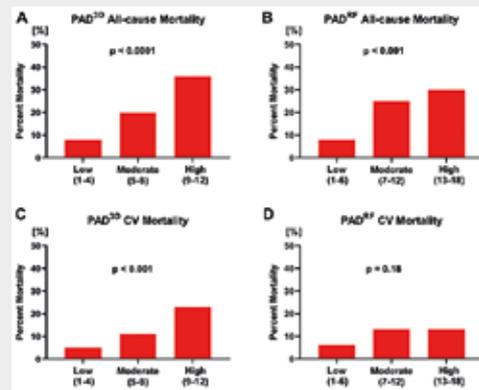


### SNSF SINERGIA: Disease-targeted NGS for detection of mutations in congenital vascular malformations to enable personalized therapeutic approaches

We want to establish a customized disease-targeted gene-sequencing panel (“VASCSeq”) to identify (known) malformation genes, which may allow for drug repurposing and want to consolidate an interdisciplinary collaboration network of vascular physicians, pediatricians, radiologists and geneticists to enable project harmonization between Bern and Brussels. Further, we aim at developing new standardized imaging to support a truly multiscale trial design.

### Development of a 3-Dimensional Prognostic Score for Patients With Symptomatic Peripheral Artery Disease: PAD3D Score

Peripheral artery disease (PAD) is a high-risk condition for cardiovascular (CV) events, but no specific prognosis assessment tool exists. We developed an individual risk score (PAD3D) based on the combined predictive value for mortality, including (1) age, (2) severity of PAD, and (3) extent of atherosclerosis. Addition of the classical risk factors to PAD3D did not further improve the prognostic value. We developed a score for precise prediction of all-cause and CV mortality. The PAD3D score promises to allow for personalized goals in risk intervention. Doppeide et al., *Angiology* 2020.

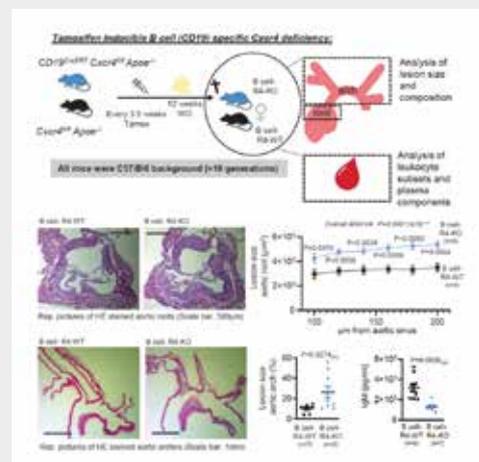


Peripheral arterial disease (PAD)3D score as prognostic predictor. Event rate of (A) all-cause mortality, (B) cardiovascular mortality for the PAD-3D score, as well as for the PAD-RF score (C, D) in the validation cohort.

### B-Cell Specific CXCR4 Protects Against Atherosclerosis Development and Increases Plasma IgM Levels

Over the last years, studies focusing on the role of B-cells in atherosclerosis have revealed that this cell subset can have both pro- as well as anti-atherosclerotic properties depending on the specific subset and method of targeting. Here we revealed that B cell specific CXCR4 deficiency specifically decreases B1 cell and thereby plasma IgM titers. Overall, these results suggest that the atherosclerotic effects observed upon B-cell CXCR4 deficiency are primarily caused by a B-cell-mediated decrease in IgM levels. Döring et al. *Circulation Research*, 2020.

Aortic roots and arches with main branch points were quantified for the extend of atherosclerotic lesions and plasma IgM levels were determined



# Department of Cardiology

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Prof. Stephan Windecker



Prof. Christoph Gräni



Prof. Lukas Hunziker



Prof. Katja Odening



Prof. Thomas Pilgrim



Prof. Lorenz Räber



Prof. Tobias Reichlin



Prof. Markus Schwerzmann



Prof. Christian Seiler



Prof. Stefan Stortecky



Prof. Marco Valgimigli



Prof. Matthias Wilhelm

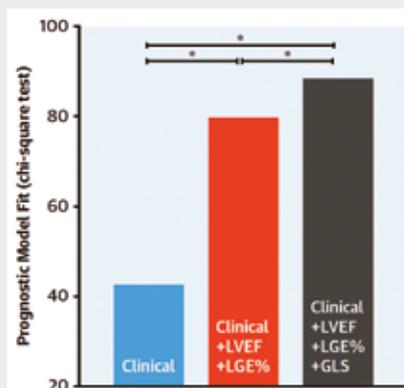
## Profile

- Teaching at multiple levels: clinical training, lectures for undergraduate and graduate students, supervision of MD, Master and PhD students
- Continuous medical education program
- Translational research (electrophysiology, arterial hypertension)
- Broad range of clinical research activities, encompassing investigations of devices for the minimal-invasive treatment of coronary artery disease and valvular heart disease; pharmacological therapies in patients with acute coronary syndromes; studies for the treatment of electrophysiological disorders and heart failure
- External partners: University and large hospitals in Switzerland and abroad, Clinical Trials Unit Bern, ETH, CSEM, industry
- Adjunct Professor: Prof. Roxana Mehran, Mount Sinai, New York, USA

## Grants

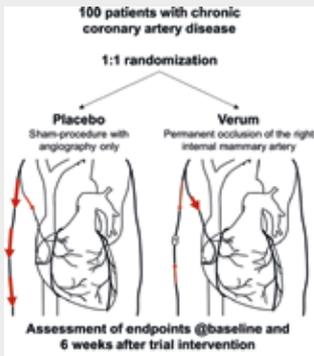
- SNF Grant "PRE-MITRA - Prediction of reverse remodeling in patients with severe secondary mitral valve regurgitation undergoing transcatheter edge-to-edge mitral valve repair", Prof. C. Gräni and PD F. Praz
- SNF-Grant "How do mechano-electrical interactions impact on arrhythmia formation in 'electrical' long-QT and short-QT syndrome?", Prof. K. Odening
- Swiss Heart Foundation Grant "Effects of SARS-CoV-2 infection on outcomes in patients hospitalized for acute cardiac conditions. A prospective, multicenter cohort study (Swiss Cardiovascular SARS-CoV-2 Consortium)", Prof. S. Windecker

## Highlights



Cardiac magnetic resonance feature tracking (CMR-FT) is a developing, contrast-free, quantitative method that uses cine images in routinely acquired CMR scanning. It is able to quantify systolic and diastolic myocardial deformation in different orientations. Data from a cohort of patients with myocarditis who underwent a CMR were analyzed with regard to major adverse cardiovascular events (MACE). Our data showed that myocardial strain using CMR-FT provided independent and incremental prognostic value in patients with myocarditis and may therefore serve as a novel marker to improve risk stratification in this clinical setting. Fischer K. et al., J Am Coll Cardiol Img. 2020;13(9):1891-901.

CMR Feature Tracking is an incremental prognostic marker for MACE in Myocarditis, beyond clinical and traditional CMR features.



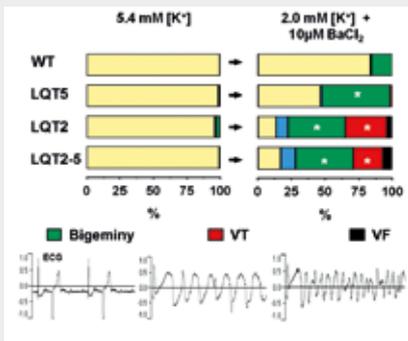
Natural, nonsurgical internal mammary artery (IMA) bypasses to the coronary circulation have been shown to function as extra-cardiac sources of myocardial blood supply. The goal of this randomized, placebo-controlled, double-blind trial was to test the efficacy of permanent right IMA (RIMA) device occlusion on right coronary artery (RCA) occlusive blood supply and on clinical and electrocardiographic signs of myocardial ischemia. Permanent RIMA device occlusion augments RCA supply to the effect of diminishing clinical and electrocardiographic signs of myocardial ischemia during a brief controlled coronary occlusion.

Bigler M. et al., Am Heart J. 2020 Sep 17;230:1-12.

Trial Design

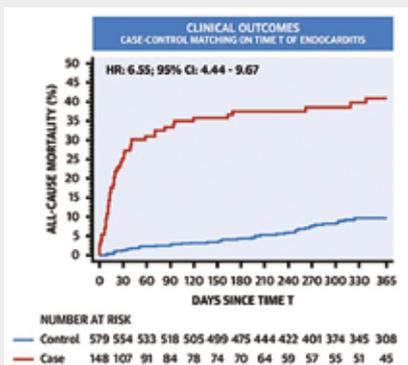
We retrospectively assessed how cumulative meta-analysis of randomised clinical trials evaluating bioresorbable scaffolds (BVS) could serve as a safety-monitoring tool to identify the time point when firm evidence for safety concerns of a rare outcome (namely device-related thrombosis) becomes available. The cumulative meta-analysis revealed that the initial uncertainty regarding the treatment effect based on early trials gained precision through inclusion of additional trials with longer follow-up time and provided firm evidence earlier than the individual trials.

Siontis G. et al., JAMA Network Open. 2020;3(9):e2015031.



Reliable prediction of potentially lethal pro-arrhythmic side effects of novel drug candidates is still a major challenge. To improve current safety screening, transgenic long QT (LQTS) rabbit models were generated. They represent patients with reduced repolarisation reserve due to different pathomechanisms. As they demonstrate increased sensitivity to different specific ion channel blockers, their combined use could provide more reliable and more thorough prediction of (multichannel-based) pro-arrhythmic potential of novel drug candidates.

Hornyik T. et al., Br J Pharmacol. 2020 Aug;177(16):3744-3759.



Infective endocarditis may affect patients after transcatheter aortic valve replacement (TAVR). To provide detailed information on incidence rates, types of microorganisms, and outcomes of infective endocarditis after TAVR, data from the SWISS TAVI registry including consecutive patients between 2011 to 2018 were analyzed. Infective endocarditis after TAVR most frequently occurs during the early period, is commonly caused by Enterococcus species, and results in considerable risks of mortality and stroke.

Stortecky S et al., J Am Coll Cardiol 2020 Jun 23;75(24):3020-3030.

All-cause mortality after infective endocarditis compared to matched case-control group

Contemporary drug-eluting stents (DES) are the standard of care for patients undergoing percutaneous coronary intervention (PCI). In an international, randomized, single-blind trial, polymer-coated DES were compared with polymer-free DES in patients at high bleeding risk. After PCI, patients were treated with 1 month of dual antiplatelet therapy, followed by single antiplatelet therapy. The use of polymer-coated zotarolimus-eluting stents was noninferior to polymer-free umirolimus-eluting stents with regard to safety and effectiveness composite outcomes.

Windecker S. et al., N Engl J Med. 2020;382(13):1208-1218.

# Department of Cardiovascular Surgery

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Prof. Jürg Schmidli  
Director from  
1.10.2020



Prof. Thierry Carrel  
Director until  
30.9.2020



Prof. Alexander Kadner  
Consultant  
Cardiac  
Surgeon,  
Surgery of  
Congenital  
Heart Disease



Prof. Florian Schönhoff  
Consultant  
Cardiac  
Surgeon, Aortic  
Surgery



Prof. Sarah Longnus  
Research Group  
Leader



Dr. Salome Weiss  
Research Group  
Leader

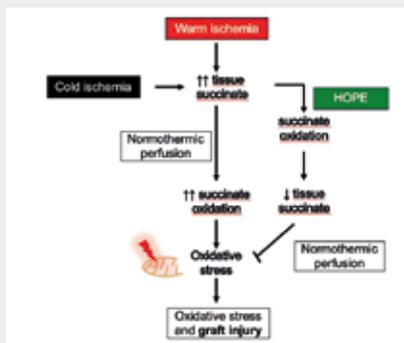
## Profile

- The Department of Cardiovascular Surgery engages in both preclinical and clinical research activities. Specific areas of preclinical research include the pathophysiology of acute cardiac ischemia-reperfusion injury and cardioprotection in the context of heart transplantation. Clinical research can be divided into studies that serve to test clinical devices, which are mostly “industry-sponsored” and “investigator-initiated”, reflecting the Department’s main areas of expertise. Clinical research comprises cardiac surgery, aortic surgery and vascular surgery
- External partners: Integrated Actuators Laboratory - Zentrum für künstliche Muskeln, EPFL Lausanne, Microcity Neuchâtel; Cardiac Surgery, University of Alberta, Edmonton, Canada; Department of Transplantation, Royal Papworth Hospital, Papworth Everard, Cambridge, UK; Laboratoire de Signalisation et Physiopathologie Cardiovasculaire, INSERM, Université Paris Sud, Université Paris Saclay, Châtenay-Malabry, France; St. Vincent’s Hospital, University of New South Wales, Victor Chang Cardiac Research Institute, Sydney, Australia

## Grants

- AARE-TAD (Aortic Aneurysms in 1st degree Relatives from Patients with Thoracic Aortic Disease) study: CHF 42’600; 3Hearts Foundation
- New approaches for evaluation of cardiac grafts obtained with donation after circulatory death: the era of machine perfusion: CHF 90’000; Swiss Heart Foundation (Principal Applicant)
- Unravelling consequences of SARS-CoV-2 mediated inflammatory immune responses in heart and vasculature: CHF 1.95 Mio; SNSF NRP 78 (Project Partner)
- EXaCT: EXosomes based Combination Therapy to target multiple signaling within cardioprotective pathways: CHF 318’000; SNF COST Application (Co-Applicant)
- A collaborative platform for artificial muscles (collaboration with EPFL Lausanne & Nanocity Neuchâtel); Siemens Foundation

## Highlights



## Preclinical Research

For patients with end-stage heart failure, heart transplantation is the gold-standard treatment. Unfortunately, the supply of allografts is insufficient to cover the demand. Donation after circulatory death (DCD) could substantially increase donor heart availability; however, DCD hearts undergo warm ischemia, which is a concern for graft quality. We reported a novel approach for limiting DCD cardiac graft damage using hypothermic, oxygenated perfusion (HOPE). HOPE provides cardioprotection by limiting oxidative stress and restoring high-energy phosphates. HOPE holds great potential for clinical translation.

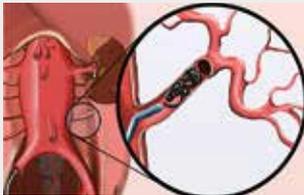
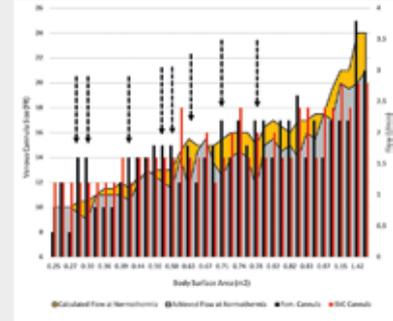
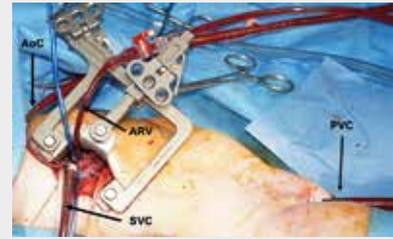
Wyss RK, et al. Hypothermic, oxygenated perfusion (HOPE) provides cardioprotection via succinate oxidation prior to normothermic reperfusion in a rat model of donation after circulatory death (DCD). *Am J Transplant* 2020;00:1-9.

## Cardiac surgery

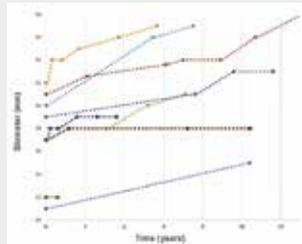
Current clinical studies evaluate devices, especially prosthetic aortic valves, in a prospective and randomized fashion. Special attention is given to the comparison of catheter-based and surgical procedures. Biogenic, polymeric materials for heart valves are being developed as part of our collaboration with the ARTorg Center of the University of Bern. Biogenic polymers, such as bacterial cellulose, are promising candidates for the development of heart valves.

Additional research is focused on the use of minimal extra-corporeal circulation (MECC) and peri-operative care. Furthermore, Bern is an active member of EUROMACS; a registry of patients with implanted mechanical circulatory support systems. In another area of expertise, pediatric cardiac surgery, studies are ongoing to establish minimally-invasive surgical techniques.

Heinisch PP et al. Right axillary thoracotomy in congenital cardiac surgery: analysis of percutaneous cannulation. *Ann Thorac Surg.* 2020 Nov 4;S0003-4975(20)3 1855-5



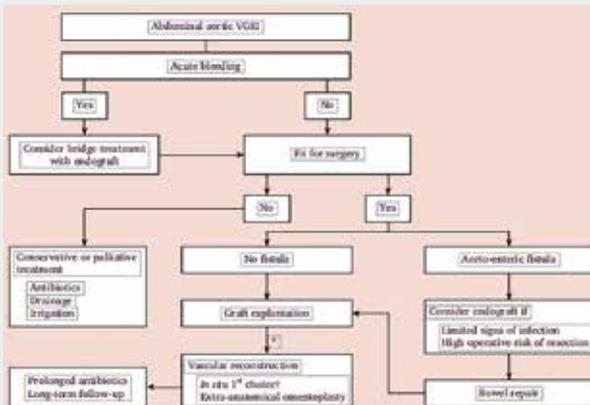
Paraplegia Prevention in Aortic Aneurysm Repair by Thoraco-abdominal Staging (PAPAartis) with "Minimally-Invasive Staged Segmental Artery Coil-Embolization" (MIS2ACE): A Randomized Controlled Multicentre Trial, Horizon2020



Mosbahi S. et al. Long-term outcome of patients with Marfan syndrome with previous aortic surgery but native aortic roots. *European Journal of Cardio-Thoracic Surgery* 58 (2020) 1289–1295. (First Prize-Winner Forschungspreis 2020, Schweizerische Gesellschaft für Herz und Thorakale Gefäßchirurgie, 20'000 CHF)

## Aortic Surgery

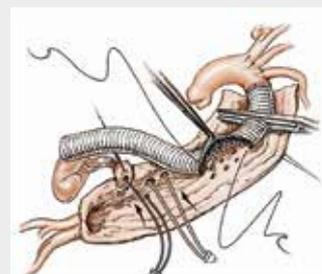
Aortic surgery remains our main clinical research focus. Multicenter, randomized trials are underway to investigate measures to prevent paraplegia in patients undergoing treatment for thoraco-abdominal aneurysms and dissections. Our detailed databases support guideline-relevant publications for the care of patients with heritable disorders of connective tissue with vascular involvement. Our team participates in large, international registries (ARCH Registry, GERAADA, EURAADA); we recently received the first results of a large, international, multi-center study with 22 centers in Europe, the US and Asia investigating reasons for acute aortic dissection in patients below the age of 30 years.



European Society for Vascular Surgery (ESVS). Clinical Practice Guidelines on the Management of Vascular Graft and Endograft Infections. *Eur J Vasc Endovasc Surg* (2020) 59, 339-384.

## Vascular Surgery

Native and vascular graft infections have become an important aspect of our clinical activity. We were able to initiate a European multicenter registry on this topic and played an active role in the development of the corresponding clinical guidelines of the European Society for Vascular Surgery.



## Department of Clinical Chemistry

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Director



Prof. Carlo Largiadè  
Deputy Director



Prof. Alexander Leichtle



Prof. Mojgan Masoodi



Prof. Michael Nagler



PD Dr. Jean-Marc Nuoffer



PD Dr. Ursula Amstutz



PD Dr. Michaela Fux

### Profile

- Teaching students of medicine, biomedicine, bioinformatics, biochemistry, pharmacy, biology, epidemiology, as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB).
- Seven research groups
- Research focus: translational research, clinical research, and precision medicine
- Aim: to translate scientific knowledge into clinically useful bio markers and digital algorithms for more individualized treatments
- Specific research topics: pharmacogenomics and drug metabolism, liquid biopsy, inherited metabolic diseases, clinical cytomics, thrombosis and haemostasis, and computational medicine
- External Partners: Canadian Pharmacogenomics Network for Drug Safety, University of British Columbia, Vancouver, Canada; Laboratory of Biometry, University of Thessaly, Greece; Department of Statistics and OR, Complutense University of Madrid, Madrid, Spain; Mayo Clinic Cancer Center, Mayo Clinic, Rochester, Minnesota, USA; Department of Medical Oncology & Hematology, Cantonal Hospital, St. Gallen, Switzerland; mitoNet (DACH-research Network for mitochondrial medicine); European Drug-Induced Agranulocytosis Consortium (EuDAC), Uppsala University, Uppsala, Sweden

### Grants

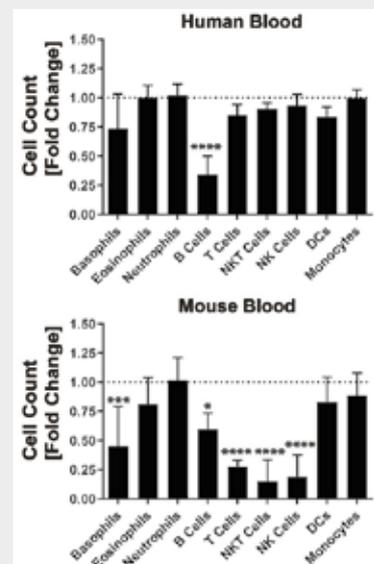
- Swiss National Science Foundation (grant No. 310030-163205; 31003A-160206; 310030-188762; 179334; 162691; BioLink 31BL30-185419; Spark CRSK-3-190977 (co-applicant); Spark grant No: 190686)
- Swiss Personalized Health Network: Project "L4CHLAB" (co-applicant)
- Fondation Johanna Dürrmüller-Bol
- PIPKIN-Foundation

### Highlights

#### Impact of BH3-mimetics on Human and Mouse Blood Leukocytes: A Comparative Study

BH3-mimetics, selective inhibitors of anti-apoptotic proteins, gained interest in the treatment of haematological malignancies. In order to test the future clinical application of BH3-mimetics, an easy to handle test system is needed. We established an ex vivo flow cytometric assay to compare the impact of BH3-mimetics on blood leukocytes from humans and mice. Our results demonstrate that responses towards BH3-mimetics can be identical as well as considerably different in leukocytes of the two species. For instance, ABT-199 (BCL-2 inhibitor) efficiently induced apoptosis in all types of lymphocytes in mice but was exclusively specific for B cells in humans. Our ex vivo assay may support the investigation of future clinical applications of BH3-mimetics.

Rohner L et al., Scientific Reports Nature Publishing Group, 2020, 10(1):222.

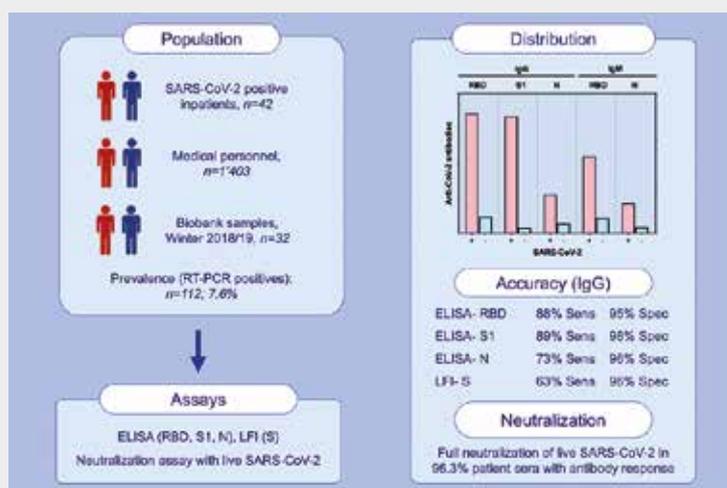


## Predicting COVID-19 predictive immunity

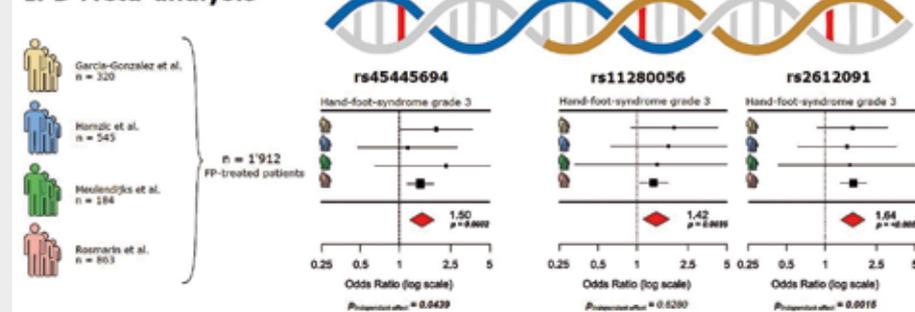
The prediction of protective immunity against SARS-CoV-2 is a crucial aspect to help controlling the 2019 coronavirus (COVID-19) pandemic and serological immunoassays are the most promising laboratory tests. We have conducted an extensive diagnostic accuracy study to comprehensively assess the diagnostic accuracy of various serological immunoassay strategies and first results are already published.

Our results suggest that (a) the utility of immunoassays strategies displays remarkable variation among analytical techniques and SARS-CoV-2 epitopes, (b) complete neutralization of live SARS-CoV-2 suggests protective immunity in many cases, (3) a large variation in the antibody response hints at factors relevantly affecting immune response to SARS-CoV-2, (4) and relevant differences in the duration of protective immunity exists. In a set of additional studies, we aim (a) to systematically study the long-term humoral and cellular immune response, and clinical immunity in a representative population, (b) to establish the predictive value of various immunoassays for long-term protective immunity, and (c) to study a broad range of factors affecting the long-term protective immunity.

Brigger D, et al. Allergy. 2020 Sep 30;10.1111/all.14608. doi: 10.1111/all.14608. Epub ahead of print.



## IPD Meta-analysis



## Evaluating the role of ENOSF1 and TYMS variants as predictors in fluoropyrimidine-related toxicities: an IPD meta-analysis

Thymidylate synthase encoded by TYMS, the therapeutic target of the important chemotherapeutic fluoropyrimidines (FPs) has been extensively investigated to identify potential biomarkers for FP- treatment safety and effectiveness. Recently, a variant in the adjacent Enolase Superfamily Member 1 gene (ENOSF1), a gene partially overlapping with the TYMS locus was proposed to account for the previously reported associations of TYMS variants with FP-toxicity by genetic linkage. In order to resolve this controversy, we performed an individual patient data meta-analysis including a so far unpublished cohort. Our data suggest an important role of genetic variation in both TYMS and ENOSF1 in the development of FP-related toxicity. All investigated variants were specifically associated with severe hand-foot-syndrome (HFS). These results provide important evidence for the role of both, TYMS and ENOSF1 in the development of this adverse drug event, which might help to understand the so far unknown underlying mechanisms of HFS.

Hamzic et al. 2020. Pharmacol Res; 152:104594. doi: 10.1016/j.phrs.2019.104594.

## Department of Cranio-Maxillofacial Surgery

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Chief Physician



Prof. Benoît Schaller  
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PD Dr. Nikola Saulacic  
Chief Division  
Clinical  
Research



PD Dr. Ali-Farid Safi  
Scientific  
Associate



Dr. Sherin Khalil  
Resident



Inga Grigaitiene  
Laboratory  
Bone Biology



Thuy-Tran Nguyen  
Laboratory  
Bone Biology



Prof. Niklaus Lang  
Senior  
Scientific  
Consultant

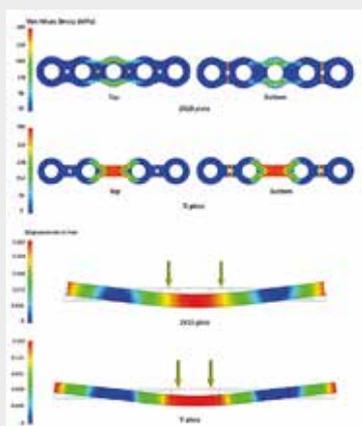
### Profile

- Teaching students of medicine and dentistry at the University of Bern, postgraduate education and training for specialization in Oral and Maxillofacial Surgery on the European (EU) level
- Education and training of young academics by providing various clinical and scientific fellowship programs in international cooperations
- 3 research groups consisting of international team members. We mainly conduct preclinical research with the specific aim of transferring research results into clinical practice. Our research therefore has a strong translational character.
- Investigation of the biological process of bone and soft tissue regeneration in connection with the use of various bone substitutes and bone grafts
- Development of titanium and biodegradable osteosynthesis devices
- Technical development of 3D-Print-technologies in clinical practice of Cranio-maxillofacial Surgery
- External Partners: Metal Physics and Technology, Department of Materials, ETH Zurich, Zurich, Switzerland; Advanced Research Center, School of Life Dentistry at Niigata, Nippon Dental University, Japan; National Dental Centre Singapore, SingHealth, Duke-National University of Singapore, Singapore; Department of Periodontology, College of Dental Medicine, Nova Southeastern University, Florida, USA; Department of Veterinary Clinical Sciences, Faculty of Veterinary, University of Santiago de Compostela, Lugo, Spain; International Bone Research Association (IBRA), Basel, Switzerland; Geistlich Pharma, Wolhusen, Switzerland

### Grants

- Swiss National Science Foundation Synergia Grant (No. 180367 / 1)
- Swiss National Science Foundation (No. 31003A\_182350/1)
- Clinical Research Grant Maxillofacial Surgery, International Bone Research Association/IBRA
- AO Foundation Research Fund (No. AOCMFS-19-15K)
- TI Research Grant (No. 1287\_2018)
- Osteology Young Researcher Grant, Osteology Foundation (No. 18-077)

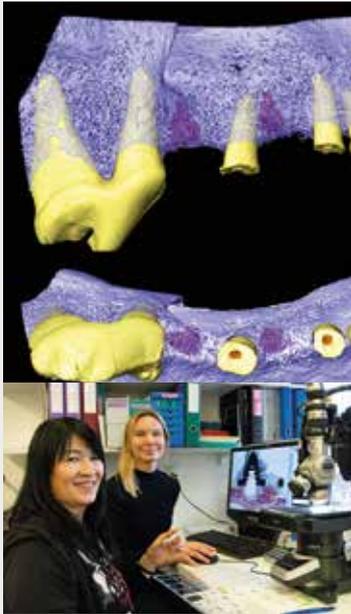
### Highlights



#### Biodegradable osteosynthesis devices: Successful material testing in vitro

There are numerous pleasing highlights to report for the year 2020. In the research on biodegradable osteosynthesis materials (plates and screws), in vitro studies, which are a preliminary stage of the upcoming main in vivo trials, have been completed. The results are promising and the design of the in vivo studies will be adapted accordingly for the next Swiss National Science Foundation project.

Masterthesis by Malavika Nambiar



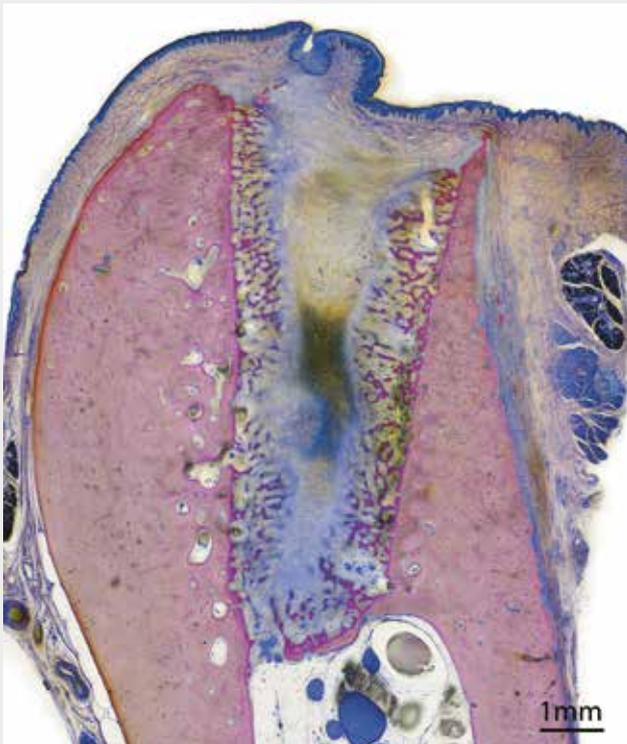
## News from our Laboratory of Bone Biology

Our bone biology laboratory, which is known for the excellent image quality of histology, has developed very positively this year. In particular, the Immuno-Histochemistry has been technically improved and strengthened by a new staff. Thus, the laboratory is now able to perform all bone biological diagnostics and analyses in outstanding quality. Against this background, the industrial cooperation has been intensified. Now the Research focuses on the development of biodegradable and collagen-based bone substitutes. Moreover, a joint PhD program has been established within the official cooperation agreement with the University of Shimane, Japan. A PhD student from Japan will participate in our research project on bone regeneration.

## Effects of Bisphosphonates on preservation of extraction socket of the teeth

The research group for bone regeneration has extended its research field to the preservation of the alveolar bone after tooth extraction, which is important for the subsequent insertion of dental implants. For this purpose, effects of bisphosphonates (alendronate) were tested in vivo. Our preliminary results showed that local application of alendronate affects bone remodeling of the extraction socket. The Research in this field will be continued to determine optimal drug concentration.

Saulacic N et al. Clin Oral Investig. 2020 Apr;24(4):1579-1589.



## Restart of the research group on 3-D printing technology with new members

With the enormously fast technical development in this field, the research group needed a new orientation. Since our research area is located at the borderline between medicine and dentistry, the research has been extended to dentistry, especially to the field of pre-implant surgery on the one hand and also to the craniofacial reconstructions. Two new enthusiastic researchers have joined the research group and will work particularly in these fields. The main focus remains on the technique of transferring virtual data to real operations.



## Department of Dermatology (DERK)

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Chairman



Prof. Nikhil Yawalkar  
Deputy  
Chairman



Prof. Dagmar  
Simon



Prof. Robert  
Hunger



Prof. Christoph  
Schlapbach



PD Dr. Helmut  
Beltraminelli



PD Dr. Laurence  
Feldmeyer



Prof. Eliane  
Müller

### Profile

- Investigation how T cell metabolism and T cell function are linked in inflammatory skin disease
- Investigation of the skin-specific cytokine interleukin 9 (IL-9) and its role in skin inflammation
- Translational and precision medicine studies in cutaneous T cell lymphoma
- Study of the autoimmune response and the molecular events leading to skin blistering in pemphigus
- Understanding stem cells' epigenetic and biochemical circuits driving skin homeostasis and disease
- Investigation of epithelial barrier dysfunction and type 2 inflammation
- Carrying out clinical trials with different biologics and targeted therapies for atopic dermatitis, psoriasis, hidradenitis suppurativa and melanoma
- External Partners: Institute for Research in Biomedicine, Bellinzona; Huashan Hospital, Fudan University, Shanghai China; Department of Immunology, University Hospital Zurich, Zurich; The Regional Dermatology Training Centre, Tanzania; C.H.U. Henri Mondor, Paris, France; University Hospital, Düsseldorf, Germany; Universitätsklinikum Marburg, Germany; Institute of Molecular Systems Biology, ETH, Zurich; Centro Studi GISED, Bergamo, Italy; Lübeck Institute for Experimental Dermatology, University of Lübeck; Institute for Biomedical Techniques, Department of Information Technology and Electrical Engineering, ETH Zürich; Department of Dermatology and Cutaneous Biology, Thomas Jefferson University, Philadelphia, Pennsylvania, USA

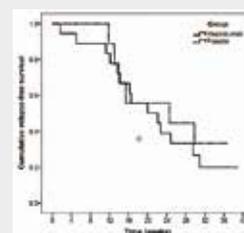
### Grants

- SNFS project grant "Unraveling the role of interleukin 9 in human skin inflammation", CHF 700'000; 2020-2024
- Bern Center for Precision Medicine Pilot Project Grant; 2019-2020
- Industry partnership research development grant for PPAR $\gamma$  modulation in human T cells, Nogra Pharma/PPM Services, 2020-2021
- SNF project grant "Pemphigus - from pathogenesis to therapeutics (Pegasus)"
- Swiss Personalised Health Network Board: Identification of biomarkers and therapeutic targets in inflammatory disease immunotherapy by high-dimensional single cell analysis and cluster proteomics
- Peter Hans Hofschneider Stiftungsprofessur für molekulare Medizin
- Stiftung für Naturwissenschaftliche und Technische Forschung
- Standortförderung Kanton Bern und Innosuisse
- International Society for Dermatology - African Dermatopathology Conference 2020, Tanzania

### Highlights

#### Mepolizumab failed to affect bullous pemphigoid

In patients with bullous pemphigoid (BP) eosinophils are thought to contribute to tissue damage and blister formation upon activation with IL-5. In this randomized controlled study, the anti-IL-5 antibody mepolizumab did not show any significant effect on disease activity and course in BP patients. Factors responsible for this lack of response to mepolizumab might include either the study design (limited sample size, short treatment period) or the insufficient effect of mepolizumab on tissue eosinophils.  
Simon D. et al. Allergy 2020;75:669-672.



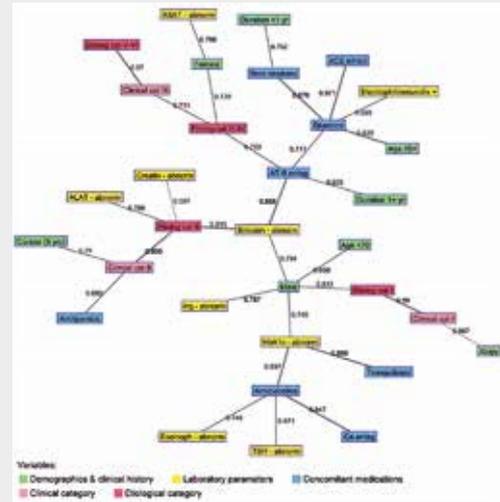
Relapse-free survival curves in the two arms of the randomized controlled study



### Skin hyperpigmentation index: a new practical method for an automated quantification of hyperpigmentation

Hyperpigmentation is worldwide a common dermatological problem. There are only a few available methods for a quantification of skin hyperpigmentation. We have developed the "Skin Hyperpigmentation Index (SHI)" measurement method. The latter enables a fast fully-automated and standardized quantification of skin hyperpigmentation based on clinical and/or dermatoscopic images. This user-friendly unbiased online SHI-calculator is freely accessible: <https://shi.skinimageanalysis.com/>. We anticipate that the SHI method will be widely used in clinical studies and in practice.

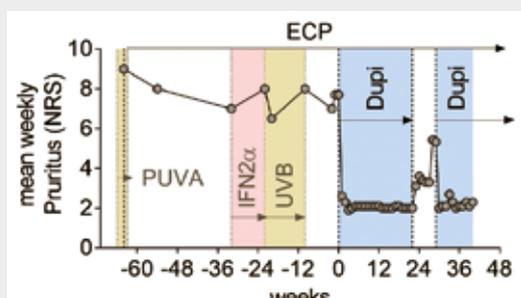
Bossart S. et al. Phlebology 2020;35:833-5; Dermatology 2020 Aug 11:1-3. J Eur Acad Dermatol Venereol. 2020;34:e334-6.



### Patterns of patients with chronic pruritus (CP)

CP is common and severely affects patients' quality of life. To better understand pattern of CP, data of 170 cases were retrospectively analyzed. The semantic map showed clinical categories separated in different hubs associated with distinct patterns concerning sex, etiology, laboratory findings, and pharmacological treatment. Diabetes, cancers and psychiatric comorbidities were linked with certain clinical categories. Skin eosinophilia was a common finding. Our study provides new insights into CP and basic principles for a clinical work-up.

Simon D. et al. Acta Derm Venereol 2020 Feb 29; 100(4):adv00068.



Rapid control of itch by dupilumab in Sézary Syndrome  
Self-reported itch severity (numerical rating scale, NRS) before and after dupilumab therapy. Dupi: dupilumab; ECP: extracorporeal photopheresis; IFN2α: interferon alfa-2a; PUVA: psoralen + ultraviolet A; UVB: narrowband ultraviolet B.

### Dupilumab controls itch and reduces Th2 bias in Sézary syndrome

Sézary syndrome is a leukemic variant of cutaneous T cell lymphoma with a poor prognosis. Therapy of the associated severe unbearable pruritus is challenging.

We have treated a Sézary syndrome patient with dupilumab (anti-IL-4Rα-antibody) and performed in-depths translational analysis of clinical and immunological effects of type-2 cytokine blockade. Inhibition of IL-4 and IL-13 signaling resulted in a striking clinical benefit in terms of quality of life, pruritus, and use of topical corticosteroids. While safety remains an important concern, the results supports the future exploration of Th2 modulation for supportive care in Sézary syndrome.

Schlapbach C et al. J Eur Acad Dermatol Venereol. 2020 Oct 17.

# Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)

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Prof. Markus Laimer



Prof. Zeno Stanga



PD Dr. Michel Hochuli



Dr. Roman Trepp



Prof. Lia Bally



Prof. Regula Everts



PD Dr. Maria Balmer

## Profile

- Eight research groups covering the areas of Diabetes Technology, Metabolic Science and Modelling, Food Science (Artificial Intelligence/Data Science, Peptide Analytics)
- Under-graduate, graduate and post-graduate education in metabolic science
- Postgraduate education (CAS in sex and gender-specific medicine, Certificate Course Clinical Nutrition)
- External partners: ETH Zürich, Universität Zürich, ETH Lausanne, CHUV, Universität Basel, Hochschule StGallen, CSEM Neuchatel, UniFR, Universities of Cambridge, Manchester, Swansea (UK), Lyon, Rotterdam, Padova, Cologne, Graz, Toronto, Duke, Yale, Berkeley.

## Grants

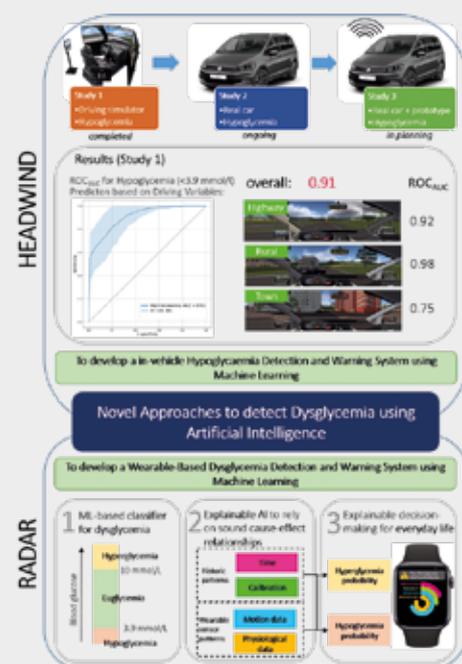
- SNF Eccellenza Grant (PI Prof. L. Bally), SNF Eccellenza Professorial Fellowship (PI Prof. M. Balmer), SNF Sinergia Program (PI Prof. C. Stettler)
- InnoSuisse Projects (PI Prof. C. Stettler)

Further Funding Sources: Scherbath Foundation, Dexcom Inc. ISS, Nestlé Health Science ISS, Swiss National Kidney Foundation, Helmut Horten Foundation, Swiss Diabetes Foundation, Vontobel Foundation, Novonordisk ISS, Boehringer Ingelheim ISS, Bangerter Foundation, Nutricia ISS, Foundation Rolf Gaillard, Swiss Foundation for Nutrition Research

## Highlights

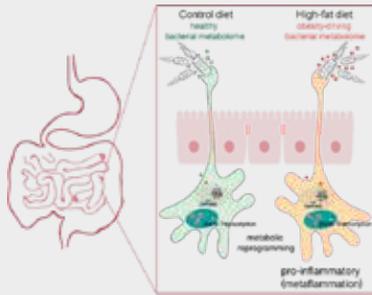
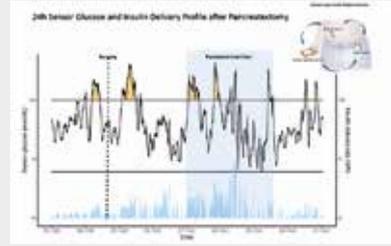
### Artificial Intelligence / Machine Learning in Diabetes

Supported by the SNF (Sinergia) and in collaboration with ETHZ and HSSG we have developed a hypoglycemia warning system based on car-derived data while driving. The system was successfully investigated in a car simulator and is currently tested under real driving conditions. In parallel, we develop a hypoglycemia detection system based on smartwatch data (InnoSuisse), avoiding the time delay of standard glucose sensors. We further use novel machine learning approaches for the development of computer-vision based automated food analysis allowing smart insulin dosing and diet advice for diabetes and other metabolic disorders.



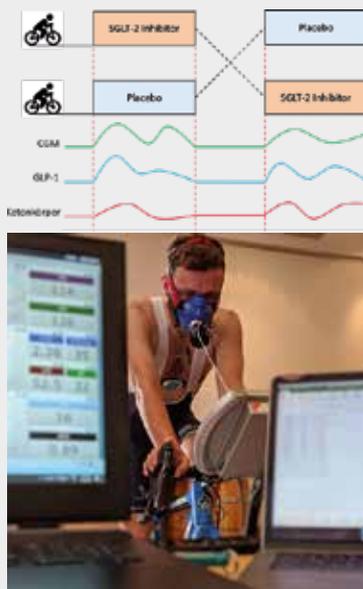
## Closed-Loop Glucose Control – Artificial Pancreas

We are developing and evaluating a broad set of insulin-delivery algorithms for the treatment of different target groups. Current studies address the safety, efficacy and utility of various hybrid and fully-automated closed-loop systems in people with type 1 and type 2 diabetes. In parallel we are evaluating “do-it-yourself” systems using advanced in-silico environments and explore novel machine learning approaches to incorporate in diabetes management decision support devices. We work with renowned scientists in the field (University of Cambridge, University of Padova).



## Immunometabolism in Pre-clinical Metabolic Disease Models

Obesity and diabetes are characterized by a chronic low-grade inflammatory state linking metabolism with altered immune functionality. We perform research at the intersection between gut microbiota metabolites and immune cell metabolism and function in gnotobiotic and human disease models of obesity and diabetes with the ultimate goal to translate pathophysiological and therapeutic concepts from pre-clinical to clinical stages.

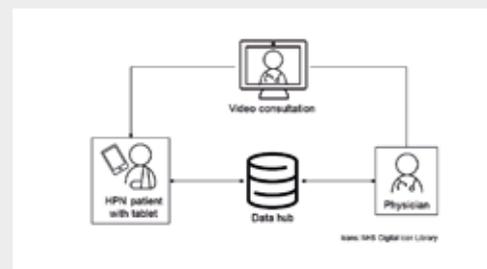


## Experimental Clinical Hormone and Metabolic Research

We are using state-of-the-art and novel techniques (e.g. clamps, labelling with stable isotopes, metabolic imaging) for in-vivo physiological testing to quantify beta-cell function, insulin sensitivity, insulin clearance, whole body and intracellular metabolic fluxes and inter-organ metabolic crosstalks. In the DEEP project, we are deciphering the underlying mechanisms of post-prandial hypoglycaemia after gastric bypass – an increasingly recognized late metabolic complication of bariatric surgery. Insights shall provide novel predictive markers and therapeutic targets addressing dysregulated glucose homeostasis. We further explore shifts in fuel energetics induced by the SGLT inhibitor dapagliflozin in people with type 1 undergoing physical exercise. Within this framework, we have developed and validated novel highly specific and sensitive mass spectrometric assays for peptide hormones (e.g. multiplex assay for PYY/PP/PPY, insulin/proinsulin/C-peptide).

## Personalized Nutrition

Personalized Nutritional Support is of uttermost importance for the treatment of a broad range of metabolic diseases. In various projects (inborn errors of metabolism, malnutrition, diabetes, obesity), we develop and evaluate novel personalized nutritional strategies. In view of the current COVID pandemic, a specific focus is on the establishment of remote nutrition support platforms.



## Department of Diagnostic and Interventional Neuroradiology

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Gralla  
Chairman and  
Physician  
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Prof. Roland  
Wiest  
Deputy  
Chairman



PD Dr.  
Christoph  
Ozdoba  
Physician  
in Chief (SLS)



Michela  
Mordasini  
Head of  
Medical  
Technical  
Neuroradiology



PD Dr. Pasquale  
Mordasini  
Consultant



PD Dr. Franca  
Wagner  
Consultant

### Profile

- **Neurovascular research:**  
The research group focuses on treatment strategies for neurovascular diseases (aneurysms, AVM) and especially the evaluation and treatment of acute ischemic stroke. The researchers combine preclinical development of techniques in bench-top and animal models and evaluate their application in large-scale international clinical studies (Swift direct). Furthermore, the group evaluated robotic approaches in neurovascular treatment
- **Advanced Neuroimaging and Artificial Intelligence Technology in Neuroradiology:**  
The research of the Support Center of Advanced Neuroimaging (SCAN) focuses on the translation of quantitative imaging methods, artificial intelligence technology and automated image analysis into clinical practice, sequence development and methodological counselling for neuroimaging studies. In this domain, the researchers of the SCAN have participated in international neuroimaging trials (e.g. ENIGMA Epilepsy and Parkinson's disease), neuroimaging challenges and data analysis networks in cerebrovascular research, neuro-oncology, neuro-immunology, sleep-related disorders, epilepsy and neurodegenerative disorders
- **CSF Hypo- und Hypertension Syndromes:**  
The multidisciplinary group of the Neurocenter develops new imaging modalities and interventional/surgical treatment options for patients with CSF leakage syndromes and idiopathic intracranial hypertension
- **Translational imaging / Ultra High Field MRI:**  
MR-physicists and imaging experts support the Translational Imaging Center (TIC) at the sitem-insel in MR methodology and explore new indications for UHF MRI in CNS disorders (as e.g. structural epilepsies, neuroimmunological and vascular disorders)

### Grants

- Horizon 2020 INSPIRE MED (Marie Skłodowska-Curie grant 813120).
- SINERGIA CRSII5\_180365
- SPHN Driver Project IMAGINE
- SNF grants 170060, 182569, 190817 195801, 189136, 160107
- Innosuisse 43087.1 IP-LS
- SISF Grants (UHF MRT: Gluco-CEST, Deuterium Imaging, Neuroinfection, Intrakranial stenoses, Aneurysms)
- SWISS Heart (Covid 19, posterior circulation stroke, intracranial stenosis)
- SWIFT Direct

## Highlights

### **Peter-Huber Prize (young researcher publication award) for PD Dr. Johannes Kaesmacher**

In the awarded article, the research group evaluated the safety and efficacy of administering intra-arterial thrombolytics during mechanical thrombectomy (extraction of the clot with specialized catheters). Mechanical thrombectomy has evolved as the standard of care for patient with a large vessel occlusion in the brain. However, many patient have an incomplete reperfusion with residual occlusions after the intervention. With the additional administration of intra-arterial thrombolytics these remaining thrombi can be resolved and hence, this treatment harbors the potential to further improve the outcome of stroke patients.



Reperfusion improvements in interventional stroke treatment

### **First installation of the prototype/ CUT biplane neuroangio-suite worldwide**

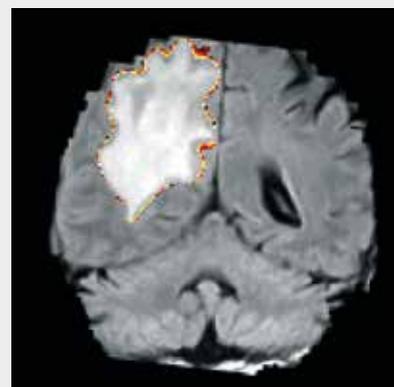
In 2019 the first installation worldwide of the prototype/CUT biplane neuroangio-suite Aritis Icono has taken place in the new neuroangio perimeter at the University Institute of Diagnostic and Interventional Neuroradiology. The constructional measures could be finished in 2020 with the installation of the second Artis Icono neuroangio-suite. The new equipment allows the clinical implementation as well as the scientific development of new imaging capabilities in the neuroangio-suite such as improved image quality using lower radiation doses and advanced flat panel cone beam imaging. The installation has fostered a close clinical and scientific collaboration between the University Institute of Diagnostic and Interventional Neuroradiology and Siemens. Several research projects regarding the evaluation and further development of these new imaging capabilities and post-processing software in the neuroangio-suite are ongoing, including the evaluation of the first flat panel cone beam whole-brain perfusion acquisition as the leading neurointerventional centre world-wide.



First prototype/CUT biplane neuroangio-suite installation in Bern

### **International Brain Tumor Segmentation Challenge (BRATS) of the Society for Medical Image Computing & Computer Assisted Intervention**

The BRATS challenge rates participants in three categories: brain tumor segmentation performance, quantification of uncertainty in brain tumor segmentation, and overall survival prediction. The DeepSCAN neural network, developed by a team led by Dr Richard McKinley, has for several years been ranked highly in a crowded field in segmentation performance. This year, in addition to sustained high segmentation performance, DeepSCAN was ranked first in uncertainty quantification and in survival prediction. The uncertainty prediction was obtained via new in-house method (Focal Kullback-Leibler divergence), while the survival prediction was developed using simple, physician-interpretable inputs: patient age, number of tumor sites, number of distinct tumor cores.



A FLAIR image from the BRATS challenge, showing (in red and yellow) the region deemed uncertain by DeepSCAN. Indicating uncertainty helps radiologists to interpret the segmentation, and may prevent under-segmentation of tumor tissue

## Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)

Inselspital, Tiefenau Hospital, Hospitals in Aarberg, Münsingen, Belp, Riggisberg  
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Prof. Johannes Heverhagen  
Director



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Prof. Lukas Ebner  
Senior Physician



Dr. Verena Obmann  
Senior Physician



PD Dr. Adrian Huber  
Senior Physician



Prof. Martin Maurer  
Senior Physician



Dr. Paolo Lombardo  
Senior Physician

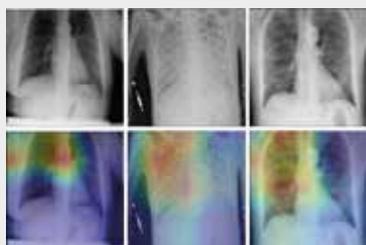
### Profile

- teaching medical students, biomedical engineering students, FaGes, and radiographers
- currently performing 13 self-initiated studies, more than 20 cooperation-studies, and supporting ca. 135 ongoing clinical studies
- research topics include multiparametric imaging, advanced image analysis, structured reporting, and digitalization of workflow
- aiming at further improving diagnosis, navigation during intervention, and treatment and workflow planning
- external partners: Radiological Physics, Radiology and Nuclear Medicine, University of Basel; German Cancer Research Center (DKFZ), Heidelberg; ETH Zürich and EPFL/CHUV Lausanne; Ohio State University, Columbus, USA; Departments of Radiology and Biomedical Engineering at Case Western Reserve University, Cleveland, USA; Duke University Hospital, Dept. of Radiology, NC, USA; Swiss Working Group for Clinical Cancer Research (SAKK), Bern; Switzerland Innovation Park, Biel; Mechanical Systems Engineering, EMPA Dübendorf

### Grants

- SNF-Grant on Covid-19 prognostic stratification (NRP 78" Covid-19" 2020) to PD Dr. Pöllinger
- SNF-Grant on NGS of somatic mutations in vascular malformations (SINERGIA; 2020) to Prof. von Tengg
- Grant from Lindenhof Foundation on an Inverse Image Search Engine to PD Dr. Pöllinger
- VCCI Fonds for Radiology and Orthopedic surgery to Dr. Daneshvar
- Young Researcher grant from ESSR to Dr. Schroeder
- Travelling Fellowship from SSSR to Dr. Schmaranzer

### Highlights



Top row: left: sample for healthy class, middle: sample for other types of pneumonia, right: COVID-19 pneumonia  
Bottom row: overlaid class activation maps

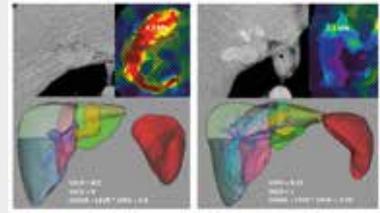
#### **A Deep-Learning Diagnostic Support System for the Detection of COVID-19 using Chest Radiographs: A Multi-Reader Validation Study**

The purpose of this study was to compare a novel diagnosis support system to detect COVID-19 pneumonia on chest radiographs (CXR) against radiologists of various levels of expertise in chest imaging. Data from five publicly available databases included 7966 normal cases, 5451 with pneumonia other than COVID-19 and 258 CXRs with COVID-19 pneumonia were used for the system development. The proposed AI based system achieved higher overall diagnostic accuracy (94.3%) than the eleven radiologists ( $61.4\% \pm 5.3\%$ ).

Fontanellaz M, Ebner L, Mougiakakou S, Christe A. Invest Radiol. 2020 Nov 30. doi: 10.1097/RLI.0000000000000748.

## Liver segmental volume and attenuation ratio (LSVAR) on portal venous CT scans improves the detection of clinically significant liver fibrosis compared to liver segmental volume ratio (LSVR)

We demonstrated that the LSVAR improves the detection of significant liver fibrosis on portal venous CT scans compared to the LSVR. This ratio is easy to calculate based on liver segmental volumetry and by comparing the enhancement of the liver veins and the inferior vena cava. The use of the LSVAR allows for the accurate screening of portal venous CT scans to detect possible liver fibrosis with excellent interobserver reliability. Obmann, V.C., et al. *Abdom Radiol* (2020).



Patient examples with (6.7 kPa) and without (2.2 kPa) clinically significant increased liver stiffness demonstrating the LSVR and LSVAR. Left: hypertrophic left and caudate lobes as well as non-contrasted liver veins (LVCA 4) are shown. Right: All liver fibrosis measures within normal limits



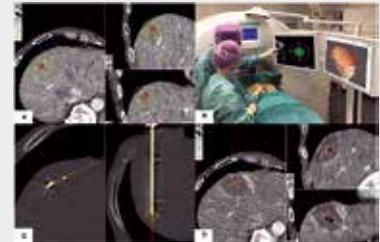
## Advocating the Development of Next-Generation, Advanced-Design Low-Field Magnetic Resonance Systems

New next-generation low-field magnetic resonance imaging systems (operating in the range of 0.5 T) hold great potential for increasing access to clinical diagnosis and needed health care both in developed countries and worldwide. We discuss the potential impact of low-cost, advanced-generation low-field magnetic resonance imaging systems and advocate its development regardless of disease entity and anatomic region of involvement. Runge V., Heverhagen J., *Invest Radiol*. 2020 Dec;55(12):747-753.

## Stereotactic Image-Guided Microwave Ablation for Malignant Liver Tumors - A Multivariable Accuracy and Efficacy Analysis.

In a study including 153 patients with malignant liver lesions treated with percutaneous stereotactic microwave ablation (SMWA) we analyzed the precision of ablation probe positioning using a navigation device for lesion targeting. We found that accuracy and efficacy was very high and allowed a precise and effective treatment of lesions even in challenging locations in the liver.

Tinguely P., [...], Maurer M.H. *Front Oncol*. 2020; 10:842.



Example of a percutaneous stereotactic microwave ablation: Procedure planning (A), navigation (B), control of the exact probe positioning (C) and evaluation of treatment success by a full coverage of the target lesion with the ablation zone



## RadioComics

Recently, we started to convey topics relating to radiology and medicine by comic stories. Referring to Radiomics, a field of radiology that deals with data extraction from medical images, we term them RadioComics. In a peer-reviewed (!) comic strip, we deal with the prophecy by the renowned deep-learning specialist Geoffrey Hinton who suggested that "... we should stop training radiologists". Further, we could not let pass the first Corona lockdown, its side-effects, and their potential connection to the construction activity at the Inselhospital campus uncommmented. Lombardo P et al. *Eur J Radiol* 2020; 122;108771.

Based on: VITA, magazine of the Inselgruppe

## Division of Magnetic Resonance Methodology (MRM)

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Prof. Peter Vermathen



Karin Zwygart-Brügger



Dr. Gabriele Bonanno



Dr. Arun Joseph



Dr. Maïke Hoefemann



Damian Hertig



Rudy Rizzo



Martyna Dziadosz



Kadir Simsek



Simone Poli



Christian Urzi



Christoph Meyer

### Profile

- Magnetic resonance imaging (MRI) and spectroscopy (MRS) methods in collaboration with clinical partners in prospective studies of different organs
- Development of novel methods to suit pertinent needs to study physiology and pathology
- MRI and MRS studies in brain, kidney, muscle, liver, and heart
- High resolution NMR studies on biopsies, cell cultures and body fluids
- The MRM participates in University teaching programs for students of medicine, chemistry, biochemistry, and biomedical sciences
- External Partners: Max-Planck-Institute for Cognition- und Neurosciences, Leipzig, Germany; Max Planck Institute for Biological Cybernetics, Tuebingen, Germany; University Children's Hospital and Children's Research Center, Zurich, Switzerland; Department of Physiology, University of Lausanne, Lausanne, Switzerland

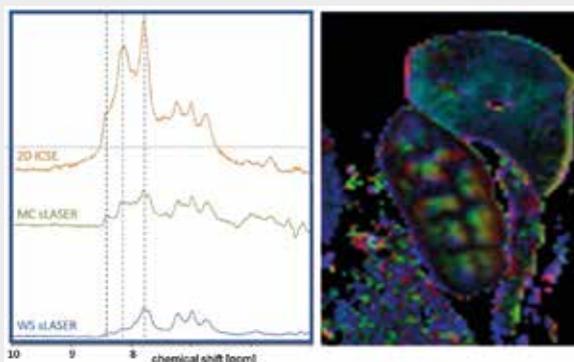
### Grants

- Swiss National Science Foundation (grant No. 320030\_175984; 320030\_170062; 310030\_192691)
- Marie-Curie Initial Training Network (H2020-MSCA-ITN-2018-813120)
- sitem-insel Support Funds (SISF)

### Highlights

#### Overview

MRI and MR spectroscopy (MRS) are powerful and extremely versatile methods for non-invasive studies and diagnostic examinations in humans. We use MRI and MRS methods in collaboration with clinical partners primarily in prospective studies of different organs. We develop novel methods to suit pertinent needs to study physiology and pathology, together with the underlying mechanisms, in situ. Most current studies are performed in brain, kidney, muscle, liver, and heart (see Figure). In addition, high resolution NMR studies are performed on biopsies, cell cultures, body fluids.



Left: Sensitizing MRS to exchangeable amide protons  
(doi:10.1002/mrm.28322)

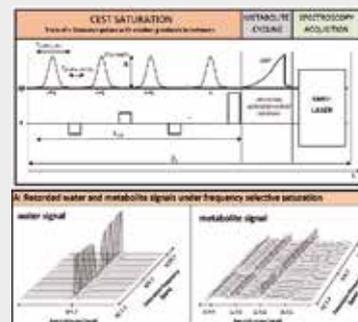
Right: Renal Diffusion Tensor Imaging; Fractional Anisotropy Map

## Group logistics

Located with offices in the new sitem-insel building, where we are also part of the novel translational imaging center (TIC). This is equipped with a high-end 3T MR scanner, but also one of the worldwide few clinical 7T whole body MR scanners. The group also hosts two Siemens MR Research Scientist (Dr. Bonanno and Dr. Joseph) in charge of support of clinical researchers from Inselspital performing research at 7 Tesla. HR-NMR is performed in the INO building in close cooperation with the Department of Clinical Chemistry.

## Brain Physiology

One of the SNF grants aims at the development of MR methods and synergistic postprocessing methods that are tailored to the observation of brain metabolism, yet are also transferable to other organs. Exchange processes between amide protons and water are studied in human brain (see figure). MRS is optimized for evaluation of systemic brain diseases and for optimal reproducibility in longitudinal studies on one hand and for detection of low-concentrated metabolites like phenylalanine and NAD<sup>+</sup>. Diffusion properties of brain metabolites are investigated with dedicated methodology to elucidate microstructural properties of human brain where we make use of the fact that metabolites, in contrast to water, are essentially confined to intracellular space of specific cell types. In collaboration with a Max Planck Institute in Leipzig, where we use a MR system with the strongest gradient system available for human research, we try to identify macromolecular background signals to aid clinical MR spectroscopy.



Novel MR method to study proton exchange in parallel with metabolite content. doi: 10.1002/mrm.28574.

## European Innovative Training network (ITN)

The Marie Curie ITN INSPiRE-MED (<http://www.inspire-med.eu/>) has its focus on multi-parametric and multi-modal MRI/MRS and PET techniques in a European multicenter research and training network. The specific aim of our subproject includes novel synchronized acquisition and processing methods aiming at standard modeling evaluations in contrast to the use of dictionaries and machine learning methods.

## Renal Function

Renal Function in native and transplanted kidneys has been investigated by multi-modal MRI and MRS. In collaboration with the Nephrology Department we aim at a better perception of the physiologic basis behind functional MR-parameters and why they may be changed in renal disease. In collaboration with Siemens an improved method for respiratory triggered diffusion has been developed and evaluated. Funded by a sitem-insel Support Fund and in collaboration with the Nephrology we are currently preparing a study for localized non-invasive in vivo determination of potassium by 39K MRI and MRS on the 7T MR Scanner.

## High-Resolution NMR and Magic Angle Spinning NMR

High-resolution magic angle spinning (HR-MAS) NMR techniques were applied to correlate in vivo and in vitro NMR spectra of tissues but also from cell cultures and body fluids.

Several HR-MAS studies have been performed on biopsies as well as on cell cultures and analyzed by "metabonomical" methods. Funded by an SNF Grant special emphasis is on investigation of OXPHOS deficient fibroblasts for separating different defect subgroups. In collaboration with the vendor Bruker we established a perfused bioreactor system within the NMR spectrometer and performed feasibility measurements of living 3D cell cultures inside the NMR with changing conditions monitoring consequent metabolic and oxygenation cell responses (see Fig).



Bioreactor for online Metabolomics of living cells inside the NMR.

## Department of Emergency Medicine

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Dr. Beat Lehmann  
Deputy Chief  
Physician



Prof. Wolf Hautz  
MME, Head  
of Research,  
Diagnostic Error  
and Patient  
Safety



PD Dr. Monika Brodmann  
Maeder  
MME and  
Wilderness  
Medicine



Dr. Simone Ehrhard  
Infectious  
Diseases



PD Dr. Martin Müller  
Resource & Risk  
Management



Prof. Thomas Sauter  
MME  
Tele-emergency  
medicine and  
e-health

### Profile

- Teaching medical students, residents and postgraduate nursing students in emergency medicine and point of care ultrasonography
- 6 research groups
- Investigation of research questions with direct relevance to emergency patients
- External partners: ARTORG Center for Biomedical Engineering Research, Diabetes Technology, Institut für Gebirgsnotfallmedizin EURAC, Bozen, CHUV Lausanne, HUG Genf, Max Planck Institute for Human Development Berlin, Institute of Educational Measurement, University of Oslo, Norway, Sarah Lawrence College, New York University School of Medicine, USA, Charité Berlin, Germany, Erasmus Medical Center Rotterdam, The Netherlands

### Grants

- SNF, European Union, foundation and industry funding
- Foundational professorship for tele-emergency medicine and e-/m health
- BAG and SEM funded projects in migrant health
- career funding for young clinical scientists

### Highlights

#### Foundational Professorship in tele-emergency medicine

Thanks to the support of Touring Club Switzerland (TCS), the University of Bern has appointed Prof. Dr. med. Thomas Sauter, MME as an assistant professor for tele-emergency medicine.

In close cooperation with partners at the University of Bern, at Inselspital and industry partners, the aim of the professorship will be to create evidence for the application of emergency telemedicine. Research projects include digital triage (SNF Corona Call funded mixed-method research project) and the development of a triage tool for children "[www.coronabambini.ch](http://www.coronabambini.ch)" in collaboration with the pediatric departments at Inselspital and the FOPH.



Prof. Thomas Sauter



### Marie Skłodowska-Curie Fellowship

Dr. rer. nat. Juliane Kämmer of the Max Planck Institute for Human Development Berlin was awarded one of the prestigious Marie Skłodowska-Curie Fellowships of the European Union, lasting until May 2022. She now co-leads the Diagnostic Error Research Group together with Prof. Dr. med. Wolf Hautz, where she focuses in particular on collaborative decision making and the relationship between physician confidence and their diagnostic performance.



### Migrant health research

Dr. med. Anne Jachmann obtained funding from both SNF and SEM for applied research into refugee and migrant health. She investigates the health status and current needs of refugees living in Greek refugee camps and their access to healthcare, as well as how they are impacted by the living conditions of the camp and by the COVID-19 pandemic. Furthermore, she investigates and promotes mental wellbeing of refugee aid workers. In this context she is also active at the National and Kapodistrian University of Athens. A first result of this cooperation is a Mental Health Week for refugee aid workers in Greek camps, which is also supported by WHO Europe.



### Swiss symposium on tele-emergency medicine and digital health

The department hosted the first Swiss symposium on tele-emergency medicine and digital health on february 13th 2020. Speakers on artificial intelligence, telemedicine in cardiology and neurology, and preclinical emergency telemedicine gave a broad overview of the future of emergency medicine. <https://www.enotfallmedizin.ch/service/about/>



### Virtual Reality (VR) simulations

Dr. med. Tanja Birrenbach, MME and Prof. Dr. med. Thomas Sauter from the Virtual Insel Simulation Lab (VISL) developed several VR simulations to enable fully immersive, interactive educational experiences for healthcare personal. Learners can engage with acutely unwell patients to gain competency in typical emergency situations, as well as different technical skills (use of personal protective equipment and obtaining a nasopharyngeal swab) including difficult invasive skills such as placement of a REBOA catheter. Scientific evaluation of the virtual experiences focusses on usability, efficacy and implementation in preexisting medical curricula.

## Department of ENT, Head and Neck Surgery

Inselspital, 3010 Bern  
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Prof. Marco Caversaccio  
Chairman



Prof. Roland Giger  
Deputy Director



Prof. Martin Kompis  
Head of  
Audiology



Prof. Eberhard Seifert  
Head of  
Phoniatriy



Prof. Georgios Mantokoudis  
Head of  
Cochlea-  
Implants



Dr. Wilhelm Wimmer  
Head of Hearing  
Research  
Laboratory

### Profile

- Teaching students of medicine and dentists in ENT
- Teaching and supervising graduate students at the ARTORG Center (Hearing Research Laboratory) and Sitem-Insel AG
- Training of young ENT surgeons on a daily basis and in internal courses
- Courses in audiology, biomedical acoustics, medical image analysis and phoniatics for speech therapists
- Research collaboration with the Hearing Research Laboratory at the ARTORG Center to develop and integrate new technologies for the treatment of hearing loss
- Research projects in ENT oncology and the treatment of vestibular loss
- External Partners: Department of Otorhinolaryngology, University Hospital of Zurich, Switzerland; ORL University Hospital Modena, Italy; Nottingham Hearing Biomedical Research Unit, University of Nottingham, UK; Johns Hopkins University, Department of Neurology, USA; Harvard Medical School, Department of Otolaryngology-Head and Neck Surgery, USA

### Grants

- SNF Grant, The Human Auditory System in Motion (320030\_192660 / 1)
- CTU Research Grant 2020
- Grant of the Gebauer Foundation
- Grant of the Gottfried and Julia Bangerter-Rhyner Foundation

### Highlights



Snapshot of aerosolization risk during mastoidectomy

#### Droplet formation during ORL surgery

The COVID-19 pandemic was also a challenge for our clinic. The disproportional spread of the disease among ORL surgeons raised concerns about the safety of healthcare staff. To evaluate the risk droplets may pose during ear surgery, the Hearing Research Lab of the Inselspital and the ARTORG Center of the University of Bern has compared the droplet emission in different surgical approaches of ORL interventions.

Results showed that otologic surgery causes considerable droplet generation and represents a risk for the spread of airborne infection diseases. The endoscopic technique offers the lowest risk of droplet formation as compared with the microscopic approach. This quantitative risk assessment will help to protect the healthcare staff when operating on COVID-19 positive patients.

Anschuetz L et al., Otolaryngol Head Neck Surg. 2020:S1-6.

## Vertigo Research

Within the framework of the vertigo research (DETECT study), more than 1500 patients with vertigo were examined in the emergency ward. The first research results have shown that the examination with video glasses (video-oculography) has a high accuracy to detect a patient with dizziness and stroke. A short instruction and training session on how to use the video glasses in an emergency is sufficient to enable even "non-experts" to perform the examination. It has also been shown that additional examinations such as caloric tests or nystagmus suppression are less accurate in acute settings. The experience with vertigo patients on the emergency ward has also led to new findings regarding examination procedures. A new clinical test for the visualization of nystagmus without Frenzel goggles shows encouraging results.



Examination of a patient by Prof. Mantokoudis

## Second 1st Poster Award: Repositioning manoeuvres for BPPV treatment: Moving in the exact plane matters

The annual meeting of the SSORL took place in November 2020. Due to the COVID-19 pandemic the talks and posters were presented in a virtual meeting. Carina Götting presented a study in the field of benign paroxysmal positional vertigo (BPPV). Patients with BPPV are routinely treated with the Semont Manoeuvre (SM). The success rate of this treatment was unknown regarding the effects of deviations from the optimal semicircular canal plane and waiting time. C. Götting and others evaluated different settings and could demonstrate at what parameters the manoeuvre still leads to a successful release of the otoconia. She received the second 1st poster award for this research.



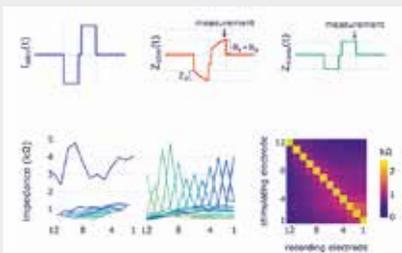
Award Winner Carina Götting and Dr. Isabel Gebhart



## Grand Prix Award of the SSORL 2020

The Swiss Society of Oto-Rhino-Laryngology, Head and Neck Surgery is the professional association of Swiss ear, nose and throat specialists. Its aim is to ensure high-quality care for patients and supports further training, research and practice in these medical fields. Every two years, the Society awards a price for physicians for outstanding scientific work in the field of otorhinolaryngology, its subspecialties and border areas. The price money is 5.000 CHF. This year, Prof. Dr. med. Georgios Mantokoudis was nominated for the Grand Prix of the SSORL for his high-quality scientific research in the field of vertigo.

Award Winner Prof. Mantokoudis



Schematic drawings of stimulus and impedances

## Impedance-based CI Insertion Depth Estimation

A team from the Hearing Research Laboratory of the ARTORG Center and the Inselspital ENT Department have developed a new method that enables surgeons to quickly estimate the insertion depth of a cochlear implant (CI). CI impedances are influenced by the intracochlear position of the electrodes. Tissue resistances from transimpedance recordings can therefore be used to estimate the insertion depth of the electrodes based on non-invasive telemetry recordings. This method is a valuable alternative for objectively assessing the surgical outcome, especially when resources are not available for postoperative computed tomography scans.

Aebischer P et al., IEEE Trans Biomed Eng. 2020:S1-11.

## Department of General Internal Medicine

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Prof. Drahomir Aujesky  
Director, Chief Physician General Internal Medicine



Prof. Nicolas Rodondi  
Chief Physician, Head Polyclinic



Dr. Martin Perrig  
Chief Physician, Head Bedside Wards



Prof. Maria Wertli  
Consultant Physician, Deputy Head Polyclinic



Prof. Manuel Haschke  
Chief Physician, Head Clinical Pharmacology



PD Dr. Christine Baumgartner  
Consultant Physician

### Profile

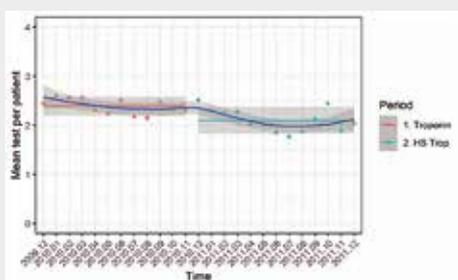
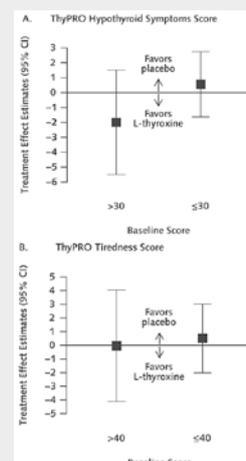
- Research focus: multimorbidity, venous thromboembolism, anticoagulation, variation in care, overtreatment, thyroid diseases, primary care, epidemiology, public health, chronic pain, opioid use, drug metabolism and safety, nicotine dependence, pharmacometrics, machine learning
- 8 research groups
- Overall aim: To improve quality of care and to promote evidence-based, high-value, safe, patient-centered, data-informed, and sustainable health care
- Teaching (lectures, clinical teaching, skills training, small group teaching) and assessment (practical and theoretical examinations) of students in medicine, pharmacy, and dental medicine
- High-quality post-graduate training of general internal medicine and specialty residents
- International academic partners: Division of General Internal Medicine, University of Pittsburgh Medical Center, USA; Department of Medicine, Ottawa Hospital Research Institute, University of Ottawa, CA; Departments of Primary Care/Public Health and Internal Medicine, Leiden University Medical Center, NL; Division of Hospital Medicine and Clinical Pharmacology/Experimental Therapeutics, Department of Medicine, Department of Epidemiology and Biostatistics, and Center for Tobacco Control Research and Education, University of California, San Francisco, USA; The Thyroid Studies Collaboration on 5 continents; Department of Neurobiology, Care Sciences and Society, Institute of Environmental Medicine, Division of Physiotherapy, Karolinska Institutet, Stockholm, Sweden; Occupational and Industrial Orthopaedic Center, New York University Langone Orthopedic Hospital, New York, USA; Division of Research, Kaiser Permanente Northern California, Oakland, USA; The European Drug Emergencies Network Research Group; Global Health Institute Barcelona, Spain; Kenya Medical Research Institute, Nairobi, Kenya
- Swiss academic partners: Venous thromboembolism network including 22 Swiss university and non-university hospitals; Institute of Biostatistics, Epidemiology, Biostatistics and Prevention, University of Zürich; Department of Health Sciences, Helsen, Dübendorf; Horten Center for Patient Oriented Research and Knowledge Transfer, University of Zürich, Zürich; Department of Internal Medicine, Centre Hospitalier Universitaire Vaudois, Lausanne; Department of General Internal Medicine, Hôpitaux Universitaires Genève, Geneva; Swiss Tropical and Public Health Institute, Basel

### Grants

- Swiss National Science Foundation Investigator Initiated Clinical Trial (IICT) grants no. 193052 and no. 185616.
- Swiss National Science Foundation National Research Program 74 (NFP74) grants no. 167339, no. 167465, and no. 167519.
- Swiss National Science Foundation grants no. 172676, 179346, 189132, and 160206.
- OPERAM – European Union's HORIZON 2020 grant agreement 634238.
- Novartis Foundation for Medical-Biological Research, Bangerter-Rhyner Foundation, Swiss Society of General Internal Medicine Foundation, Swiss Heart Foundation, Eurospine Task Force Research Grant, UNITAID: BOHEMIA (Broad One Health Endectocide-based Malaria Intervention in Africa), SUVA Forschung Medizin, Stiftung für Krebskranke Kinder Regio basiliensis, Bundesamt für Gesundheit
- Intramural grants: UniBE ID Grant

### L-thyroxine therapy for older adults with subclinical hypothyroidism and hypothyroid symptoms

Subclinical hypothyroidism (SCH) is a common condition in older people, and it is often treated with L-thyroxine, which is one of the most commonly prescribed drug in the US and Europe. The randomized TRUST trial of older adults with SCH found no improvement in symptoms with L-thyroxine therapy, compared to placebo. However, it remained unclear whether patients with SCH who have greater symptoms might still benefit from treatment. Therefore, our study focused on those with high symptom burden. In our study symptoms improved, but similarly in the L-thyroxine and placebo groups. Thus, our study does not support routine L-thyroxine treatment for older adults with SCH, including those with high symptom burden. Treating physicians should reconsider prescribing/ offering L-thyroxine to older adults with SCH, even those with symptoms. *Ann Intern Med.* 2020;172:709-16.



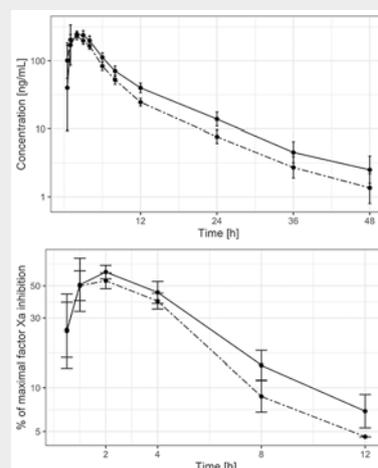
Average monthly number of diagnostic tests per patients before and after the introduction of the hs-troponin test

### Impact of the introduction of high-sensitive troponin assay in the emergency department

Compared to standard troponin T/I test, the introduction of a high-sensitive (hs) troponin test may result in a higher proportion of positive test results in patients with chest pain and over testing in patients without acute coronary syndrome. In a retrospective analysis of 1274 patients (standard 597 troponin group, hs-troponin troponin group 677) we found a higher proportion of patients with non-ST-segment elevation myocardial infarction (hs-troponin 14.9%, compared with 9.7%). Although the proportion of patients with non-cardiac chest pain and positive hs-troponin increased (6.1% vs 2.0%), the average number of additional diagnostic tests per person decreased in troponin-positive and troponin-negative patients. The finding indicates an increased confidence of clinicians in their diagnosis when using the hs-troponin test. *Am J Med* 2020;133:976–985.

### Effects of Hypericum perforatum (St John’s wort) on the pharmacokinetics and pharmacodynamics of rivaroxaban in humans

St John’s wort (*Hypericum perforatum*) extracts inhibit the uptake of neurotransmitters and are used as herbal remedies in patients with depression. Extracts with high hyperforin content induce CYP3A4 and P-gp, who are also involved in the metabolism of the direct oral anticoagulant rivaroxaban. The effect on PK/PD of rivaroxaban was investigated in an open-label, sequential treatment interaction study in healthy volunteers. Pretreatment with St John’s wort extract for 2 weeks reduced rivaroxaban exposure by 24% (geom mean ratio 0.76, 95%CI 0.70, 0.82) and inhibition of factor Xa activity by 20% (AUEC geom mean ratio 0.80, 95%CI 0.71, 0.89). The combination of rivaroxaban and St John’s wort should either be avoided or laboratory monitoring should be performed in patients treated with this combination. *Br J Clin Pharmacol*;2020 Sep 22.



Plasma concentration–time profiles of rivaroxaban (top) and inhibition of factor Xa (bottom) before (solid line) and after (dashed line) induction with St John’s wort

## Department of Geriatrics

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[www.geriatrie.insel.ch](http://www.geriatrie.insel.ch)



Prof. Andreas Stuck  
Department Director



Prof. Andreas Schönenberger  
Clinical Director



Dr. Dominic Bertschi  
Senior Fellow



Dr. Anna Stuck  
Senior Fellow

### Profile

- Clinical profile: Inpatient geriatric rehabilitation unit (50 beds, Spital Belp), inpatient geriatric acute care unit (40 beds, Spital Tiefenau), orthogeriatrics unit in collaboration with Department of Orthopedics and Traumatology (Inselspital)
- Teaching profile: Geriatric core curriculum in geriatrics for medical students, at University of Bern, course for dental medicine students, residency training programs
- Research profile: geriatric assessment, orthogeriatrics, sarcopenia, osteoporosis, nutrition, gait speed, physical function, TAVI, frailty, grip strength. Research is organized in collaboration with internal partners (audiology, cardiology, family medicine, osteoporosis, orthopedics, CTU, ARTORG and others)
- External partners: Department of Geriatrics, University of Basel, University Hospital Basel; Geriatrics, University of Geneva, University Hospital Geneva; Department of Geriatrics, University of Lausanne, University Hospital Lausanne; Department of Geriatrics, University of Zurich, University Hospital Zurich; Rehabilitation Center Kliniken Valens, Valens; Department of Internal Medicine, Hospital San Giovanni, Bellinzona; National Institute of Gerontology and Geriatrics, Ana Aslan, Bucharest, Romania; Department of Medicine and Surgery, University of Milano-Bicocca, Milan, Italy; Department of Geriatrics and Medicine, University of Florence, Florence, Italy

### Grants

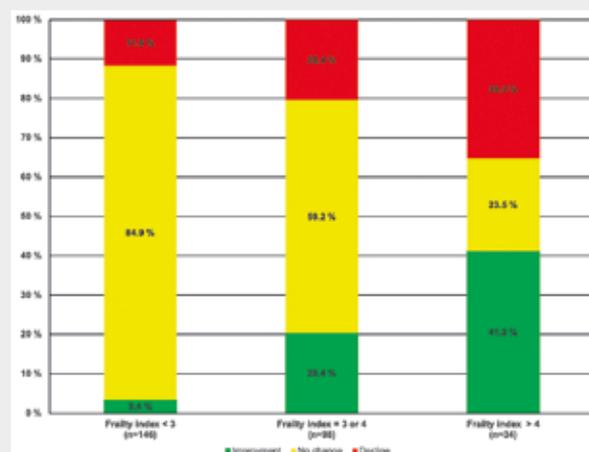
- Swiss Personalized Health Network: Swiss Frailty Network and Repository 2018 to 2021 (Co-Investigator: CHF 1.785 Mio)

### Highlights

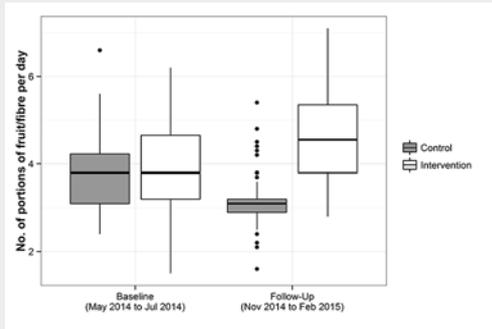
#### Frailty and Transcatheter Aortic Valve Implantation

We conducted a prospective one-year follow-up study with baseline measurement of a frailty index (based on geriatric assessment) and cardiac risk scores (EuroSCORE, Society of Thoracic Surgeons [STS] score) in older patients before TAVI. Our study revealed that a frailty index, and not cardiac risk scores, identifies patients at an increased risk of functional status decline after TAVI. However, based on our data, it is not justified to use information on frailty status as the criterion for identifying patients in whom TAVI might be futile. Although the probability of poor outcome is high, very frail patients also have a high probability of favorable long-term functional outcome.

Bertschi D, Moser A, Stortecky S, Zwahlen M, Windecker S, Carrel T, Stuck AE, Schoenenberger AW. Evolution of Basic Activities of Daily Living Function in Older Patients One Year After Transcatheter Aortic Valve Implantation. *J Am Geriatr Soc* 2020; DOI: 10.1111/jgs.16927.



Functional status one year after TAVI



Fruit and vegetable intake at baseline and after 6-month intervention in control and intervention group

## Randomized Study on Nutrition Intake

In collaboration with the Roumanian Institute of Gerontology and Geriatrics we conducted a randomized controlled study on nutrition intake in community-dwelling older persons. Personalised food-based dietary guidance, delivered as part of multidimensional preventive health counselling during geriatric clinic visits, results in relevant improvement of fruit and vegetable intake in community-dwelling older adults. Herghelegiu AM, Wenzel KM, Moser A, Prada GI, Nuta CR, Stuck AE. Effects of health risk assessment and counselling on fruit and vegetable intake in older people: A pragmatic randomised controlled trial. *J Nutr Health Aging* 2020;24:591-597.

## Standardization of Gait Speed Assessment

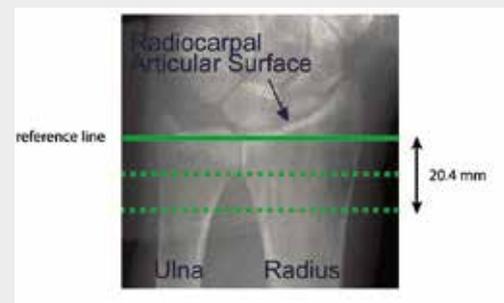
Although gait speed is a widely used measure in older people, testing methods are highly variable. We conducted a systematic review to investigate the influence of testing procedures on resulting gait speed. We found that the type of starting procedure, the length of the test distance, and the surface of the walkway may have a clinically relevant impact on measured gait speed.

Stuck AK, Bachmann M, Füllemann P, Josephson KR, Stuck AE. Effect of testing procedures on gait speed measurement: A systematic review. *PLoS One* 2020;15:e0234200. doi: 10.1371/journal.pone.0234200.



## HR-pQCT-Based Radius/ Tibia Strength Assessments

Reference values for radius and tibia strength using multiple-stack high-resolution peripheral quantitative computed tomography (HR-pQCT) with homogenized finite element analysis were derived in order to derive critical values improving risk prediction models of osteoporosis. Stuck AK, Schenk D, Zysset P, Bütikofer L, Mathis A, Lippuner K. Reference values and clinical predictors of bone strength for HR-pQCT-based distal radius and tibia strength assessments in women and men. *Osteoporos Int* 2020. doi: 10.1007/s00198-020-05405-0.



## Online Keynote Lectures in Germany and Roumania

Our department has close ties with other geriatric departments in Europe. Due to COVID-19, new forms for exchange had to be found. The German and Roumanian Geriatrics societies convened online national meetings, and Andreas Stuck was invited for keynote lectures on multidimensional geriatric assessment. Based on research conducted in Bern, he developed a vision for geriatric assessment in hospitalized older patient in the future.

Online Jahreskongress Deutsche Gesellschaft für Geriatrie (DGG) Halle 2020 and National Congress of Geriatrics and Gerontology: Challenges of Older People in Circumstances of Vulnerability Bucharest, Roumania 2020.



## Department of Hematology and Central Hematology Laboratory

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Prof. Anne Angelillo-Scherrer  
Director



PD Dr. Alicia Rovó  
Deputy Director



Prof. Sacha Zeerleder  
Head Transfusion Medicine, Apheresis and Hematopoietic Stem Cell Transplantation Program



Prof. Vera Ulrike Bacher  
Academic Head of Morphology, Hematological Immunophenotypisation and Molecular Diagnosis



Prof. Johanna A. Kremer Hovinga  
Strebel  
Head Reference Center/European Hemophilia Comprehensive Care Center and Academic Head Hemostasis Laboratory



Prof. Gabriela Baerlocher  
Head Stem Cell Laboratory



PD Dr. Elisabeth Oppliger  
Leibundgut Group Leader



SNF Prof. Ramanjaneyulu Allam  
Group Leader



PD Dr. Nicolas Bonadies  
Head Clinical Study Management/Biobanking



Dr. Michael Daskalakis  
Head Laboratory Transfusion Medicine

### Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedical sciences as well as graduate students at the Graduate School of Graduate School for Cellular and Biomedical Sciences (GCB) of the University of Bern
- 9 research groups
- Investigation of epidemiological and pathophysiological processes as well as diagnosis, prognosis and therapeutic approaches of blood-related disorders, pathophysiological processes that contribute to inflammation and tumor diseases
- External partners: Université Paris-Sud, University Paris-Saclay, Le Kremlin-Bicêtre, France; The Scripps Research Institute, La Jolla, CA, USA; Research Centre for Innovative Oncology, National Cancer Center Hospital Est, Chiba, Japan; Cardiovascular Research Institute Maastricht, Maastricht University, Maastricht, The Netherlands; University of Montreal, Montréal, Canada; Boston Children's Hospital and Department of Pediatric Oncology, Dana-Farber Cancer Institute, Harvard Medical School, Boston, MA, USA; Steering committee and Advisory Board of Hereditary TTP Registry ([www.ttpregistry.net](http://www.ttpregistry.net)); University Medical Center Amsterdam, Amsterdam, The Netherlands; Department of Experimental Immunohematology, Sanquin, Amsterdam, The Netherlands; University of Oklahoma Health Sciences Center, Norman, OK, US; American Society for Transplantation and Cellular Therapy – Survivorship Special Interest Group, EBMT Chronic Malignancies Working Party (CMWP); DCEG National Institutes of Health National Cancer Institute, Rockville, Bethesda, USA; DKFZ Heidelberg, Heidelberg, Germany; University Hospital Salzburg, Salzburg, Austria; University Hospital of Freiburg, Freiburg im Breisgau, Germany; University Hospital Zurich and ETH Zurich, Zurich, Switzerland; Swiss MDS Registry and Biobank

### Grants

- Swiss National Science Foundation
- SNF Professorship
- Landsteiner Foundation for Blood Transfusion Research, Amsterdam, The Netherlands
- Product and Process Development Cellular Products Sanquin (PPOC) program Sanquin, Amsterdam, The Netherlands
- Dutch Thrombosis Foundation, Amsterdam, The Netherlands
- Health Services Research grant, Swiss Cancer Research
- Swiss Cancer Grant, SAKK Grant
- Bernese Cancer League, Jacques und Gloria Gossweiler Stiftung, Olga Mayenfisch Stiftung
- 3rd Call for Proposals for Personalized Health and Related Technologies PHRT
- IIR grant from Baxalta US Inc., Novartis, CSL Behring AG, Alexion

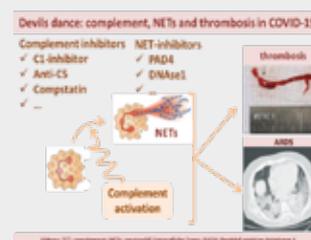
### Günter Landbeck Excellence Award for the International Hereditary TTP Registry to Prof. Johanna A. Kremer Hovinga

Hereditary thrombotic thrombocytopenic purpura is an ultra-rare autosomal recessively inherited disease. Little is known today on the natural course, treatment requirements and shortcomings, long-term outcome and morbidities, and mortality. The International Hereditary TTP registry was started in 2006, with more than 200 participants and is currently the largest TTP cohort study. Kremer Hovinga JA et al., *Haemostaseologie* 2020, 40 (S 01):S5-S14.



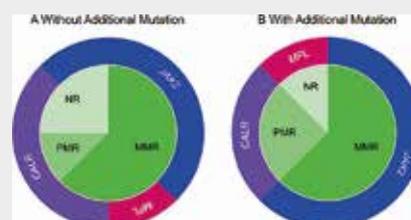
### Devils dance: complement, NETs and thrombosis in COVID-19 (NFP78 COVID-19, 4078P0\_198255)

This project investigates the role of complement and neutrophil activation (neutrophil extracellular traps, NETs) in the pathogenesis of vascular complications and organ dysfunction in COVID-19.



### Dynamics of mutations in patients with essential thrombocythemia treated with imetelstat

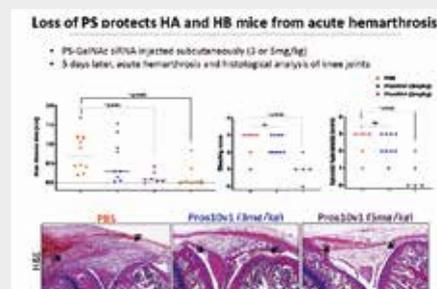
A panel of genes frequently mutated in myeloproliferative neoplasms was assessed by next generation sequencing at study entry and during treatment with imetelstat and the dynamics of additional mutations and their association with hematologic and molecular response was investigated in patients with essential thrombocythemia. Treatment with imetelstat led to hematologic and molecular responses and additional mutant allele burdens were also reduced. Of acquired mutations with known adverse prognosis and/or risk for transformation to myelofibrosis or acute myeloid leukemia, ASXL1, EZH2 and U2AF1 mutations were responsive to imetelstat, while SF3B1 and 1/2 TP53 mutations persisted. Oppliger Leibundgut E et al., *Haematologica* 2020, in press.



Distribution of molecular response and driver mutations among patients with or without additional mutations. (A) Patients without additional mutations. (B) Patients with additional mutations. MMR, major molecular remission; PMR, partial molecular remission; NR, no remission; JAK2, JAK2 V617F; CALR, CALR mutation; MPL, MPL mutation.

### Targeting protein S using small interfering RNA is well tolerated and protects mice with hemophilia A from acute hemarthrosis

Patients with hemophilia often suffer from spontaneous bleeding within the musculoskeletal system, such as hemarthrosis. Small interfering RNA conjugated to an N-acetylgalactosamine (GalNAc) cluster to target protein S (Pros1) gene expression (GalNAc-PS siRNA) was used in vivo to target protein S in hepatocytes. These data provide the first evidence that using a GalNAc-siRNA conjugate to modulate Pros1 gene expression is well tolerated and has the ability to reduce plasma PS level and protect mice with hemophilia A from acute hemarthrosis pointing to protein S targeting using GalNAc-siRNA-PS as a new valuable therapeutic approach for hemophilia. Prince Eladnani R et al., oral communication, Congress of the American Society of Hematology 2020 and Hemostasis Prize 2020, Swiss Society of Hematology.



## Department of Human Genetics

Inselspital, 3010 Bern

<http://www.humangenetik.insel.ch>



Prof. Christiane  
Zweier  
Director and  
Chair



PD Dr. André  
Schaller  
Head a.i. until  
08/20

### Profile

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- Teaching students of medicine and biology
- Providing training in Medical Genetics (FMH and FAMH)
- Offering PhD training in programs of the Graduate Schools of the University of Bern
- Two research groups
- Identification of new disease genes for neurodevelopmental and rare disorders
- Clinical and mutational characterization of neurodevelopmental and rare disorders
- *Drosophila melanogaster* as a model organism to functionally characterize disease mechanisms and to investigate genetic interactions
- iPSC and other cell-based models to investigate pathomechanisms
- External partners: University Hospitals Switzerland, Institute of Human Genetics, Erlangen, Germany; Department of Human Genetics, University Hospital Leipzig, Germany; Department of Human Genetics, Radboud University Nijmegen, Netherlands; Department of Neuroscience, Erasmus MC Rotterdam, Netherlands; ORPHANET; ERN ITHACA; numerous collaborations with geneticists worldwide

### Grants

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- SPHN Swiss GenVar, 2020-2021 (Schaller)
- EU – Marie Curie (837547), 2019-2021 (Gregor/Zweier)
- DFG ZW 184/6-1, 2019-2022 (Zweier)

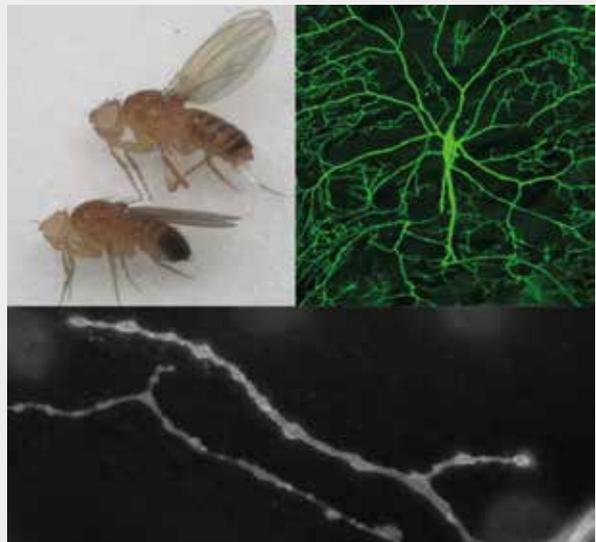
### Clinical Genomics Lab

The cytogenetic and molecular genetic diagnostic laboratories moved from the Department of Human Genetics in the children's hospital to the Clinical Genomics Lab (6th floor Murtenstrasse 31). This interdisciplinary laboratory (human genetics, molecular pathology, hematology, clinical chemistry) covers a broad spectrum of up-to-date genetic testing such as high-throughput sequencing and represents an integrative and synergistic platform for the participating departments as well as a core facility for clinical research.

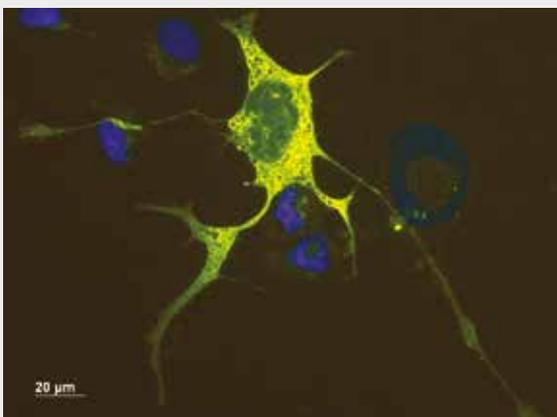


### New Drosophila laboratory

With the move of Christiane Zweier's research group from Erlangen to Bern, a fly lab is established in the Department of Human Genetics. Using the UAS/GAL4-system knockdown or overexpression of any gene of interest can be achieved in a relatively short time, allowing a broad spectrum of analyses. These include assessment of viability/lethality, morphology of the eyes or wings, of neuromuscular synapses or multiple dendrite neurons and of neurological functioning and behavior such as activity, gross neurological function, seizure susceptibility or learning and memory (courtship conditioning paradigm).



Drosophila female and male, larval multiple dendrite neuron and larval neuromuscular junction



Neurite length is increased after PHF6 knockout

### Role of PHF6 in neurodevelopmental disorders

PHF6 is implicated in Borjeson-Forssman-Lehmann syndrome (BFLS), an X-chromosomal neurodevelopmental disorder manifesting in both males and females. We used CRISPR/Cas9 to induce knockout of PHF6 in SK-N-BE (2) cells which were then differentiated to neuron-like cells. Loss-of PHF6 resulted in defects of neuron proliferation, neurite outgrowth and migration. Impairment of these processes might therefore contribute to the cognitive dysfunction in BFLS.

Fliedner A et al., Sci Rep 2020; 10(1):19030.

# Department of Infectious Diseases

Inselspital, 3010 Bern  
[www.infektiologie.insel.ch](http://www.infektiologie.insel.ch)



Prof. Andri Rauch	Prof. Hansjakob Furrer	PD Dr. Christine Thurnheer	Prof. Jonas Marschall
Deputy Head of Department	Chairman and Head of Department	Head ID Services Hospitalized Patients	Head of Infection Control

## Profile

- Teaching students of medicine in Infectious Diseases (ID). Clinical skills training, problem based learning modules, practical months. Teaching students of Dental Medicine and Biomedicine and Biology
- Accredited for postgraduate education in Infectious Diseases and Tropical Medicine.
- Cohort Studies: 1. Swiss HIV Cohort Study (A. Rauch Chair of Scientific Board): Swiss and international collaborations. 2. Swiss Transplant Cohort Study (C. Hirzel Chair of ID Board)
- Infection prevention: Healthcare-associated infections and research partnering with a number of clinical specialties of the Inselgruppe, IFIK, external surveillance systems Anresis and Swissnoso.
- Clinical aspects and epidemiology of infectious diseases with clinical partners Insel Group and Institute for Infectious Diseases (IFIK). ID in people who inject drugs
- Research collaboration and implementation science within SubSaharan Africa: G. Wandeler via SNF, IEDA/NIH; C. Staehelin ESTHER project in Guinea-Conakry; Dr. S. Zimmerli, Harare Zimbabwe
- Publications: <https://boris.unibe.ch/view/divisions/DCD5A442BB13E17DE0405C82790C4DE2.html>
- External Partners: Swiss Centre for Antibiotic resistance, Anresis; Swissnoso, Swiss HIV Cohort Study; leDEA, International Epidemiology Databases to Evaluate AIDS, NIH, Bethesda, USA; Swissnoso; Swiss Transplant Cohort Study; Fungal Infections Network of Switzerland; EUROSIDA; Swiss Tropical and Public Health Institute, Basel; Kirby Institute, Sydney, Australia; Centre Hospitalier Macenta Guinée-Conakry

## Grants

- SNF Project grants: 32003B\_179500 J. Marschall; 324730\_179567 A.Rauch; 33CS30\_177499 A.Rauch, H. Furrer (co-applicants); 31CA30\_196245 A. Rauch (co-applicant); 31CA30\_196615 P. Jent (co-applicant)
- SNF Professorship PP00P3\_176944 G. Wandeler
- SNF SPARK 19097, A. Atkinson
- SPHN Personalized Swiss Sepsis Study (PSSS), H. Furrer (co-applicant)
- ESTHER Switzerland Partnership Project Grant 17G4, C. Staehelin
- Krebsliga Schweiz KLS-4879-08-2019, G. Wandeler

## Highlights

### PD Christine Thurnheer, Head of ID Services Hospitalized Patients

PD Christine Thurnheer was nominated Head of Infectious Disease Services for Hospitalized Patients August 2020. Congratulation.





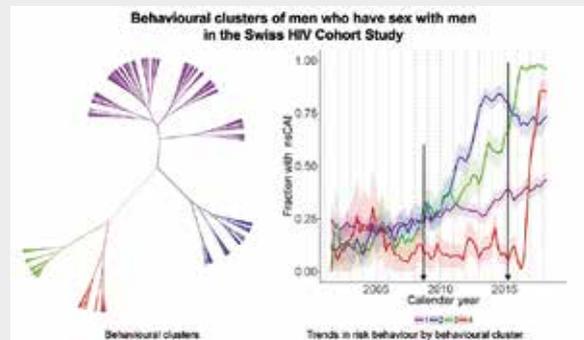
## Involvement in Handling of the COVID-19 Pandemic

At the beginning of the COVID-19 pandemic, under the lead of the infection prevention and control team a large-scale COVID testing site (COVIDtrack) was built up. Throughout the year 2020, our department was substantially involved in the handling of the pandemic, e.g.:

- As unit responsible for pandemic planning and epidemiology experts in the pandemic strategy and internal policy making.
- As consulting unit in the treatment of COVID-patients on normal wards as well as in the ICU
- As prevention and control team in the training and setup of dedicated isolation units and more.

## Machine learning identifies behavioural clusters in the Swiss HIV Cohort Study

Dr. Salazar-Vizcaya implemented a machine learning-based algorithm to identify clusters of sexual behavior among men who have sex with men in the Swiss HIV Cohort Study. The study revealed highly dissimilar trajectories in sexual behavior. Recognizing such patterns may be critical to design more effective interventions to reduce the incidence of sexually transmitted infections. Salazar-Vizcaya L. et al, *Clinical Infectious Diseases* 2020 Jan 16;70(3):416-424; SNF Project #324730\_179567.



## Hepatocellular carcinoma surveillance in people with chronic hepatitis B infection in Senegal and Zambia

Funded by the Krebsliga Schweiz (KLS-4879-08-2019), the group of Prof. Gilles Wandeler implements an ultrasound-based HCC screening and evaluation of potential HCC biomarkers within established research collaborations in Senegal and Zambia.

We hope to be able to help to reduce the burden of liver cancer in sub-Saharan Africa.



## MD PhD Program Clinical Sciences

Carlotta Riebensahm and Lorin Bégré started the MD/PhD Program Clinical Sciences of the Graduate School for Health Science under the supervision of Prof. Rauch and Wandeler.

- Prevalence and progression of non-alcoholic fatty liver disease among HIV-infected individuals: impact of age, statins and antiretroviral drugs (C. Riebensahm), also supported by PRT Grant of the University
- Understanding treatment outcomes of HIV/ HBV coinfection: A prospective cohort of HIV/HBV-coinfected patients in Europe (L. Bégré)



# Department of Intensive Care Medicine

Inselspital, 3010 Bern  
[www.intensivmedizin.insel.ch](http://www.intensivmedizin.insel.ch)



Matthias  
Theis  
Nursing  
Manager

Prof. Stephan  
Jakob  
Director, Chief  
Physician

Brigitte  
Hämmerli  
Head of IIMC  
Nursing,  
Deputy Nursing  
Manager

Felix  
Zürcher  
Head of  
Management  
Services

Prof. Joerg C.  
Schefold  
Chief Physician,  
Head of  
Research

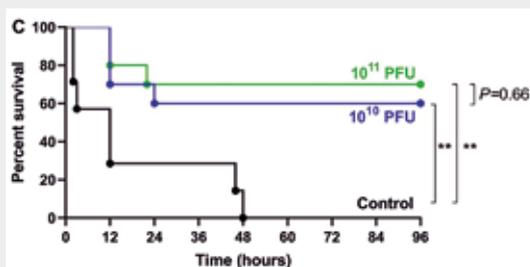
## Profile

- Key objective: to advance the pathophysiological understanding and associated host response patterns in critical illness, to develop innovative strategies to treat critical illness (e.g. severe infections).
- Numerous clinical trials, including international multicenter trials with internal and external partners focusing on organ dysfunction, fluid management, metabolism/immune response, severe infections, swallowing disorders, delirium, and post-resuscitation care.
- Experimental and laboratory research (including animal models particularly on severe infections (e.g. using phages), the pathophysiology of circulatory, cerebral and gastrointestinal function) is performed in cooperation with other groups, including ARTORG and Institute for Infectious Diseases, University of Bern.
- Full spectrum of training in Intensive Care Medicine, including training to qualify as an ICU specialist, training for medical students, advanced training for specialist nurses to qualify as certified experts in intensive nursing (NDS HF) and training for individuals to become professional healthcare assistants.

## Grants

- Innosuisse Innovation project: Selective Adsorption in Sepsis, No. 42313.1 IP-LS
- Innosuisse, 45148.1 INNO-LS, «BET inhibitors for inflammatory and fibrotic diseases – focus lung injury»

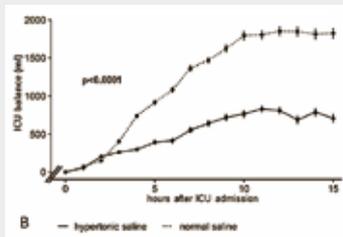
## Highlights



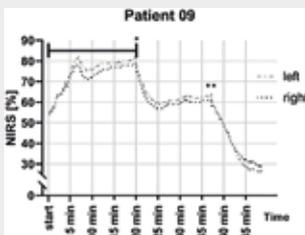
In this pre-clinical trial, we were able to show that a single prophylactic application of a nebulized bacteriophage-cocktail was able to significantly reduce mortality of ventilator-associated pneumonia in rats due to methicillin resistant *S. aureus* (MRSA). Rat survival was associated with substantial decrease in bacterial titers in the lungs. Further, after aerosolization bacteriophages were able to persist in modest concentrations for at least for 24 hours inside the lungs of rats.

Prazak J et al., Nebulized Bacteriophages for Prophylaxis of Experimental Ventilator-Associated Pneumonia Due to Methicillin-Resistant *Staphylococcus aureus*, *Critical Care Medicine*, 2020, 48(7):1042-1046.

Subjective assessments by healthcare professionals indicate that heightened noise levels on ICUs induce annoyance, elevated stress levels, impaired well-being, and reduced performance. However, in an experimental setting, no significant effects of exposure to ICU ambient sounds on working memory performance were observed. Schmidt N et al., Effects of intensive care unit ambient sounds on healthcare professionals: results of an online survey and noise exposure in an experimental setting, *Intensive Care Medicine Experimental* (2020) 8:34.

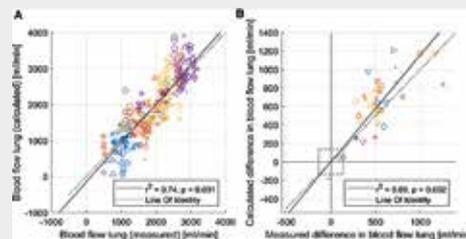


In this clinical trial, we observed that hypertonic saline did not reduce the total fluid volume administered on the ICU in critically ill cardiac surgery patients. Hypertonic saline infusion was associated with timely increase in urinary output and decreased ICU fluid balance. Variations in electrolyte and acid–base homeostasis were transient, but substantial in all patients. Pfortmueller C et al., Hypertonic saline for fluid resuscitation in ICU patients post-cardiac surgery (HERACLES): a double-blind randomized controlled clinical trial, *Intensive Care Med* (2020) 46:1683–1695.



In this clinical trial, demonstrated that it is feasible to insert a balloon occluder in

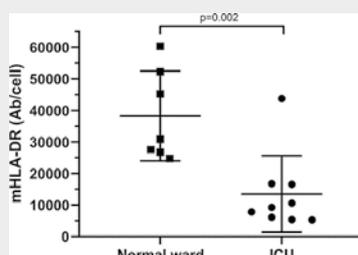
the aorta of patients who suffer from cardiac arrest and are under cardiac massage and resuscitation. With the occlusion, we intend to increase blood flow to the heart and brain, but this awaits confirmation in a future trial. Levis A, Haenggi M et al., Resuscitative endovascular balloon occlusion of the aorta (REBOA) during cardiopulmonary resuscitation: A pilot study. *Resuscitation*, 156 (2020) 27-34.



In this experimental trial, we developed a modified thermodilution technique that allows the determination of native cardiac output with high accuracy and precision in the setting of extracorporeal circulation and description of right heart function. The right ventricle will inevitably dilate during weaning from extracorporeal circulation due to increased venous return. Bachmann K et al., Assessment of Right Heart Function during Extracorporeal Therapy by Modified Thermodilution in a Porcine Model, *Anesthesiology* 2020, 133:879-91.



In this study, we assessed effects of repeated increases in CVP – as occurring during standard nursing procedures in the ICU – on hepato-splanchnic oxygen transport in a prolonged porcine sepsis model. We found that sepsis impaired normal/intrinsic mechanisms to attenuate effects of increasing back pressure on hepatic oxygen transport, which could contribute to organ failure. Liu S et al., Defense mechanisms to increasing back pressure for hepatic oxygen transport and venous return in porcine fecal peritonitis, *Am J Physiol Gastrointest Liver Physiol* 319: G289–G302, 2020.



As one of the first groups, we observed that critically ill COVID-19 patients show considerable and persisting (cellular) immunosuppression, as evidenced by diminished monocytic human leukocyte antigen-DR (mHLA-DR) expression. Diminished mHLA-DR was not observed in non-critically ill (hospitalized) patients. Cellular immunosuppression may be key in severe COVID-19 and might pave the way for (viral) disease progression. Spinetti T and Hirzel C et al., Reduced Monocytic Human Leukocyte Antigen-DR Expression Indicates Immunosuppression in Critically Ill COVID-19 Patients. *Anesthesia & Analgesia*, 2020, 131(4):993-999.

## Department of Medical Oncology

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[www.onkologie.insel.ch](http://www.onkologie.insel.ch)



Prof. Adrian Ochsenbein



Prof. Thomas Pabst



Prof. Jörg Beyer



PD Dr. Urban Novak



PD Dr. Julian Schardt



PD Dr. Martin Berger



Prof. Rory Johnson



PD Dr. Carsten Riether



Dr. Simon Häfliger

### Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- Research groups involved in basic, translational and clinical research
- GOLD lab with focus on long non-coding RNAs (lncRNAs); links NCCR RNA and disease with clinical oncology
- Research focus in translational medicine in the field of Immuno-Oncology and Hematooncology
- More than 200 patients per year are treated in clinical interventional phase 1-3 trials
- Largest clinical CAR-T cell program in Switzerland
- Certified phase 1 trial unit
- Development of Biomarkers to further optimize personalised treatment in the field of gastrointestinal oncology

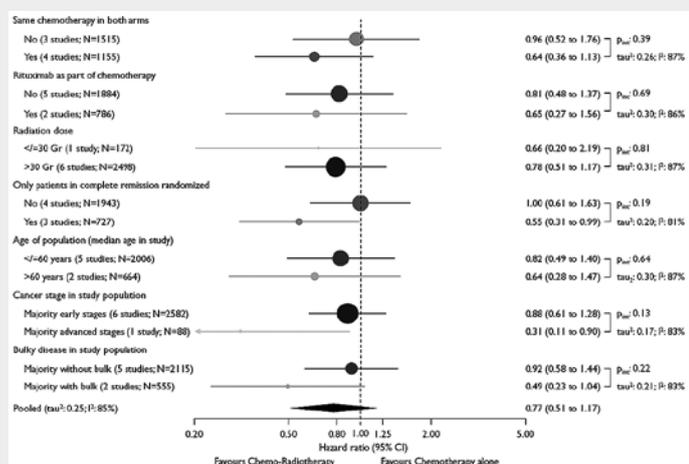
### Grants

- Several project grants from SNF, Sinergia grant, Grants from Swiss Cancer League and Helmut Horten Foundation

### Highlights

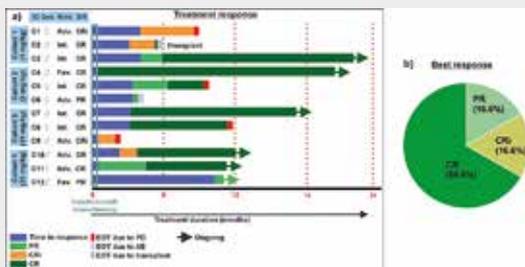
#### Impact on survival through consolidation radiotherapy for diffuse large B-cell lymphoma: a comprehensive meta-analysis

Radiotherapy is an effective modality to treat aggressive lymphomas, and e.g. widely used to shorten the duration of chemotherapy in patients with localized DLBCL. However, especially the role of consolidation radiotherapy for advanced aggressive lymphomas is not based on randomized clinical data. We conducted a comprehensive meta-analysis that indicated that consolidation radiotherapy does not improve the outcome in unselected DLBCL patients. We also provided the rationale for a future clinical trial.



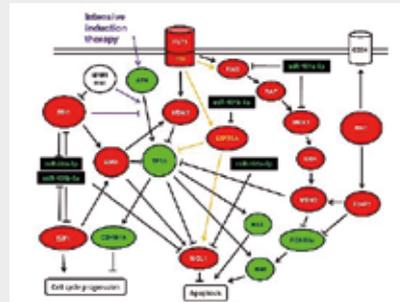
## Targeting CD70 with cusatuzumab eliminates acute myeloid leukemia stem cells in patients treated with hypomethylating agents

In this study, we show that hypomethylating agents increase the expression of CD70, the target of the monoclonal antibody cusatuzumab, on leukemia stem cells (LSCs) in acute myeloid leukemia (AML). We found that cusatuzumab monotherapy and in combination with hypomethylating agents is highly active in previously untreated patients with AML unfit for intensive chemotherapy and substantially reduces CD70-expressing LSCs through activation of gene signatures related to myeloid differentiation and apoptosis. Riether et al., Nature Medicine.



## Identification of biomarkers in acute myeloid leukemia

We evaluated the prognostic impact of MN1 and MN1-associated gene expression in intensively treated AML patients who received autologous stem cell transplantation (SCT) in CR1. Elevated MN1 gene expression was shown to be an adverse prognostic factor. In addition, elevated expression of the putative MN1 target gene FOXP1 was a negative prognostic predictor. Elevated expression of MN1 and CD34, another MN1 target gene, was clearly associated to higher numbers of CD34 positive leukemic blasts at diagnosis, which is also a negative predictor for outcome in AML.



## Searching for new cancer genes with the PanCancer Analysis of Whole Genomes consortium

The advent of low-cost genome sequencing has made it possible to search for cancer-causing «driver» mutations across the entire tumour genome, including in non-protein-coding regions that have been largely neglected. An international consortium, PanCancer Analysis of Whole Genomes (PCAWG), recently completed the first large scale survey of tumour mutations across >2500 individual tumours from 37 types. The Johnson lab contributed to PCAWG with its «ExInAtoR» software designed to find mutated cancer-driver genes. ExInAtoR revealed dozens of non-protein-coding genes that are mutated in various tumour types and represent promising new drug targets. This work was published as a series of articles in Nature and other journals.

## Precision medicine: Identification of predictive biomarkers in metastatic colorectal cancer

Through enhancement of the Wnt signalling pathway, R-spondins are oncogenic drivers in colorectal cancer and stimulate angiogenesis. Using three cohorts from 2 phase III randomized trials we could demonstrate that a variation within the R-spondin 2 gene predicts outcome in a subgroup of patients with metastatic colorectal cancer (mCRC) treated with upfront FOLFIRI and bevacizumab. Genotyping of the RSPO2 rs555008 polymorphism may help to identify patients who will derive the most benefit from a treatment with FOLFIRI/bevacizumab dependent on (K)RAS mutational status. Berger MD et al. Eur J Cancer.

## Department of Nephrology and Hypertension

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Deputy Clinic Director



Prof. Uyen Huynh-Do  
Consultant Physician



Prof. Daniel Fuster  
Consultant Physician



Prof. Geneviève Escher  
Lab Head

### Profile

- Teaching programs for students in medicine and biomedical sciences (BMS), supervision of bachelor and master students for their elective modules and master thesis, supervision of PhD students for Cellular and Biomedical Science (GCB)
- 9 research groups
- Investigation of the mechanisms that contribute to renal function loss upon hypoxia and chronic allograft failure, formation of kidney stones, development of renal fibrosis and atherosclerosis, as well as factors influencing the steroid hormone metabolome.
- Aim: improving diagnostic tools and implement of novel therapeutic approaches to enhance patient care.
- External partners: Department of Chemistry and Biochemistry, University of Bern; Department of Pharmacology and Toxicology and Institute of Social and Preventive Medicine, University of Lausanne; Institute of Pharmaceutical Sciences of Western Switzerland, Geneva; and many more in France, Sweden, UK, South Africa, Australia, and USA

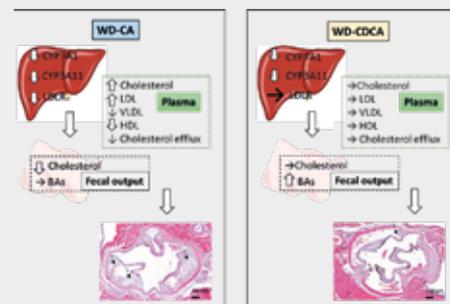
### Grants

- Swiss National Foundation
- NCCR Kidney.ch, NCCR-Kidney.ch Junior Grant Award and NCCR TransCure
- Swiss Transplant Cohort study
- Swiss Cancer League
- Foundation Johanna Dürmüller-Boll
- CLS Research Acceleration Initiative Grant
- Vifor investigator-initiated grant

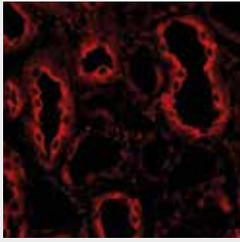
### Highlights

#### Cholic acid and chenodeoxycholic acid: differential cardiovascular outcome in Cyp27a1/ApoE double knockout mice

Sterol 27-hydroxylase (CYP27A1) is a key enzyme in bile acids (BAs) biosynthesis and cholesterol metabolism. Up-regulation of hepatic Cyp7a1 and Cyp3a11 protects Cyp27a1/ApoE double knockout (DKO) mice fed with western diet (WD) from atherosclerosis. Since feeding BAs ameliorates metabolic changes in Cyp27a1 KO mice, we assessed the atherosclerotic phenotype in DKO mice fed with WD containing Cholic acid (WD-CA) or Chenodeoxycholic acid (WD-CDCA). Hepatic Cyp7a1 and Cyp3a11 expression were reduced by 60% with both diets; DKO mice fed with WD-CA developed atherosclerosis, not those with WD-CDCA. This difference was mainly driven by atherogenic plasma lipid composition and impaired cholesterol absorption by the intestine in WD-CA mice. Understanding the mechanism accounting for this difference in lipid metabolism and cardiovascular outcome is essential for the development of future therapies involving BAs. Zurkinden L, Zviridov D, Vogt B, Escher G. *Front. Endocrinol.* 2020.



Proposed mechanism for atherosclerosis development in DKO mice fed with WD-CA or WD-CDCA.

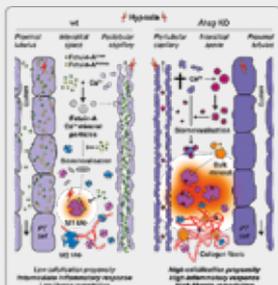


The sodium/proton exchanger NHA2 regulates blood pressure through a WNK4-NCC dependent pathway in the kidney.

## Sodium/hydrogen exchanger NHA2: critical factor in the regulation of blood pressure homeostasis

NHA2 (SLC9B2, sodium/hydrogen exchanger associated with arterial hypertension) is expressed in the kidney, localizing to distal convoluted tubules (DCT). NHA2 KO mice displayed: reduced blood pressure, normocalcemic hypocalciuria, attenuated response to thiazide diuretics. Complementary ex vivo and in vitro studies revealed the mechanism: loss of NHA2 caused increased ubiquitylation and proteasomal degradation of “with no lysine kinase 4” (WNK4) with an attenuated activity of the Na/Cl-cotransporter NCC in the DCT. Our study revealed NHA2 as a critical component of the WNK4-NCC pathway and novel regulator of blood pressure homeostasis in the kidney.

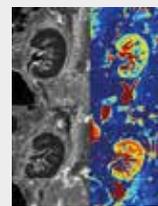
Anderegg MA, Albano G, Hanke D, Deisl C, Uehlinger DE, Brandt S, Bhardwaj R, Hediger MA, Fuster DG. *Kidney Int.* 2020 Sep 18;S0085-2538(20)31066-8. doi: 10.1016/j.kint.2020.08.023.



Local induction of fetuin-A in hypoxia augments the clearance of calcium biominerals and reduces inflammation, fibrotic tissue remodeling and M1 macrophage polarization, thus protecting the kidney from hypoxic injury. Rudloff et al., *Nat. Comms*, 2020.

## Fetuin-A is a HIF target that safeguards tissue integrity during hypoxic stress

Reduced oxygen availability during embryogenesis leads to intra-uterine growth restriction (IUGR), increasing the risk for hypertension, cardiovascular and chronic kidney disease (CKD). In a mouse model of hypoxia-induced IUGR, we characterize fetal adaptations at mRNA, protein and cellular levels, and their long-term functional consequences, using the kidney as readout. We identify fetuin-A (Ahsg) as an evolutionary conserved HIF target gene, and investigate its role using fetuin-A KO animals. Lack of fetuin-A during fetal hypoxia accelerates CKD progression in the adult, whereas fetuin-A supplementation during ischemia reperfusion injury attenuates fibrotic remodeling. Beside its systemic role, we identify Fetuin-A as a multifaceted protective factor acting locally in the tissue. Fetuin-A is identified as systemic calcification inhibitor, but also as multifaceted protective factor. Our study paves the way to novel therapeutic approaches mitigating mineral stress-induced inflammation and damage.



Blood oxygen-level-dependent (left panels) and arterial spin labeling-magnetic resonance imaging sequences (right panels) in kidney grafts during neutral (upper panels) and flexed hip position (lower panels).

## Influence of hip position on oxygenation and perfusion of kidney allografts - the bent knee study

In collaboration with the AMSM, a multi-parametric functional magnetic resonance imaging protocol was used to investigate the influence of hip position on oxygenation and perfusion of renal allografts. Similar to iliac claudication previously described in professional cyclists, tethering of the transplant renal artery by fibrous peri-graft tissue might occur during hip flexion leading to iterative ischemia, and thus represent a cause of interstitial fibrosis and tubular atrophy (IFTA) of the organ. The results are significant and surprising, demonstrating an acute impact of hip position on functional magnetic resonance imaging parameters of the kidney graft. (Manuscript submitted)



Structure of insulin

## Novel method for insulin detection

In collaboration with the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism, we developed two methods for fast quality assessment of insulin medication and parallel measurement of endogenous insulin and insulin drugs in patient blood samples. Using these methods, we gain better understanding of the pharmacological properties of insulin drugs, which helps establishing improved treatment schemes.

*Anal. Bioanal. Chem.* 2020. DOI: 10.1007/s00216-020-02971-4, *Diabetes Technol. Ther.* 2020, 22, 326-329.

# Department of Neurology

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Prof. Claudio Bassetti  
Clinic Director



Prof. Andrew Chan  
Deputy Clinic Director



Prof. Antoine Adamantidis  
Extraordinarius



Prof. Urs Fischer  
Extraordinarius



Prof. Marcel Arnold



Prof. Selma Aybek



Prof. Simon Jung



Prof. Paul Krack



Prof. René Mürli



Prof. Smita Saxena



Prof. Christoph Schankin



Prof. Kaspar Schindler



Prof. Werner Z'Graggen

## Profile

- Clinical, translational, basic and nanotechnological research
- Topics and teams: sleep, stroke, epilepsy, neuroimmunology, neurorehabilitation, Parkinson/movement disorders, functional neurological disorders, dementia/neurodegeneration, advanced neuroimaging, biomarkers
- Teaching students of medicine, biomedicine as well as graduate students of the Graduate School of Health Sciences (GHS) and Graduate School of Cellular and Biomedical Sciences (GCB); international postgraduate master in sleep (ASC)
- Promotion of Young Researchers: Internal funding schemes for young researchers (Research Grant in Neurology), as well as for excellent female researchers (Excellence in Diversity Fellowship) and translational research (Bridge Scholarship in Translational Research in Neurology)
- Number of external academics affiliated with the department: 23
- External Partners: Universities and large hospitals in Switzerland, European Stroke Organisation Trials Alliance; Department of Neurology, McGill University, Canada; University Claude Bernard - Lyon 1, France; Institute of Neuropathology, University Medical Center Goettingen; Institute of Neuroimmunology and Multiple Sclerosis Research, Georg-August-University Goettingen; Department of Neurology, Ruhr University Bochum; Department of Neurology, University of Duisburg-Essen; Eginition University Hospital, National and Kapodistrian University of Athens, Greece

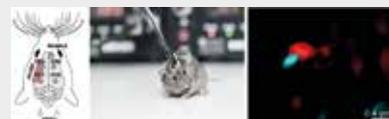
## Grants

- Swiss National Science Foundation: 20 grants (2 grants awarded in 2020: 197009, 197709. 18 running grants: 169975, 175615, 172952, 172793, 179929, 179436, 176985, 179595, 185362, 188761, 173081, 179667, 189077, 172676, 179277, 179565, 175984, 180365)
- Horizon 2020: 5 grants (1 grant awarded in 2020: MSCA-ITN-2020 956977. 4 running grants: ERC Consolidator Grants (725850 and 725825); Eurostars-2 (EI 12034/18/Q); MSCA-ITN-2019 860035)
- Others: Swiss Heart Foundation, Swiss Academy of Medical Sciences, Innosuisse, Bangerter-Rhyner Foundation, Baasch Medicus Foundation, Parkinson Schweiz, Synapsis Foundation Switzerland

## Highlights

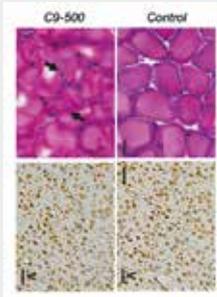
### Sleep as possible target to improve recovery after ischemic stroke

Since 25 years, Prof. Bassetti and his team made fundamental clinical and experimental contributions to our understanding of the sleep-stroke relationship. Until today, neurorehabilitation is the only approach that



promotes recovery after stroke. In this “proof of concept” study, the team showed that the induction of slow wave in a rodent model of stroke using optogenetics improves motor recovery after stroke, further implicating sleep slow waves in promoting brain plasticity in health and disease.

Facchin et al., *J Neurosci* 2020 Nov 4. doi: 10.1523/JNEUROSCI.0373-20.2020.



### Characterization of C9-500 model of ALS/FTD

Preclinical rodent models underpin neurodegenerative disease research. However, faithful spatio-temporal reproduction and measurement of human pathological hallmarks remains challenging, especially in genetically overlapping disorders such as C9ORF72-linked ALS/FTD. In this collaboration, we devised molecular and behavioral assays to reproducibly measure C9ORF72-related temporal degeneration patterns associated with ALS (NMJ) and FTD (cortex), providing the field with a novel and robust model of C9orf72-linked ALS/FTD. Nguyen et al., *Neuron*, 2020. doi:10.1016/j.neuron.2020.09.009.

Representative images depicting NMJ abnormalities as well as cortical neuron loss in C9-500 model of ALS/FTD



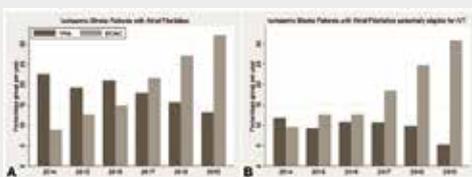
### Rapid-eye movement sleep tunes eating behavior

What is the role of brain-wide neuron activity during rapid-eye-movement sleep remains unclear. The team of Prof. Adamantidis has now discovered that activity patterns of neurons in the hypothalamus usually encoding eating in the awake mouse are reactivated during REM sleep. When these activity patterns for eating were modified during REM sleep, then the animals eat less, emphasizing that not only sleep quantity, but sleep quality, are both responsible for physiology homeostasis of the brain and the body. Oesch et al., *PNAS* 2020 Aug 11. doi: 10.1073/pnas.1921909117.

### Prior Anticoagulation in Patients with Ischemic Stroke and Atrial Fibrillation

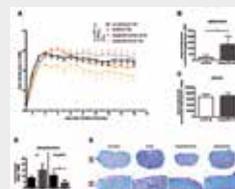
Selecting patients on DOAC therapy for intravenous thrombolysis is a major clinical challenge. In this analysis of the Swiss Stroke Registry (n= 8,179), we showed that 1 in 4 ischemic stroke patients potentially eligible for thrombolysis had prior anticoagulation treatment. Despite markedly lower rates (15%) of thrombolysis, DOAC therapy was associated with decreased stroke severity at onset, and a better outcome at 3 months when compared with controls. The figure shows the increasing rate of pretreatment with DOAC and decrease of Vitamin K antagonists.

Meinel et al., *Annals Neurology* 2020 Sep 30. doi: 10.1002/ana.25917.



### Multi-drug transporters modify therapeutic efficacy in an animal model of multiple sclerosis

Multi drug transporters actively extrude immunotherapeutics used in multiple sclerosis (MS) across cellular membranes. We investigated whether the transporter *abcg2* influences effects of the MS first line therapy teriflunomide (*teri*). *abcg2*-deficiency increased intracellular *teri* concentrations and *teri*-induced inhibition of T-cell proliferation *in vitro*. In experimental autoimmune encephalomyelitis (MOG35-55 EAE), *teri* treatment ameliorated disease in *abcg2*-KO at a dosage not efficacious in wildtype animals, accompanied by higher *teri* spinal cord tissue concentrations. Further investigations as potential determinant of interindividual MS treatment response are warranted, since markers to guide individualizing treatment strategies are still a major unmet need. Thiele et al., *J Neuroinflamm* 2020 Jan 8. doi:10.1186/s12974-019-1677-z.



Impact of *abcg2*-modulation in *teri*-induced treated EAE. a) clinical scores. *Teri* concentration in b) spinal cord and c) plasma. d) Quantification of spinal cord demyelination with e) representative microphotographs (LFB)

## Department of Neurosurgery

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Prof. Claudio Pollo



Prof. Philippe Schucht



Prof. Hans-Rudolf Widmer



Prof. Werner Z'Graggen



Dr. Ralph Schär

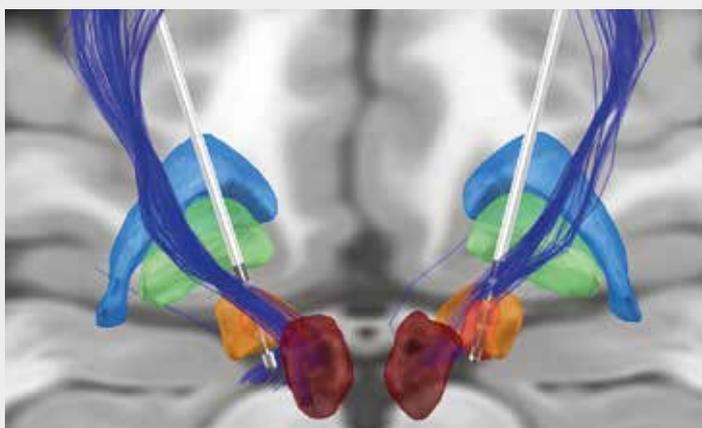
### Profile

- Our clinical research commitment is driven by the need to improve and refine neurosurgical operations. Focusing on this area, we examine and test how to translate increasingly frequent emerging new technologies into neurosurgical practice. Another focus are clinical studies or trials to investigate different managements or treatments. In our laboratory of regenerative experimental medicine we aim at the development and improvement of therapeutic strategies for neurodegenerative diseases.
- Teaching profile: workshops for medical students, medical students in-house rotations, co-organizers of the lecture series "Disease and Repair at the CNS" for master students of the gcb Bern. Hans-Rudolf Widmer serves as mentor and co-advisor for PhD students of the gcb Bern.
- Laboratory of Hemodynamic and Cardiovascular Technology, EPFL Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland; Schweizer Zentrum für Elektronik und Mikrotechnologie, Neuchâtel, Switzerland; Department of Neurosurgery, Freiburg University Hospital, Freiburg, Germany; Department of Neurobiology Research, University of Southern Denmark, Odense, Denmark.

### Grants

- SNF Ambizione Grant 4 years : Mapping and Modeling Deep Brain Stimulation
- Swiss Foundation for Research in Muscle Diseases, 2019: "Facilitating diagnosis of critical illness myopathy using muscle excitability testing"

### Highlights



Reconstruction of DBS leads implanted bilaterally in the Subthalamic nucleus (orange).

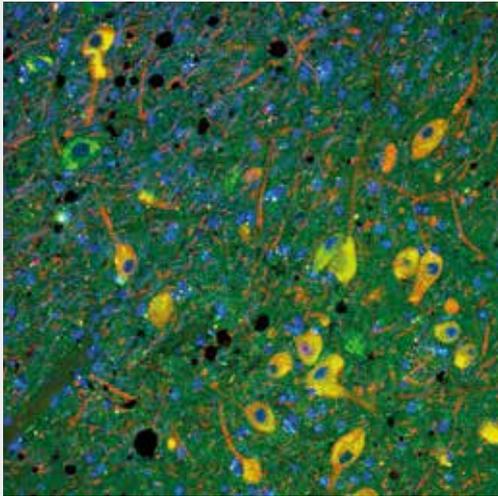
The red volumes around the leads are the estimation of the volume of tissue activated generated by the electrical stimulation, and the blue streamlines represent the pathway of interest.

#### Deep Brain Stimulation (DBS)

We have pioneered the development of segmented DBS leads and focus our research on predicting the best stimulation area and postoperative programming parameters in patients receiving DBS in the Subthalamic Nucleus (STN) for Parkinson's disease. We have implemented our probabilistic STN sweet spot obtained from our previously developed computed model on a cohort of DBS patients and are analyzing our ability to predict the best stimulation area and programming parameters. Our preliminary results show a high accuracy of our image-based predictive algorithm. This will open new insights in DBS programming and improve clinical outcome by reducing DBS induced side effects.

## Infection prevention in complex spine surgery

The VANCO Trial, a multicenter, randomized controlled trial supported by a CTU-Research grant and the Gottfried-Bangerter Foundation, initiated at the Department of Neurosurgery in Bern, started recruiting patients in November 2019. Further centers have agreed to participate, namely the Spine Unit in Biel, the Lindenhofspital in Bern, the Department of Orthopedic Surgery at the Inselspital and the Department of Neurosurgery in Freiburg, Germany. The trial aims to deliver clinically important evidence on the safety and efficacy of intrawound vancomycin powder for infection prevention in complex spine surgery.



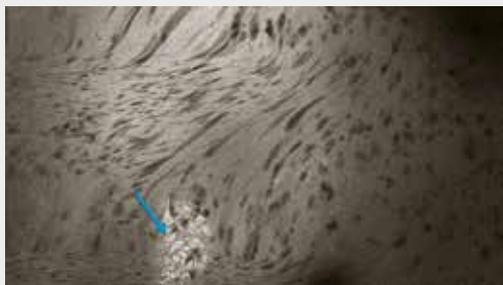
## Co-localization of Nogo-A in dopaminergic neurons of the human substantia nigra pars compacta

In 2020 we investigated the relationship of Nogo-A expression in dopaminergic neurons depending of age and in Parkinson's disease. In collaboration with the Translational Research Unit, we developed a tissue micro array (TMA) of the human non-parkinsonian and parkinsonian substantia nigra pars compacta. While we observed that Nogo-A expression in dopaminergic neurons is higher with increasing age, the opposite is the case in Parkinson's disease. These observations hint to the idea that Nogo-A plays a substantial role in the vulnerability of dopaminergic neurons in Parkinson's disease.

Photomicrograph of the human substantia nigra pars compacta. Dopaminergic neurons (green) co-expressing Nogo-A are shown in yellow, nuclei in blue.

## Mortality after elective craniotomy in older patients

With global aging, the frequency of elective craniotomies in elderly patients increases continuously. By analyzing a cohort of 1452 patients, who underwent elective cranial neurosurgery at our Department, we could show that overall mortality after elective craniotomy is low in all age groups and that the risk in patients older than 75 years is not increased but that elderly patients are more dependent on discharge to other medical institutions. Schär RT et al., J Neurosurgery, 2020.



Non-invasive, live-imaging of a colorectal metastasis (blue arrow) infiltrating the brain, taken by CONVIVO with a hand-held probe during brain surgery

## Neurooncology

The confocal laser microscope CONVIVO is a mobile unit for identification of tumor cells during surgery. A handheld probe allows for instantaneous analyses of the tissue in sight at any given time point during surgery, providing information on the microarchitecture of the tissue and the type of cells, hence clarifying whether a complete resection has been achieved. Selected as one of very few centers worldwide to test this potentially groundbreaking technology, we are now using CONVIVO in selected patients.

## Spontaneous intracranial hypotension

In a research paper published in Neurology we were able to describe new insights into the natural history of spontaneous intracranial hypotension from lumbar infusion testing. The study highlighted the acute and dramatic alterations of the cerebrospinal fluid (CSF) dynamics by a CSF leak in the acute stage with distinct pattern changes over time. An association between these changes and the clinical presentation was found and described. Häni L et al., Neurology 2020.

## Department of Nuclear Medicine

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Director  
Head of Clinical Research



Prof. Ali Afshar-Oromieh  
Deputy Director



Prof. Paul Cumming



Prof. Kuangyu Shi  
Scientific Head of Artificial Intelligence and Translational Theranostics



Dr. Eleni Gourni

### Profile

- Teaching students in the field of medicine, biomedical engineering, and chemistry. Education of medical technical radiology assistants
- Research in radiopharmacy, PET imaging in oncology and neurology with focus on total body PET, implementation of artificial intelligence and support of novel deep learning algorithms in Nuclear Medicine.
- Aim: Improve PET and SPECT techniques in the field of oncology, neurology, and cardiology. Increase the therapeutic spectrum of Nuclear Medicine
- External partners: Dept. of Nuclear Medicine, University of Heidelberg; Dept. of Nuclear Medicine, Technical University Munich; Dept. of Nuclear Medicine, Ludwig-Maximilian-University Munich; Fudan University Shanghai, China; Institute of Nuclear Chemistry, Johannes Gutenberg-University Mainz; Kindai University Osaka, Japan; MGH PET Core, Harvard Medical School, USA; Dept. of Molecular Pharmacology, UCLA, USA; Dept. of Nuclear Medicine, Shanghai Jiaotong University, China; Institute of Biomedical Engineering, ETH Zürich; Laboratory of Functional and Metabolic Imaging, EPFL; Faculty of Biochemistry, Biophysics and Medical Biotechnology Jagiellonian University; European Institute of Oncology, Milan; Preclinical PET/CT Laboratory, The University of Edinburgh; French National Institute of Health and Medical Research; Dept. Nuclear Medicine, Ruijin Hospital, Shanghai Jiaotong University; Dept. Engineering Physics, Tsinghua University; Dept. Urology, Gulou Hospital, Nanjing University; Dept. Nuclear Medicine, No. 1 Hospital, Nanjing Medical University; Dept. Nuclear Medicine, Peking Cancer Hospital, Peking University; Dept. Nuclear Medicine, Wuhan Union Hospital, Huazhong University of Science and Technology; Diagnostic Imaging and Radiotherapy, Humanitas University

### Grants

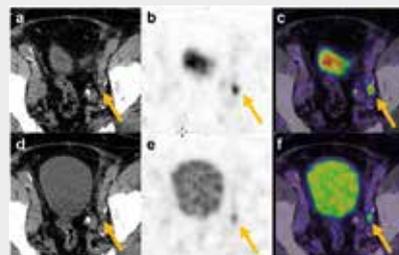
- Swiss National Science Foundation (grant no. 200021\_188914; IZKSW3\_188350; 310030\_192704)
- Swiss Cancer League (grant no. KFS-4723-02-2019)
- FreeNovation Fund, Novartis Foundation
- Berner Krebsliga
- Deutsche Forschungsgemeinschaft (grant no. RO5194/1-1)
- Berger-Janser Stiftung (grant no. 11/2019)

### Highlights

#### Dynamic patterns of [<sup>68</sup>Ga]-PSMA-11 uptake in recurrent prostate cancer lesions.

A heterogeneous pattern of dynamic tracer uptake was observed, with increasing pattern observed for locally recurrent lesions and lymph nodes and a significant proportion of bone lesions exhibiting decreasing tracer uptake. The results are of significance not only in the imaging and identification of PC lesions, but they also have implications for PSMA-directed ligand therapy.

I. Alberts et al, EJNMI 2020 47(1):160-167.

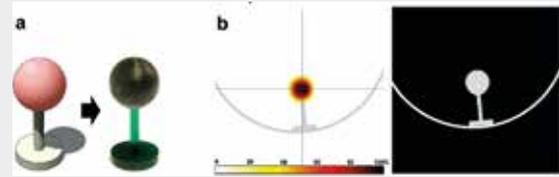


Heterogeneous pattern of dynamic tracer uptake was observed with increasing pattern observed for locally recurrent lesions and lymph nodes.

### 3D printing of radioactive phantoms for nuclear medicine imaging.

3D printing of radioactive phantoms using <sup>99m</sup>Tc-containing building materials is feasible. Compared to the classical fillable phantoms, 3D printing with radioactive building materials allows manufacturing of phantoms without cold walls and in almost any shape. Related procedures with longer-lived radionuclides will enable production of phantoms for scanner validation and quality control.

T. Lappchen et al., EJNMMI Physics 2020 7(1):22.

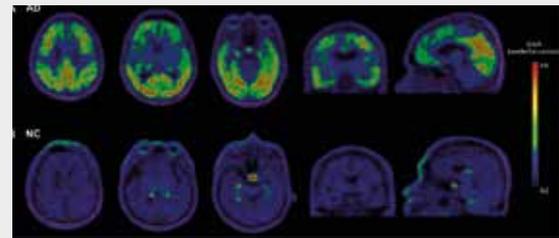


Computer model and photo of the 3D printed spherical phantom (a) and the corresponding SPECT/CT images of the radioactive phantom (b)

### Associations of [<sup>18</sup>F]-APN-1607 Tau PET Binding in the Brain of Alzheimer's Disease Patients with Cognition and Glucose Metabolism.

[<sup>18</sup>F]-APN-1607 PET sensitively detected tau deposition in Alzheimer's Disease and individual tauopathy correlated with impaired cerebral glucose metabolism and cognitive function.

J. Lu et al., Front Neurosci 2020 14:604.



(A) [<sup>18</sup>F]-APN-1607 PET of an Alzheimer's Disease patient  
(B) [<sup>18</sup>F]-APN-1607 PET of a normal control subject

### In Vivo Assessment of Neuroinflammation in 4-Repeat Tauopathies.

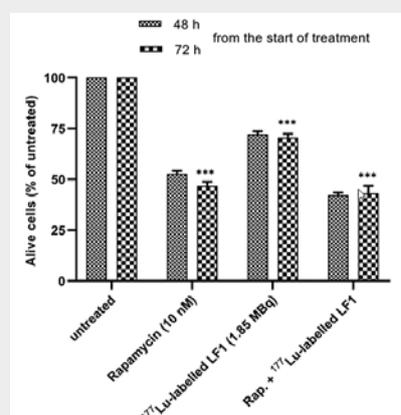
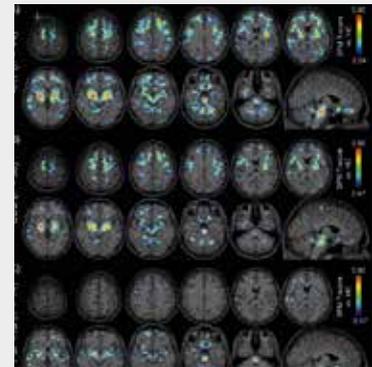
The study indicates that [<sup>18</sup>F]-GE-180 PET detects microglial activation in the brain of patients with 4-repeat tauopathy, fitting to predilection sites of the phenotype. The 18 kDa translocator protein PET has a potential for monitoring neuroinflammation in 4R tauopathies. C. Palleis et al., Mov Dis 2020 epub.

Voxel-based differences of TSPO-PET binding in 4R tauopathy patients.

(A) in 4-repeat tauopathy (n = 44),

(B) corticobasal syndrome (n = 30)

(C) progressive supranuclear palsy-Richardson syndrome patients (PSP-RS; n = 14) when compared with healthy controls.



### Effect of the versatile bifunctional chelator AZZTA5 on the radiometal labelling properties and the in vitro performance of a gastrin releasing peptide receptor antagonist.

LF1 labelled lutetium-177 and indium-111 appears to have a considerable potential to serve as a versatile probe suitable for SPECT, therapy and intra-operative applications. The ease of LF1 synthesis, the efficient radiolabeling at RT with a variety of radiometals, the stable encapsulation of lutetium-177 and indium-111 by AAZTA5 and their favorable in vitro performance renders them suitable candidates for further extensive in vivo studies.

M. Hofstetter et al., EJNMMI Radiopharm Chem 2020 5(1):29.

In vitro therapy assessing the effect of monotherapy (rapamycin or <sup>177</sup>Lu-labelled LF1) and combination therapy (rapamycin and <sup>177</sup>Lu-labelled LF1) on PC3 cells

# Department of Obstetrics and Gynecology

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## Division of Obstetrics and Feto-Maternal Medicine



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Director  
Research and Teaching



Prof. Luigi Raio  
Deputy Director  
Group Leader



PD Dr. Beatrice Mosimann  
Group Leader



PD Dr. Marc Baumann  
Group Leader  
Coordinator  
Clinical Research



Prof. Andreina Schoeberlein  
Co-Head  
Research Laboratory  
Prenatal Medicine



Prof. Martin Müller  
Group Leader

## Profile

Areas of Scientific Investigation:

- Stem cells, exosomes, non-coding RNA and Astroglial function in perinatal brain damage and neuroregeneration
- Transmembrane transporter and biomarker in preeclampsia and preterm birth
- Molecular signature of circulating free DNA in maternal blood in adverse pregnancy outcome
- Clinical research in preterm birth, labor induction, postpartum hemorrhage, screening for pre-eclampsia and gestational diabetes, maternal-neonatal microbiome development
- Teaching: preclinical and clinical at master, MD and PhD level; postgraduate preclinical / clinical training
- External Research partners: Dept. Pediatrics and Neonatology, Maastricht University; Dept. Neurosurgery, Cellular and Molecular Physiology, Yale University; Dept. Obstetrics, Peking Union Medical College Hospital (PUMCH); Dept. Obstetrics, Schiller University Jena; BioIncept, LLC, Cherry Hill, New Jersey; Dept. of Obstetrics, CHUV, Lausanne

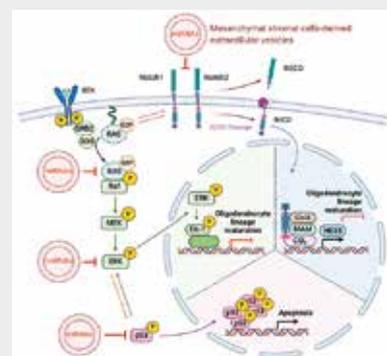
## Grants

- SNF Grant: Salt Supplementation in pregnancy at high risk to develop preeclampsia
- EU Grant COST: International network for translating research on perinatal derivatives
- Bangerter Foundation: Mesenchymal stem cells-derived exosomes as a neuroregenerative therapy
- CTU Grant: Preimplantation factor: Biomarker for preterm birth?
- Grant Swiss Society of Obstetrics and Gynaecology / Bayer
- Investigator-initiated trial (Vifor): Patient blood management in obstetrics
- Perinatal medicine intramural fund: Several grants for clinical studies

## Highlights

### Selected publications in 2020

- Spinelli M et al. Synthetic Preimplantation Factor (sPIF) reduces inflammation and prevents preterm birth. *PLoS One* 2020 Jun 8;15(6):e0232493.
- Poon LC et al. From first-trimester screening to risk stratification of evolving pre-eclampsia in second and third trimesters of pregnancy: comprehensive approach. *Ultrasound Obstet Gynecol.* 2020 Jan;55(1):5-12.
- Surbek D. et al. Patient blood management (PBM) in pregnancy and childbirth: literature review and expert opinion. *Arch Gynecol Obstet.* 2020 Feb;301(2):627-641.
- Mosimann B. et al. First trimester screening for preeclampsia – a systematic review. *Hypertens Pregnancy.* 2020 Feb;39(1):1-11.
- Sommerstein R, et al. Antimicrobial prophylaxis administration after umbilical cord clamping in cesarean section and the risk of surgical site infection: a cohort study with 55,901 patients *Antimicrob Resist Infect Control.* 2020 Dec 22;9(1):201.



Mechanisms involved in neuroregeneration with stem cell-derived extracellular vesicles' microRNA

## Division of Gynecology and Gynecological Oncology



Prof. Michael Mueller  
Director and  
Head Research



Prof. Annette Kuhn



PD Dr. Sara Imboden



Dr. Konstantinos Nirgianakis



Dr. Thomas Andrieu

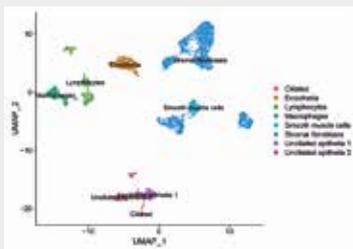
### Profile

- Pathophysiology of endometriosis and associated pain
- Recurrence and treatment non-response in endometriosis/adenomyosis
- Impact of endometriosis on fertility and pregnancy
- Pathophysiology of gynaecologic cancers
- Quality of life before and after urogynaecologic interventions
- Physiologic and pathophysiologic changes of the pelvic floor during exercises
- Transgender studies
- External partners: Center for Gender Variance, Univ. of Basel; Berner Fachhochschule, Bern; Dell Medical School, Univ. of Texas, Austin; Croydon Univ. Hospital, London; Dept. of Obstetrics & Gynaecology, Inst. for Molecular Biosciences, Queensland; Clinical Pathology & Cytology, Karolinska Univ. Hospital, Stockholm; Dept. of Urogynaecology, Princess-N-Hospital, Southampton; Dept. of Obstetrics & Gynecology, Ospedale Santa Chiara di, Trento

### Grants

- Swiss National Science Foundation
- Contura AG, Copenhagen, Denmark
- Innosuisse – Swiss Innovation Agency
- Stiftung für Klinisch-experimentelle Tumorforschung
- Bern Center for Precision Medicine (BCPM)

### Highlights



#### Endometrial cell atlas revealed by single-cell analysis

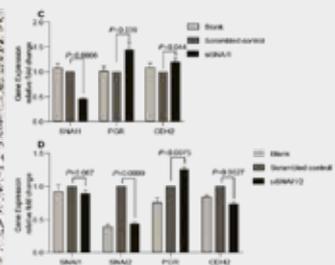
Endometriosis is a frequently occurring disease affecting 1 in 10 women, characterized by the growth of endometrial tissue outside the uterus. We aim to unveil disease causing changes in endometrial cellular pathways and cell interactions using cutting-edge single-cell techniques to gain a better understanding of the disease and its origin.

Dr. Lea Dümpelmann

#### Epithelial to mesenchymal transition (EMT) and Progesterone Receptor (PR) expression in endometriosis lesions

Our study revealed a negative correlation between PR and N-cadherin (EMT marker) across different subtypes of endometriosis (Fig. A, B) and highlighted the role of SNAI1 as a core EMT related transcription factor in this process (Fig. C, D). Such finding has potential to improve our current therapeutic approach especially regarding progestin resistance observed in some patients.

Lijuan Ma



# Department of Ophthalmology

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Prof. Sebastian Wolf  
Co-Director



Prof. Martin Zinkernagel  
Co-Director  
Head of  
Outpatient  
Department



Prof. Beatrice Früh  
Anterior  
Segment



Prof. Mathias Abegg  
Orthoptic  
Goldman  
Foundation



Prof. Volker Enzmann  
Research  
Laboratories



Prof. Pascal Escher  
Ophthalmogenetics

## Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- 6 research groups
- Investigation of the pathophysiology and treatment of vitreoretinal diseases, glaucoma, neuro-ophthalmologic disorders and external disease. Clinical research includes phase I-IV studies as well as the development of new imaging modalities for retinal diseases.
- The Bern Photographic Reading Center (BPRC) is an internationally renowned center for coordination and independent evaluation of images obtained in clinical multicenter trials.
- Research projects in cooperation with the Artificial Intelligence in medical Imaging group at the ARTORG-Center explore new deep-learning approaches for image evaluation.
- The research groups involved in basic research use state-of-the-art molecular, cellular and imaging techniques for in vitro, cell culture, ex vivo and in vivo studies. Research projects in Experimental Ophthalmology focus on the potential of stem cells and progenitor cells in restoring visual function, in ocular immunology and the influence of the microbiome on inflammatory eye diseases, as well as on new avenues to treat them.
- The ophthalmogenetics group continuously strives to identify new phenotype-genotype correlations in inherited eye diseases by molecular diagnostic and to understand their impact on eye development.
- External Partners: Dept. of Biology, University of Fribourg, Switzerland; Schepens Eye Research Institute/Massachusetts Eye and Ear, Boston, MA, USA; Department of Ophthalmology, Harvard Medical School, Boston, MA, USA.; Dept. of Ophthalmology and Visual Sciences, University of Louisville, Louisville, KY, USA; Hôpital Ophtalmique Jules-Gonin, Université de Lausanne, Switzerland; Lab for Retinal Cell Biology, Department of Ophthalmology, University of Zurich, Switzerland; Augenklinik, Universitätsspital Basel, Switzerland; Department of Ophthalmology, University Hospital Regensburg, Regensburg, Germany

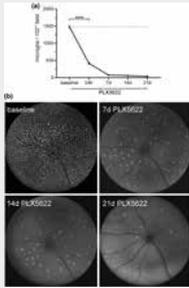
## Grants

- Molecular mechanisms of NR2E3-linked retinal degenerations SNF 33IC3031003A\_169237
- Foundation Bertarelli: Associations between the ocular microbiom and the mucosal immune system in dry eyes
- Stiftung OPOS: Associations between the ocular microbiom and the immune system in dry eye disease
- Structural Imaging Assisted Retinal Fluorescence Lifetime Imager (STARFLI) using a high-speed fluorescence lifetime measurement scheme / JOINT CALL SK-CH 2019

## Highlights

### The role of inflammatory cells on retinal degeneration in a mouse model of retinal vein occlusion

Retinal vein occlusion is a relatively common eye disease and is a condition that may lead to blindness. In a mouse model of vein occlusion we could show that microglia become activated and trigger an inflammatory response including recruitment of neutrophils during the early phase of the disease. To influence the role of microglia we employed PLX5622 (a selective tyrosine kinase inhibitor that targets the colony-stimulating factor-1 receptor) mice with experimental retinal vein occlusion. PLX5622 caused dramatic suppression of microglia. In depleted mice,



retinal pro-inflammatory cytokine signaling was diminished and retinal ganglion cell survival improved by almost 50% compared to non-depleted animals 3 weeks after vein occlusion. In summary, findings indicate that suppression of cells bearing the colony-stimulating factor-1 receptor, mainly microglia and monocytes, mitigates ischemic damage and salvages retinal ganglion cells in retinal vein occlusion. Published in *Glia*.2020;68:574–588.

Monitoring of retinal microglia depletion by in vivo confocal scanning laser ophthalmoscopy. (a) There is quick and sustained suppression of microglia with PLX5622 treatment. (b) Representative images of microglia depletion kinetics. Pictures were taken in blue-light autofluorescence mode using a 102° ultrawidefield optic at baseline, 7d, 14d, and 21d, \*\*\*\* $p < .0001$  (Dunnett's multiple comparison test)

## 4-year outcomes of a 'treat-and-extend' regimen with exit-strategy in patients treated for exudative age related macular degeneration

Exudative age related macular degeneration is a progressive degenerative disease characterized by the development of choroidal neovascularization. The use of anti vascular endothelial growth factor antibodies has revolutionized the treatment of this condition. However, repeated injections with antiVEGF are necessary for treatment. In this study we report long-term outcomes on best-corrected visual acuity (BCVA) and treatment intervals with a treat-and-extend (T&E) regimen in patients with neovascular age-related macular degeneration.

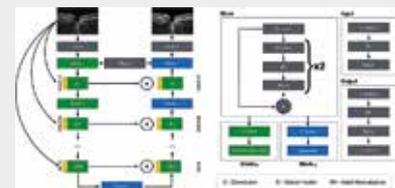
We showed, that after 4 years of treatment, initial vision gains were maintained with a reasonable treatment burden using a T&E regimen, even without an initial loading phase of three consecutive injections. Our results on functional outcomes in a real life setting are comparable with large controlled studies.

Br J Ophthalmol2020;0:1–5.

## Automatically Enhanced OCT Scans of the Retina: A proof of concept study

In this work we evaluated a post-processing, customized automatic retinal OCT B-scan enhancement software for noise reduction, contrast enhancement and improved depth quality applicable to Heidelberg Engineering Spectralis OCT devices. A trained deep neural network was used to process images from an OCT dataset with ground truth biomarker gradings.

Performance was assessed by the evaluation of two expert graders who evaluated image quality for B-scan with a clear preference for enhanced over original images. Objective measures such as SNR and noise estimation showed a significant improvement in quality. Presence grading of seven biomarkers resulted in similar inter-grader agreement. Scientific Reports volume 10, Article number: 7819 (2020).

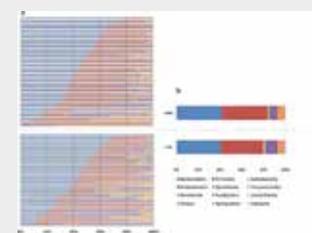


BRUNet version 9.4 architecture

## Associations of the intestinal microbiome with the complement system in neovascular age-related macular degeneration

The etiology of AMD is multifactorial including nutritional factors, genetic variants mainly in the complement pathway, environmental risk factors and alterations in the intestinal microbiome. However, it remains unexplored whether there is an interdependency of these factors leading to the development of AMD. To investigate this, a shotgun metagenomics analysis was performed. Whereas the class Negativicutes was more abundant in patients with neovascular AMD, the genus *Oscillibacter* and species *Bacteroides* had a significantly higher prevalence in persons without AMD. While SNPs within the complement factor B gene were more abundant in controls, SNPs within the high temperature requirement A serine peptidase 1 and complement factor H (CFH) genes were associated with neovascular AMD. This study suggests an association between the intestinal microbiome and the complement system in neovascular AMD.

npj Genomic Medicine volume 5, Article number: 34 (2020).



Relative abundances of microbiota at phyla level in all study subjects (a) and averaged for study groups (b). c Principal component analysis of microbial species abundance grouped patients and controls separately, with PERMANOVA confirming a significant difference between the groups ( $p=0.0018$ ). d Relative abundances of taxa associated with AMD (q-values after adjusting for false discovery rate). AMD age-related macular degeneration; CTRL control.

# Department of Orthopedic Surgery and Traumatology

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Prof. Klaus A. Siebenrock  
Chairman



Prof. Frank M. Klenke, PhD  
Vice-Chairman,  
Head of Knee  
Surgery & Tumor  
Surgery



PD Dr. Christoph  
E. Albers  
Co-Head of  
Spine Surgery,  
Head of  
Translational  
Medicine



Dr. Moritz C.  
Deml  
Co-Head of  
Spine Surgery,  
Head of  
Pediatric Spine  
Surgery



Dr. Michael  
Schär  
Head of  
Shoulder, Elbow  
and Sports



Prof. Fabian G.  
Krause  
Head of Foot &  
Ankle Surgery



Prof. Johannes  
D. Bastian  
Head of  
Orthogeriatrics



Prof. Benjamin  
Gantenbein  
Head of  
Orthopaedic  
Research

## Profile

- Hip research focus on the development of osteoarthritis and pre-arthritis deformities like femoroacetabular impingement
- Spine research is focused on disc degeneration models and tissue-engineered disc regeneration and the treatment of osteoporotic fractures
- The shoulder & elbow team is working on statistical shape modeling of shoulder morphology, rotator cuff regeneration incl. stem cells and the investigation of surgical techniques and implants
- The main focus of knee research is the regenerative treatment of the anterior cruciate ligament; prosthetic infections and anti-infectious implants are also research topics
- Arthrosis of the ankle joint, innovative treatment of ankle fractures and AMIC plastic in osteochondral lesions is the main focus in foot & ankle research
- Orthogeriatrics investigates the impact of orthogeriatric pathways and rehabilitations protocols on the clinical outcome in geriatric patients
- Translational medicine is the latest research field which will come to focus during the next years
- External Partners: Musculoskeletal Research Unit, Vetsuisse Faculty, University of Zürich, Zürich, Switzerland; Department of Small Animals, Division of Diagnostic Imaging, Vetsuisse Faculty, University of Zürich, Zürich, Switzerland; AO Research Institute, Davos; RMS Foundation, Bettlach; SUVA

## Grants

- Gantenbein B, Wöltje M. Swiss National Science Foundation (SNF): «Fibre-based 3D implants from regenerated silk fibroin for intervertebral disc regeneration» 2019 – 2022
- Gantenbein B, and the consortium of "disc4all": «Training network to advance integrated computational simulations in translational medicine, applied to intervertebral disc degeneration (Disc4All)», Nov 2020 – Oct 2024
- Hofstetter W, Klenke FM. Alfred & Anneliese Sutter-Stöttner Stiftung, Münchwilen, Schweiz Heilung von Defekten in osteoporotischen Knochen unter Behandlung mit Bisphosphonaten 2019-2021

## Highlights

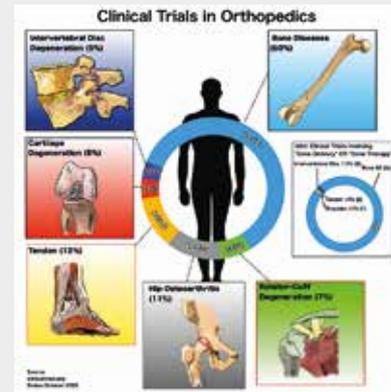
### Highlights of the Tissue Engineering, Orthopaedics & Mechanobiology (TOM) Group: Induced pluripotent stem cells - iPSCs

The Tissue Engineering, Orthopaedics & Mechanobiology (TOM) Group of the Department of Orthopedics and Traumatology, and the Department for BioMedical Research (DBMR), at University of Bern, conducts translational research in the intersection of tissue engineering, biology and applied clinical research. The group is knowledgeable in musculoskeletal connective tissues, such as bone, cartilage, ligaments and tendons. Most recently, three key topics were established.

The first topic is on the isolation and culture of specific progenitor cells. This progenitor cell research is financed by iPSPine, a 16 M € research project, which was funded to the consortiums leader Prof. Marianna Tryfonidou, a veterinarian from the University Medical Center (UMC) Utrecht & Universiteit Utrecht (<https://cordis.europa.eu/project/id/825925>). The iPSPine partners, which include both universities and companies, joined together in January 2019 to begin researching a new, advanced therapy for the treatment of LBP caused by disc deterioration. The

ultimate aim of this project is to investigate and develop a new advanced biological therapy using a type of cell called induced pluripotent stem cells (iPSCs) (<https://ipspine.eu>). Over the next five years, the iPSpine partners want to show that iPSCs can work as a therapeutic strategy. This will start with basic laboratory research to create the cells and will continue on into a preclinical animal model. By the end of the project, the therapy should be ready for advancement to the first clinical trial in people.

Within this highly cross-disciplinary consortium our group was able to isolate primary cells isolated from human trauma IVDs with written consent from patients. These cells were then isolated from the primary tissue, cell sorted using a cell surface marker and delivered to consortium partners at the INSERM in Montpellier and Nantes, France. These partners at INSERM were then able to derive novel iPS cell lines from these primary cells. These cell lines will provide valuable information to future generation researchers and whether these can be used for future cell therapy to possibly cure degenerated IVDs.



Gantenbein et al. Front Bioeng Biotechnol 8: 1320. <https://doi.org/10.3389/fbioe.2020.598466>

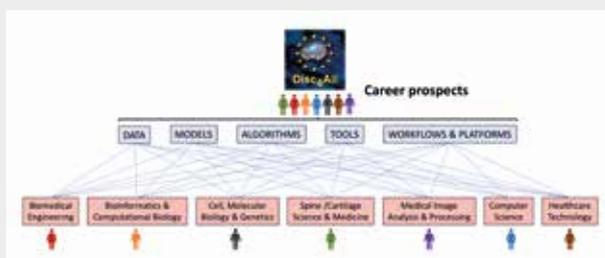
### Silk for IVD repair - Silk scaffolds for intervertebral disc repair

A second highlight is the investigation into engineered silk scaffolds for IVD repair. Previous research by the TOM group investigated on the usage of silk for the production of a scaffold for IVD repair, which would recruit or activate existing cells of the degenerated disc or novel cells would be seeded de novo. Here, a new project funded by the Swiss National Science has just been started that targets regeneration of the IVD by using “cross-linked growth-factors and engineered” silk fibres and using knitting techniques developed by Dr. Michael Wöltje at the “Technische Universität Dresden, Institut für Textilmaschinen und Textile Hochleistungswerkstofftechnik”, Dresden, Germany. <http://p3.snf.ch/project-192674>.



### Artificial Intelligence (AI) and 3D organ culture to model IVD degeneration

The third key topic was just started in Nov 2020, which involves artificial intelligence, statistical shape modelling and finite element modelling and organ culture models for IVD regeneration: The 4M € funded “Disc4All” project aims to tackle this issue through collaborative expertise of clinicians; computational physicists and biologists; geneticists; computer scientists; cell and molecular biologists; microbiologists; bioinformaticians; and industrial partners (<https://cordis.europa.eu/project/id/955735>). It provides interdisciplinary training in data curation and integration; experimental and theoretical/computational modelling; computer algorithm development; tool generation; and model and simulation platforms to transparently integrate primary data for enhanced clinical interpretations through models and simulations. The consortium is lead by the biomedical engineer Prof. Jérôme Noailly from the Universitat Pompeu Fabra (UPF) in Barcelona, Spain (<https://www.upf.edu/web/disc4all>). The Disc4All ESRs will provide a new generation of internationally mobile professionals with unique skill sets for the development of thriving careers in translational research applied to multifactorial disorders. The TOM group is proud to host and train two of the total 15 financed PhD candidates, and contribute with molecular investigations using 3D primary cell culture and specific organ culture models.



A new International training Network has been started for 15 new Early Stage Researchers (ESR) on discogenic low back pain.

## Department of Osteoporosis

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Prof. Kurt Lippuner  
Director and  
Head Physician



Prof. Ernst Hunziker  
Head  
Translational  
Research Group



Dr. Daniela Frauchiger  
Study  
Coordinator



Dr. Penny Atkins,  
Research Project  
Lead

### Profile

- Epidemiological Research: focused on the epidemiology of fractures and the socioeconomic burden of osteoporosis and fractures. Continued development and update of the country-specific fracture risk prediction tool (FRAX)
- Translational research: development of bone strength prediction and clinical fracture risk assessment by finite element analysis using high resolution peripheral quantitative CT (HR-pQCT) at the forearm and the tibia
- Clinical research (Phase II-IV): development of new investigational drugs for the treatment of osteoporosis and the reduction of fracture risk
- Experimental first in man clinical research: investigation of local bone remodeling and mechanoregulation of bone fracture healing in healthy, aged, and osteoporotic humans; Targeted stimulation of bone anabolism with in situ bone active agents; osseointegration of bone implants
- Osteoporosis lectures for medical students in the context of geriatrics (year 4); Lectures on bone measurement technologies ("Biomechanics Labs") for students of biomedical engineering in cooperation with ARTORG Center for biomedical engineering research, Univ. Bern. Lectures for Masterstudents in Pharmacy (year 4) in cooperation with BIHAM (Berner Institut für Hausarztmedizin), University of Bern
- Research Partners: Centre for Metabolic Bone Diseases, University of Sheffield, UK; ETH Zurich, Institute for Biomechanics, Leopold-Ruzicka-Weg 4, 8093 Zurich; Free University of Amsterdam (ACTA), Amsterdam, the Netherlands; Swiss Paraplegic Center, Clinical Trial Unit, 6207 Nottwil; University Hospitals of Geneva, Service of Bone Diseases, Department of Rehabilitation and Geriatrics, 1205 Geneva; Zhejiang Chinese Medical University, Hangzhou, China

### Grants

- MICROMESO SNF project grant no 165510 → 2021 (Co-PI)
- PARATY Fondation pour l'Ostéoporose → 2020 (PI)
- AFFIRM-CT SNF sinergia grant no 183584 → 2023 (Partner)
- SNF 320030L\_170205 (D-A-CH): Local remodelling and mechanoregulation of bone fracture healing in healthy, aged, and osteoporotic humans. Collaborative Project with ETH Zurich, Univ. Hospital Innsbruck, Univ. Ulm → 2021

### Highlights

#### HR-pQCT-Based Estimation of Bone Strength

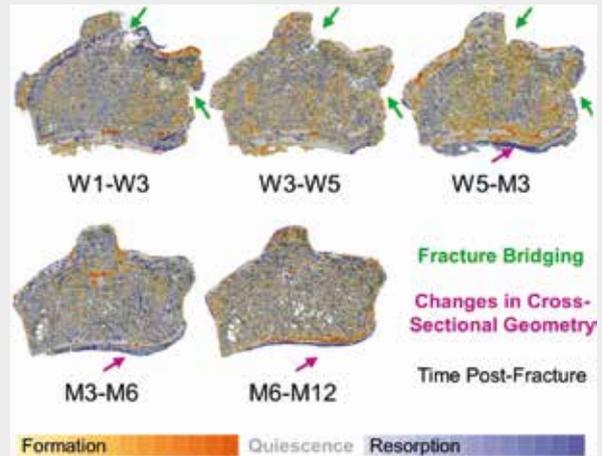
High-resolution peripheral computed tomography (HR-pQCT) allows to reconstruct the in vivo geometry of distal fracture sites, including the radius and the tibia, with a resolution of 61 microns. A novel measurement protocol with multiple bone sections and a homogenized finite element (hFE) methodology was developed for evaluation of bone strength at the distal radius and tibia. An extensive in vivo repeatability study was conducted to determine the precision of this methodology in clinical environment and establish reference values and clinical predictors of bone strength for HR-pQCT-based distal radius and tibia strength in young Swiss women and men.



From HR-pQCT to a homogenized finite element model. Schenk et al.: In vivo repeatability of homogenized finite element analysis based on multiple HR-pQCT sections for assessment of distal radius and tibia strength, *Bone*, 2020. Stuck et al.: Reference values and clinical predictors of bone strength for HR-pQCT-based distal radius and tibia strength assessments in women and men, *Osteoporosis Int.*, 2020.

## SNSF Lead Agency Fracture Study (DACH Fx)

In collaboration with ETH Zurich, University Hospital Innsbruck, Ulm University, and Insel Orthopaedics, this study follows distal radius fracture patients over one year. Detailed clinical assessment and HR-pQCT imaging are performed at six time points. This study will characterize fracture healing at the level of single trabeculae as well as the outcome contribution of age, osteoporosis, and bone biomarkers. In addition, computational models are built to study local mechanical regulation and to simulate the healing process.



Bone remodeling during the process of fracture healing indicates fracture bridging is complete by three months post-fracture with evidence of continued changes in cross sectional geometry through 12 months post fracture. Image courtesy of Penny Atkins



## Bone Type Identification by qCBCT

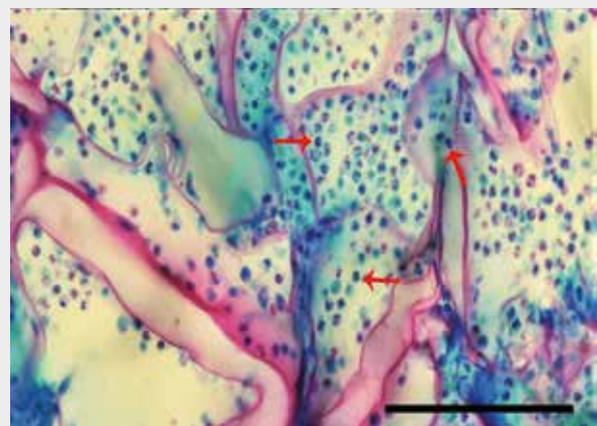
In the presurgical planning phase in dental implantology it is crucial to determine the type of bone in patients for an appropriate choice of implant and surgical technique for a successful longterm outcome. This is nowadays routinely done on a subjective basis. This study establishes a novel objective and observer-independent approach to determine bone type by quantitative Cone Beam Computed Tomography (qCBCT).

Chen et al: Presurgical Human Bone Type Identification by Quantitative CBCT: an Observer-Independent Approach, in preparation, 2020.

Histology of a cross-section through a human mandibula used for bone typing

## Enhanced Osteogenesis by Anticytokine Activity

Postsurgical local inflammation and tissue swelling in surgery when using bioactive implants (BMP-2) is often treated by systemic steroids, associated with reduced osteogenesis. We found that local application of anticytokine activity (antibodies vs. IL-1 $\beta$  and TNF- $\alpha$ ) is able to enhance periimplant osteogenesis significantly even in the presence of local inflammation. Yang et al.: Anticytokine Activity Enhances Osteogenesis of Bioactive Implants. Tiss. Engin. Part A, June 14, 2020 (doi: 10.1089/ten.TEA.2020.0067).



Collagen implant infiltrated by diverse inflammatory cells

## Department of Pediatrics

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Prof. Matthias Kopp  
Director



Prof. Philipp Latzin  
Head Paediatric  
Pneumology  
and Allergology



Prof. Christa Flück, Head  
Paediatric  
Endocrinology,  
Diabetology &  
Metabolism



Prof. Maja Steinlin  
Head Paediatric  
Neurology and  
Neurodevelop-  
mental Unit



Prof. Christoph Aebi  
Head Paediatric  
Infectiology



Prof. Jochen Rössler  
Head Paediatric  
Haematology  
and Oncology



Prof. Karen Lidzba  
Head Paediatric  
Neuropsychology

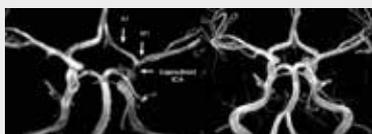
### Profile

- Teaching at every level at the School of Medicine and at other courses at the University of Bern (e.g. dentist school, life sciences, biology). Innovative approaches for teaching in paediatrics with respect to basic clinical skills as well as clinical internships.
- Providing training in Paediatrics and all its specific subspecialties FMH.
- PhD training in programs of the Graduate Schools of the University of Bern.
- Very broad research spectrum ranging from basic to translational to clinical projects.
- Endocrinology/Diabetology and Metabolism: Several clinical and translational (lab-based) projects in topics regulation and disorders of steroidogenesis, sex development and growth. In general, molecular and clinical studies of rare genetic diseases. Partners: Steroid Core Lab Nephrology Insel, NCCR RNA&Disease (AdmiR study), I-DSD community for SF1 next study (<http://home.i-dsd.org>).
- Haematology/Oncology: Study on continuous vital data monitoring for children with chemotherapy using a wearable device. Quality of life of childhood cancer survivors. Study on modulatory effects of high dose glucocorticoids on emotion and emotion discrimination in patients with haematological malignancies. Laboratory research on delivery of cancer drugs and CAR-T cells for pediatric sarcoma.
- Infectiology: Multidimensional research (clinical, epidemiology, bacteriology, immunogenetics) of pediatric sepsis as host organization of the Swiss Pediatric Sepsis Study; Partner in two EU Horizon 2020 projects on diagnostics of sepsis using novel biomarkers and host RNA profiles.
- Neuropaediatrics: Swiss Registry based clinical research in rare diseases as paediatric Stroke, SMA, MS (all PI's in Bern). Start of "PASTA" an international multicentre treatment trial in stroke. Studies on rehabilitation and reorganization (MRI based) in: Brainfit-, HERO- and Onsetstudy. Worldwide cooperations are numerous.
- Pneumology: Research topics are lung development in health and disease, novel lung function tests and state-of-the-art diagnostics in rare diseases (such as cystic fibrosis and primary ciliary dyskinesia). Key projects are the BILD ([www.bild-cohort.ch](http://www.bild-cohort.ch)) and the SCILD ([www.scild.ch](http://www.scild.ch)) longitudinal study. Worldwide cooperation partners are numerous.
- The list of the above mentioned research topics and collaborators is noncomprehensive.

### Grants

- EU HORIZON 2020 – PERFORM, Partner (2017-2020); DIAMONDS, Partner (2020-2024), Infectiology
- SNF Nr. 197725, Uniscientia, Novartis and IFCAH-ESPE grants; Endocrinology
- SNF Nr. 33IC30\_193039 (Steinlin), Jacobs Foundation (Everts); Neuropaediatrics
- SNF Nr. 182719 (Latzin), 179905 (Yammine), 168173 (Ramsey), 182871 (Frey), Pneumology
- Schweizer Krebsliga, Schweizer Krebsforschung, Phospholipid Res. Center; Haematology/Oncology

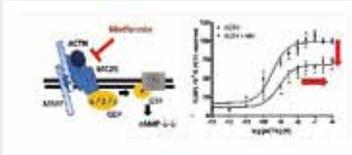
### Highlights



FCA with FCASS score of 6, improvement to FCASS of 0 six months later with additional normal perfusion in arterial spin labeling imaging.

#### Childhood stroke and help of neuroimaging methods

Evaluation of perfusion by ASL did show that persistence of asymmetry of perfusion in children after stroke are related to motor outcome. Thus, residual arteriopathy might influence outcome of these children. Wiedemann et al., Eur J Paediatr Neurol. 2020 Mar;25:97-105.



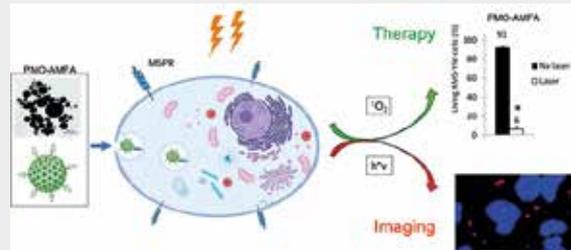
Metformin inhibits ACTH regulated steroidogenesis.

### Metformin inhibits ACTH stimulated signaling of the melanocortin receptors MC2R and MC3R in vitro.

The role of MC2R for steroidogenesis is well established. MC3R is involved in energy balance and seems to act as a rheostat when the metabolism is challenged. Thus, this study may explain how metformin helps in weight loss and attenuates the excess response to ACTH in androgen excess disorders such as the polycystic ovary syndrome and congenital adrenal hyperplasia. Parveen et al., *J Steroid Biochem Mol Biol.*, 2020 Jun; 200:105684.

### The mannose 6-phosphate receptor targeted with porphyrin-based periodic mesoporous organosilica nanoparticles for rhabdomyosarcoma theranostics

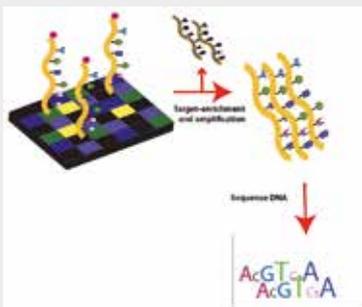
Here, we demonstrate for the first time that mannose 6-phosphate receptor is over-expressed in RMS cells and can be efficiently targeted with PMO nanoparticles functionalized with mannose, allowing two-photon excitation imaging and photodynamic therapy of rhabdomyosarcoma cells. The comparison with healthy myoblasts showed an absence of biological effects, suggesting a cancer cell specificity. Daurat et al, *Biomater. Sci.*, 2020 May;8(13), 3678–3684.



Targeted nanoparticles increase killing of RMS cells by photodynamic therapy and allow imaging.

### Whole-exome sequencing for the identification of rare variants in primary immunodeficiency genes in children with sepsis

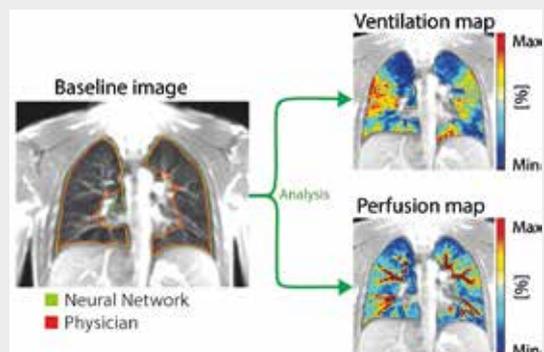
In the attempt to identify the presence of underlying immunodeficiency in previously healthy children with bacterial sepsis we applied Whole Exome Sequencing (WES) to a population-based cohort of pediatric sepsis patients and identified variants of uncertain significance in Primary Immunodeficiency (PID) genes in 1 out of 5 children. Future studies need to investigate the functional relevance of these variants to determine whether variants in PID genes contribute to pediatric sepsis susceptibility. Borghesi A et al. *Clin Infect Dis* 2020 Mar 18.



Exome sequencing work flow

### The impact of segmentation on whole-lung functional MRI quantification

For the transfer of functional lung MRI to clinical routine, post-processing time needs to be shortened. In this work, we introduce artificial intelligence (a neural network) and compare it to two humans for segmentation of lung lobes. We are able to show that results from the neural network are as precise as human observers, but much faster. Processing time is reduced from 40 minutes to 0.25 min per patient. Willers et. al., *Magn Reson Med.*, 2020; 00:1-14.



Segmentation of functional lung MRI: neural network versus human readers

## Department of Pediatric Surgery

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Prof. Steffen  
Berger



PD Dr. Elizaveta  
Fasler-Kan



PD Dr. Kai  
Ziebarth



PD Dr. Thoralf  
Liebs



PD Dr. Ulf  
Kessler

### Profile

- Teaching profile: The Department for Pediatric Surgery participates in University teaching programs for students of medicine (PBL-teaching, bedside teaching, practical year, clinical skills training, surgical rotation for students)
- Research profile: Oncobiology (laboratory research in childhood malignancies). Study of the expression of Tim-3 and Gal-9 molecules and their roles in leukemia and in pediatric and adult solid tumors: PD Dr. E. Fasler-Kan; Necrotizing enterocolitis of the newborn (Hosting of the Swiss national NEC registry): Prof. S. Berger, PD Dr. U. Kessler, Dr. M. Kordasc; Pathophysiology of necrotizing enterocolitis and appendicitis: PD Dr. U. Kessler; Health related quality of life after pediatric extremity fractures (clinical research and follow up studies): PD Dr. T. Liebs, Dr. N. Kaiser; Development of new operative strategies in pediatric hip surgery and clinical outcome research after surgical treatment of paediatric hip and knee diseases, including slipped capital femoral epiphysis and ruptured anterior cruciate ligaments: PD Dr. K. Ziebarth

### Grants

- Batzebar grants PD Dr. Fasler-Kan, PD Dr. Liebs
- AO foundation grants PD Dr. Ziebarth, Dr. Slongo

### Highlights

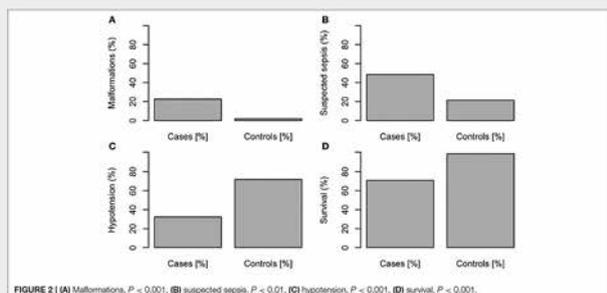


FIGURE 2 | (A) Malformations,  $P < 0.001$ , (B) suspected sepsis,  $P < 0.01$ , (C) hypotension,  $P < 0.001$ , (D) survival,  $P < 0.001$ .

Percentages of (A) associated malformations,  $P < 0.001$ , (B) suspected sepsis,  $P < 0.01$ , (C) hypotension,  $P < 0.001$ , (D) survival,  $P < 0.001$  in NEC cases and control patients without NEC.

data between patients with PDA and those with PDA and NEC from 2004 to 2018 using 1:2 and 1:1 matching. We used 1:2 matching with 26 NEC patients (cases) and 52 PDA patients without NEC (controls) and 1:1 matching with 5 NEC patients and 5 PDA patients without NEC. The mortality was higher in NEC cases [29% (9/31)] compared to the control patients [2% (1/57),  $P < 0.001$ ]. Lower Apgar score (1') was correlated with an increased risk of NEC stage III. Hypotension was inversely correlated with the odds of NEC (OR 0.3). NEC increased mortality in infants with PDA. Hypotension did not increase the risk of NEC in infants with PDA. Routine clinical parameters were not able to predict NEC in infants who suffer from PDA.

Haefeli et al, Front Pediatr 8:197, 2020.

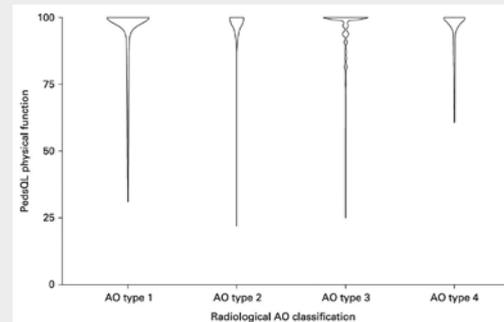
### Risk Factors for Necrotizing Enterocolitis in Infants With Patent Arterial Duct. A Retrospective Matched Paired Analysis

The development of necrotizing enterocolitis (NEC) in neonates with patent ductus arteriosus (PDA) is not well-understood. Our aim was to find risk factors for NEC in children with a significant PDA and to assess differences in mortality and duration of hospital stay between patients with PDA and those with PDA and NEC. We performed a retrospective single center case control study including infants with PDA scheduled for treatment. We compared multiple patient

## Health-related quality of life after paediatric supracondylar humeral fractures

We aimed to evaluate the health-related quality of life (HRQoL) in children with supracondylar humeral fractures (SCHFs) in relation to fracture classification and treatment type. 775 patients (395 girls, 380 boys) who sustained a SCHF from 2004 to 2017 were included. Patients completed questionnaires including the Quick Disabilities of the Arm, Shoulder and Hand questionnaire (QuickDASH; primary outcome), and the Pediatric Quality of Life Inventory (PedsQL). An AO type I SCHF was most frequent (327 children; type II: 143; type III: 150; type IV: 155 children). In this cohort of 775 patients in whom nonoperative treatment was chosen for AO type I and II fractures and CRPP or a lateral external fixator was used in AO type III and IV fractures, there was equally excellent mid- and long-term HRQoL when assessed by the QuickDASH and PedsQL. These results indicate that the treatment protocol followed in this study is unambiguous, avoids open reductions, and is associated with excellent treatment outcomes.

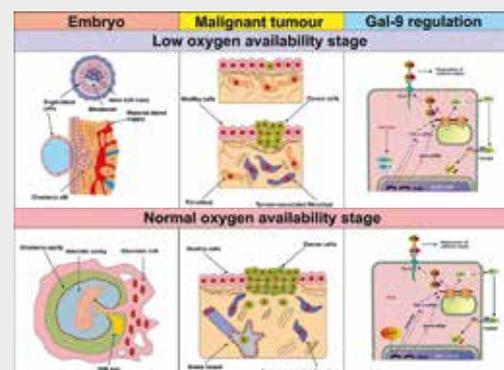
Liebs et al., Bone Joint J 2020;102-B(6):755-765.



Violin plots of Pediatric Quality of Life Inventory (PedsQL) physical function at follow-up by radiological AO classification of supracondylar humeral fractures

## Transforming growth factor beta type 1 (TGF- $\beta$ ) and hypoxia-inducible factor 1 (HIF-1) transcription complex as master regulators of the immunosuppressive protein galectin-9 expression in human cancer and embryonic cells

Galectin-9 is one of the key proteins employed by a variety of human malignancies to suppress anti-cancer activities of cytotoxic lymphoid cells and thus escape immune surveillance. Human cancer cells in most cases express much higher levels of galectin-9 compared to non-transformed cells. However, the biochemical mechanisms underlying this phenomenon remain unclear. Here we report for the first time that in human cancer as well as embryonic cells, the transcription factors hypoxia-inducible factor 1 (HIF-1) and activator protein 1 (AP-1) are involved in upregulation of transforming growth factor beta 1 (TGF- $\beta$ 1) expression, leading to activation of the transcription factor Smad3 through autocrine action. This process triggers upregulation of galectin-9 expression in both malignant (mainly in breast and colorectal cancer as well as acute myeloid leukaemia (AML)) and embryonic cells. The effect, however, was not observed in mature non-transformed human cells. Our results suggest the possibility of using the TGF- $\beta$ 1 signalling pathway as a potential highly efficient target for cancer immunotherapy. Selnø et al., Aging. 2020 Dec 8;12. doi: 10.18632/aging.202343. Online ahead of print.



Proposed mechanism of the regulation of galectin-9 expression in human cancer and embryonic stage at low and normal oxygen availability stages. During the hypoxic stage, HIF-1 induces TGF- $\beta$  expression, which then displays autocrine activity and triggers galectin-9 expression in a Smad3-dependent manner. During the normal oxygen availability stage, AP-1 indirectly contributes to TGF- $\beta$  expression but it is also self-triggered by TGF- $\beta$ . Galectin-9 upregulation is perpetually induced by the TGF- $\beta$ -Smad3 pathway.

## Department for Plastic and Hand Surgery

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Prof. Mihai  
Constantinescu



Prof. Esther  
Vögelin

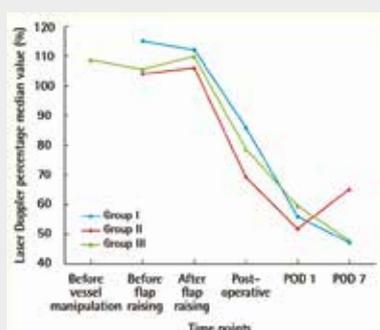
### Profile

- Conducting clinical and basic research in the fields of Plastic, Reconstructive and Aesthetic Surgery, under the lead of Prof. Mihai Constantinescu, and Hand Surgery and Surgery of the Peripheral Nerve, under the lead of Prof. Esther Vögelin
- Focus of the Plastic Surgery clinical research: implementation of 3D models of aesthetic tissue reconstruction and innovative strategies for the diagnosis and treatment of critical ischemic tissue and malignant skin tumors
- Focus of the Hand surgery research: developing new mini-invasive treatment modalities for hand injuries and evaluation of innovative modalities for repair of peripheral-nerve injuries
- Conducting several basic research projects in the field of vascularized composite allotransplantation (VCA)
- Investigating the possibility of innovative nanoparticle-based modalities for the treatment of nerve injuries and surgical complications
- Teaching programs for students of Medicine, Biomedical Science and Molecular Life Science, involved in outreach activities for education of young students, such as the Swiss Youth in Science program and the mentoring of Matura Projects of the Swiss Academy of Science
- External Partners: Department of Pharmaceutical Technology, Institute of Pharmacy, University of Jena, Germany; Department of Plastic Surgery and Hand Surgery, University Hospital Zurich, University of Zurich, Switzerland; Institut de Recherche Expérimentale et Clinique (IREC), Université catholique de Louvain, Brussels, Belgium; Institute for Stem Cell Biology and Regenerative Medicine (inStem), Bangalore, India; Institute of Pharmaceutical Sciences, Department of Chemistry and Applied Biosciences, ETH Zurich, Switzerland.; Swiss Federal Laboratories for Materials Science and Technology, St Gallen, Switzerland.

### Grants

- Johanna Dürmüller Bol – Support for Study “Sensory recovery of digital nerves after primary repair using microsurgical epineurial end-to-end neurorrhaphy alone, or in combination with Tisseel® fibrin sealant enwrapping – RET” Study (Lena Fuest, Rahel Meier, Esther Vögelin)
- Neutromedics AG Support for Study “MRI in peripheral nerve lesions in the upper extremities” (Dominique Merky, Esther Vögelin)
- SUVA – Support for Study “A prospective, experimental, single center, observational study to analyse the concentration of the antiseptic Octenisept® in hand wounds due to high performance liquid chromatography (HPLC)” (Carsten Surke, Rahel Meier, Susanne Langen, Esther Vögelin)

### Highlights



#### The effects of optimizing blood inflow in the pedicle on perforator flap survival: A pilot study in a rat model

Optimization of arterial inflow, regardless if performed acutely or as preconditioning, led to increased flap survival in a rat perforator flap model. Olariu, Radu; Moser, Helen Laura; Lese, Ioana; Sabau, Dan; Georgescu, Alexandru Valentin; Grobbelaar, Adriaan Ockert; Constantinescu, Mihai Adrian (2020). Archives of plastic surgery, 47(3), pp. 209-216. Korean Society of Plastic and Reconstructive Surgeons 10.5999/aps.2019.00871.

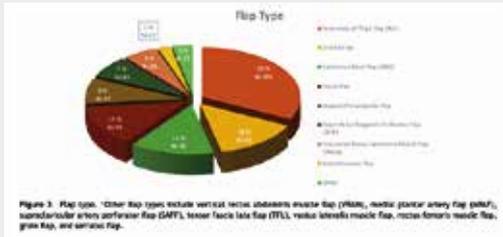


Figure 3. Flap type. Other flap types include vertical rectus abdominis muscle flap (VRAM), medial plantar artery flap (MPAF), humeral artery perforator flap (HAPF), lesser fascio lata flap (LLF), radial forearm muscle flap, rectus femoris muscle flap, gracilis flap, and sartorius flap.

## Predicting risk factors that lead to free flap failure and vascular compromise: A single unit experience with 565 free tissue transfers

A predictability index with three classes (low, moderate, and high risk) was calculated for each patient. A patient with moderate-risk index had 9.3 times higher chances of developing vascular compromise than those in the low-risk group, while a high-risk index had 18.6 higher odds.

Lese, Ioana; Biedermann, Raphael; Constantinescu, Mihai; Grobbelaar, Adriaan O.; Olariu, Radu (2020). Journal of plastic, reconstructive & aesthetic surgery Elsevier 10.1016/j.bjps.2020.08.126.

## The Propeller Flap for Traumatic Distal Lower-Limb Reconstruction: Risk Factors, Pitfalls, and Recommendations

Propeller flaps are a reliable option for traumatic reconstruction in carefully selected patients with lower-limb defects. The posterior tibial artery-based propeller flap is a reliable surgical option for patients with a small defect in the distal third of the lower limb.

Journal of bone and joint surgery Lese, Ioana; Grobbelaar, Adriaan O.; Sabau, Dan; Georgescu, Alexandru V; Constantinescu, Mihai A.; Olariu, Radu (2020). American volume, 102(6), pp. 510-518. Journal of Bone & Joint Surgery Inc. 10.2106/JBJS.19.00648.



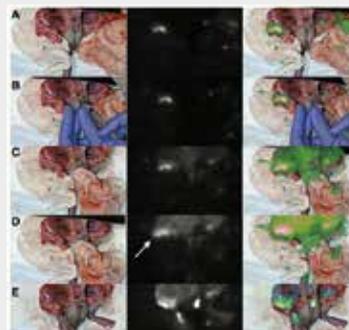
## Development of vascularized nerve scaffold using perfusion-decellularization and recellularization

Perfusion-decellularization can be used to create vascularized nerve scaffolds in which the vasculature and the ECM component are well preserved. As compared to non-vascularized conduits, engineered vascularized nerve scaffolds may represent an ideal approach for promoting better nerve regeneration in larger nerve defect reconstructions. Wüthrich, Tsering; Lese, Ioana; Haberthür, David; Zubler, Cédric; Hlushchuk, Ruslan; Hewer, Ekkehard; Maistriaux, Louis; Gianello, Pierre; Lengelé, Benoît; Rieben, Robert; Vögelin, Esther; Olariu, Radu; Duisit, Jérôme; Taddeo, Adriano (2020). Materials science & engineering C, 117(111311), p. 111311. Elsevier 10.1016/j.msec.2020.111311.



## Regional Lymphatic Inclusion in Orthotopic Hindlimb Transplantation: Establishment and Assessment of Feasibility in a Rodent Model

An experimental orthotopic hindlimb transplantation model in rats that includes the draining inguinal lymphatic basin was developed by our team, which is an important asset in further research on lymphatic tissue and its role in VCA. Lese, Ioana; Leclère, Franck M.; Gayanayake, Thusitha; Taddeo, Adriano; Leckenby, Jonathan Ian; Banz, Yara; Constantinescu, Mihai A.; Vögelin, Esther; Olariu, Radu (2020). Transplantation direct, 6(9), e592. Wolters Kluwer Health 10.1097/TXD.0000000000001044.



# Department for Pulmonary Medicine

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Prof. Thomas Geiser



PD Dr. Manuela Funke-Chambour



PD Dr. Gunar Günther



Dr. Anne-Kathrin Brill



Dr. Nikolay Pavlov



Dr. Sabina Guler



PD Dr. Amiq Gazdhar



PD Dr. Fabian Blank



Prof. Olivier Guenat

## Profile

- Mimicking the healthy and diseased lung alveolar barrier with organs-on-chip technologies
- Pathophysiology of lung inflammation and fibrosis
- Long-term consequences of infection (i.e. COVID-19) on the lung parenchyma and fibrogenesis
- Effects of cell senescence on idiopathic lung fibrosis and after COVID-19
- Biomarkers for lung fibrosis
- Effects of SARS-CoV-2 on lung cells

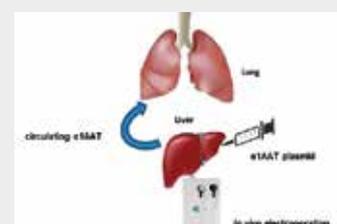
## Grants

- Swiss National Science Foundation – Bioartificial Microvascularized Lung Alveoli Array, project 185365 (Prof. Olivier Guenat)
- Swiss 3R Competence Center – Idiopathic pulmonary fibrosis-on-Chip, project OC-2019-025 (Prof. Olivier Guenat and Prof. Thomas Geiser)
- Novartis Foundation – MAPK signaling second generation lung-on-chip (Prof. Olivier Guenat and Prof. Olivier Pertz)
- Bangerter Foundation (PD Dr. Manuela Funke-Chambour)
- Johanna Dürmüller Foundation (PD Dr. Manuela Funke-Chambour)
- Lungenliga Bern (PD Dr. Manuela Funke-Chambour)
- BCPM Grant (PD Dr. Manuela Funke-Chambour)
- Innosuisse Grant (49697.1 IP-LS) (PD Dr. Amiq Gazdhar)
- Lungenliga Bern 2020 (PD Dr. Blank Fabian)
- Bern Center for Precision Medicine (BCPM), «Identification of Patient-specific Master Regulator Proteins Associated with SARS-CoV-2-Infection and Pulmonary Fibrosis in Lung-on-Chip (Prof. Thomas Geiser)
- Lungenliga Schweiz 2019/2020 «Lung Organoid Development» (PD Dr. Amiq Gazdhar, Prof. Thomas Geiser)
- Project Grant Stiftung Lindenhof Bern «Treatment response in inflammatory and non-inflammatory systemic sclerosis» (Dr. Sabina Guler)

## Highlights

### In Vivo Electroporation-Mediated, Intrahepatic Alpha1 Antitrypsin Gene Transfer Reduces Pulmonary Emphysema in Pallid Mice

Mutation in the alpha1 antitrypsin (AAT) gene leads to low circulating levels of AAT, which is associated with several disease processes including pulmonary emphysema. We studied a novel approach to obtain sustained therapeutic



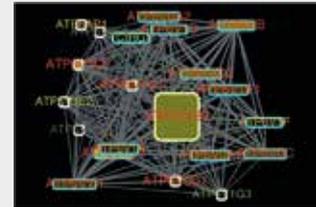
levels of circulating AAT using nonviral in vivo electroporation-mediated gene transfer to the liver. Mice showed morphologically detectable pulmonary emphysema. Thirty days after in vivo electroporation-mediated gene transfer directly aimed at the liver, circulating human AAT was elevated and lung function was significantly improved compared to non-treated mice.

Suter MA, Cremona TP, Nita I, Cavarra E, Lungarella G, Lewis EC, Schittny JC, Geiser T, Gazdhar A. *Pharmaceutics*, 2020 Aug 21;12(9):793. doi: 10.3390/pharmaceutics 12090793.

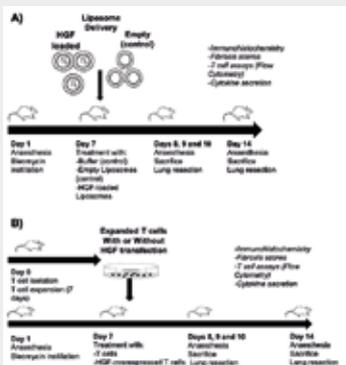
## Azithromycin has enhanced effects on lung fibroblasts from idiopathic pulmonary fibrosis (IPF) patients compared to controls.

New drug strategies are urgently needed for Idiopathic pulmonary fibrosis (IPF). The macrolide Azithromycin (AZT) has anti-inflammatory and immunomodulatory properties. We report different treatment responses after AZT with enhanced anti-fibrotic and pro-apoptotic effects in IPF compared to control-FB. Possibly impaired lysosomal function contributes towards these effects. In summary, different baseline cell phenotype and behavior of IPF and control cells contribute to enhanced anti-fibrotic and pro-apoptotic effects in IPF-FB after AZT treatment and strengthen its role as a new potential anti-fibrotic compound, that should further be evaluated in clinical studies.

Krepaska K, Barnowski S, Gavini J, Hobi N, Ebener S, Simillion C, Stokes A, Schliep R, Knudsen L, Geiser TK, Funke-Chambour M. *Respir Res.* 2020 Jan 15;21(1):25. doi: 10.1186/s12931-020-1275-8. PMID: 31941499.



Microarray analysis (KEGG pathway map) revealed the engagement of various vacuolar ATPases. Particularly the increase of ATP6V1B2 gene expression, which suggests the involvement of lysosomal acidification.



## Effect of hepatocyte growth factor on T cells: A novel treatment approach for pulmonary fibrosis

Idiopathic pulmonary fibrosis (IPF) is a fatal interstitial lung disease with no cure at hand due to the current lack in understanding the pathomechanisms governing onset and progression of the disease, in particular with respect to pulmonary immune cells.

In the present project we aim to test whether immunomodulation with hepatocyte growth factor (HGF) might stimulate epithelial repair and regeneration by inducing T cell homeostasis in the bleomycin injured mouse lung. We are in particular investigating the role of T cell subsets in IPF, upon HGF treatment with administration of HGF-transfected T cells.

## Awards

Prix Fond Carlo 2019 de la Fondation Philanthropia (Prof. Olivier Guenat)

Lung League - Award 2020 (Dr. Sabina Guler)

DBMR annual research day Prize for the best project by a medical student (Mr. Marco Sutter)

"In vivo electroporation-mediated, intrahepatic Alpha1 antitrypsin gene transfer reduces pulmonary emphysema in pallid mice"

Poster Award at the Swiss Society of Pneumology and the Swiss society of Thoracic Surgery Abstract Event on 23.09.2020 for Seyran Mutlu for the poster abstract: "Regulatory T cells in bleomycin injured mouse lung"



Award Ceremony Lung League: Dr. Sabina Guler

## Department of Radiation Oncology

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Aebersold  
Director



Dr. Kristina  
Lössl



Dr. Evelyn  
Herrmann



Dr. Olgun  
Eliçin



Dr. Mohamed  
Shelan



Prof. Steffen  
Eychmüller



PD Dr. Peter  
Manser



Prof. Michael K.  
Fix



Prof. Yitzhak  
Zimmer



PD Dr. Michaela  
Medova

### Profile

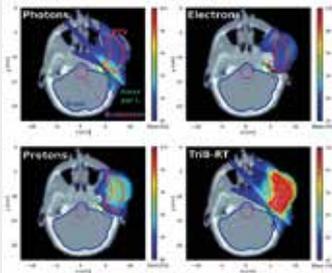
- Teaching: Undergraduate lectures are provided for students in medicine, physics, biomedical engineering, molecular and biomedical sciences as well as in dental medicine at the University of Bern; undergraduate teaching does also include practical training for medical students; postgraduate lectures in medical physics are given at the Department of Physics at the Swiss Federal Institute of Technology in Zurich; a CAS program for palliative care is run in cooperation with various faculties of the University of Bern, the center for palliative care in St. Gallen and the Bern University of Applied Sciences; various PhD and MD-PhD positions are provided in radiation biology, medical physics and palliative care.
- Clinical Research: (a) Prostate cancer: salvage radiotherapy in biochemical failure, metabolomic signatures; (b) head neck cancer: Role of upfront neck dissection in the context of primary radiotherapy; single vocal cord irradiation; outcome of immune checkpoint inhibitor and chemotherapy followed by dose and volume adapted chemo-radiotherapy; (c) brain tumor: Automatic segmentation of brain tumors, postoperative radiosurgery; (d) palliative care: advance care planning, early integration of palliative care; best care for the dying patient; community palliative care, regional networks
- Medical physics research: (a) Dynamic Trajectory Radiotherapy (DTRT) and Modulated Electron Beam Radiotherapy (MERT); (b) Independent Dose Calculation and Radiation Protection in the Context of Robotic Stereotactic Radiotherapy; (c) Efficient Quality Assurance for External Beam Radiotherapy and Accurate Dose Calculation for Brachytherapy; (d) Medical Imaging Related Research Topics
- Radiation biology research: (a) Transcriptomics, (phospho-)proteomics, single-cell proteomics and metabolomics studies on receptor tyrosine kinase (MET) signaling, radiation therapy response and resistance and head and neck squamous cell carcinoma (HNSCC); (b) Roles of novel phosphorylation sites in tumor cell responses to DNA-damaging agents and targeted therapies; identification of new synthetic lethal interactions; (c) Translational research to explore new prognostic and predictive biomarkers; (d) Experimental CAR T-based immunotherapy in combination with radiotherapy for glioblastoma multi-forme treatment
- Collaborations: Multidisciplinary and multiinstitutional national and international collaboration within the SAKK & EORTC networks, the Swiss research platform in palliative care, through the current EU- Horizon 2020 project as part of the international collaborative for the dying patient; Institute for Biomedical Engineering, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland; Princess Margaret Cancer Center, Toronto, Canada; Laboratory of Artificial Intelligence in Medicine and Biomedical Physics, Stanford Medicine, USA; ACRF Image X Institute, University of Sidney, Australia; Scailyte AG, Switzerland

### Grants

- Swiss National Science Foundation
- Innosuisse
- Rising Tide Foundation
- Research Framework Agreement, Varian Medical Systems Inc.
- Swiss Bridge Foundation
- sitem-insel Support Funds
- Werner und Hedy Berger-Janser Stiftung

- Krebsforschung Schweiz
- EU Horizon 2020
- Federal Office for Public Health
- Gesundheitsförderung Schweiz

## Highlights



Dose contributions of the photons, electrons, and protons resulting in the total TriB-RT dose distribution

### Triple Beam Radiotherapy (TriB-RT): Mixing Photons, Electrons and Protons for Optimizing Dose Distributions

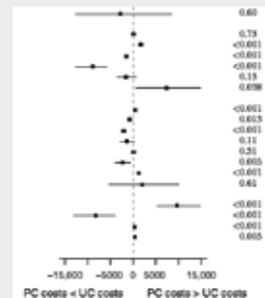
Recently, our group developed a novel treatment planning process enabling the simultaneous optimization of modulated photon, electron and proton beams for improved treatment plan quality in radiotherapy. The framework is based on highly accurate dose calculation using Monte Carlo simulations. Dosimetric comparisons to currently available treatment techniques reveal the potential of TriB-RT. It is especially promising for cost-effective single-room proton solutions with a fixed beamline in combination with a conventional linac delivering photon and electron fields.

Kueng R et al., Phys. Med. Biol., 2020.

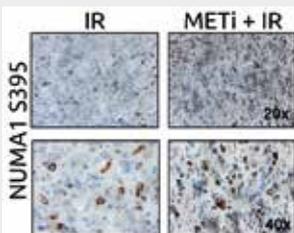
### Which Cost Components Influence the Cost of Palliative Care (PC) in the Last Hospitalization? A Retrospective Analysis of Palliative Care Versus Usual Care at a Swiss University Hospital.

Costs at the end of life are widely discussed as being high and sometimes inadequate because of futile treatment. This study examined the effect of inpatient palliative care on various types of costs within an university hospital. It showed clear benefit of PC in most of the hospital cost components especially in regard of decrease in diagnostics, lab costs, and medication.

Hagemann M et al., J Pain Symptom Manage. 2020.



Total costs Palliative Care versus Usual Care



The relationship between MET inhibition, RT and NUMA Ser985 phosphorylation in vivo

### Deciphering MET-dependent modulation of global cellular responses to DNA damage by quantitative phosphoproteomics

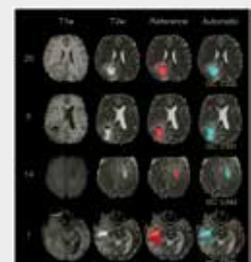
Pharmacological interference with growth factor receptor signaling can impact on cellular responses to radiotherapy (RT). We have corroborated phosphorylation sites at the intersection between MET and the DNA damage response signaling networks, and suggest that these represent a class of proteins at the interface between oncogene-driven proliferation and genomic stability.

Bensimon A et al., Mol Oncol. 2020.

### Fully automated brain resection cavity delineation for radiation target volume definition in glioblastoma

Auto-segmentation of medical imaging has been a hot topic over the last years. We designed a concept study to evaluate whether our deep learning based automated segmentation method in GBM patients is comparable to manual segmentation by experts in the process of radiotherapy target volume definition.

Ermis E. et al., Radiat Oncol. 2020.



Representative slices of the produced segmentations in comparison to the expert consensus

## Department of Rheumatology, Immunology and Allergology (RIA)

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Prof. Peter Villiger



Prof. Martin Bachmann



PD Dr. Monique Vogel



PD Dr. Alexander Eggel

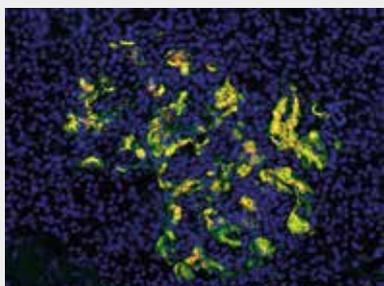
### Profile

- Participating in University Teaching programs for students of medicine, biomedicine and biology; master students of biology are also coming from foreign Universities
- Aim: Understanding of immune regulation and the development of potential new therapies for inflammatory and other diseases
- Rheumatology, Clinical Immunology and Allergology offered optional teaching courses for last-year medical students, in addition to regular courses and lectures; these interactive workshops were again very popular
- Clinical research focuses large-vessel vasculitides, immune regulation in pregnancy, pathogenesis of arthritides and osteo-immunological interaction; in Allergology drug-hypersensitivity and immune-deficiencies are in the research focus
- External Partners Immunology: The Jenner Institute, University of Oxford, UK; Allergy Therapeutics (UK) Ltd., Dominion Way, UK; BRSC, Riga, Latvia; Anhui Agricultural University, Hefei, China; Novartis Pharma AG, Basel, Switzerland; Prof. Theodore Jardetzky, Stanford University, USA; Prof. Tony Wyss-Coray, Stanford University, USA

### Grants

- Eurostars. Project: ASF-INNOVAC Challenging african swine fever outbreaks with innovative VLP-based vaccines. Project period: 1.10.2020 – 30.09.2023
- UniBE ID Grant. Project: Next generation subunit malaria vaccine. Project period: 1.2.2021 - 31.1.2022
- Dornonville Stiftung, Zürich. Project: COVID-19 vaccine. Project period: 1.10.2020 – 31.12.2022
- National Institute of Health R01 Subaward with Prof. Theodore Jardetzky from Stanford University. Project: Suppression of basophil activation by IgE glycovariants. Project period: 15.4.2018 – 31.3.2022
- Velux Stiftung. Project: Healthy aging – an immunologic approach to promote systemic rejuvenation. Project period: 1.1.2018 – 31.12.2020
- The clinical research program about giant cell arteritis is supported by Hoffmann-La Roche

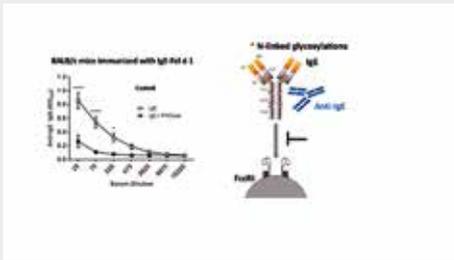
### Highlights



Monoclonal antibody induced by immunization with our vaccine candidate stains aggregated amylin in human pancreas from type 2 diabetic patient

#### Vaccination against amyloidogeni aggregates in pancreatic islets prevents development of Type 2 Diabetes Mellitus

Type 2 diabetes mellitus (T2DM) is a chronic progressive disease characterized by insulin resistance and insufficient insulin secretion to maintain normoglycemia. The majority of T2DM patients bear amyloid deposits mainly composed of islet amyloid polypeptide (IAPP) in their pancreatic islets. As aggregates are considered to be a key factor in  $\beta$  cell death, we generated a vaccine, based virus-like particles targeting the cytotoxic IAPP deposits in order to prevent the development of T2DM. Using a mouse model of islet amyloidosis, we demonstrated *in vivo* that our vaccine induced a potent antibody response against aggregated, but not soluble IAPP, strikingly preventing IAPP depositions, delaying onset of hyperglycemia and the induction of the associated pro-inflammatory cytokine Interleukin 1 $\beta$  (IL-1 $\beta$ ). Roesti, E.S et al. *Vaccines* 2020; 8(1):116. doi: 10.3390/vaccines8010116.



Glycan-specific IgG anti-IgE antibodies are protective in vivo

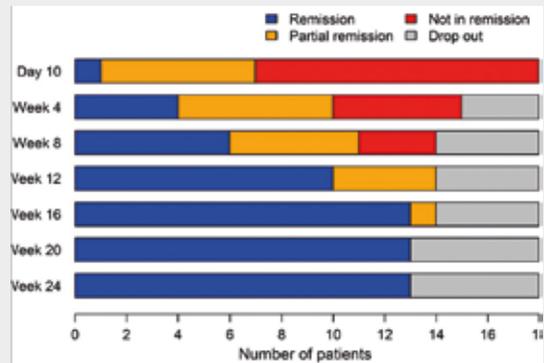
## Glycan-specific IgG anti-IgE autoantibodies are protective against allergy

The mechanisms that control IgE activity and prevent anaphylaxis under normal conditions are still enigmatic. In this study we aimed to unravel how anti-IgE autoantibodies are induced and understand their role in regulating serum IgE level and allergic anaphylaxis. We showed that immunization of mice with IgE-immune complexes induced glycan specific anti-IgE autoantibodies. These antibodies prevented effector cell sensitization and protected mice from passive and active IgE sensitization. With these findings, we provide first evidence that the anaphylactic of IgE may be down-regulated by glycan-specific IgG anti-IgE autoantibodies. Engeroff, P. et al. JACI 2020.

## Induction of Remission of Giant Cell Arteritis by Tocilizumab

Two RCTs have demonstrated maintenance of remission by the anti-IL-6R autoantibody Tocilizumab (TCZ) in Giant Cell Arteritis (GCA). The GUSTO (GCA treatment with Ultra-Short glucocorticoids and Tocilizumab) is the first study to prove or dismiss the hypothesis that TCZ can induce remission. Although the primary end point was not met (induction of remission within 31 days), the study proved that TCZ induces remission in 70% of patients within 90 days. Furthermore TCZ maintained patients in remission until study end of 52 weeks. Add-on projects are:

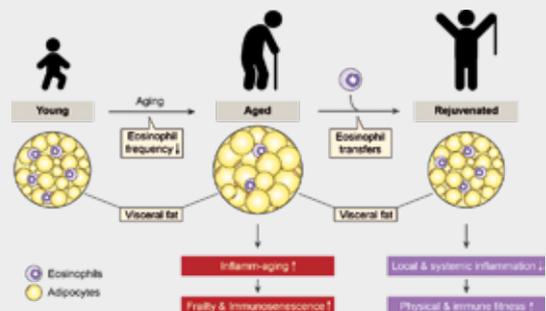
- 1) performance of ultrasound to monitor vessel wall inflammation
  - 2) analysis of soluble molecules to detect markers of disease activity
  - 3) characterization of T cell populations in blood
- Adler S, Reichenbach S, Gloor A, Yerly D, Cullmann JL, Villiger PM. Rheumatology (Oxford). 2019 Sep 1;58(9):1639-1643. doi: 10.1093/rheumatology/kez091.



GUSTO overview of response of the whole patient cohort

## Eosinophils regulate adipose tissue inflammation and sustain physical and immunological fitness in old age

Frailty and immune decline are two main features of old age. We demonstrated in an animal model that these two age-related impairments can be halted and even partially reversed using a novel eosinophil-transfer based therapeutic approach. Brigger, D. et al. Eosinophils regulate adipose tissue inflammation and sustain physical and immunological fitness in old age. Nature Metabolism 86, 97 (2020).



Rejuvenation by eosinophil transfers

## Department of Thoracic Surgery

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[www.thoraxchirurgie.insel.ch](http://www.thoraxchirurgie.insel.ch); [www.thorax-schweiz.ch](http://www.thorax-schweiz.ch)



Prof. Ralph A. Schmid  
Director



PD Dr. Gregor Kocher  
Deputy Director



Dr. Roland Kuster  
Consultant



Dr. Jon Andri Lutz  
Senior Physician



Dr. Patrick Dorn  
Senior Physician



Dr. Adrian Zehnder  
Senior Physician



PD Dr. Ren-Wang Peng  
Research Group Leader



Dr. Sean R. R. Hall  
Research Group Leader



PD Dr. Thomas M. Marti  
Research Group Leader

### Profile

- Teaching students of medicine as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- Identify the molecular mechanisms conferring resistance to clinical standard therapies, with the goal to unravel druggable vulnerabilities - the 'Achilles' heel' - of therapy-resistant cancer cells for development of innovative strategies to treat lung cancer and MPM
- Investigate how nucleotide/lactate metabolism and the DNA damage response machinery is linked to the tumor initiating capacity and chemotherapy response of NSCLC cancer stem cells
- Evaluation and therapeutic improvements of uniportal minimally-invasive thoracic surgery techniques
- Investigation of different clinical and functional parameters with the aim of achieving better outcome and improvement of patient's comfort
- External Partners: Universities of Basel/Vienna/Essen/Changsha (China)/Shanghai China)

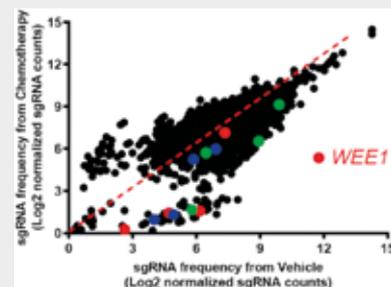
### Grants

- Swiss National Science Foundation (310030\_192648, IZSEZO\_195105)
- Swiss Cancer League (KFS-4265-08-2017; KFS-4851-08-2019)
- China Scholarship Council (201606230238; 201708530258; 201606740067; 201808170004; 201906240084)
- Lungenliga Bern

### Highlights

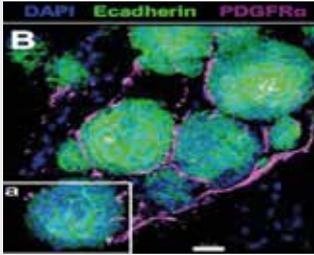
#### WEE1 is a drug target that promotes resistance to standard chemotherapy in MPM

Malignant pleural mesothelioma (MPM) is a rare but very deadly cancer. In a kinome CRISPR/Cas9 knockout screen, we identified the G2-M checkpoint kinase WEE1, whose inhibition synergistically enhances the efficacy of cisplatin/pemetrexed chemotherapy in vitro and in vivo. Xu et al. Mol Cancer Ther, 2020; 19: 661-672.



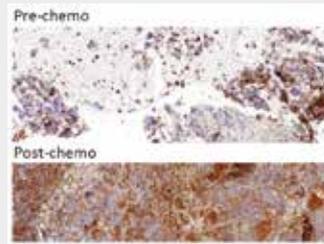
## Characterization of a pericyte-like cells in postnatal lung

We characterized mesenchymal cell subtypes in human postnatal and adult lung. In microscopically normal postnatal human lung, there was a fivefold higher mesenchymal (CD90+) compared with epithelial (EpCAM+) fraction, which diminished with age. In postnatal lung, a subset of CD90+ cells coexpresses the pericyte marker CD146 and supports self-assembly of perfusable microvessels. Wang et al. *Am J Physiol Lung Cell Mol Physiol.* 2020;318(4):L813-L830.



## Chemotherapy increases CDA and TYMP expression thereby rendering resistant lung cancer cells susceptible to subsequent 5'-DFCR treatment.

We performed a small-scale screen of mitochondrial metabolism inhibitors, which revealed that 5'-DFCR selectively targets chemotherapy-resistant lung cancer cells characterized by high CDA and TYMP expression. In a subset of patient tumors, CDA expression was also increased after treatment with neoadjuvant chemotherapy. Gao et al. *J Exp Clin Cancer Res.* 2020. "In revision".



## Thoracoscopic approach leads to fewer surgical site infections

Surgical site infections are a constant concern in thoracic surgery due to higher morbidity, prolonged hospital stay and costs. We analyzed the incidence of wound infections in general thoracic surgery in a cohort of 2430 patients and the impact of the implementation of our uniportal VATS program for anatomical resections. In the multivariate analysis high blood loss and open approach were associated with surgical site infections. Aeschbacher P et al. Primary minimally invasive approach leads to a low rate of surgical site infections in thoracic surgery. *J of Thor Surg.* "Under review".



## Evaluating a body weight-based approach to chest tube management

Removal of the chest tube after lung surgery significantly improves pain symptoms and lung function. The criteria for chest tube are vague and are usually not adjusted even after the introduction of more minimal-invasive surgical procedures. It has been shown that pleural fluid resorption is proportional to body weight. Thus, in this study we report our findings in evaluating a body weight-based approach to chest tube management after pulmonary surgery in a single center randomized controlled trial. (Manuscript in preparation).



## Effect of surgical smoke on air quality

We examined the air quality in our surgery room by mass spectrometry focusing on the surgical smoke generated during surgery by electrocautery devices. We found that this surgical smoke contains various carcinogenic substances similar to those found in cigarette smoke. We furthermore could show that mobile smoke evacuation systems are able to reduce smoke emissions significantly and might have the potential to also clear the air over the wound from bacterial as well as viral particles including Coronavirus (SARS-CoV-2). (Manuscript in preparation).



## Department of Urology

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Prof. George N.  
Thalmann



Prof. Fiona  
Burkard



PD Dr. Marianna  
Kruithof-de Julio



Prof. Katia  
Monastyrskaya



Prof. Roland  
Seiler-Blarer



PD Dr. med.  
Bernhard Kiss

### Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB) at the University of Bern, CH and Leiden, NL
- 4 Groups
- Investigation of pathophysiological processes that contribute tumor diseases and bladder disfunction
- Aim: Understand the molecular processes of urological cancer progression and bladder disfunction
- External Partners: Alvaro Aytes Institut d'Investigació Biomèdica de Bellvitge, Program Against Cancer Therapeutic Resistance / Prostate Cancer Lab, Barcelona, Spain; Theodore Alexandrov EMBL-Heidelberg, Structural and Computational Biology / Spatial Metabolomics Lab, Heidelberg, Germany; Cristina Müller, Center for Radiopharmaceutical Sciences ETH-PSI-USZ, Paul Scherrer Institut, Zürich, Switzerland; Sylvia LeDevedec, Leiden Academic Centre for Drug Research, Leiden University, Leiden, The Netherlands; Rosalyn Adam, Urological Diseases Research Center, Boston Children's Hospital, Boston, USA; Duke University, Durham USA; Swiss Institute for Bioinformatics, HEIG-VD, TKI Bern, ETH Zürich

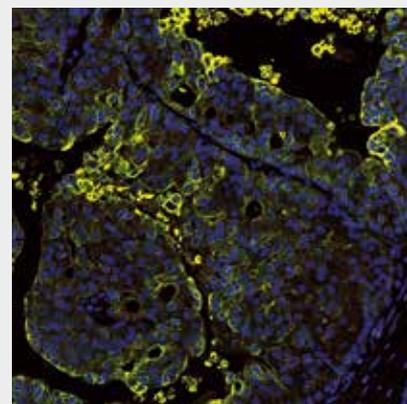
### Grants

- Swiss National Science Foundation (#179265, #189149, #184933, #189369, #175773/1, #182966/1)
- Department of Defense Impact Award PC180280 (W81XWH-19-1-0432)
- Swiss Cancer League (KFS 4718-02-2019, KFS-4960-02-2020)
- HORIZON 2020 (Marie Skłodowska-Curie Action (STOPa 748836)
- Bern Center for Precision Medicine
- Wings for life Spinal Cord Research Foundation
- Novartis Foundation for medical-biological Research
- Innosuisse Grant Nr 41236.1 IP-LS
- 3RCC OC-2019-003
- Initiator Grant (UBERN)
- Lungenliga Bern

### Highlights

#### The role of CRIPTO signaling in lethal prostate cancer

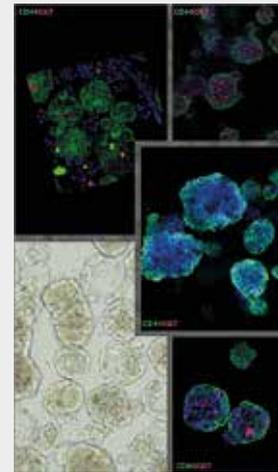
Cripto is an oncofetal protein that regulates stem cell-associated signaling pathways and promotes cellular plasticity, epithelia to mesenchymal transition and maintenance of the stem cell state during normal development, tissue homeostasis and tumorigenesis. Cripto is expressed at high levels in human tumors but not their normal tissue counterparts and has multiple oncogenic effects both in vitro and in mice. Tumor cells with stem cell-like properties have a distinct metabolic profile and perturbation in their metabolomics landscape could result in acquisition of the stem cell phenotype. We demonstrated that CRIPTO signaling sustains stem cell-like PCa cells that initiate the growth of prostate tumors and promote therapy resistance and metastasis.



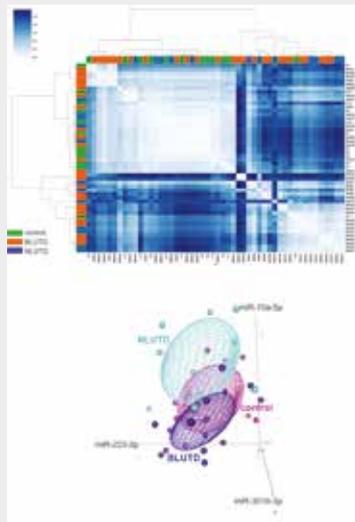
Cripto Expression in genetically engineered mice models of prostate cancer

## Preclinical Models for the Translational Study of Urological Cancers

We have 1. generated patient derived xenografts (PDX) and patient derived organoids (PDO) from biopsies of prostate and bladder cancer (Karkampouna et al. Nat. Com. 2020). 2. defined a new media composition that allows culture of PDO matrix free and allows medium throughput on the PDOs (collaboration NEXUS, ETH). 3. developed and implemented a clinically relevant culture system for studying tumor tissue ex vivo (patent pending). This technique allows cultivation of tumor slices and needle biopsies without loss of normal architecture, viability, proliferative properties, or expression of specific markers (Karkampouna et al. MTNA 2014; Karkampouna et al. Journal of Pathology 2017). We have shown that the effects of drug treatment in this system is consistent with that observed on organoids (in vitro) and PDXs (in vivo) (Karkampouna et al. Nat. Com. 2020). 4. customized a microvasculature-on-chip device to study cancer cell extravasation. 5. generated and fully characterized an unique PDX BRCA2 mutant and fully characterized it (Karkampouna et al. Nat. Com. 2020). 6. performed a medium throughput screen with NEXUS and identified 16 compounds that are currently being used on PDO (Karkampouna et al. 2020; La Manna 2020 FrOnc). 6. identified CRIPTO, a cell surface protein, as a driver of bone metastatic progression.



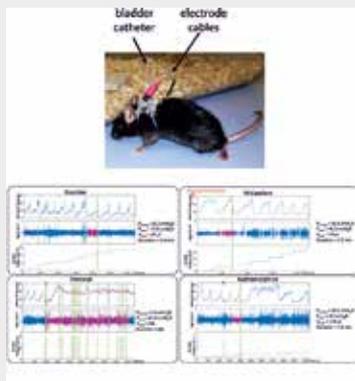
Prostate Cancer Organoids



Hierarchical clustering of significantly regulated mRNAs and miRNAs in benign prostatic obstruction patients

## Urinary miRNA profiles discriminate between obstruction-induced bladder dysfunction and healthy controls

The symptoms of urgency, frequency and incomplete emptying are often shared between the benign prostatic obstruction-induced (BLUTD) and the neurogenic (NLUTD) bladder dysfunction. Previously, using bladder biopsies, we suggested a panel of miRNA biomarkers for different functional states of the bladder. Urine is a good source of circulating miRNAs, which can be used as disease biomarkers. We analysed two age-matched groups of healthy subjects and show that the number of secreted urinary vesicles and expression of several miRNAs were higher in the young group. We demonstrate that a three urinary miRNA signature (miR-10a-5p, miR-301b-3p and miR-233-3p) could discriminate between controls and the patients with BLUTD and NLUTD. This panel of representative miRNAs can be further explored to develop a non-invasive diagnostic test for bladder outlet obstruction.



UDI and EMG measurements in awake mice

## Novel mouse urodynamic model including repeated detrusor pressure and external urethral sphincter activity measurements

Urodynamic investigation (UDI) is the only objective method to assess bladder function in humans. We developed the first mouse model including detrusor pressure and external urethral sphincter (EUS)-EMG measurements in a repeated manner. The presence of electrodes next to the EUS does not obstruct the bladder outflow as no differences were found in urodynamic parameters between the two groups. Midazolam, Fentanyl and Hydromorphone interfere with the physiological bladder function, causing detrusor pressure increase in all three drug conditions. The exposure to Hydromorphone significantly increased the duration of micturition cycles and detrusor control was lost upon Fentanyl exposure, leading to urine leakage. Therefore, we suggest to perform UDI in mice in an awake condition and to omit drug exposure.

## Department for Visceral Surgery and Medicine

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Candinas  
Managing  
Director and  
Chief of Surgery



Prof. Andrew  
Macpherson  
Director and  
Chief Physician  
Gastroentero-  
logy



Prof. Jean-François  
Dufour  
Director and  
Chief Physician  
Hepatology

### Staff members

PD Dr. Vanessa Banz, Senior Surgeon Visceral Surgery  
Prof. Guido Beldi, Senior Surgeon Visceral Surgery  
PD Dr. Lukas Brügger, Senior Surgeon Visceral Surgery  
Prof. Beat Gloor, Senior Surgeon Visceral Surgery  
Prof. Dr. Daniel Inderbitzin, Senior Consultant Visceral Surgery  
PD Dr. Reto Kaderli, Senior Surgeon Visceral Surgery  
Prof. Deborah Keogh-Stroka, Senior Scientist Visceral Surgery  
Prof. Markus Laimer, Chief Physician Diabetology and Metabolism (UDEM)  
PD Dr. Philipp C. Nett, Senior Surgeon Bariatric and Metabolic Surgery

Prof. Beat Schnüriger, Senior Surgeon Visceral Surgery  
Prof. Dr. Christian Seiler, Senior Consultant Visceral Surgery  
Prof. Annalisa Berzigotti, Senior Physician Hepatology  
Prof. Nasser Semmo, Senior Physician Hepatology  
Prof. Katharina Staufer, Senior Physician Hepatology  
Prof. Stephanie Ganal-Vonarburg, Senior Scientist Gastroenterology  
PD Dr. Pascal Juillerat, Senior Physician Gastroenterology  
Prof. Benjamin Misselwitz, Senior Physician Gastroenterology  
Prof. Reiner Wiest, Chief Physician Gastroenterology

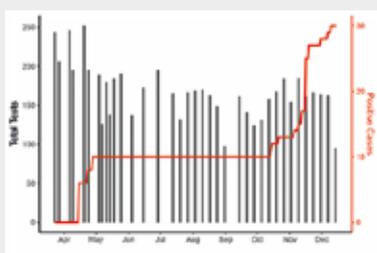
### Profile

- Visceral Surgery – Gastroenterology - Hepatology
- Endoscopy Unit; Transplantation
- External Partners: ETH Zurich, Systems Biology; Karolinska Institutet, Department of Surgery, Stockholm; University of Geneva, Molecular Biology; University of Neuchâtel, Department of Psychology; University of Freiburg, Clinic for Hepatology, Germany; SCCS (Swiss Hepatitis C Cohort Study); STCS (Swiss Transplant Cohort Study); FLIP Kohorte (European Tatty Liver: Inhibition of Progression); CLIF Consortium (European Foundation for the study of Chronic Liver Failure); VALDIG Consortium (Worldwide Vascular Liver Disease Group)

### Grants

- SNF: Longitudinal Single B-Cell Study across the Trajectory of Covid19 to identify SARS-Cov-2-Specific Monoclonal Antibodies and Long-Term Memory Formation (Prof. Andrew Macpherson, CHF 279'989)
- SNF Ambizione: Evolutionary Dynamics of Bacteria in the Intestines of IBD Patients (Dr. Bahtyar Yilmaz, CHF 951'029)
- P. H. Hofschneider: Peter Hans Hofschneider Professorship Chair (Prof. Stephanie Ganal, CHF 1'300'000)
- Gilead: Non-Invasive Findings of Fibrotic MAFLD Patients in Diabetes Outpatient Clinic. Investigator Sponsored Research Agreement for NASH Models of Care (FIMADIA) (Prof. Jean-François Dufour, CHF 379'932)
- Ministero della Salute, Italien: Role of Nutritional Intervention for the Treatment of Sarcopenia in Cirrhotic Patients with Refractory Ascites Candidate to Transjugular Intrahepatic Portosystemic Shunt Placement and Identification of Prognostic Factors Related to Clinical Outcome (Prof. Annalisa Berzigotti, CHF 53'460)
- SNF: How to Protect Healthcare Workforce during an Epidemic Outbreak: Modelling a Desynchronization Strategy from the COVID-19 Pandemic (Prof. Guido Beldi, CHF 296'250)
- Fondation ACLON: Adult Stem Cells for Regenerative Medicine & PCSK9 and Cholesterol Metabolism in HCC (Prof. Deborah Stroka, CHF 350'000)
- SNF Sinergia: Functional chemoinformatic modelling of the host cell metabolome to fight apicomplexan parasites (Prof. Deborah Stroka, CHF 671'175 (total CHF 3'133'006)

## Highlights

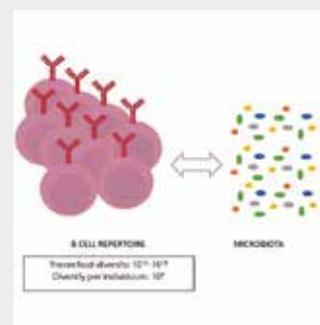


### How to protect healthcare workers during a pandemic

Soon after the first cases of the COVID-19 in Bern, researchers and clinicians of the Department for Visceral Surgery and Medicine set up a clinical trial with the aim to assess the most effective strategy to protect healthcare workforce during the current pandemic. Two strategies were followed. First, teams were divided into two groups, each group working alternatively for one week. Second, a pipeline for testing of asymptomatic healthcare workers was designed and introduced after approval of the ethical committee.

### Mucosal or systemic microbiota exposures shape the B cell repertoire

A study published in Nature in 2020 by Andrew Macpherson, Stephanie Ganal-Vonarburg and colleagues could demonstrate that the commensal microbiota can alter the host's antibody repertoire throughout the body by the use of high-throughput B cell receptor sequencing.



### COVID-19 in an international European liver transplant recipient cohort

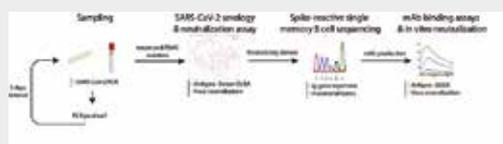
We conducted an international prospective study including 12 European liver transplant centers, on liver transplant recipients with SARS-CoV-2. The study suggests that, despite well-known risk factors for poorer outcome, COVID-19 liver transplant patients do not show necessarily more severe clinical course to that observed in non-liver transplant patients affected by COVID-19. Therefore, restrictive preventive strategies in liver transplant recipients should be implemented in those with additional risk factors other than liver transplantation.



[Video abstract](#)

### Longitudinal single B cell studies across the trajectory of COVID-19

The SNF has awarded funds for a project on a longitudinal study of SARS-CoV-2 specific monoclonal antibodies and long-term memory formation to A. Macpherson, S. Ganal-Vonarburg, G. Beldi and T. Rollenske. The study includes a cohort of 400 health care workers and scientific staff which are tested weekly in an internal SARS-CoV-2 test pipeline. Positive individuals are followed further in regard to their antibody profile and memory formation.



### H.I.T.

High Potential University Leaders Identity & Skills Training Program – Gender Sensitive Leaders in Academia is an innovative, competitive, evidence-based, exclusive leadership program to specifically train and empower female professors in Switzerland to become university leaders. Twenty-two female professors from all Swiss universities were selected and completed this first H.I.T. Program: Prof. Annalisa Berzigotti was selected.





# Clinics at the University Hospital, Universitäre Psychiatrische Dienste (UPD)

University Hospital of Old Age Psychiatry and Psychotherapy

University Hospital of Child and Adolescent Psychiatry and Psychotherapy

University Hospital of Psychiatry and Psychotherapy



# University Hospital of Old Age Psychiatry and Psychotherapy

Murtenstrasse 21, 3008 Bern  
[www.upd.unibe.ch](http://www.upd.unibe.ch)



Prof. Stefan Klöppel



PD Dr. Jessica Peter

## Profile

- Teaching students of medicine as well as graduate students at the Graduate School for Health Science (GHS)
- 2 research groups
- Investigation of retrospective as well as prospective memory with cognitive assessment, brain imaging, and non-invasive brain stimulation in healthy aging and cognitive impairment
- Application of tablet-based cognitive training in cognitive impairment
- Aim: Development and validation of non-pharmacological interventions to counteract cognitive decline
- External partners: Institute of Psychology, University of Bern, Switzerland; Department of Neuroradiology, University of Zürich, Switzerland; Department of Basic Psychological Research and Research Methods, University of Vienna, Austria; Cobtek (Cognition, Behavior, Technology) Research Lab, University Cote d'Azur, France, Neuroscience Center, University of Geneva, Switzerland; German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany

## Grants

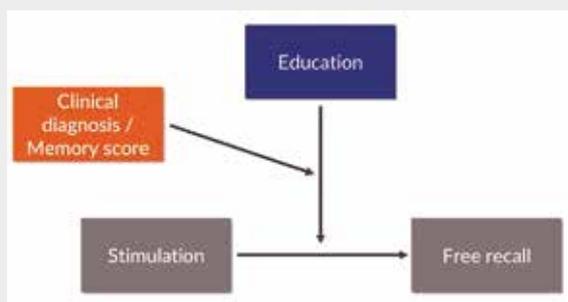
- Swiss National Science Foundation (32003B\_189240, 100014\_185105, 191026)
- Synapsis Foundation, Heidi Seiler Foundation, Peter Bockhoff Foundation
- Velux Foundation
- Bangerter-Rhyner Foundation

## Highlights

### Depending on education, electrical stimulation improves memory performance in patients with cognitive decline

We applied transcranial direct current stimulation (tDCS) to the prefrontal cortex in 28 patients with cognitive decline (n = 12 Alzheimer's disease, AD; n = 16 Mild Cognitive Impairment, MCI) while they performed an episodic memory task. We found that patients with MCI and higher education benefited significantly from stimulation, while patients with AD benefited only when they were less educated. We suggest a certain window of opportunity for tDCS to work efficiently in those with cognitive decline.

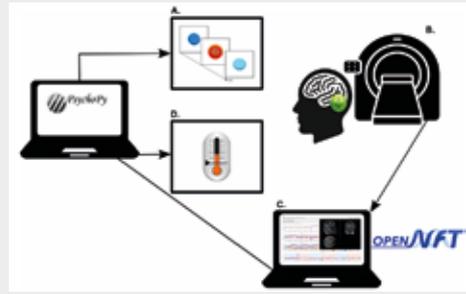
Krebs et al., *Brain Stimul.* 2020, Sep-Oct;13(5):1396-1398.



The interaction between education and the level of cognitive impairment determined who benefited the most from electrical stimulation

## Real-time fMRI neurofeedback to improve episodic memory in cognitive decline

Several fMRI studies on memory found hyperactivity in the hippocampus in patients with Mild Cognitive Impairment (MCI). This hyperactivity was associated with memory deficits, subsequent cognitive decline and a higher rate of progression to dementia. A reduction of hippocampal hyperactivity with an antiepileptic drug improved memory performance. Pharmacological interventions, however, entail the risk of overmedication and side effects. An alternative approach may be real-time fMRI neurofeedback during which an individual learns to control region-specific brain activity. In the current project we aim to test the potential of neurofeedback to reduce hippocampal hyperactivity and thereby improve memory performance. We will include patients with MCI as well as healthy controls. The study is currently ongoing and we expect to have results next year.

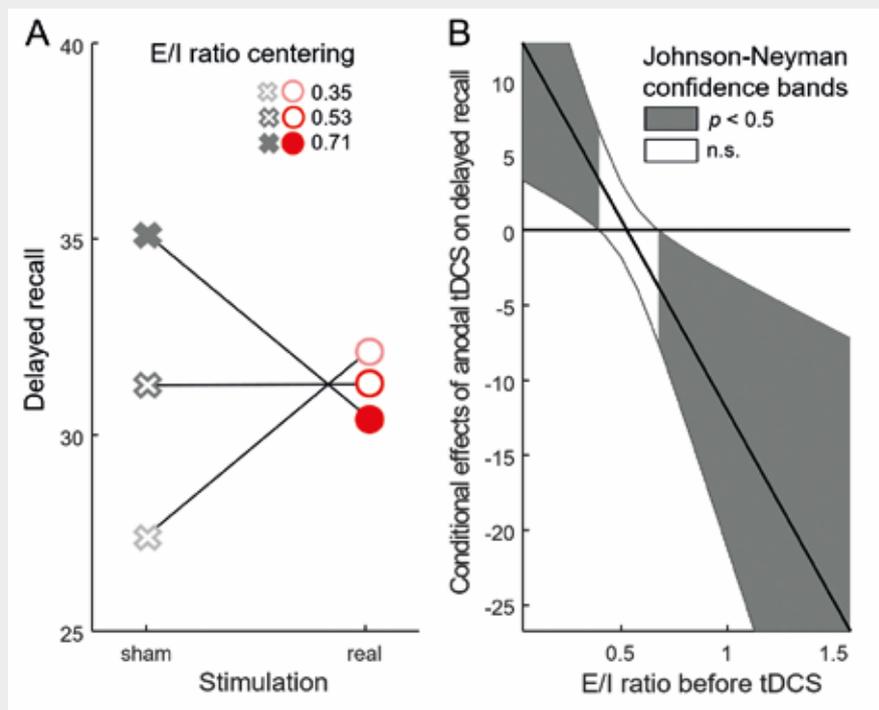


Real-time fMRI neurofeedback: The training is accomplished by continuously measuring brain activity (A,B), analysing it in real-time (C), and then providing feedback about the current (and the targeted) brain activity to the participant (D).

## Neurotransmitter levels as predictors of tDCS effects on cognition

While performance levels at baseline give an indication of subsequent tDCS-related cognitive gains, neurophysiological measures may be more informative regarding potential treatment benefits. In our recent study, 33 healthy young and 22 elderly participants received anodal tDCS during a verbal episodic memory task. Apart from the assessment of cognitive performance, glutamatergic metabolites (Glx) and  $\gamma$ -aminobutyric acid (GABA) levels were measured before and after the stimulation period. No beneficial group effects of tDCS emerged in verbal retrieval performances nor did tDCS influence neurotransmitter concentrations. Nevertheless, analyses suggested a predictive value of the Glx:GABA ratio, with lower ratios at baseline indicating greater tDCS-related gains in delayed recall performance. This highlights how the excitatory state of the stimulated system influences its response to tDCS and thus behavioural stimulation gains.

Habich et al., *Neural Plast.* 2020 Sep 22;2020:8896791.



Differential effects of anodal tDCS. Lower Glx:ratio at baseline predicts greater tDCS-related cognitive gain compared to sham.

# University Hospital of Child and Adolescent Psychiatry and Psychotherapy

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Prof. Michael  
Kaess



PD Dr. Julian  
Koenig



PD Dr. Jochen  
Kindler



Dr. Leila  
Tarokh

## Profile

- 4 research groups, 20 staff members
- Investigating mental disorders with an onset during childhood and adolescence up to emerging adulthood
- Focus on: neurobiological mechanisms, early precursors, innovative treatment development, psychotherapy research, E-mental health
- Teaching students of Medicine and Psychology at all educational levels
- External Partners: Department of Child and Adolescent Psychiatry, Psychiatric Clinics of the University of Basel, Basel, Switzerland; Department of Economics, University of Zurich, Zurich, Switzerland; Developmental Clinical Psychology Research Unit, Faculty of Psychology and Educational Sciences, University of Geneva, Geneva, Switzerland; Department of Child and Adolescent Psychiatry, Heidelberg University, Heidelberg, Germany; University Hospital of Child and Adolescent Psychiatry, Medical University Vienna, Vienna, Austria; Orygen, The National Centre of Excellence in Youth Mental Health, University of Melbourne, Melbourne, Australia; Division of Sleep Medicine, Harvard University, Boston, USA; Department of Psychology, University of Zurich, Zurich, Switzerland; Psychiatry and Human Behavior, University of California, Irvine, Irvine, USA; Department of Psychiatry and Human Behavior, Brown University, Providence, USA; Child Psychiatry Branch, National Institute of Mental Health, Maryland, USA; Upstate Medical University, Syracuse, New York, USA; School of Psychiatry, University of New South Wales, Sydney, Australia & Neuroscience Research, Sydney, Australia; Center for Psychiatric Neuroscience, Department of Psychiatry, Lausanne University Hospital, Lausanne, Switzerland

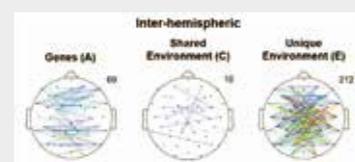
## Grants

- Interfaculty Research Cooperation Grant - Decoding Sleep: Sleep subtypes in adolescent depression: Sleep physiology and treatment (Ongoing; PI: Dr. Tarokh)
- SNF Project Grant (182639): Neurobiological Mechanisms of Pain Dependent Stress-Regulation in Adolescent Non-Suicidal Self-Injury (Ongoing; PIs: Prof. Dr. Kaess & PD Dr. Koenig)
- SNF Project Grant (184943): Sleep Neurophysiology: A Window onto Adolescent Mental Health (Ongoing; PI: Dr. Tarokh)
- SNF Project Grant (197714): Course and burden of risk symptoms and criteria of psychosis in the community: 5- to 10-year follow-up of the Bern Epidemiological At-Risk (BEAR) and the Bi-national Evaluation of At-Risk Symptoms in children and adolescents (BEARS-Kid) studies (PI: Dr. Michel)
- SNF Project Grant (193279): A smartphone-based ecological momentary assessment and intervention for adolescents with auditory verbal hallucinations (PI: Dr. Cavelti)
- SNF Project Grant (192623): Aberrant local brain oscillations and cortical connectivity in the prodromal state and early psychosis – a TMS-EEG study (PI: PD Dr. med. Kindler, PD Dr. med. Morishima)

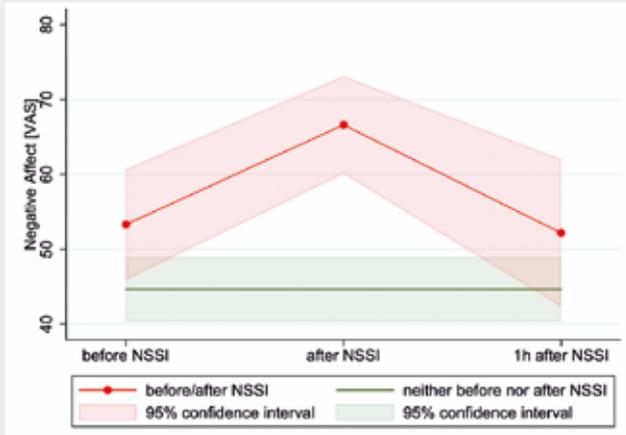
## Highlights

### Environmental factors shape brain connectivity during sleep in adolescents

Patterns of brain connectivity underlie brain function and behavior and are altered in psychiatric disorders. In this study of adolescent twins measured during sleep, we show that environmental factors unique to an individual play an important role in shaping brain connectivity. Our findings suggest that the brain is wired through interaction with the environment and that small differences early in life may cascade into meaningful differences in brain connectivity. Markovic, Kaess and Tarokh, *Cerebral Cortex*, 2020.



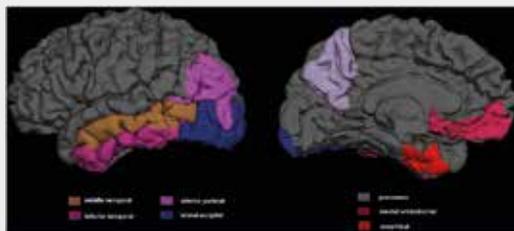
Environmental factors unique to an individual shape brain connectivity-baseline, after 4 months, and after 10 months.



Negative affect before and after non-suicidal self-injury in everyday life

## Relief of negative affect following self-Injury is only short-lived

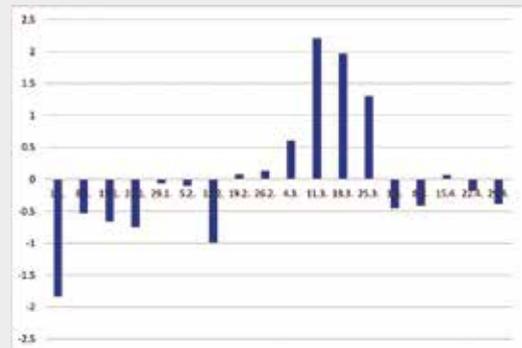
Adolescents engage in non-suicidal self-injury (NSSI) to relieve negative affect. In this study, using high-frequency ecological momentary assessment, we were able to show, that the relief from negative affect following acts of self-injury in daily life is at best short-lived (< 1 hour). In fact, negative affect increases following acts of self-injury. Findings inform clinical practice and our understanding of the motives to engage in NSSI in adolescents. Koenig et al., *European Child & Adolescent Psychiatry*, 2020.



Regions with a significant group difference in gray matter volume between full-blown psychosis, risk-state and controls.

## Basic Symptoms and Gray Matter Volumes of Patients at Clinical High Risk for Psychosis

Clinical high-risk (CHR) for psychosis is indicated by ultra-high risk (UHR) and basic symptom (BS) criteria; however, conversion rates are highest when both UHR and BS criteria are fulfilled (UHR&BS). We investigated gray matter volumes (GMV) in clinical controls (CC), first-episode psychosis (FEP), and CHR, separated for UHR, BS and UHR&BS criteria. Overall, significantly lower GMV was detected in FEP and UHR&BS patients relative to CC with no other significant between-group differences. Five specific regions (inferior parietal, inferior temporal, medial orbitofrontal, lateral occipital, precuneus) showed the most prominent effects. Thus, patients who fulfill both UHR and BS criteria exhibit more severe GMV reductions relative to those who satisfy BS or UHR criteria alone. Our findings might help to improve the prognostic validity of psychosis risk criteria. Hubl, Michel, ..., Kaess, Kindler, *Psychological Medicine*, 2020.



Utilization of an E-mental health intervention for adolescents with mental health problems in association with the COVID-Pandemic in Germany. On March 11th the nation-wide closing of schools was announced.

## Utilization of Online Mental Health Interventions in Youth during the COVID-Pandemic

The COVID-pandemic has considerably disrupted the delivery of mental healthcare. Young people may face even more barriers to professional care than in pre-pandemic times. Based on data from an ongoing large-scale consortium, investigating different online mental health interventions (ProHEAD), we assessed usage patterns of an intervention for adolescents with mental health problems between January and May 2020, associated with the closing of schools in Germany. We found an increase in utilization of the intervention, suggesting greater need and uncertainties related to the limited availability and accessibility of conventional mental health care. Overall, findings highlighting the potential and importance of E-mental health, particularly to reduce barriers for help-seeking in youth. Kaess, ...Koenig..., *Journal of Child Psychology and Psychiatry*, 2020.

# University Hospital of Psychiatry and Psychotherapy

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Prof. Thomas Dierks



Prof. Sebastian Walther



Prof. Franz Moggi



Prof. Daniela Hubl



Prof. Andrea Federspiel



Prof. Thomas König



Prof. Wolfgang Tschacher

## Profile

- Teaching students of medicine, biomedical science, and psychology within the curriculum, supervision of masters and doctoral theses projects, as well as teaching at various graduate schools at the University of Bern
- 16 research groups
- Clinical translational research topics include psychosis pathophysiology and treatment, sleep, addiction, stress, and depression
- Aims: understand the etiology and pathophysiology of psychiatric disorders and develop novel non-pharmacological treatment options
- External partners: Dept. of Psychiatry, Northwestern University, Chicago, USA; Dept. of Psychiatry, Vanderbilt University, Nashville, USA; Dept. of Psychiatry, Philipps-University Marburg, Germany; Dept. of Psychiatry, Karolinska Institute, Stockholm, Sweden; Dept. of Psychiatry, University of Freiburg, Germany; Dept. of Psychiatry, University of Würzburg, Germany; University of Amsterdam, The Netherlands; University of Milano, Italy; Depts. of Psychiatry, University of Basel and University of Zurich; Neurocenter of the University of Lugano

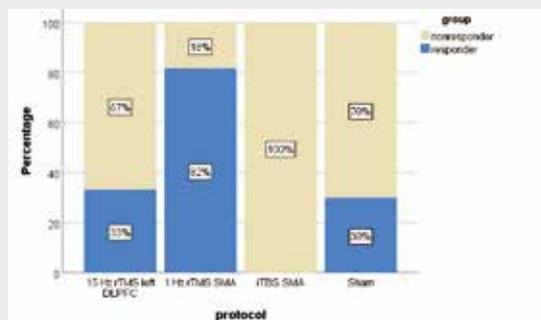
## Grants

- Swiss National Science Foundation grants: 32003B\_182469; 32003B\_184717; 105319\_159286; 10531C\_179451, CRSK-3\_190524, 32003B\_189058
- National Institute of Mental Health R01 grant MH118741
- SNSF Ambizione PZPGP3\_180022
- Frutiger-Foundation, Novartis-Foundation, Velux-Foundation, Gesundheitsförderung Schweiz, Volkswagen-Foundation, Swiss Foundation for Alcohol Research, Swiss Life Jubiläumsstiftung, Synapsis Foundation
- IFK "decoding sleep" University of Bern

## Highlights

### Precision Psychiatry: Inhibition of the SMA resolves psychomotor slowing

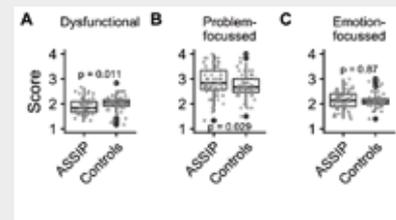
In a transdiagnostic, randomized, double-blind, controlled trial of 15 sessions of transcranial magnetic stimulation (rTMS) over the supplementary motor area (SMA) for psychomotor slowing in patients with schizophrenia or depression, inhibitory 1 Hz rTMS had 82% responders. In contrast, a facilitatory protocol with intermittent theta burst over SMA performed worse than placebo (0% vs. 30% responders). Precision psychiatry treatment is possible when selecting the right patients for a mechanism-based therapy with inhibitory non-invasive brain stimulation.



Walther et al. 2020 Schizophr Bull Open

## Attempted Suicide Short Intervention Program (ASSIP) influences coping behavior

The development of individual coping strategies for suicidal crises is essential for suicide prevention. We could identify 11% less dysfunctional coping in the ASSIP group and 6% more problem-focused coping compared to the control group after 24-months. These results indicate that both, the reduction of dysfunctional coping and the development of problem-focused coping strategies seem to be essential in overcoming suicidal crises. Gysin-Maillart et al. 2020, J Affect Disord 264, 393.

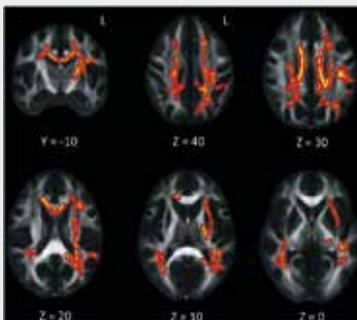


Scores for problem-focused, emotion-focused, and dysfunctional coping after 24-months follow-up, for both groups.

## Altered white matter pathways in catatonia

Catatonia is a complex psychomotor syndrome that may occur in schizophrenia. Here we investigated white matter properties of major motor pathways in schizophrenia patients with catatonia compared to patients without catatonia or healthy controls. The finding suggests substantial structural brain alterations in patients with catatonia supporting the notion of massive changes in cerebral motor circuits as a putative mechanism in catatonia.

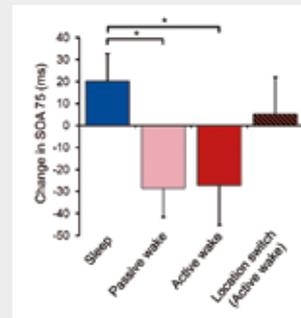
Viher et al. 2020, Schizophr Res 220: 210.



Altered fractional anisotropy in white matter motor tracts in patients with catatonia

## Sleep and Plasticity

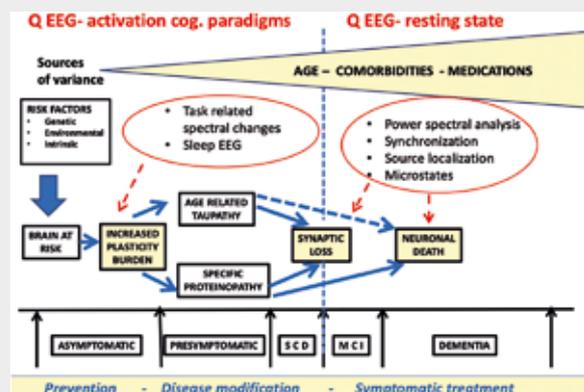
Sleep is critical for healthy performance. However, it is unclear whether sleep-specific brain activity promotes adaptation of behavior and underlying neural plasticity, or whether sleep only provides a window of reduced stimulus interference. Here, we used visual texture discrimination as a model of primary cortex plasticity and provide first direct evidence that sleep is more than a state of reduced interference, but that sleep-specific brain activity restores performance by actively refining cortical plasticity Nissen et al. 2020 Sleep doi: 10.1093/sleep/zsaa216.



Only sleep restored visual performance, as indicated by a positive change in SOA (stimulus onset asynchrony)

## Neuroimaging in neurodegenerative disorders and brain plasticity

Following a joint meeting between the UPD and the Karolinska Institute, Stockholm, Sweden, a special journal issue covered topical issues related to neurodegeneration. The included opinion papers debate diagnostic questions in CT, MRI, and EEG assessments, present novel neurostimulation techniques to improve cognition while also exploring controversial etiological topics. T.Dierks, LO. Wahlund. Imaging in neurodegeneration. Psychiatry Res Neuroimaging (PSYN), 2020, 306.



König, T. et al, 2020, PSYN, 306, 111182.