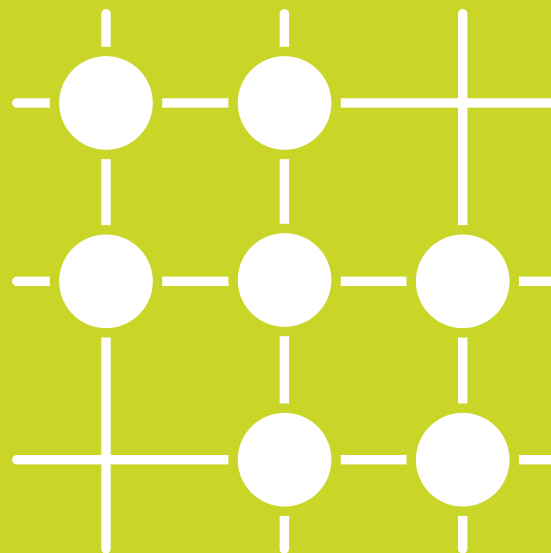


# Research Report 2017/2018

**University Children's Hospital Basel**



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# Editorial



I am very pleased to present the UKBB research report for 2017 and 2018 to interested researchers, collaborators, colleagues from clinical and administrative fields, and to the wider public. The past two years were characterised by a number of far-reaching advancements in the UKBB research infrastructure, such as the implementation of a **general research consent** procedure, a strong increase in the number of studies supported by the **paediatric clinical trials** unit at UKBB and the initiation of a structured approach towards standardised **biobanking** in our wet lab. Within this research report, dedicated articles will cover the latter two topics. Implementing a general research consent procedure in a hospital is an enormous undertaking. This is particularly true for a children's hospital due to, e. g. its highly vulnerable patient population and the requirements for age-specific consent. Nevertheless, implementing general research consent at UKBB is a success story: First evaluations indicate a parental consent rate of about 80–90% in regular inpatients. This rate is far above expectations and demonstrates that the vast majority of parents and children visiting UKBB are indeed willing to support research. It also underlines **the valuable role of families** in helping scientists to conduct research in order to improve health outcomes in children.

## Foreword

**Prof. Sven Schulzke, MD, MSc, FRACP**  
**Head of Research**

### Significant Changes in Paediatric Research Infrastructure in Basel

Over the last two years, there have been considerable improvements in the paediatric research landscape in Basel. First and foremost, this is reflected by the creation of **The Botnar Research Centre for Child Health (BRCCH)** which will be presented in a dedicated article in this report. Creation of the BRCCH was a team effort and was only possible due to the outstanding work of the planning groups. The BRCCH operating institutions are the University of Basel and ETH Zurich. BRCCH has a clear vision: To establish itself in the next few years as the leading institution conducting use-inspired cutting-edge research to improve the health and well-being of children and adolescents worldwide. Notably, UKBB and the Swiss Tropical and Public Health Institute in Basel are official partner institutions of BRCCH.

## Support of Students, Young Scientists and Mid-level Faculty

UKBB has continued to specifically support young scientists through targeted early career programs, such as the **Club Paediatrics** for undergraduate students and the **Special Research Program Paediatrics** for junior doctors in paediatric training, supported by the Botnar Foundation. As a new feature in the current report, we will not only provide reports from senior research group leaders but will also present some of our **mid-level faculty**, the so-called 'rising stars', who represent an important group of researchers, clinician-scientists and teachers essential to the functioning of our research environment. This research staff represents a driving force of scientific development and is a dependable resource, supporting both young scientists and established senior researchers and also professorial faculty.

## Personalised Health

Lastly, the ongoing, global process of digitalisation of health and research-related data and procedures, as demonstrated by the the Swiss Personalised Health Network (SPHN), enables (and requires) researchers in all fields to rethink and develop new methods of performing and connecting research across all disciplines. This process is very demanding but also offers unique opportunities, potentially leading to a new level of translational research initiatives that will hopefully translate into beneficial health outcomes for children in the future. UKBB has a matched strategy together with the University of Basel and the USB to address upcoming scientific and infrastructural challenges.

# UKBB Research at a Glance

## Vision

Research groups at UKBB operate on an international level, demonstrate outstanding research excellence and have a clear focus leading to beneficial effects on health in infants, children and adolescents.

## Research Goals

The main goal of our research is to gain scientific knowledge across basic, translational and clinical research fields to improve diagnosis, treatment and prevention of diseases in the entire paediatric age range. We aim to collaborate with associated institutions of SwissPedNet, other partner institutions within and beyond Switzerland and industry partners in clinical trials. We promote truly translational research from bench to bedside, support young scientists in the development of their career through fostering their creativity, their scientific thinking and problem-solving abilities and help them acquiring methodological skills to obtain scientific independence, resulting in successful competitive research grant proposals and growth of research groups.

## Key Areas of Research

The key areas of research at UKBB are largely defined by structural professorships at the University of Basel and also include very successful research groups with excellent scientific output independent of structural endowment. The key focus areas of research at UKBB are as follows:

- Developmental paediatrics and pulmonology
- Haematology and oncology
- Immunology, infectious diseases, vaccinology
- Paediatric orthopaedics

## Organisation and Governance

Research at UKBB is carried out based on the current research strategy 2014–2017, under the governance of the University of Basel, and embedded in the departmental structure of the medical faculty. An updated research strategy for the years 2019 and following is currently under development by the research strategy commission, a body consisting of members from the University of Basel, UKBB board of directors, UKBB executive board, and UKBB research board. Researchers at UKBB are affiliated with one or more of the departments of biomedicine (DBM), biomedical engineering (DBE), clinical research (DKF), or public health (DPH). As of 2018, UKBB incorporates 26 dedicated research groups. The head of research and the UKBB research board are responsible for allocation of resources and reporting of research to the executive board and the board of directors.

## Quality Control

Standard operating procedures and quality control measures from the department of clinical research (DKF) and its clinical trial unit (CTU) are used for clinical studies in the paediatric clinical trial unit at UKBB. In general, clinical research is embedded in DKF and

proposals are handled according to the Swiss Human Research Act (HRA) and assessed by the Ethics Commission of Northwestern and Central Switzerland (EKNZ).

## Members of the Research Board 2017 – 2018

**Prof. Sven Schulzke**, Neonatal Research (Head of Research UKBB from December 2018)

**Dr. Julia Bielicki**, Infectious Diseases, Medical Coordinator Paediatric Study Centre

**Prof. Reinald Brunner**, Neuroorthopaedics

**Prof. Daniela Finke**, Developmental Immunology

**Prof. Dirk Fischer**, Neuromuscular Research

**Prof. Urs Frey**, Paediatric Pulmonology

**PD Stephanie Gros**, Molecular Therapeutic Strategies in Paediatric Surgery

**Prof. Ulrich Heininger**, Infectious Diseases and Vaccinology

**Prof. Georg Holländer**, Paediatric Immunology

**Prof. Marc Pfister**, Paediatric Pharmacology and Pharmacometrics

**PD Gabor Szinnai**, Paediatric Endocrinology

## Activities of the Research Board

Strategic planning of research

Budget and infrastructure organisation

Allocation of resources to research groups

Career development of young investigators

Organisation of the annual research day

Reporting to executive board and board of directors





Future Development of  
Research Infrastructure

# Future Development of Research Infrastructure

## The Botnar Research Centre for Child Health

Children and adolescents constitute about a third of the world's population and their health status is important for every country and society. Many of the approximately 8 million deaths in 2018 among children and adolescents could have been averted with appropriate preventive measures and adequate therapies. The development of effective next generation healthcare solutions is therefore the mandate of the newly created Botnar Research Centre for Child Health (BRCCH).

Co-founded in September 2018 by the University of Basel and the Swiss Federal Institute of Technology (ETH) Zurich in Basel, and supported by a generous grant from the Fondation Botnar, BRCCH will promote research into the health and well-being of children and adolescents around the world. Conceived jointly by the two universities, the Centre's unique scientific focus strives to integrate molecular, cellular, bioengineering and digital approaches in health sciences to address unmet medical needs and implement novel solutions in economically developed societies as well as low and middle-income countries. In addition to the development of novel diagnostic methods and therapies, BRCCH will also foster the development of innovative digital tools that empower care takers in medical decision making and assist patients and their parents in becoming key stakeholders in their own health and care. Importantly, the Centre's activity will also address societal, health systems, ethical, economic and legal aspects related to these novel diagnostic and therapeutic strategies as new technologies and data governance, stewardship, and management will need to be implemented to collect precise health care information.

BRCCH has forged a close collaboration with the Children's Hospital of the Cantons of Basel (UKBB) to realise its mission. This alliance will draw on the hospital's broad expertise in translational and clinical paediatric research in diabetes, infectious diseases/immunology, functional restoration by regenerative surgery, and cardio-respiratory diseases. The close partnership between BRCCH and UKBB will promote the design and implementation of health care solutions utilising artificial intelligence, innovative hardware and modern software technologies to be employed both in hospital and domestic settings.



**Prof. Georg Holländer, MD**  
Director, Botnar Research Centre  
for Child Health

**BRC** Botnar Research  
**CH** Centre for  
Child Health



# Future Development of Research Infrastructure



**Julia Bielicki, MD, MPH**

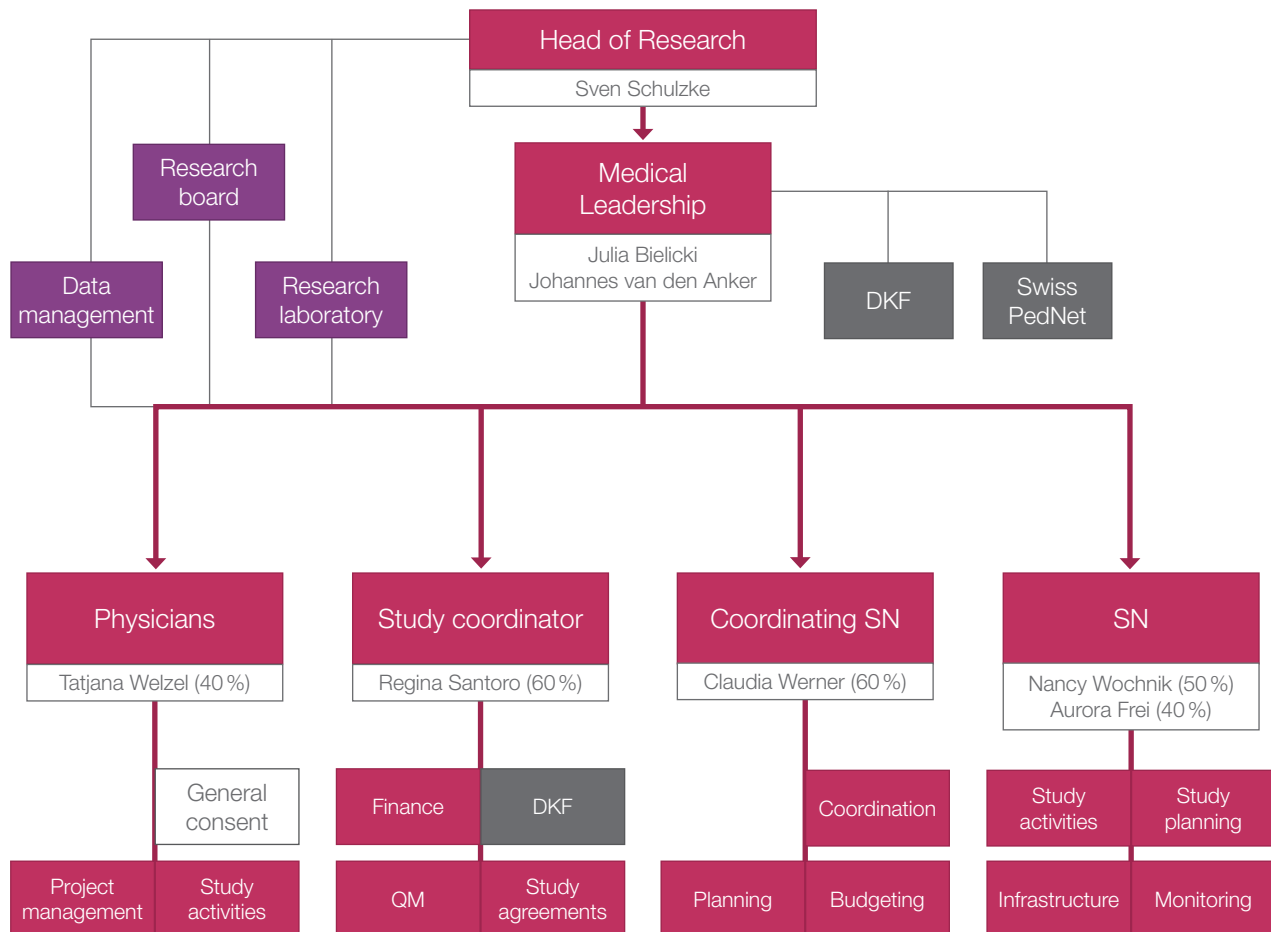
## Ambulatory Study Center

For the past three years the Ambulatory Study Center (Ambulantes Studienzentrum ASZ) has been actively supporting clinical research at UKBB through a growing team of research-experienced medical and nursing staff. Strategic medical leadership is provided by Dr. Julia Bielicki who, together with a study coordinator and coordinating study nurse, constitutes the team in charge of the day-to-day running of the ASZ. Examples of offered activities include maintenance of trial files, patient visits, data capture, monitoring, management of investigational medicinal products, processing and storage of laboratory samples, archiving, and maintenance of patient rooms for study visits.

In 2018, the ASZ looked after nearly 400 patients in 14 studies. This included two SwissPedNet studies funded under the prestigious SNSF Investigator-Initiated Clinical Trials call: the Omega3-Study (Efficacy of Omega-3 fatty acids as first line treatment in paediatric depression; PI Prof Klaus Schmeck) and the KIDS-STEP Study (Effect of adjunct oral corticosteroids on recovery and need for readmission in children admitted to hospital with pneumonia, PI Prof Ulrich Heininger). Both trials are challenging placebo-controlled studies making use of the full spectrum of ASZ services.

Currently, the ASZ supports nearly twenty clinical research projects. Of these, three are industry-sponsored trials characterized by the need to ensure all resulting data can be used to support licensing and labeling of the studied compounds. For this purpose, the ASZ uses a fully developed and regularly maintained quality management process shared with the Department for Clinical Research of the University Hospital Basel. The implementation of general consent in line with nationally agreed requirements is an example of an overarching activity lead by the ASZ. Introduced in 2018, and encouragingly for research involving children at UKBB, we observe very high acceptance rates of 90% or above by approached families.

For 2019, our aim is to achieve an even closer integration of UKBB clinical research activities and to connect local and multicenter studies and national networks, most importantly SwissPedNet, by building on existing expertise and by further developing transparent and consistent pathways for implementing high quality clinical studies.



# Future Development of Research Infrastructure



**PD Stephanie Gros, MD**

## **Biobanking – Concept for the Future**

The growing UKBB biobanking team around Stephanie Gros aided by Andrea Zelmer is currently in the process of establishing a reliable biobanking management system. Based within the Swiss Biobanking Platform (SBP) and the Basel Personalized Health Initiative the biobank will guarantee the safe and controlled storage of biological samples and strengthen research opportunities of the UKBB.

A biobank contains samples of human and non-human origin, for example liquids, tissue samples, cells, bacteria or others. Samples are intended for diagnostic, therapeutic or research purposes. The sampling is regulated and fully documented. An appropriate governance is required.

The Swiss Biobanking Platform is orchestrating the development of a network of biobanks. The goal is to make sample and data sharing possible throughout Switzerland. Documentation and harmonisation of all biobanking processes including sample collection, transport, treatment, preparation, storing, and distribution will ensure comparable quality standards.

Biobanking is regulated by national and international legal requirements and has to be compliant with all ethical and quality standards. Currently, biobanks are not available in all Swiss research and hospital institutions or do not yet conform with regulations. Embedded in the personalized health initiative of the University Basel, the standards and facilities for biobanking are currently defined.

To ensure high impact research on children's diseases, sampling of growing numbers of bio-specimen is becoming increasingly important. While the UKBB is faced with an expanding number of biosamples, the need for clearly structured, regulated and documented approaches is becoming essential. Biosampling will be accompanied by managing increasing numbers of patient data. Ensuring legally and scientifically correct handling of samples and data can only be achieved by defining and implementing new logistical and IT processes. Establishing governance for the biobank will ensure effective use of these samples for relevant research questions. Qualified personnel are essential to professionalize these processes.

Establishment of UKBB biobanking will ensure high bio-sample quality, make cooperative sharing of biological resources more accessible and will strengthen the UKBB nationally to remain competitive on the international level.



Rising Stars



**PD Maya C. André, MD**

### Group members

- Dr. Hanna Zhao, PostDoc
- Lisa Schwab, PhD student
- Henning Peters, PhD student
- Franziska Ginsberg, MD student
- Katharina Seel, MD student
- Ma Nan, MD student
- Sarah Bühler, technician

## Translational Cellular Immunotherapy

Since 2007, we have studied conditions under which natural killer (NK) cells target paediatric acute B cell leukemia. To this aim, we developed a donor-patient-specific mouse model in NOD SCID IL2R $\gamma$ c $^{-/-}$  mice (André et al., 2010, Woiterski et al., 2013) in which we use donor-specific stem cells for transplantation and patient-specific leukemia as a correlate for the individual tumor. Here we provided evidence that NK cells target paediatric B-ALL and that transfer of NK cells or the selection of a donor with certain killer immunoglobulin-like receptors is beneficial as anti-tumor effects of NK cells will be enhanced (Kübler et al. 2014, Baltner et al., 2017). We additionally showed that upon primary contact with leukemia NK cells convert to memory-like NK cells with superb GvL effects (Pal et al., 2017). Currently, we are trying to understand on the transcriptional level how epigenetically modifying drugs promote NK cell development.

Our lab is currently located at the University Children's Hospital, Tübingen, Germany, and covers the whole spectrum of analytical methods such as complex 16-color flow-cytometric analysis of developing NK cells and minimal residual leukemic disease (MRD), flow-cytometric and RT-PCR analysis of all inhibitory/activating KIRs, electroporation-induced KIR knockdown, CRISPR-Cas9 knock-down of transcription factors, induction of leukemia or adoptive transfer and humanization of NSG mice. The lab will subsequently move to the campus of UKBB.

Our work is funded by the Jose-Carreras-Leukämie Stiftung, Deutsche Kinderkrebsstiftung, Manchoth-Stiftung, Sander-Stiftung, Madeleine-Schickedanz-Stiftung and the University of Tübingen. Important collaborations include Prof. Dr. Salih and Prof. Dr. Skokowa, both University of Tübingen, and Prof. Dr. Lengerke, University of Basel.



## Neuronal Control of Colonic Immune Cells in Hirschsprung's Disease

The enteric nervous system (ENS) consists of more than 100 million neurons regulating important processes like peristalsis and electrolyte balance. Recent literature suggests a crucial role for the nervous system in fine-tuning our immune response.

In order to identify the impact of the ENS on intestinal immune cells, the research team of Dr. Simone Ross-Keck and Prof. Stefan Holland-Cunz is studying patients with Hirschsprung's disease (HD), congenitally lacking an ENS. Although surgical therapy involves pull-through-surgery to remove affected tissue, about 50 % of the children suffer from life-threatening HD-associated enterocolitis. To date the underlying pathologic mechanisms are still unclear.

To pursue this question, Dr. Ross-Keck established a Swiss- and German-wide multicentric study to recruit HD patients. Surgically removed tissue is enzymatically digested, and immune cells are isolated and analyzed using flow cytometry, Immunofluorescence microscopy and gene expression analysis. The team found out that the presence of the ENS, especially the neurotransmitter acetylcholine, protects from the development of inflammatory enterocolitis-promoting T helper 17 (Th17) T cells. The nerve fibers interact with an anti-inflammatory macrophage subtype that prevents the differentiation of Th17 T cells. The researchers follow up the patients and verify one year after pull through surgery the development of HD-associated enterocolitis. A first trend shows that children with nerve fibers develop fewer symptoms than children lacking those fibers.

The results of the 2015 established study are currently prepared for publication. Based on study results, Dr. Ross-Keck and Prof. Holland-Cunz expect to develop new diagnostic markers to predict which children are at high risk to develop enterocolitis. Follow up studies will further clarify how neurons, immune cells and the microbiome modulate each other to develop alternative immunotherapies for HD-associated enterocolitis. Dr. Simone Ross-Keck is a biologist with a focus on mucosal immunology. She performed her PhD at the Max-Planck-Institute for Immunobiology in Freiburg (DE) and completed her post-doctoral studies at the Department of Biomedicine in Basel. Since 2014, she leads the paediatric surgery research lab at UKBB.



**Simone Ross-Keck, PhD**  
Head of Paediatric Surgery  
Research Lab

**Group members at the UKBB**  
– Virginie Galati-Fournier,  
research assistant



# Rising Stars



**Daniel Studer, MD**

Project Leader

**Group members at the UKBB**

- Prof. Carol C. Hasler, MD
- Christoph Heidt, MD

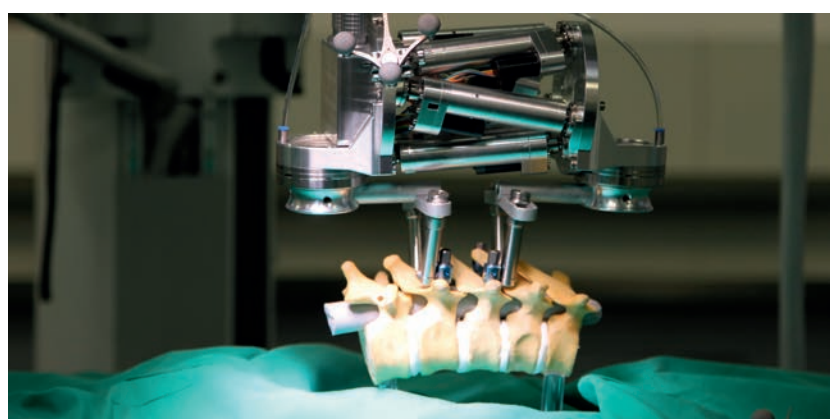
## The Spine-Doc with the SpineBot

In 2008 I first encountered the field of paediatric orthopaedics. Under the initial supervision of Prof. Fritz Hefti, I was able to experience a unique teaching and mentoring program with Prof. Carol Hasler – and continue to do so. My professional skills were deepened during a Clinical Research Fellowship at the Women’s and Children’s Hospital in Adelaide, Australia.

With an increasing focus on the treatment of paediatric spinal pathologies, and the opportunity to practice this highly specialised medicine in one of the most modern children’s hospitals, and in a region where I am socially rooted, the aim of a long-term commitment to the UKBB has been strengthened.

Thanks to financial research support from the University of Basel and targeted personal support from the Surgical Department, I was able to withdraw from clinical routine in 2018 and launch and advance various clinical research projects.

The main project relates to intraoperative measurements of segmental stiffness of the spine in children with idiopathic scoliosis using a programmable robotic device – the SpineBot. In vivo data from young patients with the corresponding pathology will be unique and can contribute to the goal of fusionless correction of spinal deformities in the future.



The SpineBot – a programmable robotic device for in vivo measurement of segmental spinal stiffness

Further projects aim at objectifying the changes in health-related quality of life (HrQoL) in adolescent patients undergoing surgery for neuromuscular scoliosis, the correlation of leg length differences and the resulting pelvic obliquity on the growing spine as a function of pelvic width, or the accuracy of radiation-free measurements of the body surface for outpatient follow-up assessments of patients with spinal deformities.

## Assuring Safety in the Treatment of Chronic Rheumatic Diseases

Paediatric chronic rheumatic diseases (pCRD) are caused by immune system disorders, leading to chronic systemic inflammation. The introduction of biologic medication has revolutionized the outcome of CRD, with achievement of inactive disease becoming the main goal of treatment.

All pCRD fulfill the rare disease criteria with a frequency of less than 1/2000. Therefore, the safety of biologic medication has often been investigated in only small paediatric studies. Therefore, the **Juvenile Inflammatory Rheumatism Cohort** was founded as a European register, currently including more than 4500 patients. One of the main goals is the investigation of phase IV medication safety signals. Dr Woerner is a member of the steering and scientific committees of this register. Further, he is principal investigator of the JIR module vaccination, which studies the safety of vaccinations in conditions of dysimmunity.

**Individual, personalized dosage of biologics** that may allow less side effects, while preserving efficacy, is the aim of a project together with Prof Marc Pfister, Paediatric Pharmacology at UKBB. In this study, investigation of blood levels of biologics at different time points in pCRD allows for the establishment of a pharmacokinetic model to optimize further drug dosing in an individual patient. This project follows the **Individualized Medicine concept**, formulated by the Swiss Federal Office of Public Health.

Further current topics of research of the team of Dr Woerner are projects addressing the transition from children with pCRD into adulthood, and studies on **primary chronic pain** in children in Switzerland.



**Andreas Wörner, MD**  
Head of Paediatric Rheumatology

### Group members at the UKBB

- Andreas Woerner, MD, Head
- Tatjana Welzel, MD, Fellow
- Thomas Daikeler, MD  
Rheumatology USB
- Christiane Marquis, Nurse
- Mary Daly, Transition Clinic  
Nurse







Research Groups

# Paediatrics and Paediatric Pulmonology Research

- Asthma
- Developmental lung physiology
- Systems medicine
- Biomedical engineering
- Air pollution



**Prof. Urs Frey, MD, PhD**  
Research Group Leader

## Group Members at the UKBB

- **Prof. Jürg Hammer**, MD, Head Intensive Care Unit and Pediatric Pulmonology, Group Leader
- **Prof. Daniel Trachsel**, MD, Intensive Care Unit and Pediatric Pulmonology
- **Dr. Anja Jochmann**, MD, Consultant Pediatric Pulmonology
- Dr. Olga Gorlanova, MD, Research physician
- Dr. Jakob Usemann, MD, PhD, Research physician
- Dr. Fabienne Decrue, MD, PhD student
- Amanda Gisler, PhD student
- Isabel Gonzalez Novoa, head study nurse
- Katrin Gerber-Windisch, study nurse
- Maya Weber, study nurse
- Amelia Imolesi, study nurse
- **Dr. Edgar Delgado-Eckert**, PhD (Junior group leader)
- Dr. Anirban Sinha, PhD, Post-Doc
- **Prof. Pablo Sinues**, PhD (Group leader)
- Dr. Kapil Singh, PhD Post Doc
- Kim Arnold, PhD
- Amanda Gisler, PhD student

The current research activity of Prof. Frey's group focuses around the ongoing BILD cohort study research, funded by the Swiss National Science Foundation. The following project, **“Impact of Air Pollution on Profibrotic and Autophagy Related Mechanisms Involved in the Development of the Respiratory System in Infants”** began in 2018.

This project is a direct continuation of a series of projects based on the on-going prospective birth cohort, BILD, which investigates the impact of environmental factors on lung growth and development, and subsequent consequences for later respiratory morbidity in early childhood.

There is increasing evidence from several birth cohort studies, including the BILD cohort, that air pollution exposure in early childhood has an impact on respiratory morbidity. Evidence from countries with high air pollution levels has shown that exposure to both particulate matter and NO<sub>2</sub> is associated with impaired lung growth and asthma. Previously, we found that low-level air pollution exposure in Switzerland was associated with respiratory symptoms in infancy. However, we did not find an effect on subsequent impaired lung function at school age. Nevertheless, even low-level air pollution exposure during pregnancy showed an effect on infant lung function shortly after birth. We thus hypothesize that, during this vulnerable pre-, perinatal and infancy phase, oxidative stress responses even at a low level might impair lung growth. There are multiple biological mechanisms involved.

Autophagy is an evolutionary, conserved major homeostatic mechanism to eliminate damaged organelles. Without proper control, autophagy contributes to various disorders including autoimmune and inflammatory diseases. Autophagy has recently been described as a novel mechanism in asthma, allergy, immune function, inflammation and anti-viral immunity. Autophagy related genes have been associated with asthma and impaired airway function in adults.

Current study hypothesis: TGFβ stimulation and autophagy related biomarkers have never been investigated in relation to lung and immune development in early infancy. Based on our RNF145 finding, we hypothesize that TGFβ stimulation and autophagy related mechanisms in response to environmental pollution (particulate matter, NO<sub>2</sub>, oxidative stress) may be involved in early lung function development, may modify airway microbiome, and may contribute to subsequent persistent respiratory morbidity or asthma.

# Translational Medicine Breath Research

Did you know that every time you exhale you are releasing thousands of molecules into the ambient air? Breath is a diagnostically underexploited bodily fluid, which contains valuable bio-chemical information about health status. For example, the sense of smell was used by clinicians in ancient Greece and China to retrieve (qualitative) information about their patients. However, nowadays very few diagnostic tests rely on exhaled air. Our mission is to reverse this situation by uncapping the potential that breath analysis holds as a non-invasive method to assist in clinical decision making. To do this, we use modern analytical platforms combined with sophisticated computational tools. In particular, we use modified mass spectrometers, which have been designed to sense exhaled molecules at minute concentrations. Since the analysis requires no sample-preparation or manipulation, the diagnostic result can be obtained nearly in real-time. This technology is especially well suited for children due to its non-invasive nature.

- Exhaled breath analysis
- Novel diagnostics
- Therapeutic monitoring



**Prof. Pablo Sinues, PhD**  
Research Group Leader

#### Group Members at the UKBB

- Dr. Kapil Dev Singh, Senior scientist
- Georgi Tancev, PhD student
- Amelia Imolesi, study nurse



Our breath analysis lab is located at the University Children's Hospital Basel (UKBB), which provides us with the unique advantage of having direct access to well characterized patients. Our state-of-the art mass spectrometric analytical platform for real-time analysis of exhaled breath consists of an efficient numerically-optimized Secondary Electrospray Ionization source coupled with a high resolution mass spectrometer. In addition, the lab is equipped with an Ultra High Pressure Liquid Chromatography system, which, coupled with the mass spectrometer, is dedicated for metabolite identification. Bio-informatic tools developed in our lab unravel biochemical information encoded in the mass spectral fingerprints of our patients. Ultimately, we aim to improve diagnosis for certain diseases, to better phenotype complex pathophysiological processes, as well as to personalize therapy. The above mentioned research activities are currently being funded by the Swiss National Science Foundation, including a prestigious Eccellenza grant (1.5 Mio CHF for the coming five years).



# Computational Physiology and Biostatistics

- Analysis of (patho-) physiological time series
- Data driven disease phenotyping in asthma
- Mathematical modeling of host-pathogen interactions
- Mathematical epidemiology



**Edgar Delgado-Eckert, PhD**  
Research Group Leader

## Group Members at the UKBB

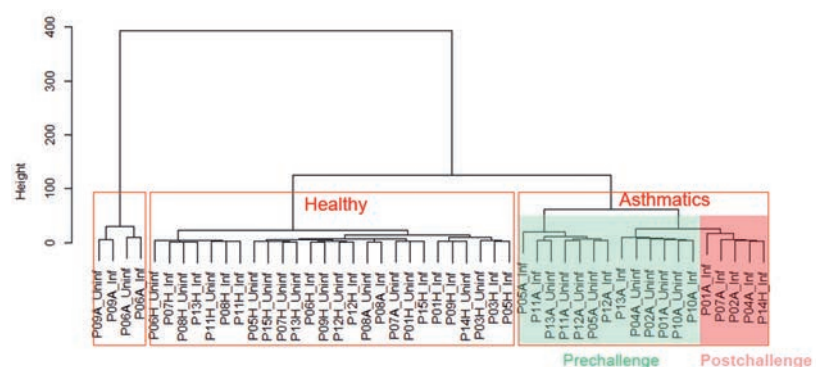
- Delphine Meier-Girard, PhD, (former PhD student)
- Binbin Xu, PhD, (former postdoctoral researcher)
- Anirban Sinha, PhD, postdoctoral researcher
- Ivo Strebel, MSc, PhD student
- Thilagavathy Jagan, MSc, programmer and data analyst

During 2017, we were able to conclude our research project devoted to data-driven disease phenotyping in asthma; that is, the development of a data-driven computational methodology designed to identify different types of asthmatic patients according to the fluctuation patterns in their lung function. This research effort concluded in the following publication: Delgado-Eckert, E. et al. Functional phenotypes determined by fluctuation-based clustering of lung function measurements in healthy and asthmatic cohort participants. *Thorax* 2018; 73:107 – 115.

In 2018, we also finished our project related to the study of the prognostic value of respiratory symptoms scores in infants. Our findings suggest that quantitatively characterized patterns of symptom deterioration and recovery during infancy are associated with asthma at school age. Our results were recently published:

Usemann, J. et al. Dynamics of respiratory symptoms during infancy and associations with wheezing at school age. *ERJ Open Research* Oct 2018, 4 (4) 00037-2018; DOI: 10.1183/23120541.00037-2018

A new project was started in 2018 in collaboration with scientists at the Academic Medical Centre at University of Amsterdam (The Netherlands). The aim of this study is to use longitudinal respiratory, inflammatory, and immunological biomarker data (i.e. time series) in order to characterize and compare healthy and asthmatic cohort participants before and after a deliberate infection with a rhinovirus. Our preliminary results provide evidence for a loss of adaptive capacity of the human respiratory system due to asthma, resulting in an impaired ability to cope with external perturbations in asthmatic patients.



Comparison of respiratory biomarker time series indicates that in healthy participants the individual pre- and post-viral-challenge states are relatively more similar to each other than to other participants'. Contrastingly, the post-viral-challenge state of an asthmatic participant resembles more other rhinovirus-infected asthmatics than the participant's own pre-viral-challenge state, revealing loss of adaptive capacity.

# Paediatric Infectious Diseases and Vaccinology

Our main area of research is in the field of **pertussis**, specifically its epidemiology, burden of disease, and prevention by vaccines. This research is done in collaboration with national (Swiss Public Health Office and Swiss Paediatric Surveillance Unit) and international collaborators (Petrovic et al 2017, Martinon-Torres et al 2018, Son et al 2018, Hellenbrand et al 2018, PERISCOPE Consortium 2018, Forsyth et al 2018).

Our second area of research deals with the epidemiology, burden of disease and vaccine prevention of **varicella** (Riera-Montes et al 2017; Bollaerts et al 2017).

We are also actively involved in the Swiss **Paediatric Sepsis Study (SPSS)**, a prospective study performed between 2011 and 2015 which has revealed new insights in the clinical and epidemiologic features of sepsis in children and is still in the phase of ongoing analyses and publications (Agyeman et al 2017, Giannoni et al 2018, Dierig et al 2018, Asner et al 2019).

Finally, acceptance of recommended vaccines or – its opposite – **vaccine hesitancy** (recently included in the top 10 threats for global health by WHO) has been an area of increasing research by our group, including both healthcare workers and the public (Schuler et al 2017, Storr et al 2018, Erb et al 2019).

- **Pertussis**
- **Vaccines**
- **Vaccine hesitancy**
- **Varicella**
- **Sepsis**



**Prof. Ulrich Heininger, MD**  
Research Group Leader

#### **Group Members at the UKBB**

- Ines Mack, MD
- Mirjam Erb, MD
- Nora Manz, MD
- Marianne Schuler, MD

# Vaccine Safety Research and Brighton Collaboration Foundation

- Vaccines
- Infectious diseases
- Pharmacoepidemiology
- Benefit-risk assessment



**PD Jan Bonhoeffer, MD**  
Research Group Leader

## Group Members at the UKBB

- Jorgen Bauwens, PhD student
- Roman Binder, master's student
- Simone Casagrande Valli, MBA
- Apoorva Sharan, PhD student
- Viviane Seeger, administrator

In 2018, the focus was on immunization in pregnancy.

The Global Alignment of Immunization Safety Assessment in Pregnancy (GAIA), funded by a research contract with the Bill & Melinda Gates Foundation (BMGF), was completed at the end of December 2018 ([www.gaia-consortium.net](http://www.gaia-consortium.net)). This Brighton Collaboration Foundation project aimed to improve data generated for strengthening programs of immunization in pregnancy by harmonizing maternal, pregnancy, fetal, and neonatal health outcome assessment with specific focus on Low and Middle Income Countries (LMIC), where perinatal and infant mortality is high. This internationally collaborative project provided over 2 dozen case definitions of adverse events following immunization, guidelines for data collection, an ontology of terms harmonized and mapped with international disease coding terminologies, case based causality assessment, Case Report Form (CRF) templates, an obstetric risk assessment tool (ORAT), customized Medical Dictionary for Regulatory Activities (MedDRA) queries, and mappings of case definitions to International Classification of Diseases ICD 10 and 11 in collaboration with WHO. All case definitions are being published and translated to the “ABC tool” as well as in the “library” so that they can be accessed via the virtual institute ACADEMY. Evaluation studies were conducted to test the feasibility and usefulness of the standards and tools developed. All outputs are published in three special issues of the Journal Vaccine.

Vaccination in pregnancy – Program Epidemiology (VIP-PREP) was the second focus project funded by Pfizer, Inc US. Group B Streptococcus (GBS) capsular polysaccharide conjugate vaccines are currently in development for use in pregnant women to primarily prevent maternal and neonatal sepsis and death. This research collaboration is to assess the Levels of Capsular Polysaccharide Antibodies in Cord Blood and the Association with Group B Streptococcal Disease by leveraging the umbilical cord serum biobank and clinical data available in the Basel Birth Cohort to meet this need. In 2018, we identified and extracted clinical data of cases and controls. We also matched corresponding umbilical cord sera. 2019 will be time for analysis, interpretation and publication.

# 1) Paediatric Mycobacterial Research

## 2) Migrant Health Research

Main research focus of the **paediatric mycobacterial research group:**

- to improve the diagnosis of tuberculosis in children
- to expand knowledge on all aspects of epidemiology and prevention of childhood tuberculosis
- to explore the use of cytokines as biomarkers for diagnosis and prognosis of diseases in childhood

The ongoing research projects in 2017/2018 were:

- Prospective multicentre Swiss Study evaluating novel immunodiagnostic tests for childhood tuberculosis (CITRUS study).
- Evaluation of novel immunodiagnostic tests for tuberculosis infection and disease in an adult HIV cohort in Switzerland (NOVDA study).
- A prospective national study on clinical aspects, diagnosis and treatment of childhood tuberculosis with the Swiss Paediatric Surveillance Unit (SPSU).
- A retrospective study on screening of migrant children for tuberculosis in school-age children in the City of Basel for 10 years.

Main research focus of the **migrant health research group:**

- to define the epidemiology of asylum-seeking children cared for at the UKBB
- to expand knowledge on all aspects of diseases and disease patterns specific to asylum-seeking and refugee children including communicable and non-communicable diseases
- to summarize and review non-medical challenges in the care of asylum-seeking children

The ongoing research projects in 2017/2018 were:

- A retrospective analysis comparing asylum-seeking and non-asylum seeking children cared for at the UKBB in 2016 and 2017
- A qualitative study investigating the perspective of asylum-seeking caregivers on the quality of care provided

- 1) – Tuberculosis
  - BCG
  - Non-tuberculous
  - Mycobacteria
  - Immuno-diagnosis
- 2) – Asylum
  - Refugee
  - Health care delivery



**PD Nicole Ritz, MD, PhD**  
Research Group Leader

### 1) Group Members at the UKBB

- Marina Beaufils-Hugot, PhD, study-coordinator
- Marc Geiger, master's student
- Noemi Meier, MSc, PhD student
- Marie-Luise Decker, MD, research physician
- Andrea Zelmer, laboratory assistant

### 2) Group Members at the UKBB

- Julia Brandenberger, PhD student, research physician
- Sina Buser, master's student
- Myriam Gmünder, master's student

# Paediatric Diabetology

- **New technologies in diabetes**
- **Hypoglycemia**
- **Heart rate variability**
- **Diabetic ketoacidosis**
- **Life quality**



**Prof. Urs Zumsteg, MD**  
Research Group Leader

## **Group Members at the UKBB**

- PhD Dr. Gabor Szinnai, MD
- Dr. Sara Bachmann, MD
- Dr. Melanie Hess, MD
- Dr. Svetlana Beglinger, MD

The focus lies on clinical application of new diabetes technologies and the quality of metabolic control. Furthermore hypoglycemia and ketoacidosis as the most harmful events in diabetes are under investigation.

Diabetic ketoacidosis (Co.Diab-Study): This prospective observational study lead by G. Szinnai and S. Beglinger describes the dynamics of water regulatory hormones at diagnosis and during 48hrs of rehydration and insulin therapy. In collaboration with Dr. MA Burckhardt in Perth all patients could be recruited and the analysis is underway. Early detection of overhydration should minimize ketoacidosis associated cerebral brain edema. For details see text G. Szinnai.

Hypoglycemia-arrhythmia study (in collaboration with B. Donner): In a previous study (Diabetes Care 2016) S. Bachmann described frequent and often prolonged nocturnal hypoglycemia in diabetic children. Such episodes are mostly asymptomatic and can be fatal in rare cases (dead in bed syndrome). The aim is to determine heart rate variability (HRV) and thereby autonomic cardiac function, as well as changes in heart rate repolarization (Qtc) during episodes of nocturnal hypoglycemia. First results reveal changes in HRV starting already 15 min before hypoglycemia. HRV reactions occur and therefore may be useful for hypoglycemia prediction algorithms in the future. Preliminary results were published in Diabetes Technology and Therapeutics <https://doi.org/10.1089/dia.2019.2525.abstracts>

Swiss Cohort of persons with disorders of sex development (local lead M. Hess): The objectives are to set up a Swiss DSD cohort of subjects born in CH and diagnosed with DSD according to the Chicago consensus guidelines. The prevalence, the spectrum of diagnoses and clinical presentations are described, aiming to optimize treatment and follow up. The longterm outcome on effectiveness of treatments, gender allocation at different time points, general health problems, such as growth restriction and fertility are assessed. Objectives for centers of excellence for DSD care will be defined.

DPV with local lead M. Hess): Large Database including anonymous patient data of >400 diabetes centers in Europe. Ongoing study with UKBB co-authorship concerning metabolic control before and after insulin pump therapy.

# Paediatric Endocrinology

Three projects summarize our key activities in endocrine research:

**ThyGEN study:** Congenital hypothyroidism (CH) is the most frequent congenital endocrine disease. Next generation sequencing (NGS) is a tool for parallel sequencing of a large number of genes. This multicenter study at UKBB/USB Medical Genetics and in Paris, Berlin, Amsterdam and Montreal integrates NGS analysis as a diagnostic tool in CH-patients. Expected results cover three areas: 1) systematic description of molecular genetics, 2) impact of genetic results on counseling, 3) evaluation, in which diagnostic algorithm of CH routine use of NGS might be cost-effective.

**CoDIAB Study: Copeptin in children with type 1 diabetes and ketoacidosis:** Osmolality is the key stimulus for AVP/copeptin secretion. Physical stress can overrule osmolality regulated copeptin release and cause high copeptin levels. Diabetic ketoacidosis (DKA) is a frequent potentially life-threatening hyperosmolal disease state in type 1 diabetes. This observational study of children with DKA at UKBB and in Perth described copeptin dynamics during DKA therapy. We observed rapid decline of highly elevated copeptin levels within 12 hours after start of DKA therapy providing first normative data for physiological copeptin dynamics during DKA therapy that could guide water replacement in the future.

**ThyMOD Study: Personalized dosing for thyroid diseases:** Thyroid hormones are essential for normal brain development, and for normal cognitive functions. Treatment of thyroid diseases is difficult. To mitigate the risk of negative neurological and developmental outcome, it is essential to establish an optimal, personalized dosing that is continuously fine-tuned in neonates, infants and children with hyper- or hypothyroidism. The aim of this collaborative research project with Paediatric Pharmacology at UKBB, and Department of Mathematics, University Konstanz is to develop mathematical population pharmacokinetic-pharmacodynamic (PKPD) models that are able to describe and predict individual thyroid disease progression during treatment with thyroid hormone replacement therapy or anti-thyroid drugs based on routine clinical and laboratory data.

- **Thyroid**
- **Genetics**
- **Pharmacometric modelling**
- **Diabetic ketoacidosis**
- **Copeptin**



**PD Gabor Szinnai, MD, PhD**  
Research Group Leader

#### **Group Members at the UKBB**

- Tatjana Welzel, MD
- Noemi Züger, physician, MD student



# Paediatric Gastroenterology and Nutrition

- **Inflammatory bowel disease**
- **Functional gastrointestinal disorders**
- **Epidemiology**



**PD Raoul I. Furlano, MD**  
Research Group Leader

## **Group Members at the UKBB**

- Marc A. Sidler, MD
- Corinne Légeret, MD

We study the interplay of movement, inflammatory activity and psyche: projects are performed in collaboration with the Institute of Sports and Sports Science and the University Psychiatric Clinics Basel. An ongoing clinical study is the comparison of the therapeutic effect of acupuncture therapy and Iberogast® (STW-5) in children with functional nausea – a randomized clinical trial with sham-conditions – work in progress. As part of the Swiss IBD Cohort study, the following papers were published in 2018: The Relevance of Vitamin and Iron Deficiency in Patients with Inflammatory Bowel Diseases in Patients of the Swiss IBD Cohort. Madanchi M, Fagagnini S, Fournier N, et al. Swiss IBD Cohort Study Group. *Inflamm Bowel Dis.* 2018 Jul 12;24(8):1768–1779.

# Clinical Research in Paediatric Cardiology

The paediatric cardiology research group focuses on clinical studies identifying patients at risk for cardiac sequelae.

## **Long-term cardiopulmonary function in preterm born children.**

In this project, we apply recently developed tools in three dimensional real-time echocardiography in combination with cardiopulmonary exercise testing for functional analysis of a cohort of formerly preterm children at school age (followed by Prof. S. Lemola, Faculty of Psychology of the University of Basel).

In close cooperation with PD Dr. Daniel Trachsel, paediatric pneumology, this cohort will be compared with an age-matched control with respect to parameters reflecting cardiopulmonary function and hemodynamics. These data could contribute to the detection of patients at risk for developing significant pulmonary hypertension or ventricular dysfunction.

## **Nocturnal hypoglycemia in diabetic children: influence on cardiac repolarization and autonomic heart rate regulation.**

This prospective study is a close collaboration between Dr. Sara Bachmann and Prof. Dr. Urs Zumsteg, paediatric endocrinologists at UKBB to investigate the influence of nocturnal hypoglycemia on cardiac repolarization and autonomic heart rate regulation in children with type 1 diabetes mellitus. The combination of continuous nocturnal glucose measurements and ECG analysis enables us to study changes in the duration of repolarization and parameters of heart rate variability related to hypoglycemia.

Initial data show alterations in heart rate variability and QT duration in diabetic children with nocturnal hypoglycemia.

This study could contribute to the identification of increased risk for children with diabetes mellitus for sudden cardiac death during the night, probably triggered by arrhythmia (so called “dead in bed phenomenon”). In addition, the analysis of the autonomic regulation of heart rate variability in relation to glucose levels could help in the development of algorithms for early detection of hypoglycemia and could, therefore, further improve metabolic control.

- **Advanced technologies in echocardiography**
- **Stress echocardiography**
- **Cardiopulmonary exercise testing**
- **Heart rate variability**
- **Cardiac repolarization**



**Prof. Birgit C. Donner, MD**  
Research Group Leader

## **Group Members at the UKBB**

- Ramona Keiser, doctoral master's student
- Arianna Lauro, master's student
- Anne Auderset, master's student

# Neonatal Respiratory and Clinical Epidemiology Research

- **Preterm birth**
- **Respiration**
- **Autonomic dysregulation**
- **Neonatal lung disease**
- **Meta-analyses**



**Prof. Sven Schulzke, MD, MSc, FRACP**

Research Group Leader

## **Group Members at the UKBB**

- Roland Gerull, MD
- Isabel Gonzalez, study nurse
- Thilagavthy Jagan, MSc
- Kerstin Jost, MD, PhD
- Sirée Kämpfen, MD, PhD student
- Lara Kollbrunner, master's student
- Roland Neumann, MD
- Yvonne Stienen, master's student
- Lilian Suter, MD student
- Nicole Wellauer, study nurse
- Emanuela Zannin, PhD

The aims of our group are to better understand and support the rapidly growing respiratory system of neonates along with systematically summarising evidence in the field to provide up-to-date clinical care and help guide the direction of future research.

## **Prognostic value of heart rate variability in preterm infants**

We finalised our SNSF-funded project on the predictive value of baseline heart rate variability on cardiorespiratory stability required for discharge from the neonatal intensive care unit. We found that adding baseline sample entropy to clinical parameters improves prediction of cardiorespiratory stability of preterm infants. Four publications from this project have been published in respected peer-reviewed journals. Based on those findings, we initiated a new SNF project assessing the predictive value of sample entropy on hypoxaemic events in preterm infants routinely immunised in the hospital. We aim to examine whether sample entropy, a measure of complexity in a time series of heart beats, helps clinicians to pre-emptively assess the risk of hypoxaemic events after immunisation. Recruitment for this study has started in November 2018 and is progressing very well due to excellent efforts of the team.

## **Assessing lung mechanics in preterm infants by non-invasive forced oscillation measurements**

We recently finalised this joint collaboration project with the biomedical engineering group of Prof Raffaele Dellaca (Politecnico di Milano, Milano, Italy) and Acutronic Medical Systems AG (Hirzel, Switzerland). The main findings are that forced oscillation measurements in preterm infants on continuous airway pressure support are safe and help to predict the duration of respiratory support in the neonatal intensive care unit.

## **Cochrane Systematic Reviews**

These reviews are considered the reference standard for independent evaluation of interventions in health care. We added a review on beta-blockers for prevention of retinopathy of prematurity to the Cochrane Library and are currently updating our review on pentoxifylline for prevention of bronchopulmonary dysplasia.

# Fetal and Neonatal Stress Research

The process of vaginal birth prepares the fetus for the extra-uterine environment; it confers respiratory, cardiovascular and homeostatic advantages to the newborn infant, and is considered to play a critical role in breastfeeding and infant-mother bonding. The goal of our research group is to better understand this process with a particular view on neuronal integrity and neurodevelopment, the effect of caesarean section on the infant's outcome and to examine therapeutic strategies against transition failure, including hypoxia-ischemia and brain hemorrhage.

In an international multimodal randomized controlled trial, entitled EpoRepair and funded by the Swiss National Science Foundation (SNSF), we test whether high-dose erythropoietin improves neurological outcome of preterm infants suffering from severe brain damage ([www.eporepair.ch](http://www.eporepair.ch)). Recruitment and study treatment were completed in 2018, assessment of brain imaging and neurodevelopmental outcome are ongoing. In a second multicenter randomized controlled trial, entitled Lacarus and funded by the Family Larsson-Rosenquist Foundation (FLRF), we test whether the induction of mild uterine contractions prior to primary caesarean section may reduce neonatal respiratory morbidity and increase breastfeeding and infant-mother bonding rates.

Accompanying observational research aims to develop diagnostic and predictive measures for the early identification of newborn infants at risk for transition failure, e.g. postnatal dehydration and neonatal jaundice in a collaborative effort with the Department of Paediatric Pharmacology and Pharmacometrics, UKBB, and the Department of Mathematics and Computer Science, University of Basel.

Severe transition failure may result in hypoxic-ischemic encephalopathy, for which therapeutic hypothermia is successfully applied but the underlying molecular mechanisms of cold protection are incompletely understood. Here, our basic research focuses on a very promising target protein, RBM3, which we study in-vitro and in-vivo in close cooperation with the Department of Neurosurgery, University Hospital of Basel.

- Neuroscience
- Brain injury
- Neuroprotection
- Prediction
- Biomarker



**Prof. Sven Wellmann, MD, MBA**  
Research Group Leader

## Group Members at the UKBB

- Katrina Evers, MD
- Severin Kasser, MD
- Xinzhou Zhu, PhD
- Jingyi Yan, PhD student
- Tessa Görne, MD student
- Andrea Zelmer, technician
- Claudia Knöpfli, technician

# Paediatric Neurology and Developmental Medicine

- **Development**
- **Cognition**
- **Attention**
- **Epilepsy**
- **Sleep**



**Prof. Peter Weber, MD**  
Research Group Leader

## **Group Members at the UKBB**

- PD Alexandre Datta, MD
- Mark Brotzmann, MD
- Patricia Dill, MD
- Stephanie Jünemann, MD
- Annette Nageleisen-Weiss, MSc
- Antoinette Depoorter, MD
- Nadine Oser, MD
- Martina Hubacher, MD

The main topics of our research group include development, cognition, attention, epilepsy, sleep and autism.

P. Weber and his co-worker A. Depoorter are currently working on prediction of the outcome of preterm babies with evoked potentials. A. Datta and his co-workers' (N. Oser, M. Hubacher and A. Nageleisen-Weiss) main interest is epilepsy and sleep: Network connectivity in epilepsy with centro-temporal spikes (BECTS), the role of cerebellum in BECTS, longitudinal neuropsychological profiles, functional MRI and sleep analysis for regenerative processes in BECTS are ongoing projects. A. Datta has a collaboration for chronobiological sleep studies in preterm babies with the department of clinical pharmacology (M. Pfister and J.v.d. Anker, UKBB) and neonatology (K. Jost and S. Schulzke) and for antiepileptic drug level analysis in breath with the Botnar Foundation Professorship (P. Sinues, UKBB). Further, collaborations in national and international studies are in progress.

Autism and attention deficit disorders are the particular sphere of interest of M. Brotzmann and what he is involved with in different studies in collaboration with the Faculty of Psychology of the University of Basel.

The Swiss register for children with cerebral palsy is S. Jünemann's main topic in collaboration of other Swiss centres for paediatric neurology as well as orthopedics.

# Neuromuscular Research

Our main scientific activities are clinical studies aimed at the delay of disease progression in neuromuscular diseases. Currently, we investigate whether tamoxifen has a positive impact on the course of disease symptoms in DMD patients. We coordinate a multicenter 48 week double-blind, placebo-controlled randomized clinical parallel trial (RCT) using a 1:1 design with a total number of 80 ambulant (6.5–12 year old) DMD patients. This trial is funded by ERA-NET 2016, the Swiss National Science Foundation, and various patient organisations of the UK, NL and Monaco (Duchenne UK, Duchenne Parent Project NL and Association Monégasque Contre les Myopathies). For more information, please refer to [www.tamdmd.ch](http://www.tamdmd.ch).

Additionally, we perform a single center double-blind, placebo-controlled randomized clinical crossover trial (RCT) using a 1:1 design with a total number of 35 patients to investigate the efficacy of ketone bodies to prevent migraine attacks. This trial is funded by the Swiss National Science Foundation.

- **Investigator initiated clinical trials**
- **Duchenne muscular dystrophy**
- **Tamoxifen**
- **Ketonbodies**
- **Migraine prevention**



**Prof. Dirk Fischer, MD**  
Research Group Leader

## **Group Members at the UKBB**

- PD Andrea Klein, MD
- Patricia Hafner, MD
- Sara Nagy, MD
- Vanya Gocheva, PhD student
- Niveditha Putananickal, PhD student
- Daniela Rubino-Nacht, Study management and coordination
- Caroline Baya, Study management and coordination
- Karin Wild, study nurse



# Paediatric Anesthesia

- Airway
- Respiratory monitoring



**Prof. Thomas O. Erb, MD, MHS**  
Research Group Leader

## Group Members at the UKBB

- Jens Moll, MD

Respiratory complications remain the leading cause of morbidity in children undergoing anesthesia or sedation. Our group's longstanding record of research activities exploring effects of anesthetic drugs, airway instrumentation and respiratory monitoring in these children has been further extended. Especially in infants and young children the great vulnerability of the airway mandates meticulous and precise management. Main research activities were centered on the development of advanced respiratory monitoring tools.

Capnography is recommended as the gold standard for respiratory monitoring during sedation. However, since signal disturbances are frequently encountered with currently used tools, especially in young children, a modified oropharyngeal airway was developed. In an artificial model mimicking a breathing 6-month-old infant, capnography signals obtained via the new device were compared with those obtained via the currently used standard CO<sub>2</sub>/O<sub>2</sub> nasal cannula. The study revealed that the tracheal to device CO<sub>2</sub> difference was significantly smaller when using a modified CO<sub>2</sub>/O<sub>2</sub> oropharyngeal airway. Based on these promising results a modified CO<sub>2</sub>/O<sub>2</sub> oropharyngeal airway was designed and developed in collaboration with FHNW Life sciences Muttens. Swissmedic approval was accomplished and a clinical evaluation is ready to start.

Reliable and precise measurement of airway pressure is a long held demand since pressure related tissue damage is a risk inherent with various medical treatments. In particular mechanical ventilation may induce pressure related lung damage. Therefore, it is mandatory to control the applied pressure in the airway in order to guide the ventilation modalities. At present, pressure measurement is simply located in the ventilator, which has considerable limitations regarding its accuracy. A sensor based pressure measurement at the tip of an endotracheal tube is expected to allow measurements with higher accuracy. An ultra-thin, <0.2mm thick, printed pressure sensor was developed in collaboration with CSEM (patent approved). The printed sensor is fabricated solely with high-throughput compatible technologies and may be produced at low costs. In an artificial lung and trachea model the new sensor (mounted on an endotracheal tube) was examined against a reference sensor. These tests revealed that the various modes of ventilation could be recorded accurately with the printed sensor. Furthermore, the amplitude of the sensor is stable over the full measurement time of 10h. Further work will include device improvements (printed shielding for the sensor and faster stabilization) and extensive in-vitro and in-vivo testing.

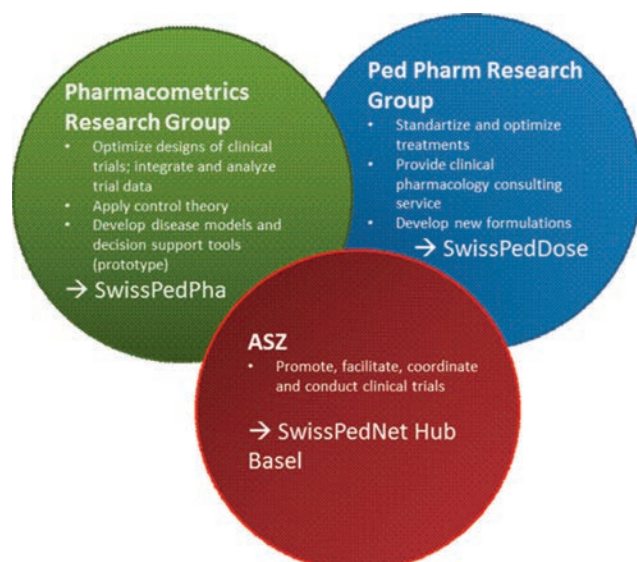
# Centre for Paediatric Pharmacology and Pharmacometrics (PedPP)

Prof. Dr. med. Johannes van den Anker and Prof. Dr. med. Marc Pfister direct Paediatric Pharmacology at UKBB, the national centre for Paediatric Pharmacology and Pharmacometrics (SwissPedPha) and the SwissPedNet Hub Basel. The primary focus of this centre is to perform clinical and translational research in the areas of developmental pharmacology, pharmacometrics and systems pharmacology (computer modeling and simulation), pharmacogenetics and pharmacoepidemiology. We train the next generation of clinical scientists, pharmacists, clinicians, pharmacologists and pharmacometricians.

We build pharmacometric models and decision support tools to optimize and personalize treatments in children. As an example, we developed an innovative algorithm to predict hyperbilirubinemia and phototherapy (European patent 171941602-1111).

We introduced SOPs and QC processes in the SwissPed Hub in Basel (Ambulantes Studienzentrum ASZ) and contributed to numerous clinical studies in children. We also manage the ASZ that you can find on page 10 of this report. In the national SwissPedDose initiative, which is funded by the federal office of public health (BAG), we made scientific contributions to harmonize and optimize dosing of drugs such as amoxicillin, gentamicin, vancomycin, and metamizole.

We also received several grants including (i) a SNF grant for the “KIDS-STEP” investigating adjunct corticosteroid therapy in hospitalized children with community acquired Pneumonia (CAP), (ii) a grant from the ETH foundation to develop a computer model that accounts for physical activity to personalize insulin treatment in children with Type-1 Diabetes mellitus (cooperation with ETH Basel), and (iii) together with DKF, we are part of a SNF grant to develop and implement a harmonized nationwide interactive electronic general consent process.



- Pharmacology
- Pharmacometrics
- Paediatric Clinical Trials
- Systems Pharmacology



**Prof. Johannes van den Anker, MD, PhD (Paediatric Pharmacology); Prof. Marc Pfister, MD (Pharmacometrics and Systems Pharmacology)**  
Research Group Leaders

## Group Members at the UKBB

- Andrew Atkinson, PhD
- Jantine Brussee, PhD
- André Dallmann (until early 2018), PhD
- Aline Fuchs (until early 2018), PhD
- Verena Gotta, PhD, research lead
- Gilbert Koch, PD, research lead
- Stephanie Leroux, MD
- Tatjana Welzel, MD
- Ricarda Foulk, administrative assistant
- Sarah Koechlin, project manager
- Tamara van Donge, PhD student
- Natalie Schoenfeld, MD student
- Carole Borter, master’s student
- Ly Wen Dieu, master’s student
- Patrick Fankhauser, master’s student

# Outcome Research in Childhood Cancer

- Childhood cancer
- Survivorship
- Physical activity
- Cardiac and bone health



**Prof. Nicolas von der Weid, MD**  
Research Group Leader

### Group Members at the UKBB

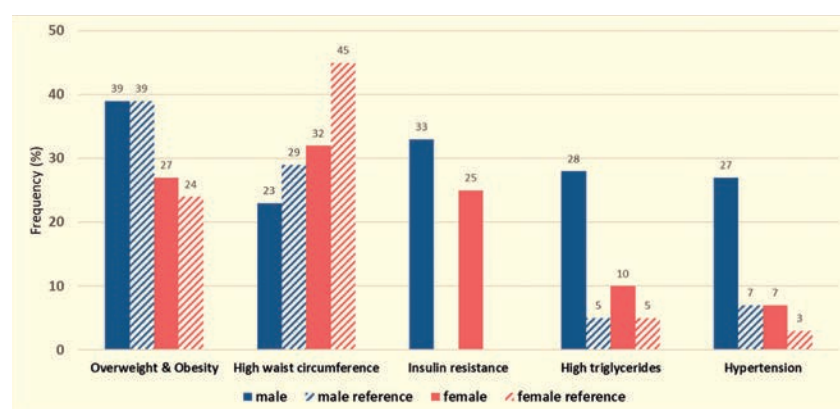
- Prof. Susi Kriemler, MD
- Corina Rüegg, PhD
- Iris Banteli, PhD, study nurse

In 2018, main activities of the group focused on the clinical part of the SURfit study, a randomized interventional study in adult childhood cancer survivors. Intervention consisted of increasing physical activity at least 3 h/week and reducing screentime by 25 % for 12 months. The type of physical activity was left open to participants, who had to record it using a web-based logbook. Probands in the control group should not change anything in their usual level of physical activity. We randomized 150 probands in the 2 groups (75 probands per group).

Main outcomes of interest were:

- 1) composite cardio-vascular risk score (waist circumference, BMI, blood pressure, glucose, HDL, triglycerides)
- 2) bone health, measured by both bone mineral density (Dexa-Scan) and architecture (HR-pQCT)
- 3) quality of life and fatigue, assessed by standardized questionnaires

Probands were assessed at baseline and after 3, 6 and 12 months of intervention. First results of the baseline investigations are now available and have been recently published (see pt.5). Briefly, they show that survivors are indeed a population at-risk for cardiovascular disease, being clearly more overweight or obese than the general population, and more often suffering from arterial hypertension, high blood lipids, reduced glucose tolerance (all features of the metabolic syndrome) and reduced bone density, putting them at risk of fractures. Results from the randomized intervention are expected for 2019 and will be published in different medical journals.



Prevalence of cardiovascular disease risk factors in Swiss childhood cancer survivors

# Immune Thrombocytopenia Research

The projects include those of the Intercontinental Cooperative ITP Study Group (ICIS, [www.itpbasel.ch](http://www.itpbasel.ch)) and of the department oncology/hematology at the UKBB. ICIS was founded in 1997 and is leading 4 registries with the aim of establishing a worldwide network of scientists and clinicians involved in immune thrombocytopenia (ITP). Currently, the Paediatric and Adult Registry on ITP (PARC-ITP) and the Splenectomy Registry are open for patient recruitment by internet access.

In 2018, a comparison of the natural history and treatment of two years of children and adults with ITP was published (Schifferli A et al. 2018a). Several unexpected similarities among children and adults were found, such as the potential of remission 1 and 2 years after the initial diagnosis, but also unexpected differences, such as the percentage of patients without bleeding; interestingly with more adults in the group of non-bleeding patients. An analysis with paediatric data extracted from ICIS Registry II focused on predictors of outcome: Younger age, bleeding severity at diagnosis, and initial treatment with a combination of corticosteroids and IVIG are associated with remission of ITP at 12 months (Bennett CM et al. 2018).

In an ongoing analysis, the rarely reported secondary ITP is described in 99 of 3581 children (2.8%) (Schifferli A et al. 2018b). Infectious and autoimmune diseases were main causes of ITP. Our group is involved in national and international guideline panels, in the development of a new edition of German, Austrian and Swiss management recommendations (Matzdorff A et al. 2018), in the description of diagnosis and treatment of paediatric ITP (Kühne T. 2018a and b) and in the development and performance of registries (Kühne T. 2018c).

The study of the immune system is a further activity of the group. Dr. A. Schifferli coordinated a clinical multi-center open-label trial in Switzerland with the aim to investigate the immunological potential of romiplostim, a thrombopoietin-receptor agonist, based on the observation that certain patients exhibited an unexpected, sustained response after termination of this drug (Schifferli A and Kühne T. 2016). The recruitment of patients is now completed (February 2019).

- Platelets
- Thrombocytopenia
- Bleeding
- Registry
- Trial



**Prof. Thomas Kühne, MD**  
Research Group Leader

#### **Group Members at the UKBB**

- Monika Imbach, study nurse
- Caroline Martin Asal, study nurse
- Alexandra Schifferli, MD
- Verena Stahel, study nurse



# Childhood Leukemia

- Acute myeloid leukemia
- Modeling
- Molecular mechanisms
- Therapeutic targeting



**Prof. Jürg Schwaller, MD**  
Research Group Leader

### Group Members at the UKBB

- Natarajaswamy Kalleda, PhD (Swiss National Science Foundation)
- Neil James Fisher, PhD (Swiss Cancer League)
- Maria Pique-Borras, PhD student
- Marwa Almosaileakh, PhD student
- Samantha Tauchmann, PhD student
- Hughes-Etienne Chatel-Soulet, PhD student
- Sabine Ehret, Laboratory technician
- Frederik Otzen Bagger, Bioinformatician

Our research studies the molecular mechanisms of paediatric acute myeloid leukemia (AML). Hereby, we focus on AML driven by epigenetic regulators such as fusions of the mixed lineage leukemia (MLL) or the nucleopore 98 (NUP98) genes. As AML is rare and access to primary cells is limited, its biology is mostly studied in mice (Fig.1). We recently developed a model for acute leukemia driven by the MLL-ENL fusion. We found that in contrast to other MLL fusions, mostly hematopoietic stem and early progenitor cells are susceptible for transformation by MLL-ENL, suggesting a differential susceptibility for malignant transformation of the cells of the hematopoietic hierarchy (Stavropoulou et al., Hemasphere, 2018).

We also studied the transforming potential of the NUP98-NSD1 fusion, a molecular hallmark of paediatric AML patients with poor outcome, and the NUP98-MLL fusion, a rare but unusual lesion in myelodysplasia and AML. We found that expression of NUP98-MLL in mice, like in patients, led to MDS and AML expressing very low levels of the so-called HOX genes (submitted). The transforming potential of NUP98-NSD1 is a matter of ongoing discussion. Our findings suggest that NUP98-NSD1 is insufficient to transform hematopoietic cells, and as observed in the majority of the patients, depends on cooperation with other mutations. Interestingly, preliminary observations suggest a particular developmental window of opportunity to induce AML by NUP98-NSD1, which may explain why older children are mostly affected.

In collaboration with the group of Thomas Mercher (Paris) we developed a novel model of acute megakaryoblastic leukemia (AMKL), a rare but very aggressive form of AML, mostly affecting infants. For the first time, we were able to induce an AMKL phenotype in mice, and show that it most likely originates from hematopoietic stem cells during fetal development (submitted).

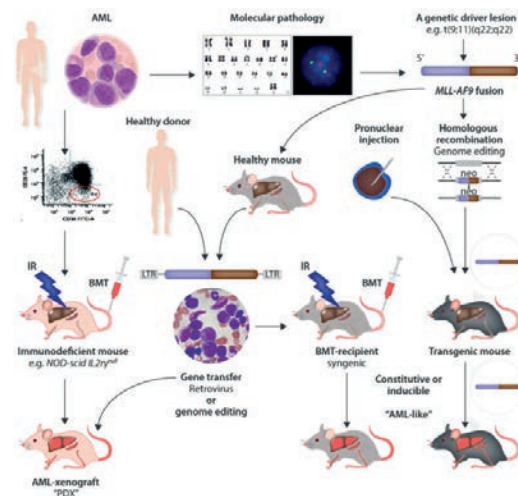
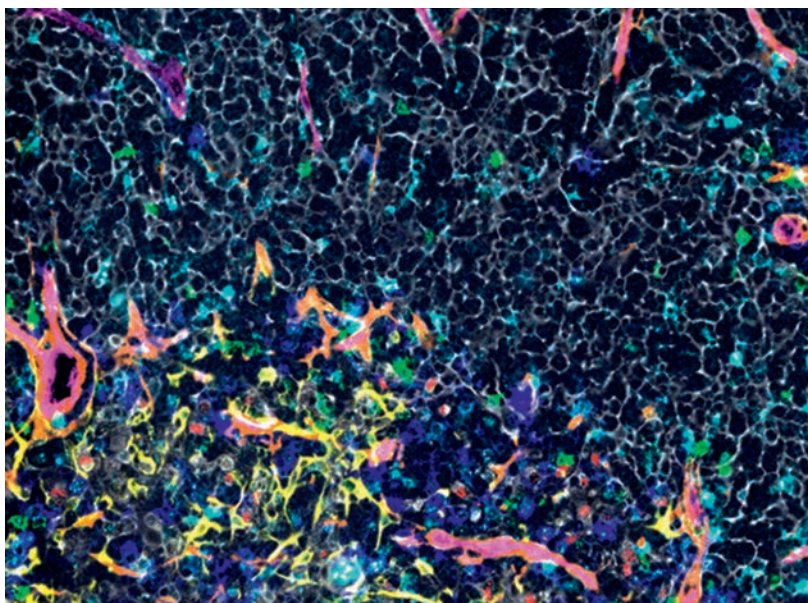


Fig.1: Different strategies to model AML in mice.

# Paediatric Immunology

T cells are essential in establishing protective immunity, but can also cause harm should their activity be directed against an individual's own tissues, a pathology referred to as autoimmunity. The T cells' ability to distinguish between potentially injurious antigens of pathogens and malignancies ("non-self") and the body's own antigens ("Self") is instructed during the cell's intrathymic development and results from interactions with the stromal microenvironment (Figure). Thymic epithelial cells (TEC) constitute an essential component of this stroma whereby cortical (c) and medullary (m) TEC differ in their phenotype, gene expression and function. Our research focuses on a detailed understanding of TEC development and function. For this purpose, we have generated experimental models with specific gain or loss of gene functions which allow for the interrogation of exact genetic and epigenetic mechanisms important for thymus organogenesis and function. Differential DNA methylation, the expression of micro-RNA and posttranslational histone modifications constitute epigenetic mechanisms essential for TEC fate determination, maintenance and function. In parallel, we have investigated the identity of TEC stem/precursor cells and their intermediate stages in differentiation towards mature cTEC and mTEC. Using lineage fate mapping, we demonstrated that the postnatal medulla is expanded from individual progenitors with a cTEC-like phenotype which are located between the two anatomical compartments of cortex and medulla. Finally, we have also established that metabolism plays an important role in TEC biology as changes in mitochondrial energy production severely disturb TEC homeostasis, cellularity, phenotype and thymocyte selection at multiple maturational stages. Hence, our findings link metabolic changes in TEC to specific stages in T cell development.



Cellular diversity of thymic stroma illustrated by 8 markers out of a total 24 used in CODEX, a novel multiparameter immunofluorescence analysis platform

- **Thymus development**
- **Thymic epithelial cell**
- **T cell genetics**
- **Epigenetics**
- **Lineage fate**



**Prof. Georg Holländer, MD**  
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#### **Group Members at the UKBB**

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- Irene Calvo, PhD
- Ellie Christen, technician
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- Lucas Musette, PhD student
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# Developmental Immunology

- Innate lymphoid cells
- Mucosa
- Inflammation
- Immunosurveillance
- Cytokines



**Prof. Daniela Finke, MD**  
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- Frank Lehmann, PhD
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Cells of the innate and adaptive immune system cooperate to achieve an equilibrium of immune responses that maintains tolerance to self-antigens (Ags), nutrients and commensal bacteria, but clears foreign Ags and eliminates tumor cells. T lymphocytes and their innate counterparts, the innate lymphoid cell (ILCs) are tightly regulated by a coordinated induction/repression of transcription factors. Moreover, tissue micro-environments contribute to the outcome of local immune responses such that immunopathology is avoided.

**Transcriptional identity of innate lymphoid cells:** ILC3s act as first-line responders to tissue injury, infection and inflammation. The identification of pathways controlling the identity of ILCs is crucial for a better understanding of how innate and adaptive immune responses are regulated across disparate organs. Small intestinal type 3 ILCs (ILC3s) prevent T cell responses to commensal Ags, whereas splenic ILC3s promote T cell responses to foreign Ags emphasizing their tissue-specific properties. Using various mouse models and in-depth single cell profiling of ILC3s we have comprehensively assessed the transcriptional signatures of ILC3s and its progenitors. Our results show that environmental signals, including the microbiota, adapt the transcriptional identity of ILC3 and modulate signalling pathways able to induce or limit Ag-specific CD4+ T-cell responses. In addition, we found key factors regulating pro-vs. anti-inflammatory cytokine responses of ILCs which are critical for the outcome of an immune response. Our data demonstrate a high responsiveness of ILCs to tissue-derived cytokines regulating their immune function in health and disease.

**Anti-tumor responses of innate lymphoid cells:** Type 1 ILCs (ILC1s) reside in the liver, and a large part of their function is attributed to the expression of TRAIL, a TNF superfamily member with a well-documented antitumor activity. We could show that TRAIL expression on mouse ILC1s is controlled by an activating receptor NKp46. In the absence of NKp46, ILC1s fail to express normal levels of TRAIL on the surface, which results in diminished cytotoxicity toward TRAIL receptor-positive targets. These findings provide the first evidence of a role of NKp46 in ILC1s that calibrates their antitumor response.

# Paediatric Surgery Research

Our research group focuses on the interaction of enteric neuronal innervation with the mucosal immune system in paediatric patients with intestinal innervation disorders (Hirschsprung's disease) and inflammatory bowel disease. Dysbiosis, bacterial overgrowth and changes in innate and adaptive effector immune cells are known to initiate colonic inflammation. Regulation of immune cells significantly contributes to mucosal homeostasis. While inhibitory cells maintain homeostasis and tolerance towards commensals, effector cells are indispensable for fighting and clearing pathogens. Recent findings suggest that enteric neurotransmitters fine-regulate microbial-immune cell crosstalk, bacterial recognition of phagocytes and subsequent T cell responses. We study the enteric innervation, characterize neurotransmitters and monitor phenotypical changes in mucosal innate and adaptive immune cells using immunofluorescence, flow cytometry and quantitative real time PCR. Combining cell sorting and immune cell based in vitro assays we focus on the underlying molecular mechanisms. Uncovering new interaction pathways between enteric neurons and immune cells will help to improve diagnosis of enterocolitis susceptible Hirschsprung's patients and will improve therapeutic treatment of juvenile colitis patients.

- Enterocolitis
- Neurodegeneration
- Mucosal neuro-immune mechanisms
- Hirschsprung's disease



**Prof. Stefan Holland-Cunz, MD**  
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#### **Group Members at the UKBB**

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- Virginie Galati, technician
- Urs Kym, technician
- Isabelle Müller, master's student
- Madlaina Helbling, master's student

# Molecular Strategies in Paediatric Surgery

- Influences of the hypoxic microenvironment on tumor progression
- Metastatic homing and proliferation in neuroblastoma
- In vivo molecular imaging of tumor models
- Orthotopic tumor models

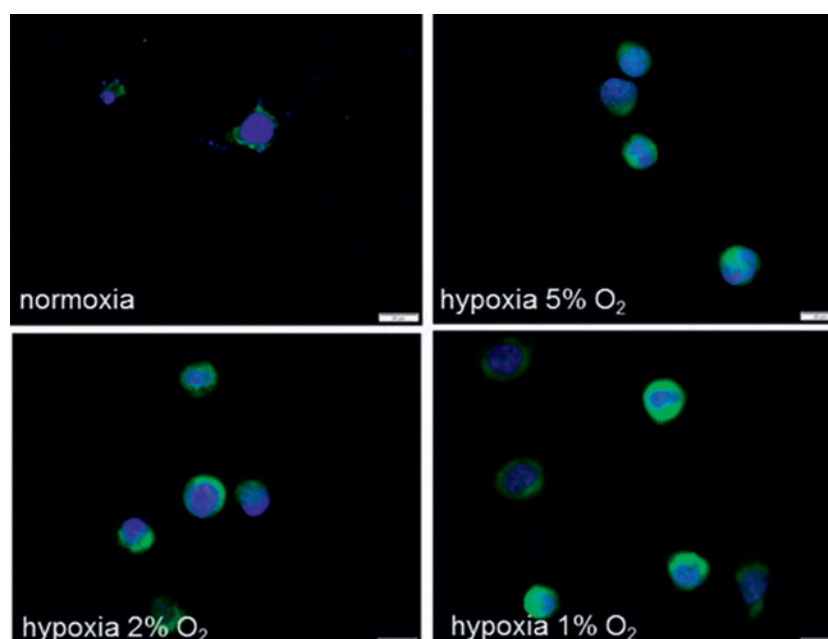


**PD Stephanie Gros, MD**  
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## Group Members at the UKBB

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- Urs Kym, technical assistant
- Nicola Pini, master's student/MD student
- Stefanie Volkart, master's student/MD student

Neuroblastoma is the most common extracranial solid tumor in childhood. Despite multidisciplinary approaches, the prognosis of high-risk neuroblastoma with disseminated disease is still poor. Our research is focused on mechanisms of tumor progression and migration of neuroblastoma as well as the latter's inhibition. Dysregulation of cell proliferation and structurally and functionally abnormal blood vessels within this highly malignant solid tumor often lead to severe hypoxia. Adaptation of cancer cells to the hypoxic microenvironment is characterized by genetic and adaptive mechanisms allowing the cells to survive. Our research is based on the hypothesis that the hypoxic microenvironment enables cancer cells to acquire enhanced invasive and metastatic properties, which lead to a highly aggressive tumor progression and poor prognosis. We could show that the enzyme carbonic anhydrase IX, which is regulated by hypoxia furthers tumor progression in the hypoxic tumor microenvironment and is a possible therapeutic target (J Enzyme Inhib Med Chem. 2018). Our work on neuroblastoma was supported by the Stiftung krebskranke Kinder - Regio basiliensis and the University of Basel and was awarded with the Jack Plasckes Award 2018. We are currently implementing novel patient-based in vitro approaches to rapidly compare established protocols with innovative therapeutics. This approach could further personalize neuroblastoma treatment and make it more effective for each patient.



Oxygen related CAIX expression of PT6216 cells in immunofluorescence staining (J Enzyme Inhib Med Chem. 2018)

# Computational Spine Biomechanics

## SpineBot

The project “Intraoperative in vivo Assessment of Spinal Stiffness with a Programmable Robotic Device”, launched in cooperation with the Institute for Surgical Technology and Biomechanics (ISTB) at the University of Berne and was co-financed twice by the Swiss National Science Foundation, with further advanced thanks to a project-related grant for Dr. Daniel Studer as part of the University of Basel’s special programme for the promotion of young researchers. The targeted, in vivo collected biomechanical data are unique in this form and could make a lasting contribution to the goal of fusionless correction of spinal deformities by implementing them in finite element models and developing new implants and surgical techniques.

## Health-related Quality of Life (HrQoL)

The project “Assessment of Health-related Quality of Life before and after spinal fusion surgery in adolescent patients with severe neuromuscular scoliosis” aims at objectifying changes of HrQoL of children and adolescents with neuromuscular scoliosis after spinal fusion surgery. Performing high-risk and cost-intensive surgical interventions in patients who are usually physically and mentally severely impaired is increasingly questioned due to pressure coming from rising costs in the healthcare system. Objective criteria, such as x-rays and functional scores are no longer sufficient to justify these interventions. The recording of HrQoL, with the help of PROMs (“patient reported outcome measures”), intends to address this problem.

## Pelvic width

With the project “The correlation of leg-length-discrepancy and pelvic obliquity in relation to pelvic width and its influence on the growing spine in patients with and without lumbosacral malformations” we investigate the influence of pelvic growth on the child’s spine as a function of leg length differences and lumbosacral malformations. Part of the project will be carried out as a doctoral thesis.

## Spinal Length

With the project “Traditional T1-S1 distance significantly underestimates the true 3-dimensional length of the spine” we investigate (within the context of a master’s thesis) the clinical application of a software to calculate the 3-dimensional length of the vertebral column based on conventional x-rays, developed in cooperation with the University of Bern.

- SpineBot
- Health-related quality of life
- Pelvic width
- Spinal length



**Prof. Carol C. Hasler, MD**  
Research Group Leader

## Group Members at the UKBB

- Daniel Studer, MD  
(Project Leader)
- Christoph Heidt, MD
- Jonas Blecher, MD student
- Thomas Angst master’s student

# Bone Tumor and Limb Reconstruction

- Bone tumor
- Limb deformity
- Tumor diagnostics
- Patient-specific implants and guides
- Reconstruction



**PD Andreas H. Krieg, MD**  
Research Group Leader

## Group Members at the UKBB

- PD Gehmert Sebastian, MD
- Zdzislaw Krol, PhD
- Chao Dong, PhD student
- Marc Schmidt, master's student

## Research finished in 2018

1. Virtual periacetabular osteotomy and anatomical measurements – how far from a disaster.  
The goals of this study were to provide safer and anatomically optimal osteotomy distances. The paper has been published in Orthopaedic Surgery and obtained the Wissenschaftspreis der Vereinigung für Kinderorthopädie an der 32. Jahrestagung, 3. March 2018 in Dresden.
2. MCS110, an anti-CSF-a monoclonal antibody, for the treatment of pigmented villonodular synovitis – the clinic trial experience in Switzerland.  
At the begin of 2016 we started with a phase II randomized, double-blind, placebo-controlled study followed by open label dosing to assess safety, tolerability and effect on tumor size of MCS110 in patients with pigmented villonodular synovitis. In 2018, this study was finished, 4 patients were included and treatment was initially very successful, but we did have one relapse. One abstract has been finished.

## Research project partly finished in 2018

1. Survivorship and clinical outcome of tumor prosthesis reconstruction in pelvic and extremities tumor patients.  
This is doctoral thesis work conducted by Mr. Chao Dong. The result has been presented in 78. Jahreskongress Swiss Orthopaedics, Montreux, 04.–06.06.2018. We plan to collect more prosthesis patients in cooperation with other tumor centers to publish 1 high quality article in 2020.
2. Percutaneous cyst aspiration with injection of two different bioresorbable bone cements in treatment of simple bone cyst.  
Results were presented in 78. Jahreskongress Swiss Orthopaedics, Montreux, 04.–06.06.2018. and also at the 37<sup>th</sup> EPOS Annual Meeting, Oslo, 11.–14.04.2018.  
The manuscript of this project is complete and will be submitted soon.

## Ongoing research

1. Fitbone: Femur lengthening via a retrograde approach with the motorized intramedullary lengthening nail: “10-year-follow-up results”, which is doctoral thesis work conducted by Mr. Marc Schmidt. The Ethics Committee has already approved this study. This work will be finished by the end of 2019 and we will publish 1 article in 2020.
2. CPT: Allograft bypass/reconstruction Technique in CPT – a new modified technique. We will present the outcome in treating congenital pseudarthrosis of the tibia with allograft bypass or cases with allograft reconstruction. This work will be finished by the end of 2019 and we will publish 1 article in 2020.  
Throughout all of 2017/2018, we completed 2 major research projects, published 3 articles as first or corresponding author, and published 3 articles as coauthor. More than 15 congress presentations were given.

# Human Locomotion Research

We study the causal connections for understanding gait pathologies and treatment improvement:

The function of the rectus femoris muscle is unclear. We computed normal function using inverse dynamics and musculoskeletal modelling (Anybody) and the effect of force changes on the gait cycle. Less force resulted in initial toe contact, more force impeded foot clearance. These effects need to be respected in case of planning a muscle transfer. Achilles tendon lengthening is said to weaken the muscle. We showed in hemiplegic patients with cerebral palsy using musculoskeletal modelling (Anybody) that the energy of the soleus muscle improved and that of the gastrocnemii muscles remained unchanged.

Patients with cerebral palsy have difficulties to walk on uneven ground. We analysed the differences during gait comparing healthy individuals and patients with spastic hemiplegia walking on an uneven surface. The joint angles, centre of mass and muscle activity were the parameters of interest.

Botulinum toxin injection is a standard treatment for the correction of gait disorders in patients with cerebral palsy. It is unclear how much of the muscle gets affected and how the remaining part reacts. Muscle contraction can be assessed by functional MRI. In connection with force measurement muscle force can be estimated. Gait analysis with musculoskeletal modelling (Anybody) assesses muscle function during gait. MRI and gait analysis are carried out before, at 6, and 12 weeks after the application of botulinum toxin. The study has only just started.

Individual outcome prognosis after conservative and surgical treatment is of major interest. The simple computation of mechanics by modelling does not consider the reaction of the individual which influences the outcome. For this reason, we apply artificial intelligence (logistic regression, random forest, deep machine learning). The basis are all patients with cerebral palsy who were treated and had gait analysis. In a first step we analyse the effect of the treatment. Multilevel surgery showed improvement even after ten years in sagittal plane kinematics. Ankle foot orthoses are widely used for gait correction. They improve the gait parameters but do not reach symmetry as an indicator for improved stability.

- Gait analysis
- Gait mechanics
- Musculoskeletal modelling
- Outcome prediction
- Treatment outcome



**Prof. Reinald Brunner, MD,  
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- Jacqueline Romkes, MD
- Katrin Bracht, PhD
- Marie Freslier, technician
- Beat Göpfert, technician
- Thomas Schlemmer, MD







Publications 2017/2018

# Publications 2017/2018

## Paediatrics

### Paediatrics & Paediatric Pulmonology

#### Peer reviewed article

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## Review

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## Editorial material

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## Review

Pfeifle V. Bowel Management in children: how to keep children clean, *Annals of Paediatric Surgery*, Vol 13, 2017

## Letter/Book

Sucic L, Galati-Fournier V, Kym U, Pfeifle VA, Gros SJ, Schäfer KH, Holland-Cunz S, Keck S. Increased regulatory T cells in paediatric acute appendicitis. *Pediatr Allergy Immunol.* 2017 Sep 7. doi: 10.1111/pai.12797.

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Pfeifle V. Phenylketonuria and Hirschsprung Disease – an report of an unusual Presentation, *International Journal of Neonatal Screening*, Vol 24, 2017

Pfeifel V. Necrotizing fasciitis due to minor lesions, *Journal of Paediatric Surgery Case Reports*, Vol. 25, 2017

# Publications 2017/2018

## Orthopedics/Neuroorthopedics

### Computational Spine Biomechanics

#### Peer reviewed article

Berger S, Hasler C, Grant C, Zheng G, Schumann S, Büchler P. A software program to measure the three-dimensional length of the spine from radiographic images: validation and reliability assessment for adolescent idiopathic scoliosis. *Computer Methods and Programs in Biomedicine* 2017, 138:57–64.

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Studer D, Hasler CC. Overview Überlastungsschäden. *Swiss Sports&Exercise Medicine*, 2017; 65(3):12–15.

Studer D. Morbus Scheuermann – Von der Willensschwäche zur strukturellen Hyperkyphose. *Leading Opinions Orthopädie und Rheumatologie* 4/2017; 24–47.

Hasler CC. Early-onset Scoliosis: Contemporary Decision-making and Treatment Options. *J Pediatr Orthop.* 2018 Jul;38 Suppl 1:S13–S20.

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#### Editorial material

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#### Letter/Book

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#### Other

Hasler CC. Skoliosechirurgie im Wandel der Zeit. *Leading Opinions*, 2017 12(4):28–32.

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### Bone Tumor and Limb Reconstruction

#### Peer reviewed article

Hefti F, Donnan L, Krieg A.H. Treatment of shepherd's crook deformity in patients with polyostotic fibrous dysplasia using a new type of custom made retrograde intramedullary nail: a technical note. *J Child Orthop* 2017;11:64–70.

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## Editorial material

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Krieg A. Beinlängendifferenzen bei Kindern und Jugendlichen – Diagnostik und Therapieoptionen. *Paediatrica* Vol. 28 Nr. 1 2017; 20–23.

Krieg A, Schreiner S, Hasler C. Morbus Perthes und Epiphyseolysis capitis femoris. *Paediatrica* Vol. 28 Nr. 1 2017; 24–29.

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Hefti F, Krieg A.H. Grundsätzliche Bemerkungen zu den Kongenitalen Pseudarthrosen der Clavicula In: RP Meyer, F Moro, HK Schwyzer, F Hefti, A Lüscher: 100 Claviculapseudarthrosen- Fehleranalyse und Behandlungsvorschläge. Springer Heidelberg 2017. 392–394.

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## Other

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## Neuroorthopedics

### Peer reviewed article

Feucht MJ, Brucker PU, Camathias C, Frosch KH, Hirschmann MT, Lorenz S, Mayr HO, Minzlaff P, Petersen W, Saier T, Schneidmüller D, Stoehr A, Wagner D, Südkamp NP, Niemeyer P. Meniscal injuries in children and adolescents undergoing surgical treatment for tibial eminence fractures., *Feb*, 25(2); 445–453 *Knee Surg Sports Traumatol Arthrosc*. 2017.

Falkowski AL, Camathias C, Jacobson JA, Magerkurth O. Increased Magnetic Resonance Imaging Signal of the Lateral Patellar Facet Cartilage: A Functional Marker for Patellar Instability. *Aug*;45(10):2276–2283. *Am J Sports Med*. 2017.

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## Review

- Scott C. E. Brandon, Darryl G. Thelen, Colin R. Smitha, Tom F. Novacheck, Michael H. Schwartz, Rachel L. Lenhart: The coupled effects of crouch gait and patella alta on tibiofemoral and patellofemoral cartilage loading in children. *Gait & Posture*. Manuscript Number: GAIP0S-D-17-00637
- Speth B, Hellmich H. Der kindliche Knick-Senkfuß – ein Problem? *PAEDIATRICA* Vol.28 Nr. 1 II/2017, S. 32–35.
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- Camathias C. Der „Türstopper-Effekt“. 24–26, 1 *Leading Opinions* 2017.
- Rutz E, Camathias C, Speth B. Update: Spitzfuß *PAEDIATRICA* Vol. 28 Nr. 1 2017. 18–19.
- Speth B. Kindliche Beinachsen und Torsionen – Nützliches Wissen für die Praxis, *Kinderärzte Schweiz* 2018, (2): 25–27.

## Letter/Book

- Camathias C Apophysitiden – Sehnenprobleme am wachsenden Skelett. In: Christian Plaass, Lukas Weisskopf (Hrsg.) *Die Sehne*, De Gruyter 2017 298–311.
- Rutz E, Graham HK. Crouch Gait in Cerebral Palsy – Current concepts. In *Current Progress in ORTHOPEDICS*, Vol. 2, Ashok Johari, Keith DK Luk, James P Waddell, TREE LIFE MEDIA, chapter 04, pages 52–65.
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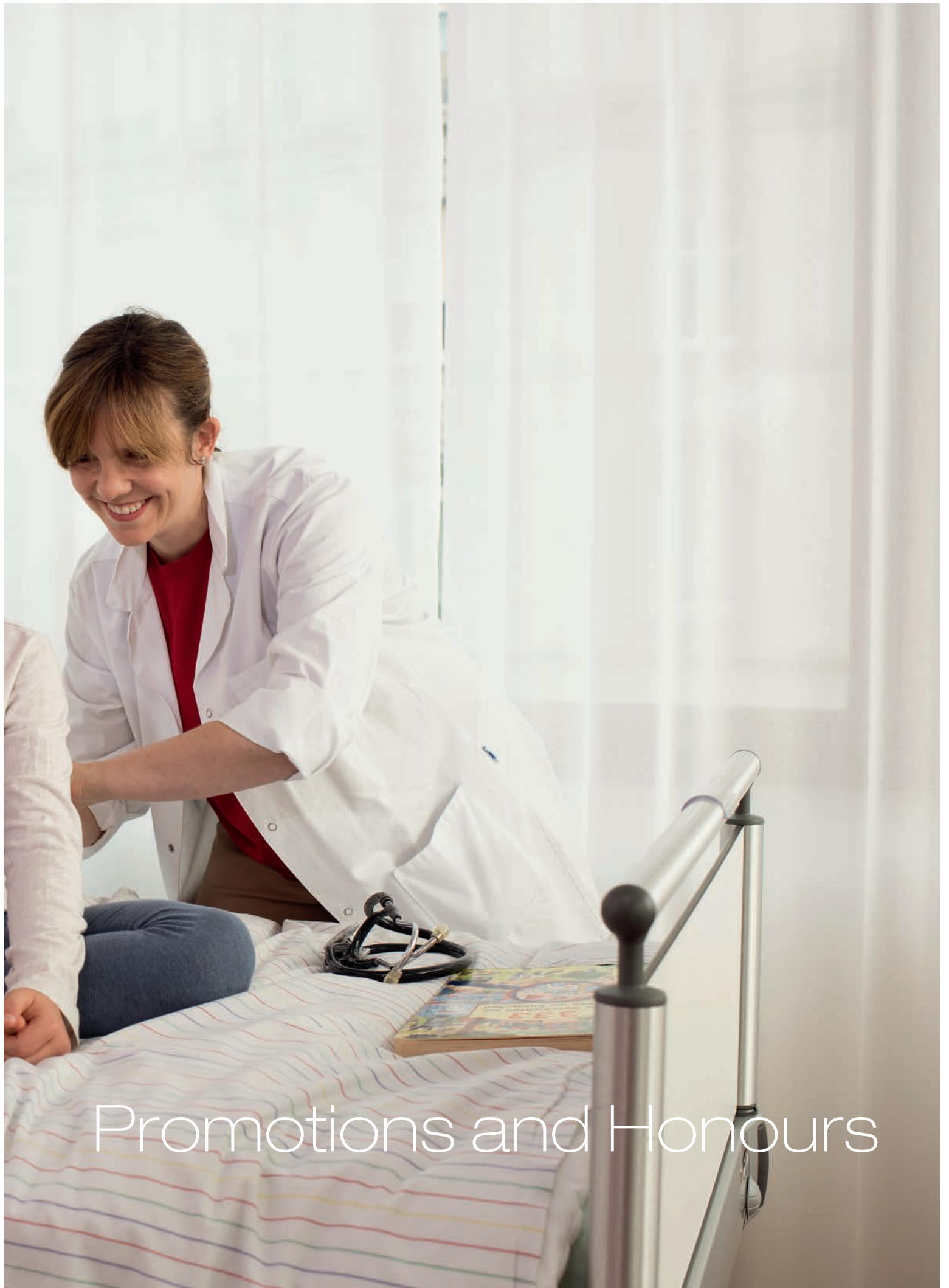
Rutz E, Thomason P, Willoughby K, Graham HK. Integrated Management in Cerebral Palsy: Botulinum Toxin A, Musculoskeletal Surgery and Rehabilitation. In *Cerebral Palsy*, Ed. C. Panteliadis, Springer 2018.

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Kläusler M, Rutz E. Evaluation and Conservative Management of Spinal Seformity in Patients with Cerebral Palsy: In „Scoliosis: Diagnosis, Classification and Management Options“; Ed. F. Canavese et al., NOVA 2018







# Promotions and Honours



# Habilitations/Dissertations/Master Thesis

## Habilitations

Name	First name	Title	Supervisor	Research Group
Camathias	Carlo	Die Patellaluxation des kindlichen Kniegelenkes	Carol C. Hasler	Computational Spine Biomechanics
Datta	Alexandre	Brain plasticity in children with benign epilepsy with centro-temporal spikes	Peter Weber	Paediatric Neurology and Developmental Medicine Group

## Dissertations

Name	First name	Title	Supervisor	Research Group
Bauwens	Jorgen	Impact of non-adherence to vaccination schedules	Jan Bonhoeffer	Vaccine Safety Research Group
Berchier	Christophe	Organisation et gestion de l'activité opératoire en hôpital pédiatrique: définition d'un modèle idéal de planification/ programmation et implémentation des mesures d'optimisation pour le service d'anesthésie et le bloc opératoire	Thomas Erb	Paediatric anaesthesia
Cremer	Martin	Immediate effects of phototherapy on sleep in very preterm neonates: an observational study	Alexandre Datta/ Peter Weber	Paediatric Neurology and Developmental Medicine Group
Depoorter	Antoinette	Neuronal biomarkers of cognitive development in preterm and term born infants: a multidimensional approach combining electrophysiology and peripheral blood biomarkers	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Dong	Chao	Survivorship and clinical outcome of tumor prosthesis reconstruction in pelvic and extremities tumor patient	Andreas Krieg	Bone Tumor and Limb Reconstruction Group
Evers	Katrina	Arginine Vasopressin and Copeptin in Perinatology	Sven Wellmann	Fetal and Neonatal Stress Research
Früh	Julia	Predicting neurodevelopmental outcome in preterm born infants using auditory event-related potentials: A systematic review	Peter Weber	Paediatric Neurology and Developmental Medicine Group

Name	First name	Title	Supervisor	Research Group
Hillenbrand	Anastasia	Impact of flash glucose monitoring on HbA <sub>1c</sub> in paediatric patients with type 1 diabetes	Gabor Szinnai	Paediatric Endocrinology
Meier-Girard	Delphine	The fluctuation behavior of heart and respiratory system signals as a quantitative tool for studying long-term environmental exposures and chronic diseases	Edgar Delgado-Eckert	Computational Physiology and Biostatistics
Müller	Isabelle	Influence of cholinergic signaling on anti-bacterial response of colonic epithelial cells	Stefan Holland-Cunz	Paediatric Surgery Research
Rost	Michael	The switch from curative to palliative care: Children's and adolescent's involvement in end-of-life decision making	Thomas Kühne	Immune Thrombocytopenia Research
Schuler	Marianne	Attitudes of Swiss Health Care Providers	Ulrich Heiningner	Paediatric Infectious Diseases and Vaccinology
Sharan	Apoorva	Multi-centre Active AEFI Sentinel Surveillance Network (MAASS) in India	Jan Bonhoeffer	Vaccine Safety Research Group
Suter	Lilian	Transoesophageal swallow detection in preterm infants	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group

# Habilitations/Dissertations/Master Thesis

## Master Thesis

Name	First name	Title	Supervisor	Research Group
Arikci	Denis	Sleep and Quality of Life Assessment in Adolescents and Young Adults with remitted Benign Epilepsy with Centro-temporal Spikes	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Auderset	Anne	Nocturnal hypoglycemia in diabetic children: Is Qtc prolonged compared to normoglycemia?	Urs Zumsteg	Paediatric Diabetology
Berni	Angela	Who where when why? Retrospective Analysis of reasons and frequency of hospitalization in children with Type 1 diabetes	Urs Zumsteg	Paediatric Diabetology
Binder	Roman	Methods for data extraction and processing of electronic health care data at the UKBB	Jan Bonhoeffer	Vaccine Safety Research Group
Bologna	Katja	Reduced Cardiorespiratory Fitness in Childhood Cancer Survivors	Nicolas von der Weid	Outcomes Research in Childhood Cancer
Borter	Carole	Population Pharmacokinetics of Intravenous metamizole in children less than 6 years old	Marc Pfister	Centre for Paediatric Pharmacology and Pharmacometrics (PedPP)
Bourquin	Luc	Immune metabolic characterization of type 3 innate lymphoid cells	Daniela Finke	Developmental Immunology
Brandenberger	Julia	The perspective of asylum-seeking caregivers on the quality of care provided by a Swiss paediatric Hospital – a qualitative study	Nicole Ritz	Paediatric Infectious Diseases and Vaccinology
Cuny	Pascale	Metabolische Kontrolle bei Kindern und Jugendlichen mit Diabetes mellitus: Prognostische Faktoren bei Diagnosestellung	Urs Zumsteg	Paediatric Diabetology
Fankhauser	Patrick	Retrospective quality control study to evaluate current amikacin dosing and therapeutic drug monitoring practices in preterm and term neonates	Johannes van den Anker	Centre for Paediatric Pharmacology and Pharmacometrics (PedPP)
Frey	Nadine	Metabolische Kontrolle pädiatrischer Patienten mit Diabetes mellitus Typ 1 vor und nach Umstellung auf eine Insulinpumpe	Urs Zumsteg	Paediatric Diabetology

Name	First name	Title	Supervisor	Research Group
Geiger	Marc	Diagnosis of tuberculosis in children: Indeterminate interferon-gamma release assays – a systematic review and meta-analysis	Ulrich Heiniger/ Nicole Ritz	Paediatric Infectious Diseases and Vaccinology
Heiri	Andrea	Analysis of children with secondary immune thrombocytopenia (ITP): An observational study of children of the PARC-ITP Registry – On behalf of the Intercontinental Cooperative ITP Study Group (ICIS)	Thomas Kühne	Immune Thrombocytopenia Research
Helbling	Madlaina	Cytokine induced upregulation of neuronal receptors	Stefan Holland- Cunz	Paediatric Surgery Research
Hongying	Teh	Role of polycomb repressive complex 2 in thymic epithelial development and function	Georg Holländer	Paediatric Immunology
Hüsler	Dario	The role of presumptive drivers of an inducible MLL-AF9-mediated leukemia cell model	Jürg Schwaller	Childhood Leukemia
Kaiser	Ramona	4D Analysis of left ventricular function and rotational mechanics by speckle tracking – normal values and values under growth hormone therapy for the paediatric and adolescent population	Birgit Donner	Clinical Research in Paediatric Cardiology
Ketterer	Naomi	The role of p38 MAPK signaling in ILC3 effector function	Daniela Finke	Developmental Immunology
Kollbrunner	Lara	Circumstances of death of preterm infant born at the border of viability	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group
Louwaige	Amber	Unraveling the molecular mechanism of acute erythroid leukemia	Jürg Schwaller	Childhood Leukemia
Manz	Nora	Evaluation of the current use of imaging modalities and pathogen detection in children with acute osteomyelitis and septic arthritis	Ulrich Heiniger/ Nicole Ritz	Paediatric Infectious Diseases and Vaccinology

# Habilitations/Dissertations/Master Thesis

## Master Thesis

Name	First name	Title	Supervisor	Research Group
Marchetti	Rosalina	The impact of neonatal hypoglycemia on sleep patterns in preterm infants: an observational study	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Nieder-schirp	Stefanie	Lean Healthcare: Wie müssen die Prozesse in der Neonatologie optimiert werden, um den Lebensstart von Frühgeborenen zu verbessern	Edgar Köster	
Pini	Nicola	Water permeability is a measure of severity in acute appendicitis	Stephanie Gros	Molecular strategies in paediatric surgery
Schönfeld	Natalie	Caffeine treatment of preterm infants: Impact on sleep	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Schwob	Noemi	Gender-related sleep differences in premature infants	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Stelz	Joelle	Turbulenz der Adoleszenz: Sitzen Psyche und Physis in einem Boot?	Urs Zumsteg	Paediatric Diabetology
Stienen	Yvonne	Analyse der Muttermilch von sehr frühgeborenen Kindern mithilfe des MIRIS Human Milk Analyzers	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group
Suter	Andrea	Breath-to-breath variability of CO <sub>2</sub> clearance measured after preterm birth is associated with subsequent re-hospitalization risk in infancy	Urs Frey	Paediatrics and Paediatric Pulmonology research group
Tauchmann	Samantha	Deciphering the role of GATA1 in a novel model of acute erythroleukemia	Jürg Schwaller	Childhood Leukemia
Tobler	Patrick	Timed function tests, motor function measure, and quantitative thigh muscle MRI in ambulant children with Duchenne muscular dystrophy: A cross-sectional analysis	Dirk Fischer	Neuromuscular Research
Veysel	Kaya	The Lin28/let7 microRNA feedback axis regulates development and maintenance of thymic epithelia and their capacity for regular T cell selection	Georg Holländer	Paediatric Immunology



Name	First name	Title	Supervisor	Research Group
Volkart	Stefanie	APQ1 in the intestinal tract of mice	Stephanie Gros	Molecular strategies in paediatric surgery
Weber	Myriam	Fatigue in Childhood Cancer Survivors	Nicolas von der Weid	Outcomes Research in Childhood Cancer
Wen Dieu	Ly	Prevalence rate of contraindicated drug drug interactions in paediatric inpatients	Johannes van den Anker	Centre for Paediatric Pharmacology and Pharmacometrics (PedPP)

# Appointments

Name	First name	Organisation	Appointment	Research Group
Bielicki	Julia	St. George's University of London	Senior Lecturer at the Institute for Infection and Immunity	Ambulatory Study Center (ASZ)
Donner	Birgit	Schweizerische Gesellschaft für Pädiatrische Kardiologie, Lausanne	Leiterin der Weiterbildungskommission	Clinical Research in Paediatric Cardiology
Donner	Birgit	Schweizerische Gesellschaft für Pädiatrische Kardiologie, Lausanne	Prä-Präsidentin	Clinical Research in Paediatric Cardiology
Frey	Urs	Swiss Personalized Health Network (SPHN)	Chairman of the National Steering Board (NSB) of the Swiss Personalized Health Network (SPHN)	Paediatrics and Paediatric Pulmonology
Hammer	Jürg	ERS HERMES Prüfungskomitee für Kinderpneumologie	Chair-Elect 2018 President 2019–2022	Paediatrics and Paediatric Pulmonology
Mayr	Johannes	Moscow Regional Research and Clinical Institute (MONIKI)	Honorary Professor for regular continuing education at paediatric congresses	Surgical Research
Schwaller	Juerg	European Haematology Association (EHA)	Associated Editor of HemaSphere, the new official EHA journal	Childhood leukemia
Sinues	Pablo	Swiss Metabolomics Society (SMS)	Vice-President	Translational Medicine Breath Research
Szinnai	Gabor	Nationale Koordination Seltene Krankheiten KOSEK	Board member	Paediatric Endocrinology

# Awards

Name	First name	Congress/ Society	Project/Title	Research Group	Award
Almosailleakh	Marwa	UKBB Research Days 2017	Role of the NSD1 methyltransferase in steady-state hematopoiesis	Childhood Leukemia	Highest award in the category Experimental Research in Paediatrics
Brotzmann	Mark	Anna Müller Grocholski Stiftung	Gait in children with infantile/atypical autism: Age-dependent decrease in gait variability and associations with motor skills	Paediatric Neurology and Developmental Medicine Group	3. Preis Anna Müller-Grocholski Stiftung
Buser	Sina	UKBB Research Days 2018	Characteristics of asylum-seeking children in need of complex care in a tertiary hospital in Switzerland	Migrant Health Research Group	Oral Presentation Award
Chawla	Raghav	UKBB Research Days 2018	Delving into the world of Single-Cell-Genomics	Childhood Leukemia	Oral Presentation Award
Decrue	Fabienne	UKBB Research Days 2018	Exposure to moderate air pollution and associations with lung function at school-age: a birth cohort study	Paediatrics and Paediatric Pulmonology	Oral Presentation Award
Depoorter	Antoinette	UKBB Research Days 2017	Neurofilament serum levels as biomarker of neuronal injury in very preterm born infants	Fetal and Neonatal Stress Research Group	Highest Award in the category clinical-epidemiological Research in Paediatrics
Finke	Daniela	University of Basel, Faculty of Medicine		Developmental Immunology	Lecturer of the year, 3 <sup>rd</sup> Place, 2 <sup>nd</sup> year Medical studies
Furlano	Raoul	University of Basel, Faculty of Medicine		Paediatric Gastroenterology & Nutrition	Lecturer of the Year 2018 , 2 <sup>nd</sup> Place

# Awards

Name	First name	Congress/Society	Project/Title	Research Group	Award
Gmünder	Myriam	UKBB Research Days 2018	Evaluation of recent asylum seeking children at inpatient department in a tertiary health care facility in Switzerland in 2016/17	Migrant Health Research Group	Oral Presentation Award
Gros	Stephanie	Schweiz. Pädiatrische Onkologie Gruppe (SPOG)	Hypoxia in tumor modulation of neuroblastoma in vitro and in the organotypic slice culture	Molecular strategies in paediatric surgery	Jack Plaschke Award 2018
Gotta	Verena	UKBB Research Days 2018	Dose optimization of intravenous metemazole in children less than 6 years old – a population pharmacokinetic analysis	Centre for Paediatric Pharmacology and Pharmacometrics (PedPP)	Poster Award
Krieg	Andreas	Vereinigung für Kinderorthopädie	Virtual periacetabular osteotomy and anatomical measurements – how far from a disaster?	Bone Tumor and Limb Reconstruction Group	Wissenschaftspreis
Latzin with Yammine	Philipp Sophie	Stiftung Pfizer Forschungspreis	Functional evidence for continued alveolarisation in former preterms at school age?	Paediatrics and Paediatric Pulmonology	Pfizer Forschungspreis 2017
Teufel	Claudia	UKBB Research Days 2018	Role of mTOR Signaling for Group3 Innate Lymphoid Cell Immune Function	Developmental Immunology	Poster Award

# Young Investigators

Name	First name	Supervisor	Research Group	Program	Project Title
Brandenberger	Julia	Nicole Ritz	Mycobacterial Research	Special program paediatric research	A systematic evaluation of the care provided to paediatric refugees and asylum seekers at the University Children's Hospital Basel
Chawla	Raghav	Nicolas Von der Weid	Outcome Research in Paediatric Oncology	Research Fond University Basel	Exploring Cell Heterogeneity and Dynamics Using Massively Parallel Single-Cell Genomics
Gros	Stephanie	Stefan Holland-Cunz	Surgical Research	Research Fond University Basel	Role of HIF-1/2 in hypoxia dependent regulation of AQP1
Hafner	Patricia	Dirk Fischer	Neuromuscular Research	Brian Fowler Fond	Partial Support for a one-year research-stay at the Dubowitz Neuromuscular Centre at GOSH in London
Hafner	Patricia	Dirk Fischer	Neuromuscular Research	Research Fond University Basel	Building a database to establish reference values of electrophysiological examinations in children
Jost	Kerstin	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology	Research Fond University Basel	NEO (Neonatal Esophageal Observation) Tube



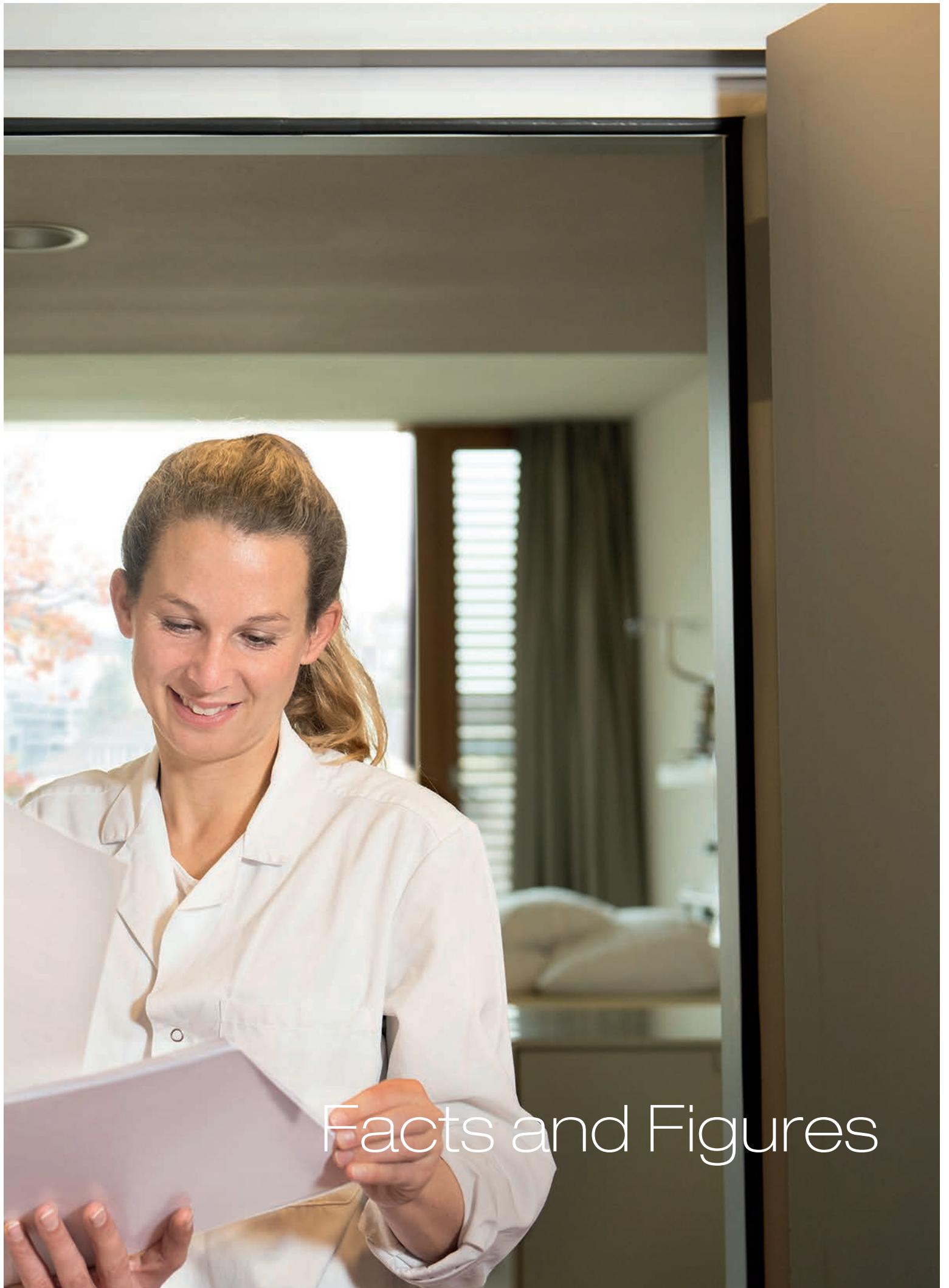
# Young Investigators

Name	First name	Supervisor	Research Group	Program	Project Title
Mack	Ines	Ulrich Heining	Paediatric Infectious Diseases and Vaccinology	Special program paediatric research	Feasibility of continuous vital signs assessment with wearable devices in paediatric surgical infections: a pilot study
Schmid	Hanna	Julia Bielicki	Paediatric infectious Diseases	Special program paediatric research	Perioperative antibiotic prophylaxis in paediatric appendectomies in Switzerland
Studer	Daniel	Carol C. Hasler	Computational Spine Biomechanics	Research Fond University Basel	Intraoperative in vivo assessment of spinal stiffness with a motorized programmable robotic device
Tauchmann	Samantha	Jürg Schwaller	Childhood Leukemia	Brian Fowler Fond	Training at the Laboratory of Prof. Thomas Mercher, Gustave Roussy Cancer institute, Paris
Usemann	Jakob	Urs Frey	Paediatrics and Paediatric Pneumology	Special program paediatric research	Non-invasive urinary eicosanoid profiles to study acute respiratory tract infections in infancy
Usemann	Jakob	Urs Frey	Paediatrics and Paediatric Pulmonology	Research Fond University Basel	Exhaled Breath Analysis in paediatric patients exposed to environmental Tobacco Smoke (EBATS): a pilot study

# Congresses/Symposia 2017/2018 organised by UKBB

Congress	Date	Organised by	Research Group
Migrant health in private practice	29.–30.06.2017	Ritz Nicole	Migrant Health Research Group
5 <sup>th</sup> Basel Immunology Focus Symposium (BIFS) in Basel	28.–30.8.2017	Finke Daniela Holländer Georg	Developmental Immunology/ Paediatric Immunology
20. Basler Symposium für Kinderorthopädie: „Langzeitresultate“	31.08.–01.09.2017	Hasler Carol C.	Computational Spine Biomechanics
9 <sup>th</sup> Scientific meeting at UKBB, Society of Paediatric Cardiology	10.11.2017	Donner Birgit	Clinical Research in Paediatric Cardiology
Jahrestagung Verein Skoliose Schweiz (VSS): „Skoliose – modern und aktiv“	07.04.2018	Studer Daniel	Computational Spine Biomechanics
Diagnostics and Functional Treatment in CP Gait Disorders.	22.06.2018	Brunner Reinald	Human Locomotion Research
KWUB (Knochen- und Weichteil- Tumorzentrum der Universität Basel) Zuweiserevent in Basel, USB	06.09.2018	Krieg Andreas	Bone Tumor and Limb Reconstruction Group
Basler Symposium für Kinderorthopädie: „Kind und Schmerz“	06.–07.09. 2018	Hasler Carol C.	Computational Spine Biomechanics
9 <sup>th</sup> International Fitbone User Meeting in Basel, UKBB	27.–28.09.2018	Krieg Andreas	Bone Tumor and Limb Reconstruction Group
Annual GCP course at UKBB together with DKF	06.11.2018	van den Anker Johannes	Centre for Paediatric Pharma- cology and Pharmacometrics (PedPP)
14 <sup>th</sup> Basel Modeling & Simulation Conference (UKBB, Roche, Novartis and Idorsia)	10.–11.09.2018	Pfister Marc	Centre for Paediatric Pharma- cology and Pharmacometrics (PedPP)
10 <sup>th</sup> National Vaccinology Congress, Basel	28.–29.11.2018	Heininger Ulrich	Paediatric Infectious Diseases and Vaccinology





Facts and Figures

# Funding and Research

## Overview Third Party Funds UKBB 2017

Category	Balance 1.1.2017 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.17 (CHF)
Competitive Research	1'556'249	5'014'503	-3'302'512	3'268'239
Non-Competitive Research	2'341'256	3'438'651	-3'504'157	2'275'750
Research and Teaching	640'752	247'916	-302'225	586'443
Patients	1'809'125	937'540	-1'280'835	1'465'831
<b>Total</b>	<b>6'347'382</b>	<b>9'638'610</b>	<b>-8'389'728</b>	<b>7'596'263</b>
<b>Research Total</b>	<b>3'897'505</b>	<b>8'453'154</b>	<b>-6'806'669</b>	<b>5'543'989</b>
Thereof competitive	1'556'249	5'014'503	-3'302'512	3'268'239
% Competitive of Total	40%	59%	49%	59%
<b>EU-Funding</b>	<b>294'516</b>	<b>1'233'481</b>	<b>-999'396</b>	<b>528'601</b>
% EU-Funding of Total	8%	15%	15%	10%

Administered by	Balance 1.1.2017 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.17 (CHF)
UKBB	5'217'830	4'109'672	-4'336'236	4'991'266
Uni Basel	1'155'201	3'557'090	-2'108'133	2'604'158
USB	-25'649	76'327	-49'838	840
Uni BS/UKBB	0	1'895'521	-1'895'521	0
<b>Total</b>	<b>6'347'382</b>	<b>9'638'610</b>	<b>-8'389'728</b>	<b>7'596'263</b>

DBM	Balance 1.1.2017 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.17 (CHF)
DBM UKBB	298'789	489'628	-430'698	357'718
DBM Unibas	401'864	541'769	-334'995	608'638
DBM USB	-25'649	76'327	-49'838	840
<b>Total</b>	<b>675'004</b>	<b>1'107'723</b>	<b>-815'531</b>	<b>967'196</b>



## Overview Third Party Funds UKBB 2018

Category	Balance 1.1.2018 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.18 (CHF)
Competitive Research	3'249'491	3'574'897	-3'435'940	3'388'448
Non-Competitive Research	1'956'850	4'080'080	-3'958'247	2'078'683
Research and Teaching	633'525	917'605	-579'086	972'044
Patients	1'465'831	926'995	-996'295	1'396'531
<b>Total</b>	<b>7'305'698</b>	<b>9'499'577</b>	<b>-8'969'569</b>	<b>7'835'706</b>
<b>Research Total</b>	<b>5'206'341</b>	<b>7'654'977</b>	<b>-7'394'187</b>	<b>5'467'131</b>
Thereof competitive	3'249'491	3'574'897	-3'435'940	3'388'448
% Competitive of Total	62 %	47 %	46 %	62 %
<b>EU-Funding</b>	<b>528'601</b>	<b>60'914</b>	<b>-469'773</b>	<b>119'741</b>
% EU-Funding of Total	10 %	1 %	6 %	2 %

Administered by	Balance 1.1.2018 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.18 (CHF)
UKBB	4'991'266	4'969'844	-4'379'564	5'581'546
Uni Basel	2'313'592	2'118'390	-2'178'661	2'253'321
USB	840	96'838	-96'838	840
Uni BS/UKBB	0	2'314'506	-2'314'506	0
<b>Total</b>	<b>7'305'698</b>	<b>9'499'577</b>	<b>-8'969'569</b>	<b>7'835'706</b>

DBM	Balance 1.1.2018 (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12.18 (CHF)
DBM UKBB	357'718	94'156	-209'507	242'368
DBM Unibas	608'638	549'465	-528'308	629'794
DBM USB	840	96'838	-96'838	840
<b>Total</b>	<b>967'196</b>	<b>740'459</b>	<b>-834'652</b>	<b>873'002</b>

# Funding and Research

## Change of Third Party Funds UKBB 2017/2018

Balance 1.1. (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12. (CHF)
1'693'242	-1'439'606	-133'428	120'209
-384'406	641'429	-454'090	-197'067
-7'226	669'689	-276'862	385'601
-343'294	-10'545	284'539	-69'300
<b>958'316</b>	<b>-139'032</b>	<b>-579'841</b>	<b>239'443</b>
<b>1'308'837</b>	<b>-798'177</b>	<b>-587'518</b>	<b>-76'858</b>
1'693'242	-1'439'606	-133'428	120'209
22 %	-13 %	-2 %	3 %
234'085	-1'172'567	529'623	-408'859
3 %	-14 %	-8 %	-7 %

Balance 1.1. (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12. (CHF)
-226'564	860'172	-43'328	590'280
1'158'391	-1'438'700	-70'528	-350'837
26'489	20'511	-47'000	0
0	418'985	-418'985	0
<b>958'316</b>	<b>-139'032</b>	<b>-579'841</b>	<b>239'443</b>

Balance 1.1. (CHF)	Inflow of Funds (CHF)	Use of Funds (CHF)	Balance 31.12. (CHF)
58'929	-395'472	221'192	-115'351
206'773	7'696	-193'313	21'157
26'489	20'511	-47'000	0
<b>292'192</b>	<b>-367'265</b>	<b>-19'121</b>	<b>-94'194</b>

University Budget and Third-Party Funds					
Year	2015	2016	2017	2018	
University Budget	8.93	8.95	9.12	8.95	Million (CHF)
External funds	5.56	6.19	8.45	7.65	Million (CHF)

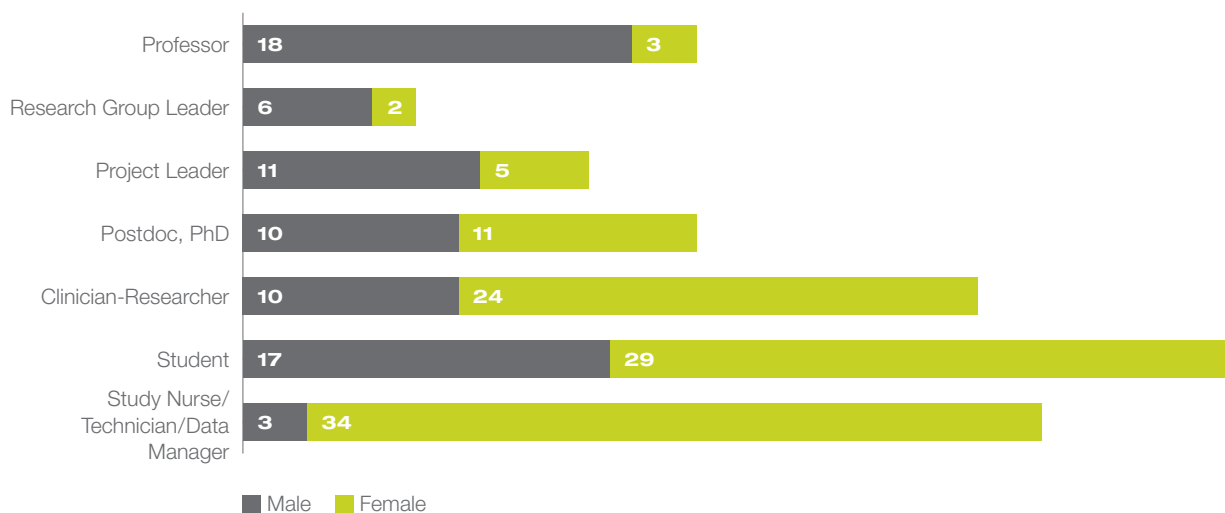
Distribution of the Research Funds by Categories (CHF)	
Botnar Professorship	472'876
Eckenstein-Geigy Professorship	1'538'731
EU	60'914
Research Fund Junior Researchers (University)	159'116
SNF	1'737'778
Special Program Paediatric Research	443'900
University Budget	8'954'171
Other foundations and donations	3'685'563
<b>Total</b>	<b>17'053'048</b>

Funding by Research Areas (CHF)	
Immunology (2)	646'229
Infectiology and Vaccinology/Brigton Collaboration (3)	569'839
Neuropaediatrics (2)	1'104'948
Oncology/Haematology (3)	772'477
Orthopaedics/Neuroorthopaedics (3)	176'206
Pharmacology (2)	2'166'615
Pneumology/Neonatology (5)	1'756'292
Surgery (2)	20'000
Others	442'372
<b>Total</b>	<b>7'654'978</b>

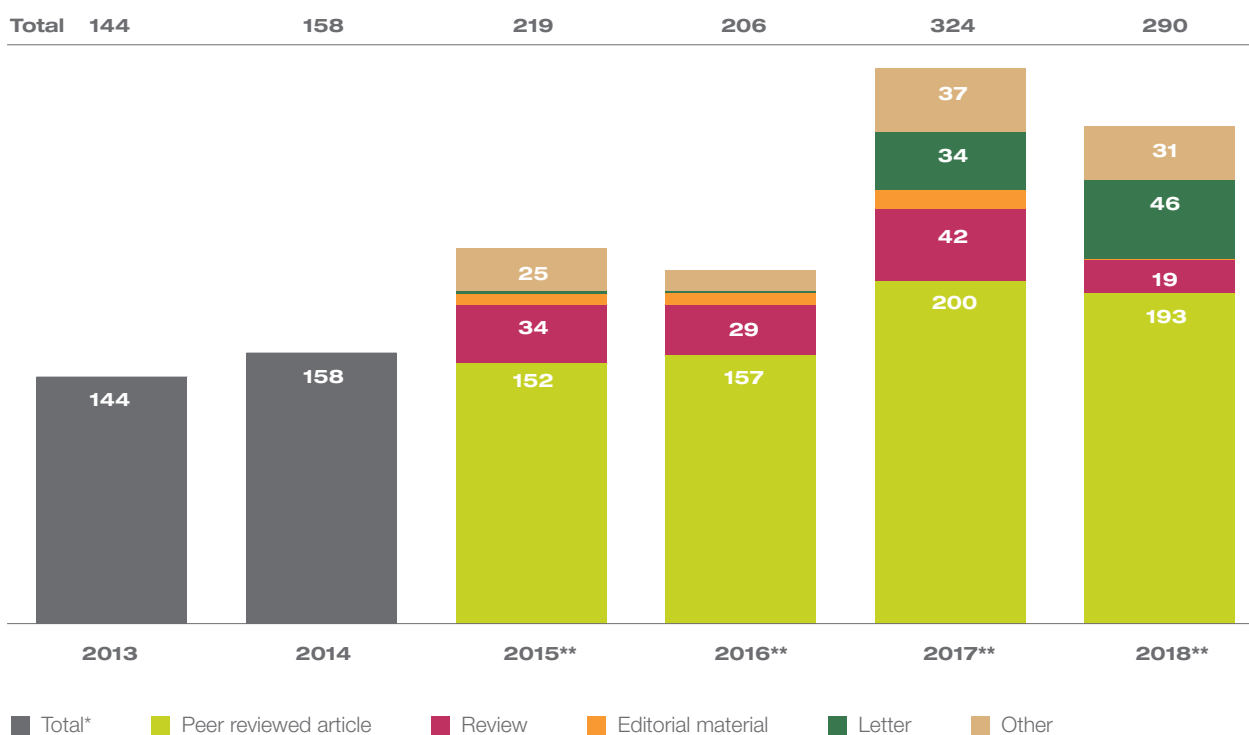
\* Number PI's

# Employees and Publications

## Gender Distribution/UKBB Research



## Number of published articles 2013–2018



\* from 2015 onwards reviews, editorials and others were separately listed

\*\* meeting reports and abstracts excluded







# Impressum

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