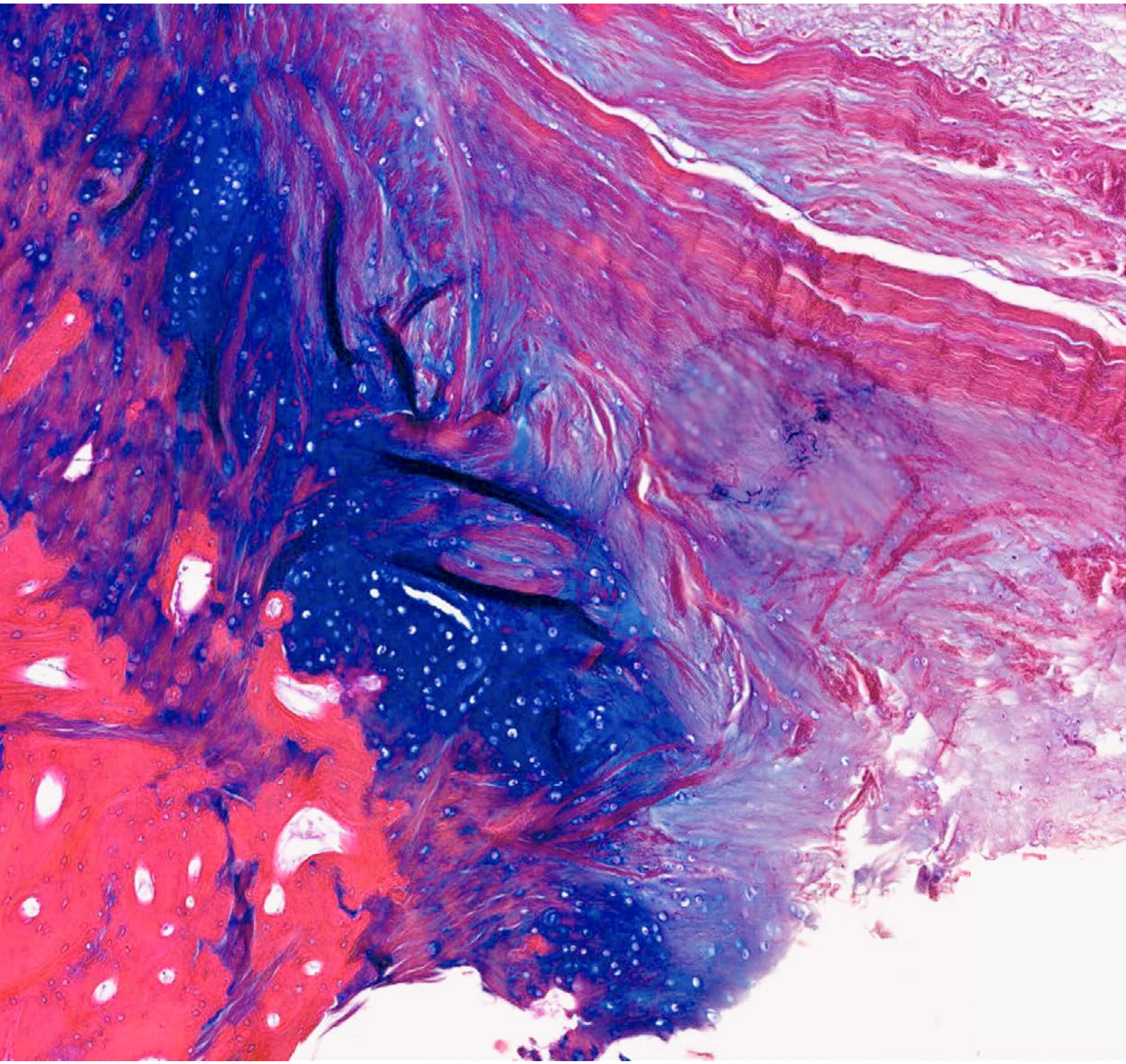
DEPARTMENT FOR BIOMEDICAL RESEARCH
www.dbmr.unibe.ch

UNIVERSITÄT
BERN

Annual Report
2025



Content

Foreword
Director's Report

I would like to take this opportunity to thank Robert for his many years of dedication to the DBMR and for the thoughtful reflections he shares in this article. As the saying goes, "A smooth sea never made a skilled sailor." Robert has helped the DBMR navigate challenging waters over the years, including stepping forward to serve as Interim Co-Director following Hugues Abriel's departure and prior to my arrival, thereby ensuring continuity and stability during an important transition for the department. His steady leadership, institutional memory, and commitment to the DBMR community have helped guide the department through these periods, and we are all the better for it. As he now quite literally sets his sails, we thank him for his service and wish him fair winds and following seas in the adventures ahead.- Mark A. Rubin, MD, Director DBMR

In the 31 years since its inception, the DBMR has evolved from an informal umbrella organization for research groups of the Clinics of the Inselspital to the largest Research department of the Medical Faculty of the University of Bern.

In the pre-DBMR era, it was the responsibility of the Clinics to secure space and provide infrastructure for their research groups. The law of the strongest prevailed: Big, important Clinics often received generous support from the Inselspital, whereas smaller, less important Clinics had only minimal infrastructure, and new staff members frequently had to struggle to obtain laboratory space to establish a research group and pursue an academic career. This has changed dramatically. Today, basic and translational research of the University Clinics is organized into Research Programs, for which the DBMR provides adequate laboratry space and state-of-the-art infrastructure, both in the labs and in Core Facilities. Clinicians who want to start lab research or continue the work they did before joining the Inselspital are welcome at the DBMR. Master's- and PhD-students, as well as postdoctoral researchers, are embedded in the Research Programs and Graduate Schools, with peers and PIs around them to foster both their current work at the DBMR and their future career.

The primary challenge for PIs remains securing funding for their research. While this has become somewhat easier for early-career researchers thanks to several internal grants from the Inselspital, the Medical Faculty, and the University of Bern, securing funding for larger projects has become increasingly challenging for established PIs. Budget cuts at the SNSF and significantly increased competition for EU and US grants have made funding more difficult to obtain, and many much-needed surgeon- and physician-scientists are tempted to scale back their basic and translational research activities. Although the DBMR cannot directly fund research projects, it provides professional grant advising so that PIs, as well as early-career researchers, are supported in identifying and securing funding.

For those who have not had the opportunity to look back over 30 years as a PI and observe how things developed, the situation for basic- and translational Research Groups affiliated to a Clinic of the Inselspital may not look bright at all. But don't worry, the current situation for DBMR Research Groups is probably better than ever before! The question, of course, remains what the future will hold. The DBMR has changed many times, and it will change again next year, when our current director, Prof. Mark Rubin, retires from the University of Bern in Jan 2027.

It is up to the Medical Faculty and the current members of the DBMR itself to define the future structure of the department, and it may be tempting to opt for 'visionary changes', which would make things much better than they are now. However, it may be worthwhile to look back over the DBMR's 31 years of history to see how things have developed. We managed to overcome the law of the strongest, achieved a fair distribution of space and resources, shared instruments whenever possible, and have excellent Core Facilities. Therefore, whatever changes are envisaged for the future of the DBMR, don't throw these achievements of the past overboard, but keep them as valuable cargo when the DBMR sets sail for a new course!

Prof. Robert Rieben

The DBMR at Glance

The Department for BioMedical Research (DBMR) in the Faculty of Medicine at the University of Bern was established in 1994 by the University of Bern and Inselspital (University Hospital of Bern). The DBMR has 14 Research Programs with approximately 100 participating individual labs and several independent research labs whose research spans all biomedical fields. To realize its mission to bridge the gap between the bench and bedside, the DBMR promotes an integrative perspective on clinical research with a strong emphasis on the development of translational approaches, the use of omics and other cutting-edge technologies, the operation of core facilities with state-of-the-art technology, and extensive interaction and collaboration between laboratory-based and patient-oriented clinical research.


BMR
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Organization

The role of the DBMR is to provide optimal infrastructure and scientific support to its affiliated members, comprising labs from the clinics of the Inselspital, University Hospital of Bern, and internal DBMR groups. The DBMR also operates core technological facilities. The research groups are supported by central services responsible for administration, facility management, and technical support, as well as providing informatics and bioinformatics services.

Organigram

Med. Faculty Board
- Dean & Vice Dean Research

Directors
- Prof. Dr. Mark A. Rubin, Director
- Prof. Dr. Volker Enzmann, Deputy Director

Administration and Services
- Secretary of Director
- Finances
- Human Resources
- Grant Advisor
- Secretariat

External Advisory Board
- 4–5 External International Experts

Board of Directors
- Prof. Mark A. Rubin, Director
- Prof. Volker Enzmann, Deputy Director
- Prof. Marianna Kruithof-de Julio
- Prof. Carsten Riether
- PD Dr. Thomas Michael Marti
- Dr. Stephan Christen **
- Dr. Mariana Ricca / Lutz Hempel **

Operations
- Operations Management
- Deputy Operations Manager
- IT-Support
- Safety (OHE)
- Supply Center
- Technical and Facility Services

Research Programs
- Blood
- Bone and Joint
- Cancer Therapy Resistance
- Cardiovascular Diseases
- Emerging and Difficult to Treat Infections
- Experimental Nephrology
- Lung Precision Medicine
- Oncology-Thoracic Malignancies (OTM)
- Regenerative Neuroscience
- Systems Biomedicine of Cellular Development and Signaling in Health and Disease
- Translational Cancer Research
- Translational Hormone Research
- Translational Immunology
- ZEN/DBMR-Neuro

WG	Technology Core Facilities
BMG	Biomedical Genomics (BMG)
FCCS	Flow Cytrometry and Cell Sorting Facility (FCCS)
LCI	Live Cell Imaging (LCI)
PMS	Proteomics and Mass Spectrometry (PMS)
TOR	Translational Organoid Resource (TOR)

Independent Groups
- Anesthesiology
- Clinical Radiopharmacy
- Endometriosis and Gynecological Oncology
- Experimental Radiology
- Functional Urology
- Human Genetics
- Molecular Dermatology and Stem Cell Research *
- AI for RNA biology

** without voting right

* Until Dec 2025

Key People

Leadership

Prof. Dr. Mark A. Rubin *
Director

Prof. Dr. Volker Enzmann *
Deputy Director and Contact Insel-Uni-Support

Board of Directors

Prof. Dr. Marianna Kruithof-de Julio
Member, Board of Directors and Gender Equality Representative

Prof. Dr. Carsten Riether
Member, Board of Directors

PD Dr. Thomas Marti
Member, Board of Directors

Lutz Hempel **
DBMR Finances (since Nov)

Dr. Mariana Ricca **
Grant Advisor (until Oct)

Dr. Stephan Christen **
Operations Manager

* Board of Directors
** non-voting members

Management

Dr. Stephan Christen
Operations Manager

Dr. Raschid Setoud
Deputy Operations Manager

Lee-Roy Tamer Romann
Project Manager

Secretary of Director

Franziska Fuchs
Jasmine Stiefel
(until Apr)
Mirjam Susanna Kiener
(Aug-Sept)

DBMR Human Resources
DBMR Grant Advisor
DBMR Finances

Daniela Scherer-Jendly
DBMR Human Resources

Dr. Mariana Ricca
DBMR Grant Advisor

Lutz Hempel
DBMR Finances

DBMR Administration and secretaries

Martine Marianne Kaufmann
Secretary

Rachel Haltmeier
Secretary

DBMR Events

Rachel Haltmeier
Event Coordinator

Occupational Safety, Health Protection and Environmental Safety (OHE)

François Achermann

IT-Support

Ilker Romann
IT specialist

Luca Sulmoni
IT specialist

Cesar Muñoz Arenas
IT specialist (since Feb)

Technical Services & House Staff

Patrick Furer
Head Technical and Facility Services

Lucille Wotzkow
Projects/Deputy Technical and Facility Services

Aurelio Franchi
Technical Services (since May)

Cédric Lüthi
Technical Services (since Jul)

Ricardo Filipe
Technical Services (until Jun)

Susanne Widmer
Facility Services (until Mar)

Klaus Ferro
Facility Services

Lácoln Holenstein
Facility Services (since Oct)

Kaba Sidikiba
Facility Services

Supply Center

Corinne Hug
Supply Center Manager

Alain Despont
Deputy Supply Center Manager

Scarlet Kohler
Deputy Supply Center Manager

Heads of Core Facilities

PD Dr. phil. nat. Fabian Blank
Live Cell Imaging (LCI)

Prof. Dr. phil. nat. Manfred Heller
Mass Spectrometry and Proteomics Laboratory (PMS)

Dr. phil. nat. Stefan Müller
Flow Cytometry and Cell Sorting (FCCS)

Prof. Dr. Marianna Kruithof-de Julio
Translational Organoid Resource (TOR)

Prof. Dr. phil. nat. Ursula Amstutz
Biomedical Genomics (BMG)

DBMR Research Programs / Independent Research Labs

Research Programs

Blood
Allam Lab
Angelillo-Scherrer Lab
Bacher Lab
Daskalakis Lab
Kremer Hovinga Lab
Meyer Lab
Porret Lab
Rovó Lab
Schaller Tschan Lab
Schroeder Lab

Bone & Joint
Gantenbein & Hofstetter Lab
Saulacic Lab

Cancer Therapy Resistance (CTR)
Chouvardas Lab
Karkampouna Lab
Kruithof-de Julio Lab
Rottenberg Lab
Rubin Lab

Cardiovascular Diseases
Döring Lab
Heller Lab
Longnus Lab
Mercader Lab
Odening Lab
Osterwalder Lab
Rexhaj Lab
Rieben Lab
Schinner Lab
Zuppinger Lab

Emerging and Difficult to Treat Infections
Leib Lab
Que Lab
Schefold Lab

Experimental Nephrology
Du Toit Lab
Fuster Lab
Huynh-Do Lab
Rudloff Lab
Sidler Lab

Lung Precision Medicine
Blank Lab
Eggel Lab
Funke-Chambour Lab
Gazdhar Lab
Gote-Schniering Lab
Klein Lab
Maurer Lab
Müller Loretta Lab
Seydoux Lab

Oncology-Thoracic Malignancies (OTM)
Dorn Lab
Marti Lab
Peng Lab

Regenerative Neuroscience
Enzmann Lab
Escher Lab
Leib Lab
Marbacher & Grüter Lab
Mure Lab
Schoeberlein & Surbek Lab
Zandi Lab
Zinkernagel Lab
Zysset Lab

Systems biomedicine of cellular development and signaling in health and disease
Al Nabhani Lab
Balmer Lab
Beldi Lab
Berzigotti Lab
Candinas Lab
Ganal-Vonarburg Lab
Macpherson Lab
Stroka Lab
Wiest Lab
Yilmaz Lab
Zindel Lab (until Aug 2025)
Zessig Lab (since Nov 2025)

Translational Cancer Research
Bernasconi Lab
Berger Lab
Bill Lab (since March)
Cerciello Lab
Häfliger Lab
Herrmann Lab
Medo Lab
Medova Lab
Novak Lab
Ochsenbein Lab
Pabst & Seipel Lab
Riether Lab
Wehrli Lab

Translational Hormone Research
Bally Lab
du Toit Lab
Flück Lab
Hediger Lab
Pandey Lab
Vogt Lab (until April 2025)

Translational Immunology
Bachmann & Vogel Lab
Eggel Lab
Schlapbach Lab

ZEN/DBMR-Neuro
Adamantidis Lab
Bassetti Lab
Baud Lab
Chan Lab
Guttierez Herrera Lab
Hoepner Lab
Schmidt Lab
Tzovara Lab

Independent Research Labs

Anesthesiology
Stueber & Hedinger Lab

Clinical Radiopharmacy
Rominger Lab

Endometriosis & Gynecological Oncology
Mueller Lab

Experimental Radiology
Tengg-Kobligk

Functional Urology
Monastyrskaja Lab

Human Genetics
Zweier Lab

Molecular Dermatology & Stem Cell Research
Müller E. Lab (until Dec 2025)

AI for RNA Biology
Luisier Lab (since Jun 2025)

Blood (BLO)

Participating Labs

- **Allam Lab**
  Inflammation & hematopoiesis
- **Angelillo-Scherrer Lab**
  Hemostasis, thrombosis, inflammation &hematopoiesis/myeloproliferative neoplasms
- **Bacher Lab**
  Innovative diagnostics in hematological Malignancies
- **Baran Lab**
  Biology of myeloid neoplasms AML&MDS
- **Daskalakis Lab**
  Mechanisms of epigenetic regulation
- **Kremer Hovinga Strebel Lab**
  ADAMTS13, Von Willebrand Factor and thrombotic thrombocytopenic purpura/ thrombotic microangiopathy
- **Meyer Lab**
  Myeloid Malignancies
- **Porret Lab**
  Molecular hematology
- **Rovó Lab**
  Myeloproliferative Neoplasms, Long termsurvivorship after Stem Cell Transplantation & Bone marrow failures and cytopenias
- **Schaller Tschan Lab**
  Thrombotic autoimmune diseases
- **Schroeder Lab**
  Experimental hemostasis (coagulation factor XIII, transglutaminase 2, complement system)

Program Contact

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Link to research program

Selected Collaborators

Abriel H, Institute of Biochemistry and Molecular Medicine, University of Bern, Bern, Switzerland
Engedal N, Institute for Cancer Research, Oslo University Hospital, Oslo, NO
Hitomi K, Nagoya University, Nagoya, JP
Levine RL, Memorial Sloan Kettering Cancer Center, New York, NY, USA
Martin-Cabrera, P, Haemato-Oncology Diagnostic Services (HODS), Addenbrooke's Hospital NHS Foundation Trust, Cambridge, UK

The BLOOD research program is a comprehensive initiative dedicated to investigating the epidemiology, pathophysiology, diagnosis, and treatment of blood-related disorders through integrated basic, translational, and clinical research.

The program comprises projects investigating myeloproliferative neoplasms, acute myeloid leukemia, myelodysplastic syndromes, hemostasis and thrombosis, thrombotic autoimmune diseases, and bone marrow failure syndromes. Research ranges from dissecting metabolic vulnerabilities and mitochondrial dysfunction in leukemias to characterizing inflammasome activation in myeloid malignancies and aging, hematopoietic stem cell regulation, mechanisms of thrombotic disorders, protein S biology in hemostasis, and portable genetic diagnostics for hemoglobinopathies. The program employs cutting-edge technologies, including CRISPR-based functional screening, multi-omics approaches, advanced flow cytometry, and next-generation sequencing. By integrating mechanistic insights with clinical applications, the BLOOD program advances patient care through improved diagnostics, novel therapeutics, and individualized management strategies.

Research Highlights 2025 / Outlook 2026

In 2025, the BLOOD research program achieved significant advances across multiple domains of hematological research, strengthening our understanding of myeloid malignancies, thrombotic disorders, hemostasis, diagnostic innovation, and hematopoietic regulation through newly funded projects and impactful publications.

Groundbreaking research on protein S as a therapeutic target demonstrated novel approaches to enhancing hemostasis in hemophilia and other bleeding disorders using small interfering RNA technology (Prince Eladnani et al., J Thromb Haemost 2025). This technology has been further developed with the support of Innosuisse, the Gebert Ruf Foundation, the University of Bern and Unitectra, and is now referred to as BnF-001. Its continued development is being pursued by BLEEDnFIRE Therapeutics, a spin-off company from the University of Bern. The principal authors of the publication in the J Thromb Haemost (2025) are also co-founders of the spin-off founded in 2025. The program was awarded a new SNSF grant to investigate the role of protein S in joint and bone health in hemophilia (PI: Anne Angelillo-Scherrer). Work on enhancing hemostasis in Glanzmann thrombasthenia via protein S inhibition received the SSH Award at the SOHC Best Abstract Awards (Rim Diab). Several abstracts received ASH 2025 Abstract Achievement Awards (Raja Prince-Eladnani, Rim Diab,Tanja Knopp, Mariantonietta Tripodo). During a three-month research stay at Nagoya University, Japan, Verena Schroeder strengthened her collaboration on transglutaminases with Profs. Hitomi and Tatsukawa.

Substantial progress was made in understanding resistance mechanisms to JAK2 inhibitor therapy in myeloproliferative neoplasms (MPN). The program received two SNSF project grants (PI: Sara Meyer): one for multi-omics characterization

of primary MPN patient cells to define mechanisms of acquired resistance, and another for a phase 1/2a investigator-initiated trial of combined JAK2/MEK inhibition in advanced myelofibrosis prior to allogeneic transplantation at Inselspital Bern and University Hospital Basel. Clinical and molecular real-world data on Ropeginterferon alpha-2b in MPN were reported (Christen et al., J Clin Med 2025), while work on novel type II JAK2 inhibitors progressed toward clinical development. Research on SHP2 phosphatase in MPN received the SOHC Best Abstract Award 2025 for Experimental Hematology (Stefanie Arunasalam). Additional competitive research grants were secured from the Foundation for the Fight against Cancer (Zurich) and Foundation for Clinical-Experimental Cancer Research Bern (SKET) (PI: Sara Meyer)

The program's focus on inflammation and innate immune regulation was strengthened by two new SNSF grants on the role of ribonuclease inhibitor (RNH1) in hematopoiesis, inflammation, and T cell biology (PI: Ramanjaneyulu Allam). Research on RNH1 function in T cells received a Best Poster Award at the 1st International RNase Meeting (Jieyu Xiong). These projects integrate hematopoiesis and innate immune sensing to better understand how chronic inflammation contributes to aging and myeloid malignancies.

Important clinical insights into paroxysmal nocturnal hemoglobinuria with large clones in non-hypoplastic myelodysplastic syndrome were published (Briggeler-Mani et al., Acta Haematol 2025). Important advances in thrombophilia characterization emerged from a large single-center cross-sectional study of 3,550 patients, identifying the prevalence and risk factors associated with high-risk thrombophilia (Najaf Zadeh et al., Res Pract Thromb Haemost 2025). A complementary study demonstrated the clinical utility of thrombin generation using ST-Genesia in patients with hereditary and acquired thrombophilia, providing new diagnostic tools for thrombotic risk assessment (Caspary et al., Thromb Res 2025). The CAN-CATCH study was submitted to the SNSF in collaboration with Dr. Kristina Vrotniakaite, and aims to develop risk assessment models for recurrent venous thromboembolism and treatment-related bleeding in patients with cancer-associated thrombosis.

Collaborative research revealed that neutrophil extracellular traps (NETs) contribute to clinical relapses but not ADAMTS13 biomarker relapses in immune-mediated thrombotic thrombocytopenic purpura, establishing the autophagy-NET axis as a driver of pathogenic inflammation. This work was accepted for oral presentation at SOHC 2025 and GTH 2026 (Sara Buonomo).

Major progress was achieved in portable genetic diagnostics for hemoglobinopathies, successfully adapting Oxford Nanopore Technology for molecular testing of sickle cell disease and β-thalassemia in remote African regions. Fabienne Grunder received the GSIA Prize for Outstanding Master's Thesis in Pharmacy for this work. The program established telomere length measurement by Flow-FISH and developed innovative flow cytometry panels to quantifying BCMA and GPRC5D expression in multiple myeloma patients receiving novel immunotherapies.

Looking ahead to 2026, the program will launch combined JAK2/MEK inhibitor clinical trials, advance protein S-targeting approaches toward clinical development, expand sequencing panels for hemoglobinopathy diagnostics, and continue mechanistic investigations into inflammasome biology and metabolic vulnerabilities in myeloid malignancies.

Selected Publications

Briggeler-Mani J, et al. Paroxysmal Nocturnal Hemoglobinuria with Large Clones in Non-Hypoplastic Myelodysplastic Syndrome: Report of Two Cases. *Acta Haematol.* 2025:1-8. PMID:40920603. 10.1159/000548287 [Epub 2025/09/08]

Caspary L, et al. Clinical utility of thrombin generation using ST-Genesia(R) in patients with hereditary and acquired thrombophilia: A cross-sectional study. *Thromb Res*. 2025;254:109454. PMID:40961717. 10.1016/j.thromres.2025.109454 [Epub 2025/09/18]

Christen M, et al. Real-World Retrospective Report on the Efficacy, Tolerability, and Molecular Responses to Ropeginterferon-alpha2b in Patients with Myeloproliferative Neoplasms. *J Clin Med*. 2025;15(1). PMID:41517377. 10.3390/jcm15010128 [Epub 2026/01/10]

Eladnani RP, et al. Enhancing hemostasis potency in hemophilia with a small interfering ribonucleic acid targeting protein S. *J Thromb Haemost*. 2025;23(7):2133-2150. PMID:40154791. 10.1016/j.jtha.2025.03.021 [Epub 2025/03/29]

Najaf Zadeh S, et al. Prevalence and factors associated with high-risk thrombophilia: a single-center cross-sectional study of 3550 patients at a tertiary Thrombosis Centre in Switzerland. *Res Pract Thromb Haemost*. 2025;9(3):102864. PMID:40475025. 10.1016/j.rpth.2025.102864 [Epub 2025/06/06]

Portable genetic laboratory for testing of hereditary genetic diseases like sickle cell anemia

Bone & Joint (BNJ)

Participating Labs

- **Gantenbein Lab**
  Tissue Engineering for Orthopaedics & Mechanobiology (TOM)
- **Saulacic Lab**
  Cranio-Maxillofacial Research

Program Contact

Prof. Benjamin Gantenbein
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- Link to research program

Selected Collaborators

Le Maitre C, University of Sheffield, Sheffield, UK
Ille F, Lucerne University of Applied Sciences and Arts (HSLU), Lucerne, CH
Wöltje M, TU Dresden, Textile Institute, Dresden, DE
Löffler JF, Department of Materials, ETH, Zurich, CH
Bohner M, Robert Mathys Foundation, Bettlach, CH

The skeletal system is subject to traumatic conditions (fractures and large bone defects) and pathologies due to degeneration (osteoporosis, osteoarthritis, and intervertebral disc degeneration. The demand for improved and efficient treatments is increasing as the population of older adults grows and wants to stay physically active. However, surgical procedures for repairing large bone defects or degenerated spinal discs still require significant improvement. The regeneration of skeletal tissues is the focus of the Bone & Joint Research Program. To this aim, strategies based on cells, materials, and growth factors are currently employed, ex vivo (2D/3D cell cultures and bioreactors) and *in vivo*. Translational orthopaedic research, which has been a long tradition in Bern, requires interactions between surgeons and scientists. The Bone & Joint Research Program will continue to extend this tradition and provide clinicians with tools to improve patient treatment.

Research Highlights 2025 / Outlook 2026

The TOM Lab successfully completed a recent Marie Skłodowska-Curie training Network Project "disc4all". Within this consortium, the group published several articles, including work on previously neglected cell population, the chondrocytes of the cartilaginous endplates. The group presented novel mechanobiological data on these cells under cyclic compressive loading and in organ explant culture.

Furthermore, the group positioned itself at the forefront of advancing spine research toward improved spinal fusion by investigating biologics to identify effective strategies for enhancing ossification in elderly patients. This research has been awarded in 2025 a SNSF Spark project under the leadership of PD Dr. Sonja Häckel. The research will elaborate on mixtures of bone morphogenic protein 2 (BMP2) combined with L51P, a BMP2 analogue that blocks multiple inhibitors of the BMP pathway. Recent in vitro studies indicate promising results in combination with an EP4 agonist, KMN-159, which acts synergistically with L51P. Even stronger ossification was observed in annulus fibrosus cells, suggesting the possibility of directing fibrous annulus fibrosus cells toward an osteoblastic phenotype.

Research on intervertebral disc (IVD) regeneration using silk and hydrogel materials has been initiated within a SNF weave agency project, in partnership with Dr. Michael Wöltje from the Technical University (TU) of Dresden (Germany). In this project, a biomimetic hydrogel composed of of hyaluronic acid and collagen type 2 is combined with silk fibres to improve cell delivery systems for the IVD. The translational application of stem cell technology to sort a seldom population of progenitor cells from the IVD is the focus of the SNF Bridge Discovery project "SORTHODISK". This interdisciplinary project integrates stem cell technology with novel non-fluorescent cell sorting methods. In this model, human donor IVDs obtained from spine surgery are used, and bovine IVDs from one-year-old cattle serve as an experimental

model. The project aims to advance sorting methods while improving knowledge of the culture conditions and transcriptomic profile of these autochthonous progenitor cells. Extracellular vesicles (EVs) may represent a promising future avenue for regenerative clues.

Titanium remains the standard material for osteosynthesis plates and screws. 3D-printed titanium implants with trabecular structures are designed to mimic the natural porosity of cancellous bone, providing a scaffold that supports vascularization and new bone ingrowth. The group findings indicate that trabecular structures functionalized with growth factors provide a favorable scaffold for bone integration. Uptake and release kinetic studies of BMP-2 showed a burst release following adsorption on calcium phosphate, whereas co-precipitation and simple adsorption resulted in a less pronounced early release of BMP-2. Functional assays demonstrated that BMP-2 containing coatings significantly enhanced cellular ALP activity across all surface morphologies. Incorporation of growth factors into 3D structure of the calcium phosphate proved to be a suitable strategy, while methods such as co-precipitation offered enhanced coating stability.

There is a strong incentive to develop new internal bone fixation systems that are mechanically stable yet degradable following complete bone healing. An SNF Sinergia project in collaboration with the Swiss Federal Institute of Technology (ETH) in Zurich, the University of Zurich, and the University Hospital Bern has advanced the development of a magnesium-based degradable osteosynthesis system composed of crystalline magnesium alloys. The material consists of ultra-high-purity magnesium, calcium, and zinc and avoids the use of rare-earth elements. Significant improvements have been achieved through the implementation of coating systems (e.g., PEO – plasma electrolytic oxidation; PCL – polycaprolactone). Previous models (calvarial and zygomatic arch defect models, as well as a mandibular fracture model) demonstrated comparable fracture consolidation at the magnesium osteosynthesis site compared with titanium.

Selected Publications

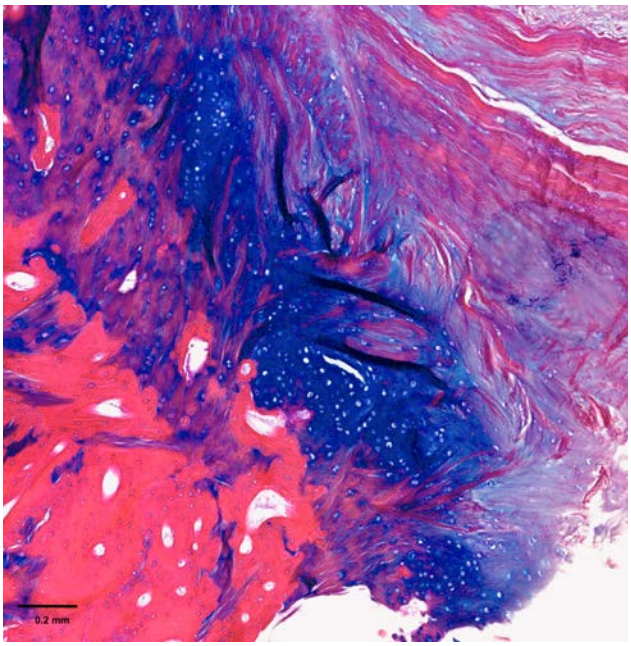
Chen S, et al. Therapeutic Approaches for Enhancing Spinal Fusion in Low Back Pain: A Review With a Focus on the Elderly. *JOR Spine.* 2025;8(4):e70136. PMID:41235064. 10.1002/jsp2.70136 [Epub 2025/11/14]

Crump KB, et al. TNF induces catabolism in human cartilaginous endplate cells in 3D agarose culture under dynamic compression. *Sci Rep.* 2025;15(1):15849. PMID:40328789. 10.1038/s41598-025-00538-w [Epub 2025/05/07]

Fujioka-Kobayashi M, et al. Combined use of deproteinized bovine bone mineral and alpha-tricalcium phosphate using gelatin carriers. *BMC Oral Health.* 2025;25(1):275. PMID:39984888. 10.1186/s12903-025-05644-9 [Epub 2025/02/22]

Lang KN, et al. Bi-Layered Biphasic Calcium Phosphate Bone Substitute to Improve Bone Formation in Lateral Jaw Defects Applying the Principle of Guided Bone Regeneration (GBR)-A Pre-Clinical Randomized Controlled Study. *Clin Oral Implants Res.* 2025;36(9):1115-1125. PMID:40474362. 10.1111/clr.14460 [Epub 2025/06/06]

Stirnimann A, et al. Advancing Intervertebral Disc Biology via Omics: Implications for Nucleus Pulposus Progenitor Cell-Based Regeneration. *JOR Spine.* 2025;8(4):e70130. PMID:41112064. 10.1002/jsp2.70130 [Epub 2025/10/20]



Enthesis tissue explants stained with Alican blue and Orange G (Rochester University protocol), digitized using an automatic slide scanner (NanoZoomer, Hamamatsu, Japan). Magnification: x20, zoomed. Scalebar: 0.2mm.

Cancer Therapy Resistance (CTR)

Participating Labs

- **Chouvardas Lab**
  Computational Biology / Urology Research Laboratory
- **Karkampouna Lab**
  Urology Research Laboratory
- **Kruithof-de Julio Lab**
  Urology Research Laboratory
- **Rottenberg Lab**
  Therapy Escape of Cancer
- **Rubin Lab**
  Precision Oncology

Contact

Prof. Marianna Kruithof-de Julio
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- Link to research program

Selected Collaborators

Kanadia R, University of Connecticut, Storrs, CT, USA
Abate-Shen C, Columbia University, New York, NY, USA
Winslow M, Stanford University, Palo Alto, CA, USA
Raspomaniki M, University of Lausanne, Lausanne, CH
Shema E, Weizmann Institute of Science, Rehovot, Israel
Jonkers J, The Netherlands Cancer Institute, Amsterdam, NL

We investigate therapy resistance by analyzing matched patient samples collected before and after treatment, using advanced *in vivo*, *ex vivo*, and in vitro models, as well as functional screens to uncover new vulnerabilities in resistant tumors. Our goal is to utilize NGS and functional genomics screens to understand the fundamental mechanisms underlying therapy resistance. In addition, the validation of patient-derived samples, organoids, 3D cultures, and more physiologically relevant animal models offers a unique opportunity.

The strength of the CTR program lies in its interdisciplinary team with extensive experience in basic, translational, and clinical research. Our focus is on identifying novel genomic alterations linked to treatment resistance and discovering new therapeutic targets to restore treatment sensitivity.

The CTR's principal investigators have established collaborations with prominent international scientists (such as SU2C-PCF Prostate, SPORE, SNF Sinergia, KWF, ITN, FWF, and The Netherlands Cancer Institute). As a result, the CTR is engaged at an international level, and we believe it will enhance the visibility of the University of Bern and Switzerland in the field of precision oncology.

Research Highlights 2025 / Outlook 2026

We have continued our efforts to identify new vulnerabilities in advanced prostate cancer (PCa) and triple-negative breast cancer (TNBC) and to develop therapies for the most aggressive disease states by integrating in vivo and in vitro models with functional screening and computational biology approaches. In 2025, we:

1. Identified a tumor-selective minor spliceosome vulnerability by demonstrating that targeting the minor spliceosome component U6atac induces R-loop–mediated DNA damage, impairs DNA repair pathways, and sensitizes therapy-resistant prostate and breast cancers to PARP inhibitors, thereby overcoming resistance with minimal toxicity.
2. Defined a therapeutic strategy for CRPC-WNT by showing that SWI/SNF-targeting PROTACs reduce viability in both AR-dependent and WNT-driven AR-negative castration-resistant prostate cancer (CRPC) through disruption of SMARCA4–TCF7L2–MAPK signaling, revealing a tractable vulnerability in this aggressive subtype.
3. Elucidated the role of SWI/SNF in lineage plasticity and resistance by combining barcoded CRISPR screening with single-cell multiomics in a lineage-switching organoid model in vivo, enabling mechanistic insight into treatment-associated state transitions in PCa.
4. Advanced a novel cell-surface target for PSMA-ineligible disease by generating polyclonal antibodies against a newly identified marker expressed in PSMA non-eligible and non-responsive metastatic PCa; these reagents are currently under validation for future diagnostic and therapeutic development.

5. Initiated a new EU MSCA Doctoral Network project (Mac4Me) focused on understanding how tumor cells interact with key components of the brain microenvironment to shape the immunosuppressive niche of brain metastases, establishing a platform for mechanistic discovery and translational opportunity.
6. Identified the N-terminal acetyltransferase NAA60 as critical factor regulating the cellular uptake of platinum drugs via LRRC8A/D-containing volume regulated anion channels.
7. Provided new insights into the role of MDC1 in replication fork progression that mediates PARPi- and cisplatin-induced DNA damage, in addition to its role in DNA double-strand repair.
8. Defined the spatiotemporal organization of residual disease in BRCA1-deficient mouse mammary tumors and human breast cancer.
9. Initiated a Eurostars project on drug sensitivities to novel tumor adaptation mechanisms in renal cell carcinoma utilizing translational, patient-derived models.
10. Characterized the multifaceted role of CRIPTO in PCa invasiveness and progression utilizing in vivo, organoid and patient data.
11. Developed a stratified oncology platform for the classification of prostate cancer samples in subtypes with specific drug vulnerabilities using transcriptomics and machine learning.
12. Initiated an Innosuisse Flagship project, with multiple academic and implementation partners, which will allow the development of an automated microfactory for precision oncology.

In parallel with these research activities, Dr. Rubin contributed to the clinical and molecular definition and characterization of prostate cancer through work with the ESMO guideline committee, helping develop guidance for the classification and management of localized and advanced disease states.

Regarding our young scientists, Dr. Martín González-Fernández, postdoctoral fellow in our program, has received the Dr. Lutz und Dr. Celia Zwillenberg-Preis of the University of Bern. Moreover, Lea Lingg, Demeter Turos, Saurav Subedi, Wanli Cheng and Francesco Bonollo successfully defended their PhD projects in the field of precision oncology.

The research of our program is supported by the Swiss National Science Foundation, European Research Council, U.S. Department of Defense, Swiss Cancer Research, ISREC Foundation, Wilhelm Sander Stiftung, Eurostars, Innosuisse Flagship and SERI.

Selected Publications

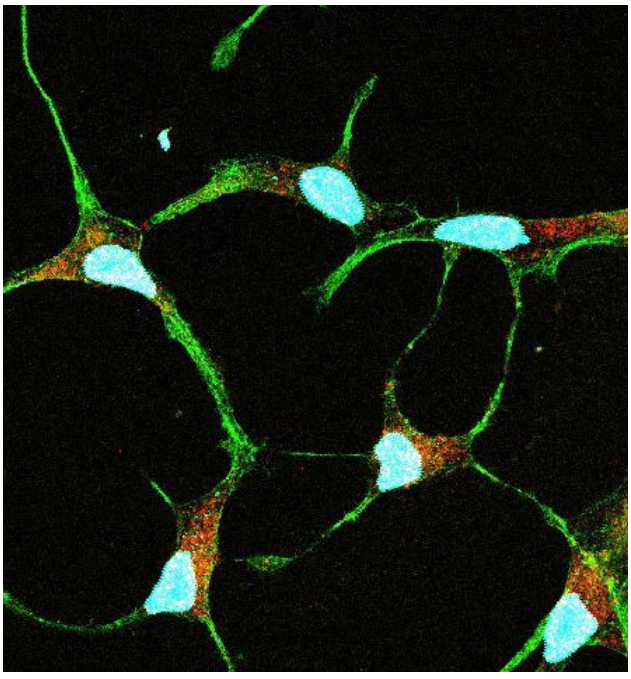
Dogan H, et al. MDC1 counteracts replication fork reversal and mediates chemosensitivity in BRCA1/2-deficient tumors. *Oncogene*. 2026;45(4):491-504. PMID:41408464. 10.1038/s41388-025-03659-8 [Epub 2025/12/18]

Kang J, et al. Multi-layer stratified oncology platform utilizing transcriptomics, prostate cancer organoids, and modeling of drug response. *J Exp Clin Cancer Res*. 2025;44(1):290. PMID:41094672. 10.1186/s13046-025-03540-2 [Epub 2025/10/16]

Rodrigues Sousa E, et al. CRIPTO's multifaceted role in driving aggressive prostate cancer unveiled by in vivo, organoid, and patient data. *Oncogene*. 2025;44(7):462-475. PMID:39592836. 10.1038/s41388-024-03230-x [Epub 2024/11/27]

Rodriguez-Calero A, et al. Predictive molecular alterations of prostate cancer brain metastases based on a companion diagnostic assay. *Discov Oncol*. 2025;16(1):2328. PMID:41307785. 10.1007/s12672-025-04150-2 [Epub 2025/11/27]

Widmer CA, et al. NAA60 facilitates LRRC8A- and LRRC8D-mediated platinum drug uptake. *Commun Biol*. 2025;8(1):1431. PMID:41053424. 10.1038/s42003-025-08826-x [Epub 2025/10/07]



Prostate cancer cells stained against actin (green), PSMA expression (red) and DAPI (nucleus)

Cardiovascular Diseases (CVD)

Participating Labs

Internal DBMR labs

- **Döring Lab**
  Atherosclerosis, vascular inflammation & lower extremity arterial disease
- **Heller Lab**
  Mass spectrometry-based methods to characterize circulating extracellular vesicles and system-wide protein regulation
- **Longnus Lab**
  Cardioprotection, heart transplantation and ex-situ heart perfusion
- **Osterwalder Lab**
  Gene regulatory mechanisms underlying cardiac morphogenesis and congenital heart malformations
- **Rexhaj Lab**
  Fetal programming of metabolic and cardiovascular function/dysfunction later in life
- **Rieben Lab**
  Ischemia/reperfusion injury, xenotransplantation, vascularized composite allotransplantation
- **Schinner Lab**
  Molecular cardiology and patho-mechanisms of genetic cardiomyopathies
- **Zuppinger Lab**
  Investigating side effects of cancer therapy using human cardiac organoids

External affiliated Labs

- **Mercader Lab**
  Heart development and regeneration
- **Odening Lab**
  Cardiac electrophysiology & arrhythmogenic mechanisms in inherited rhythm disorders

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Tight spatiotemporal control of cardiac gene expression and a functional cardiovascular system are crucial for both embryonic development and lifelong maintenance, ensuring adequate blood supply throughout the body. In healthy adults, blood vessels remain in a quiescent state with a non-proliferating, anti-thrombotic, anti-inflammatory, and non-angiogenic endothelial and smooth muscle cell phenotype. Cardiomyocytes ensure proper electrical and contractile function in the heart.

Focusing on human cardiovascular diseases (CVDs), the DBMR CVD research program covers all aspects of cardiac development, vascular and injury responses: we analyze molecular, epigenetic, and physiological mechanisms underlying heart formation, regeneration and injury responses after tissue damage (inflammation, ischemia/reperfusion injury, cancer treatment). We aim to dissect cardiac gene networks and identify both coding and non-coding genomic variations that drive congenital malformations, cardiomyopathies, and fibrotic remodeling, while also investigating the long-term consequences of arrhythmias and heart failure. Furthermore, we examine the vascular biology (e.g., role of the glycocalyx), chronic inflammation (e.g., atherosclerosis), and immune mechanisms (e.g., complement or NETs) affecting vascular health and disease.

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SNSF Starting Grantee Prof. Dr. **Camilla Schinner** (https://data.snf.ch/grants/grant/218454) successfully joined the CVD program in July 2024, and her PhD student Arturo Aguado Gonzales was able to secure a *Swiss 3RCC – 3Rs Doctorate Programme grant* 2025, through which he will establish and validate 3D heart equivalents to model Arrhythmogenic Cardiomyopathy, with the aim of reducing the need for animal experimentation by generating *in vitro* avatars from patient-derived iPSC to individually test therapeutic approaches in the future. This work is carried out with the support of CVD program members **Marco Osterwalder** and **Christian Zuppinger**. The **Osterwalder Lab**, in collaboration with the **Mercader lab**, published a preprint of a major study funded by the *SNSF Eccellenza program*, revealing the robust regulatory architecture of cardiac transcription factor enhancer landscapes and showing how cell type-specific functions integrate to drive mouse heart development (https://pubmed.ncbi.nlm.nih.gov/41509364/). The **Longnus Lab**, in cooperation with the **Heller Lab**, identified proteomics-derived perfusate biomarkers in an isolated rat DCD heart model that correlated with graft functional recovery, thereby improving the objective assessment of cardiac graft quality during *ex vivo* perfusion (https://pubmed.ncbi.nlm.nih.gov/39477820/).

The **Rieben lab**, with the support of the **Döring lab**, published a study showing that exposure to the SARS-CoV-2 spike protein induces sustained pro-inflammatory and pro-adhesive activation of human endothelial cells (https://pubmed.ncbi.nlm.nih.gov/39739157/).

Moreover, the first international symposium, "*Ex situ* heart perfusion: Heart transplantation and beyond" was held in Bern with participation of several of the CVD Program members and with support from SNSF Scientific Exchange funding (**Longnus lab**). The symposium was positively received, attracting global experts from basic/translational research, clinical practice, and industry leaders, from Austria, Germany, the Netherlands, the UK, and the US.

CVD program members further secured the following prizes: at the *Cardiovascular Research Cluster (CVRC)* Annual Meeting: Bryce Evans - Best Poster Prize, Rahel Ottersberg – Best Flash Presentation Prize; at the *LS² Cardiovascular Research Meeting 2025*: Benedetta Coppe – Best Talk, Anja Helmer – 2nd Best Poster (Category Cardiac), Anais Yerly –Best Poster (Category Vascular); at the *Swiss Cardiovascular Student Retreat 2025*: Adrita Chanda – Poster award, and at the *Swiss Transplant Society Annual Meeting 2025*: Selianne Graf – Best Laboratory Paper, second prize.

In addition, the following PhD students within the CVD program successfully defended their PhD theses (in alphabetical order of the participating labs): Anais Yerly & Bryce Evans (Döring lab), Selianne Graf, Manuel Egle, Alexia Clavier (Longnus lab), Asli Adak (Mercader lab), Lucilla Giammarino, Nicolo Alerni, Saranda Nimani (Odening lab), Matteo Zoia, Virginia Roland (Osterwalder lab) and Isabel Arenas Hoyos, Neda Salimi, and Valentina Zollet (Rieben lab).

The BCPM Lighthouse Project "Precision Diagnosis and Therapy in Cardiac Channelopathies (PACE)", involving **Katja Odening**, **Nadia Mercader**, and **Marco Osterwalder**, as members of the CVD program, together with Christiane Zweier and Jean-Louis Reymond, as well as the Faculty of Medicine Strategic Funding Board Grant "Ex-vivo Heart Perfusion – Technology that innovates cardiac transplantation and precision therapies" led by **Katja Odening** and **Sarah Longnus** together with Prof. Matthias Siepe, were successfully continued. The SNF NRP79 (407940_206520) "HeartX: Decoding cardiac regulatory landscapes in an all-human model for cardiogenesis" led by CVD-PIs **Marco Osterwalder** & **Christian Zuppinger**, as well as Iros Barozzi (Medical University of Vienna), and collaborators **Nadia Mercader**, **Katja Odening**, and **Yvonne Döring** will continue until September 2026. The CVD Program has also continued its contribution to the Cardiovascular Research Cluster (CVRC) PhD Specialization Program "Cardiovascular Research" and runs a well-attended monthly research seminar, which offers students the opportunity to obtain ECTS credits for attendance and project presentation.

Selected Publications

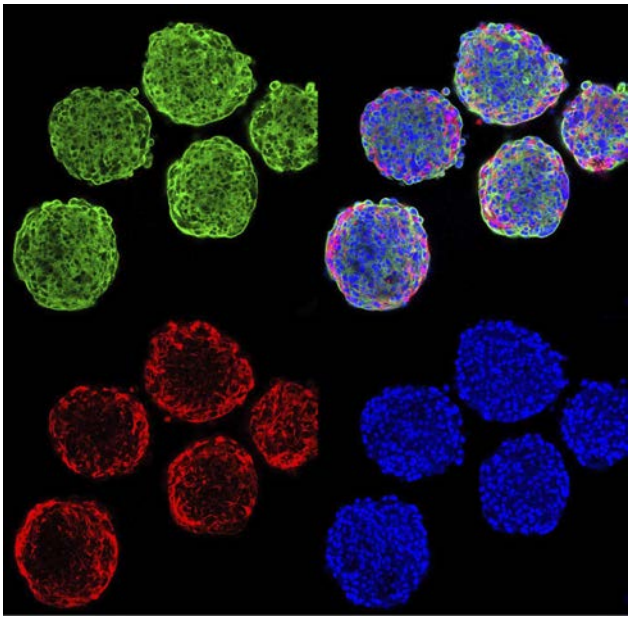
Clavier A, et al. Perfusate Biomarkers of DCD Cardiac Graft Quality Identified With Proteomics: Studies in an Isolated Rat Heart Model. *Transplantation*. 2025;109(4):646-657. PMID:39477820. 10.1097/TP.0000000000005241 [Epub 2024/10/31]

Coppe B, et al. Paternal Cardiac Lesion Induces Cardiac Adaptatıon in Offspring. *Circulation*. 2025;151(13):968-971. PMID:40163557. 10.1161/CIRCULATIONAHA.124.070323 [Epub 2025/03/31 21:17]

Evans BR, et al. ChemR23 prevents phenotypic switching of vascular smooth muscle cells into macrophage like foam cells in atherosclerosis. *Cardiovasc Res*. 2025. PMID: 41264461. 10.1093/cvr/cvaf258 [Epub 2025/11/20]

Gultom M, et al. Sustained Vascular Inflammatory Effects of SARS-CoV-2 Spike Protein on Human Endothelial Cells. *Inflammation*. 2025;48(4):2531-2547. PMID:39739157. 10.1007/s10753-024-02208-x [Epub 2025/01/01]

Roland V, et al. Functional architecture of cardiac TF regulatory landscapes in control of mammalian heart development. bioRxiv. 2025. PMID:41509364. 10.64898/2025.12.19.695499 [Epub 2026/01/09]



A group of cardiac spheroids made of human iPSC-derived cardiomyocytes and cardiac fibroblasts (green: slow skeletal troponin-I-EGFP, red: vimentin, blue: nuclei, magenta: collagen1-alpha). (Copyright: Christian Zuppinger)

Emerging and Difficult to Treat Infections (EDI)

Participating Labs

- **Leib Lab**
  Neuroinfection laboratory
- **Que Lab**
  Critical Care Microbiology
- **Schefold Lab**
  Immunosuppression in Critical Illness

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Clavica F, ARTORG Center for Biomedical Engineering Research, Urogenital Engineering, University of Bern, Bern, CH
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The rise of bacterial multidrug resistance is increasingly compromising the effectiveness of conventional antibiotics, while the development of novel anti-infectives struggles to keep pace due to microbiological and economic constraints. Therapeutic options specifically targeting emerging infectious threats are scarce despite public and private initiatives; only a few new anti-infective molecules are reaching the market, and the drug development process has become disappointingly slow. Innovative diagnostic and therapeutic approaches are urgently required to bring novel management strategies for infections to the bedside.

Using a translational and collaborative approach, the program addresses novel diagnostic and therapeutic strategies to combat emerging and hard-to-treat infections in critically ill patients. Research projects include the identification and validation of novel digital and biological biomarkers to identify patients with infections and prognosticate their outcome, the evaluation of innovative anti-infectives (e.g. bacteriophages) both in vitro and in vivo in various animal models of infection, and the development of novel microbiological diagnostic tools to enable rapid and precise pathogen identification.

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Over the course of 2025, the research program achieved major advances in translational infection research, phage therapy, and data-driven precision medicine.

Phage Therapy Projects

SNSF# 310030_212584; Stiftung für die Forschung in Anästhesiologie und Intensivmedizin #32/2019; The Placide Nicod Foundation

We validated a personalized phage therapy pipeline in patients with left ventricular assist devices, demonstrating that phages isolated from a patient's own skin microbiota can specifically target infection-associated Staphylococcus epidermidis strains. These findings support the feasibility of personalized phage therapy for chronic, device-associated infections.

In parallel, a reverse translational analysis of the Phagoburn randomized controlled trial provided novel mechanistic insights into phage therapy failure, revealing the in vivo occurrence of non-canonical phage infection states, including chronic infection and pseudolysogeny. These results highlight the complexity of phage–bacteria interactions during treatment and help explain variable therapeutic outcomes.

To support rational dosing strategies in phage therapy, we established a hollow fiber infection model to investigate phage pharmacokinetics and pharmacodynamics (PK/PD). This platform enables controlled analysis of phage–bacteria interactions and treatment schedules, including the timing of phage–antibiotic combinations, prior to validation in

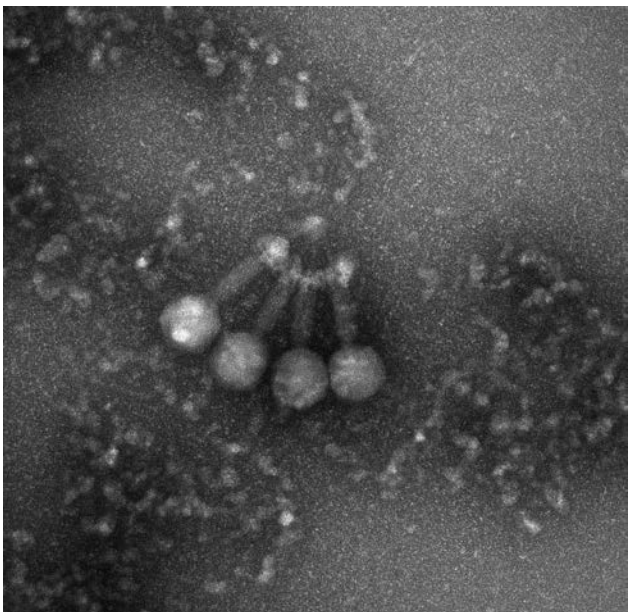
animal models of infection. This work complements the development of a rodent tissue cage model for preclinical PK/PD evaluation.

Ai And Digital Biomarkers Projects
SPHN NDS IICU

Through a collaborative SPHN-supported research project, we generated a large, structured ICU infection dataset that lays the groundwork for next-generation, context-aware outcome prediction in critically ill patients with infections using advanced AI tools.

Outlook
Looking ahead to 2026, we will intensify efforts to further elucidate the mechanisms underlying phage therapy failure and to develop adjunctive modulation strategies that enhance phage-mediated bacterial killing, thereby informing the rational design of next-generation phage-based therapies. In collaboration with PD Dr. Francesco Clavica and Prof. Dominik Obrist (ARTORG), we will develop innovative microfluidic chips enabling real-time, high-resolution observation of live phage–bacteria interactions, providing unprecedented mechanistic insight at the single-cell level. In addition, we have joined a multidisciplinary international European Consortium to design and implement a randomized controlled trial evaluating phage therapy in orthopedic infections, representing a critical step toward robust clinical evidence generation and the translation of phage therapy into routine clinical practice.

Finally, in collaboration with the IFIK (Prof. Lucy Hathaway and Prof. Stephen Leib) and funded by the Multidisciplinary Center for Infectious Diseases (MCID #MA25_02), we will explore novel anti-infective strategies by rigorously evaluating the therapeutic potential of peptides produced by *Klebsiella pneumoniae* that suppress the growth of *Streptococcus pneumoniae*. These peptides will be assessed alone and in combination with antibiotics for the prevention and treatment of pneumococcal pneumonia and meningitis, using complementary in vitro, zebrafish, and rat models of infection.



Electron microscopy of bacteriophages active against *Staphylococcus* epidermidis isolated from a patient with a left-ventricular assist device.

Selected Publications

Pitton M, et al. Targeting Chronic Biofilm Infections With Patient-derived Phages: An In Vitro and Ex Vivo Proof-of-concept Study in Patients With Left Ventricular Assist Devices. *Open Forum Infect Dis.* 2025;12(4):ofaf158. PMID:40182131. 10.1093/ofid/ofaf158 [Epub 2025/04/04]

Experimental Nephrology (EXN)

Participating Labs

- **Fuster Lab**
  Kidney stones, polycystic kidney disease, sodium-proton transporters
- **Huynh-Do Lab**
  Prevention of acute kidney injury and chronic kidney disease, rare kidney diseases
- **Rudloff Lab**
  Fetal programming of disease, ex vivo nephron-on-chip models
- **Sidler Lab**
  Transplantation and immunosuppression
- **du Toit Lab**
  Steroid metabolism and steroid-related diseases

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Olauson H, Karolinska Institute, Stockholm, SE
Patel V, UT Southwestern Medical Center, Houston, TX, USA

With one billion people affected worldwide, kidney diseases are a major cause of morbidity and mortality. To tackle this burden, the Experimental Nephrology (EXN) Research Program investigates renal disease mechanisms following a bedside-to-bench-and-back approach. Core themes span renal transport and acid-base biology, biomarker discovery in acute kidney injury (AKI) and chronic kidney disease (CKD), hereditary disorders (e.g., Fabry disease or ADPKD), mineral-bone disorders, and steroid metabolome profiling.

Across these fields, we develop innovative ex vivo tools, including segment-specific 3D nephron cultures and microfluidic tubule-on-chip systems, enabling rapid mechanistic dissection and functional testing. Integrated with established preclinical models of AKI-to-CKD transition and developmental programming (fetal hypoxia), diverse genetic mouse lines, advanced omics approaches, and tightly linked to clinical registries and studies in nephrolithiasis, cardiac-surgery-associated AKI, transplantation, dialysis, and glomerular disease, this pipeline aims to deliver precision diagnostics and targeted therapies that preserve kidney function and improve long-term outcomes.

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Program Establishment and Strategic Positioning

EXN was established in 2025 to incorporate nephrological research at the DBMR, aligning shared disease models, bioanalytics, and clinical studies into a unified pipeline.

This structure fosters synergy across topics and shared methodologies, accelerating mechanistic discovery and translation into clinically testable hypotheses while supporting the targeted development of *ex vivo* platforms.

In addition, the Department was accredited by KoSEK Switzerland as a reference center within the Swiss Network for Rare and Inherited Kidney Disorders (RARE-Kidney), strengthening our role in rare kidney disease research.

Developmental Programming of Kidney Disease

A major scientific focus in 2025 was fetal hypoxia-driven disease biology as a paradigm for developmental programming of kidney vulnerability and CKD risk. In collaboration with Kamel Laghmani (Sorbonne University), we advanced this concept in transient antenatal Bartter syndrome type V using a rare-disease-to-common strategy. Across *in vitro* and *in vivo* approaches, we generated the first mechanistic evidence that adaptation to hypoxia and endoplasmic reticulum stress intersects with regulation of key salt transporters, including NKCC2 and NCC, linking tubular stress responses to clinically relevant phenotypes. Complementing this work, we launched an interdisciplinary collaboration with Prof. Britta Engelhard (Theodor Kocher Institute) and Prof. Daniel Surbek (Clinic for Obstetrics and Feto-Maternal Medicine) to examine how fetal programming promotes premature aging and senescence, reduces tissue resilience, and impairs repair processes in placenta, brain, and kidney.

Tissue Protection in AKI and AKI-to-CKD Transition

A second major scientific focus in 2025 centered on Fetuin-A as a circulating "tissue chaperone" in a newly established bilateral kidney ischemia-reperfusion injury mouse model. A key achievement was linking ischemic injury severity to intrarenal formation of cytotoxic mineral-protein deposits, supporting a mechanism in which mineral formation amplifies inflammation, injury propagation, and maladaptive repair. This finding strengthens our target-oriented strategy to use Fetuin-A to interrupt self-perpetuating injury cascades, with potential relevance beyond the kidney.

Novel Therapeutic Targets in Cystic Kidney Disease

A third major scientific focus in 2025 explored the orphan Na+/H+ exchanger NHA2 as a potential contributor to autosomal dominant polycystic kidney disease (ADPKD) using a 3D cyst assay, complemented by machine-learning-assisted image analysis to standardize and accelerate cyst size quantification. Pharmacological inhibition of NHA2 reduced cyst growth in a dose-dependent manner without cytotoxicity across a broad concentration range. To further clarify its therapeutic potential, we will use CRISPR editing to generate well-controlled NHA2 knockout models *in vitro* and subsequently perform in vivo validation by introducing NHA2 loss-of-function into established ADPKD mouse models (collaboration with Prof. Vishal Patel, Dallas, Texas).

Outlook 2026

Building on the strong momentum in 2025, EXN will continue to grow in size and scope in 2026, supported by two newly awarded SNSF Project Funding grants, one SPARK grant, and one Ambizione grant.

We will expand our ex vivo research through a joint engineering project with FHNW to scale functional testing and therapy-response profiling across nephron segments (RENAISSANCE, Reconstructed Nephron Architecture In Segment-Specific Advanced Cultures for Nephrology and Cell Engineering).

We will also broaden our mineral and endocrine axis through a new program component on bone–kidney crosstalk led by PD Dr. Matthias Moor, focusing on the regulation of FGF23 secretion by bone and early signaling events in the kidney.

Furthermore, we will initiate a new mechanistic and translational project on Golgi ion homeostasis to elucidate the roles of NHA2 and GPP130 in pancreatic beta-cell Golgi function and insulin secretion, thereby linking transporter biology to secretory granule biogenesis and systemic glucose homeostasis, with relevance for precision strategies in diabetes.

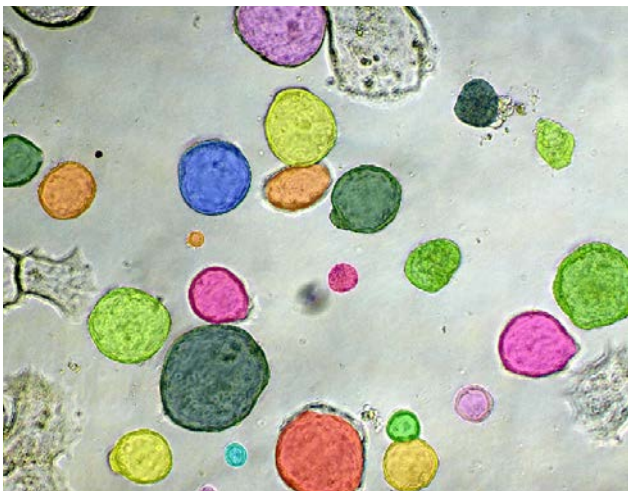
Selected Publications

Anderegg MA, et al. Empagliflozin in nondiabetic individuals with calcium and uric acid kidney stones: a randomized phase 2 trial. *Nat Med.* 2025;31(1):286-293. PMID:39747681. 10.1038/s41591-024-03330-x [Epub 2025/01/03]

Baumann SP, et al. A homology-based 3D model and structure-function studies reveal key elements for divalent metal ion transporter ZIP8 (SLC39A8) function. *J Biol Chem.* 2025;301(12):110930. PMID:41232668. 10.1016/j.jbc.2025.110930 [Epub 2025/11/14]

du Toit T, et al. Characterization of Steroid Metabolic Pathways in Established Human and Mouse Cell Models. *Int J Mol Sci.* 2025;26(19). PMID:41096985. 10.3390/ijms26199721 [Epub 2025/10/16]

Roskosch J, et al. Lectin-mediated, time-efficient, and high-yield sorting of different morphologically intact nephron segments. *Pflugers Arch.* 2024;476(3):379-393. PMID:38091061. 10.1007/s00424-023-02894-w [Epub 2023/12/13]



Machine-learning-assisted cyst delineation (color-coded masks) enables rapid, standardized extraction of cyst size metrics across samples.

Lung Precision Medicine (LPM)

Participating Labs

- **Blank Lab,** Inhalation toxicology, in vitro / in vivo inhalation models
- **Eggel Lab,** translational immunology, type-2 immunity, allergy pathogenesis, novel diagnostic and therapeuic strategies, aging and inflammation
- **Funke-Chambour Lab,** Interactions of lung inflammation and fibrosis studied in translational models like precision cut lung slices
- **Gazdhar Lab,** Role of stem cells in lung injury and fibrosis, alveolar organoids as novel in vitro models for lung disease, electroporation-mediated cancer treatment
- **Geiser Lab,** lung fibrosis, new approach methodologies (NAM, organoids, lung-on-chip), effects of environmental particles (micro-/nanoplastic) on lung health
- **Gote-Schniering Lab,** immune aging, regenerative cell circuits, lung fibrosis and autoimmunity, multiscale multiomics, systems medicine
- **Klein Lab,** Sjögren's disease, autoimmunity, connective tissue diseases, chronic inflammation, viral infections, environmental factors
- **Maurer Lab,** systemic autoimmune diseases, interstitial lung disease, personalized medicine
- **Müller L. Lab,** primary ciliary dyskinesia, mucociliary activity, impact of air pollution, viral infections, influence of early-life nutrition on the gut microbiome and the immune system
- **Seydoux Lab,** intranasal vaccination, innate immunity, allergic asthma

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Schiller H, Helmholtz Center Munich, Munich, DE

The interdisciplinary Lung Precision Medicine Program brings together clinicians, biologists, physicists, and engineers of the University of Bern and the University Hospital of Bern. The aim of the program is to address unmet clinical needs by focusing on acute and chronic lung diseases of different origins and infectious, immunological, and environmental etiologies. We aim to combine profound knowledge of inflammatory and fibrotic lung diseases and lung regeneration for precision and regenerative medicine, which are closely linked to current clinical needs. We are running a basic research platform to investigate the key mechanisms driving respiratory and immunological diseases and develop novel technologies such as precision-cut lung slices, distal lung organoids, and sophisticated cell culture models that mimic functional healthy and/or diseased lung tissues based on patient cells or patient-derived induced pluripotent stem cells. Novel personalized *in vitro* disease models will allow the development of novel therapeutic strategies for lung infection and immunity, lung fibrosis, lung repair, and regeneration.

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In 2025, the LPM consolidated interactions and collaborations between the individual research groups. On a more administrative level, we continued our weekly joint lab meetings to ensure smooth collaboration in the labs, our monthly journal club to discuss cutting-edge publications in the field, and our weekly Friday Lung Research Seminar which also involves groups outside of the LPM, e.g. the groups of Thomas Marti and Ren-Wang Peng (OTM, DBMR), Olivier Guenat (Organs-on-Chip Technologies, ARTORG) or the start-up Alveolix AG at siteminsel to present different projects or invite external speakers.

In addition, scientific collaborations between the research groups were continued or newly initiated, and several were successfully funded. These are some examples: (1) Micro/Nanoplastics in the respiratory tract – a human in vitro inhalation model (Lungenliga grant for Fabian Blank, Emilie Seydoux and Thomas Geiser), (2) SHINE study: Investigating Sjögren's disease using high field imaging, neuropsychological and molecular analyses (SF Board project grant of the University of Bern for Lisa Christ, Kerstin Klein, Iris-Katharina Penner and Angelika Hoffmann), (3) Identification of factors causing toxicity of tire wear particles in human respiratory cell models (SNSF project grant for Loretta Müller and project partner Kerstin Klein), (4) PRISM-FILD: Precision Medicine through Redefinition of Diagnosis and Management using Integrated Systems and Multilevel Data in fibrosing interstitial lung diseases (fILD) (SNSF project grant for Manuela Funke-Chambour and others) and, most prestigiously, (5) IMMUNOCODE – Decoding the Role of Immune Aging in Regenerative Cell State Dysfunction in Pulmonary Fibrosis (SNSF starting grant for Janine Gote-Schniering).

Furthermore, we celebrated the presentation of the Ewald-Weibel-Award for Lung Research in Switzerland 2025 to Loretta Müller for her work in the field of primary ciliary dyskinesia diagnostics and the impact of air pollution on the respiratory system.

Through various collaborative projects with the allergology clinic at the Inselspital as well as industry partners (i.e ATANIS Biotech AG and Excellergy, Inc.) the Eggel lab has significantly advanced allergy diagnostic and therapeutic options: (1) the establishment of a novel functional mast cell activation test based on conditionally immortalized progenitors (Hoxb8 MAT), and (2) the development of optimized next-generation anti-IgE biologics known as Effector Cell Response Inhibitors (ECRIs).

Selected Publications

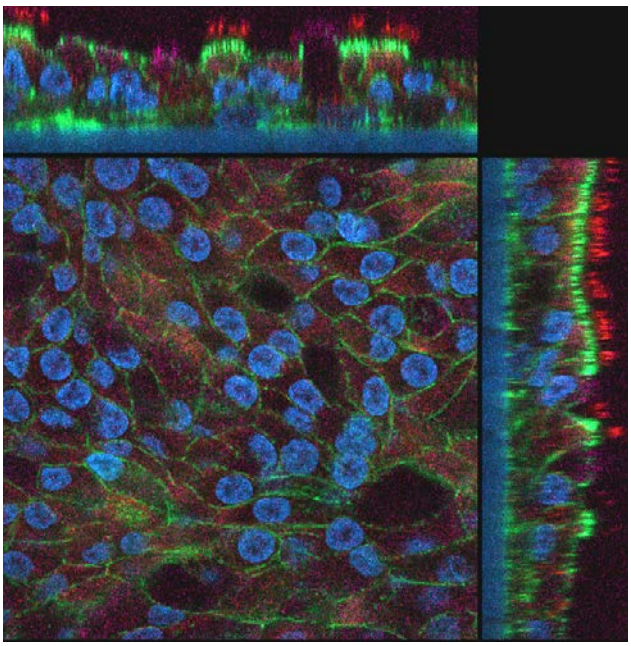
Brigger D, et al. Age-Related Increase in Anaphylaxis Severity Is Associated With Enhanced Sensitivity to Allergic Mediators. *Allergy*. 2025. PMID:41020414. 10.1111/all.70082 [Epub 2025/09/29]

Brunner M, et al. Pro-Inflammatory Properties of Salivary Gland-Derived Fibroblasts-Implications in Sjogren's Disease. *Cells*. 2025;14(8). PMID:40277884. 10.3390/cells14080558 [Epub 2025/04/25]

Celkova P, et al. Influence of Insert Brand and Culture Method on Ciliary Activity and Epithelial Cell Types in Human Nasal Air-Liquid Interface Cell Cultures. *Life (Basel)*. 2025;15(6). PMID:40566610. 10.3390/life15060958 [Epub 2025/06/26]

Magnin CY, et al. From images to clinical insights: an educational review on radiomics in lung diseases. *Breathe (Sheff)*. 2025;21(1):230225. PMID:40104259. 10.1183/20734735.0225-2023 [Epub 2025/03/19]

Ozan VB, et al. Influence of Microenvironmental Orchestration on Multicellular Lung Alveolar Organoid Development from Human Induced Pluripotent Stem Cells. *Stem Cell Rev Rep*. 2025;21(1):254-275. PMID:39417930. 10.1007/s12015-024-10789-1 [Epub 2024/10/17]



Primary nasal epithelial cells cultured and differentiated at the air-liquid interface. They show a cell nuclei (blue), a tight monolayer (cytoskeleton stained in green with phalloidin), (beating) cilia (tubulin stained in red) and produce mucus (mucin 5AC stained in mangenta).

AI for RNA Biology

The AI for RNA Biology Lab aims to uncover which RNA sequences and how define cell states and their transitions, with the goal of improving our understanding and treatment of complex human diseases such as cancer and neurodegeneration. We focus in particular on the non-coding regions of mRNA, including 5′ and 3′ untranslated regions and introns, going beyond their canonical roles in regulating mRNA metabolism to discover novel, context-specific functions.

To achieve this, we develop AI-driven computational methods that integrate multimodal biological and clinical data. Our work adopts a multiscale and temporal perspective, ranging from subcellular organization to tissue-level dynamics, to identify early and aberrant mechanisms underlying disease and enable RNA-based therapeutic strategies.

We believe that impactful science requires deep interdisciplinary and transdisciplinary collaboration. The lab leads an international alliance of experts in AI, biology, and clinical neuroscience to ensure clinical relevance, rapid translation, and strong training of future leaders fluent across disciplines. Beyond science, we actively bridge research with art and the humanities through collaborative projects and artist residencies, fostering creativity, reflection, and public engagement.

Research Highlights 2025 / Outlook 2026

Decoding RNA language with language models

By analyzing nucleotide embeddings from RNA large language models, we found that these models detect sequence irregularities linked to RNA modification potential. In particular, m6A-modified nucleotides occupy distinct latent regions, enabling the discovery of novel m6A-associated motifs beyond the canonical DRACH sequence. We are now applying these models to decode dynamic m6A regulation during motor neuron differentiation and in amyotrophic lateral sclerosis (ALS).

Spatial and temporal regulation of splicing and polyadenylation in cancer

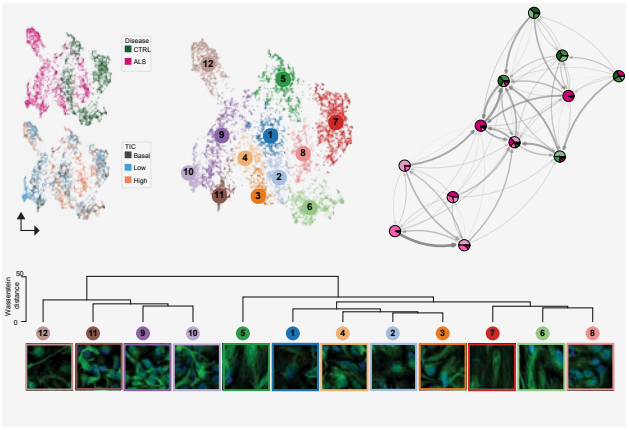
By specializing histopathology foundation models to invasive tumor tissue, we uncovered spatially distinct tumor archetypes with consistent morphological and molecular identities across patients. These archetypes show strong prognostic value, with splicing-associated subtypes predicting poorer outcomes. Ongoing work explores the therapeutic relevance of these RNA signatures across cancer types.

Morphological trajectory modeling in neurodegeneration

We developed a deep learning framework that learns disease-relevant representations from microscopy images of iPSC-derived astrocytes across genetic and inflammatory conditions. This enabled the construction of a morphological atlas and the inference of disease-associated trajectories. We are extending this approach to bright-field time-lapse microscopy to transform routine imaging into a predictive tool for studying development, neurodegeneration, and drug response.

Selected Publications

Abu-Remaileh M, et al. Visions of the future of molecular cell biology. *Nat Rev Mol Cell Biol.* 2025;26(10):735-740. PMID:40983749. 10.1038/s41580-025-00892-7 [Epub 2025/09/23]



Deep learning–based mapping of astrocyte cellular state landscapes in culture from fluorescence microscopy images.

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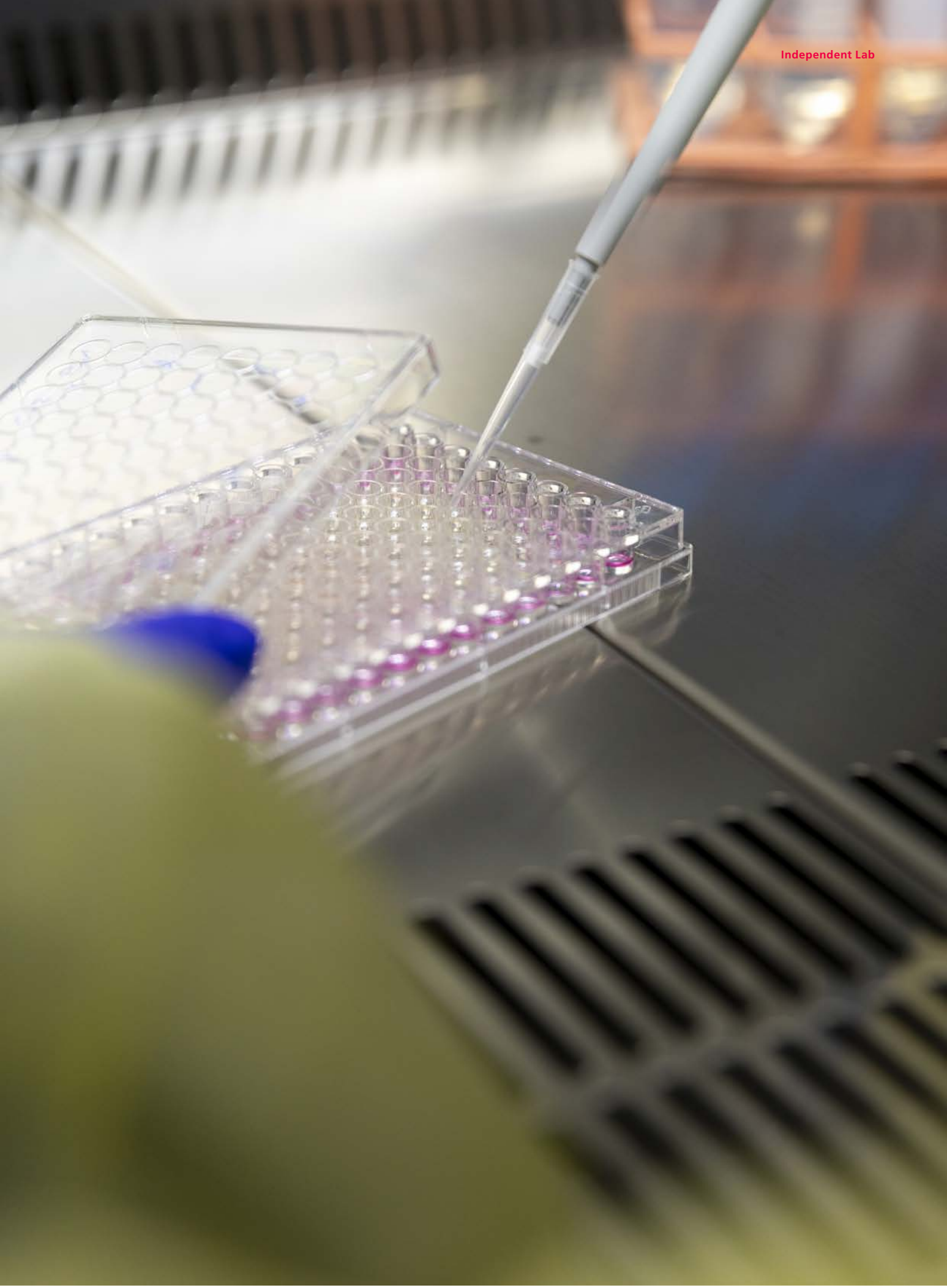
Frossard P, EPFL, Lausanne, CH
Labidi-Galy SI, HUG-UNIGE, Geneva, CH
Herrmann US, University of Bern, Bern, CH



Technology Core Facilities

Proteomics & Mass Spectrometry (PMS CF)

Achievements 2025

The number of projects increased by 16 % compared to the average of the last five years. We have continued development work using functionalized bead technologies and improved separation column chemistry in collaboration with Dr. Maish (Germany). In August, we started to develop single cell proteomics as part of a Master thesis, achieving now more than 2000 protein identifications per single cell.

Performance report 2025

We processed 1433 project and 567 development samples submitted by laboratories from the Faculty of Medicine (51.7 %), Faculty of Science (18.5 %), Vetsuisse Faculty (20.4 %), EAC (4.4 %), and external institutions (2.8 %), resulting in a total injection count of 9138 for nano-LC-MS/MS runs, including samples, QCs, and blanks. This corresponds to approximately 5787 of working hours of machine time (242 days). Despite a 43.5 % increase in processed samples compared with 2024, machine time was reduced by 9.7 % due to the enhanced performance of the new instruments allowing faster data acquisition.

Outlook 2026

At the beginning of the year, we will install a new liquid handling robot to be used for repetitive pipetting tasks, thus relieving staff from health-threatening tasks. The single-cell proteomics Master and the immunopeptidomics PhD thesis are expected to conclude in March and December, respectively.

Publications

Hänggeli KPA, et al. Pleiotropic Effects on Tachyzoite and Host Cell Proteomes in Knock-Out Clones of the Open Reading Frames 297720 and 319730 Constitutively Expressed in T. gondii ShSp1 Tachyzoites. *Int J Mol Sci*. 2025;26(21). PMID:41226474. 10.3390/ijms262110433 [Epub 2025/11/13]

Morandi SC, et al. Toward the Characterization of the Human Core Ocular Surface Microbiome. *Invest Ophthalmol Vis Sci.* 2025;66(9):40. PMID:40657968. 10.1167/iovs.66.9.40 [Epub 2025/07/14]

Müller J, et al. Proteome changes during in vitro culture adaptation of Toxoplasma gondii archetypal II and III field isolates. *Front Cell Infect Microbiol.* 2025;15:1633384. PMID:41036225. 10.3389/fcimb.2025.1633384 [Epub 2025/10/02]

Wagner TM, et al. Extracellular vesicles of minimalistic Mollicutes as mediators of immune modulation and horizontal gene transfer. *Commun Biol.* 2025;8(1):674. PMID:40301684. 10.1038/s42003-025-08099-4 [Epub 2025/04/30]

Widmer CA, et al. NAA60 facilitates LRRC8A- and LRRC8D-mediated platinum drug uptake. *Commun Biol*. 2025;8(1):1431. PMID:41053424. 10.1038/s42003-025-08826-x [Epub 2025/10/07].

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Sophie Braga Lagache, MSc, Senior Assistant

Natasha Buchs, Laboratory Assistant

Alexandra Emanuela Burger, MSc, PhD student

Flow Cytometry and Cell Sorting (FCCS)

Achievements 2025

Our application to purchase the BD FACSDiscover A8 flow cytometer was approved by the Medical Faculty and the University of Bern Investment Fund for Cost-Intensive Equipment and the instrument was installed. The first users received training for self-operated measurements, and the instrument has proven to deliver robust and reliable data and results. Dr. Miriam Diaz and Dr. Fiona Appiah were the driving forces behind revitalizing our website, and thoroughly revising our lab guidelines.

Our collaboration with the Proteomics and Mass Spectrometry core facility yielded initial, highly promising results regarding single cell proteomics from sorted cells. Our two BMA students Jonas Zürcher and Robin Spack, successfully completed their diploma thesis on image-guided high-speed cell sorting.

Performance report 2025

Cell sorting decreased by 11 % (-188 hrs), while user-operated flow cytometry measurements increased by an impressive 25 % (+1171 hrs) in 2025 compared to 2024. The latter was mainly due to the increased demand for the novel spectral flow cytometry technology. Most requests were from research groups of the Medical Faculty and, within the Medical Faculty, from groups and programs affiliated with the DBMR. We successfully conducted our FACS course twice in 2025, with a total of 30 participants.

Outlook 2026

We plan to advance with the implementation of the DBMR MARE management system for the FCCS CF. We will focus on scientific collaborations with a focus on image-supported flow cytometry in general and image-guided cell sorting in particular. A strong focus will also be placed on organizing of the 5th Swiss Cytometry Meeting, to be held from 10.2. – 12.2.2027 at the University of Bern

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Dr. Fiona Appiah, PhD

Dr. Miriam Diaz-Varela

Biomedical Genomics (BMG)

Achievements 2025

In 2025, the new QuantStudio Absolute Q Digital PCR System was successfully implemented and has generated valuable data for several projects. This dPCR system is based on microfluidic array plate technology and integrates all digital PCR steps – compartmentalization, thermal cycling, and data acquisition – into a single instrument with a qPCR-like workflow. This design improves ease of use, minimizes hands-on time, and enhances run-to-run consistency. Compared with qPCR, digital PCR enables absolute quantification without the need for a standard curve, resulting in higher sensitivity and precision, particularly for the detection of rare targets and low-concentration samples.

Performance report 2025

In 2025, a total of 978 hours were booked for PCR instrument use (Absolute Q, ViiA7, and QuantStudio). BMG staff delivered 32 introductory sessions covering PCR and quality control (QC) instruments. In addition, technical support was provided for gene expression and targeted sequencing projects, as well for troubleshooting for qPCR and dPCR experiments. Furthermore, BMG bench space and instruments supported nucleic acid extraction, PCR and genomics experiments for research groups with limited lab space (e.g. molecular hematology, translational immunology).

Outlook 2026

We are looking forward to giving more introductory trainings for instruments and supporting projects.

Selected Publications

Rodriguez-Calero A, et al. Predictive molecular alterations of prostate cancer brain metastases based on a companion diagnostic assay. *Discov Oncol.* 2025;16(1):2328. PMID:41307785. 10.1007/s12672-025-04150-2 [Epub 2025/11/27]

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Core Facility Members
Sina Maletti, MSc, Lab Manager

Live Cell Imaging (LCI)

Achievements 2025

In 2025, the LCI staff focused on optimizing new protocols, such as evaluating different approaches for tissue clearance in organoid structures for deep 3D imaging using laser scanning microscopy. Furthermore, we have intensified collaborative work with research teams within and outside of DBMR to strengthen the research support of the Core Facility by diversifying and refining the expertise in the application of different techniques of sample preparation, imaging, and image analysis. In addition, LCI has received financial support from the Investment Fund of the University of Bern and the Faculty of Medicine for the purchase of a Nikon Ti2 Crest V3 DeepSIM microscope for fast and deep 3D/4D live imaging of complex *in vitro* models. The system will be available to users in early 2026.

Performance report 2025

The total working hours of the LCI equipment (Incucyte S3 and S5) increased from 6221 hours in 2024 to 8068 hours in 2025. LCI staff organized a total of 98 introductory trainings sessions for users on LCI devices, spending a total of 224 hours (283 hours in 2024). In 2025, LCI collaborated with a total number of 31 individual research groups, spending a total of 317 hours in collaborations (a significant increase compared to the 40 hours in 2024). LCI also spent a total of 156 hours providing support for the users of the Core Facility. As in past years, the Facility contributed to the advanced microscopy lectures and practical modules organized with Microscopy Imaging Center (MIC). Over 20 students participated in hands-on workshops in 2025.

Outlook 2026

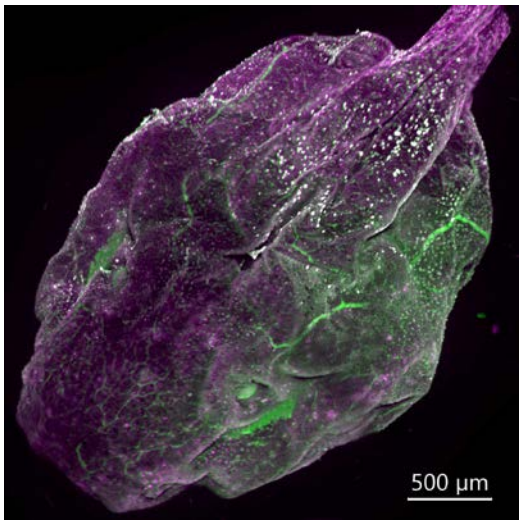
In 2026, LCI will receive a Carl Zeiss LSM880 confocal microscope with an Airyscan module and a spectral detector. The microscope will be transferred to the Facility from the Institute of Anatomy and will eventually replace the old Carl Zeiss LSM710. Furthermore, the new MARE booking and billing platform provided by DBMR will be launched for LCI in early 2026.

Publications

Mutlu S, et al. Adoptive Transfer of T Cells as a Potential Therapeutic Approach in the Bleomycin-Injured Mouse Lung. *J Gene Med.* 2025;27(4):e70018. PMID:40159455. 10.1002/jgm.70018 [Epub 2025/03/31 20:04]

Scalise MC, et al. Modulation of allergic airways disease employing bio-mimetic nanoparticles with TLR agonists. *Front Allergy.* 2025;6:1633293. PMID:40951841. 10.3389/falgy.2025.1633293 [Epub 2025/09/15]

Schultz-Pernice I, et al. Monkeypox virus spreads from cell-to-cell and leads to neuronal death in human neural organoids. *Nat Commun.* 2025;16(1):5376. PMID:40588500. 10.1038/s41467-025-61134-0 [Epub 2025/07/01]



Whole-mount Tatpole head (Allobates Femoralis) labelled for E-Cadherin (purple) and EpCAM (green) after clearing and imaged with a Nikon Ti2 Crest V3 DeepSIM (SD configuration) with a 10x/0.45 PLAN APO lambda D objective. Image reconstruction shows 3D MIP projection (Imaris; Oxford Instruments).

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Ekaterina Ivanova Staff Scientist (since August)

Selina Steiner Lab Technician

Translational Organoid Resource (TOR)

Achievements 2025

The Pancreatic Ductal Adenocarcinoma (PDAC) Feasibility Trial with the Hirslanden Clinic in Zurich has successfully transitioned to its translational phase. The fully characterized organoid biobank established in 2024 is now being utilized in various precision oncology projects. The GAIN INST Phase II trial for bladder cancer at Spitalzentrum Biel (Central Hospital in Biel) is progressing with organoid-based treatment screening, while the POLO trial, in collaboration with Prof. Roland Seiler Blarer, is moving towards organoid-guided therapeutic selection for neoadjuvant treatments. Additionally, the partnership with Prof. Rominger and Prof. Shi (University of Bern) has expanded to include organoid models for prostate and pancreatic cancer in radiotheranostic applications.

Performance report 2025

TOR has ensured a leading role in the Innosuisse ORION Flagship program. This national Swiss flagship initiative will implement organoid-based functional profiling incorporating high-content imaging, CRISPR perturbations, and AI-driven analytics for precision medicine applications. Additionally, the TOR core has secured funding from two Eurostar projects: one will use the PDAC organoid lines available at TOR to evaluate the efficacy of a newly developed targeted drug, while the other will focus on renal cell carcinoma (RCC) with the aim of identifying therapeutic vulnerabilities.

Outlook 2026

The TOR core will focus on implementing the MARE billing platform from DBMR and introducing new training course packages.

Publications

Cutrona, M.B. Quantitative assessment of nanoparticle uptake and trafficking in advanced 3D cell models: A high-content screening core to enhance precision nanomedicine development. in *Proteomics in Cell Communication*. Elsevier, 2025

Kang J, et al. Multi-layer stratified oncology platform utilizing transcriptomics, prostate cancer organoids, and modeling of drug response. *J Exp Clin Cancer Res*. 2025;44(1):290. PMID:41094672. 10.1186/s13046-025-03540-2 [Epub 2025/10/16]

Radic M, et al. Patient-derived Organoids in Bladder Cancer: Opportunities and Challenges. *Eur Urol Focus*. 2025;11(1): 62-70. PMID:39232905. 10.1016/j.euf.2024.08.008 [Epub 2024/09/05]

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Core Facility Member
Dr. Marta De Menna, Deputy Director
Dr. Meritxell B. Cutrona, Affiliated Member

Johanna Dürmüller-Bol DBMR Research Award 2025

Biosketch

Dr. Benedetta Coppe

Master's degree in Functional Genomics at University of Trieste, Italy (2018); Ph.D. in Biomedical Sciences -honors cum laude at the University of Bern, Switzerland (2023). From 2024 to March 2026, Postdoc under the supervision of Prof. Nadia Mercader in the Developmental Biology and Regeneration lab at the University of Bern. From April 2026, Postdoc in Prof. Nicola Iovino's lab Nicola Iovino's lab at the Max Planck Institute of Immunobiology and Epigenetics (MPI-IE) in Freiburg.

Project summary and outlook 2026

In response to stressors, epigenetic marks regulating chromatin conformation are altered in the gametes of exposed parents (Fitz-James, Cavalli 2022), which correlates with the emergence of altered phenotypes in their offspring.

We recently showed in the mouse model that offspring of males experiencing cardiac injury during the neonatal period display increased cardiac plasticity and enhanced functionality (Coppe et al. 2025). However, how paternal cardiac injury affects the reproductive system and induces lasting changes in gametes remains largely unknown.

In adult mice, cardiac injury triggers systemic inflammation in multiple organs, some showing long-lasting alterations (Cortada et al. 2024). The reproductive system may be similarly affected, with systemic inflammation potentially linking neonatal cardiac injury to gamete changes.

The aim of this project is to determine whether systemic inflammation impacts the testes shortly after neonatal cardiac injury and/or later in adulthood, and whether it alters chromatin structure in developing gametes, influencing gene expression in the next generation.

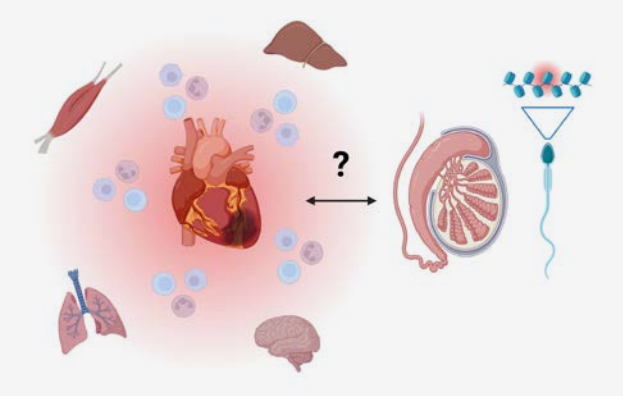
In Switzerland, around 120 children born with congenital heart disease undergo heart surgery within the first six weeks of life (Natterer et al. 2022). Understanding how neonatal cardiac damage affects the reproductive system is crucial to identifying targetable pathways that may prevent intergenerational transmission of altered information.

Selected Publications

Apolinova K, et al. ZebraReg-a novel platform for discovering regulators of cardiac regeneration using zebrafish. *Front Cell Dev Biol.* 2024;12:1384423. PMID:38799508. 10.3389/fcell.2024.1384423 [Epub 2024/05/27]

Coppe B, et al. Paternal Cardiac Lesion Induces Cardiac Adaptation in Offspring. *Circulation.* 2025;151(13):968-971. PMID:40163557. 10.1161/CIRCULATIONAHA.124.070323 [Epub 2025/03/31 21:17]

Coppe B and Mercader N. Tight Regulation of Erk Activity Protects From Anthracycline-Induced Cardiotoxicity. *JACC CardioOncol.* 2025;7(7):849-851. PMID:41546615. 10.1016/j.jaccao.2025.10.002 [Epub 2026/01/17]



Cardiac injury-induced systemic inflammation may affect the testes, altering chromatin organization in developing gametes and contributing to intergenerational inheritance of new phenotypes. *Created in BioRender.*

Contact

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Selected Collaborators

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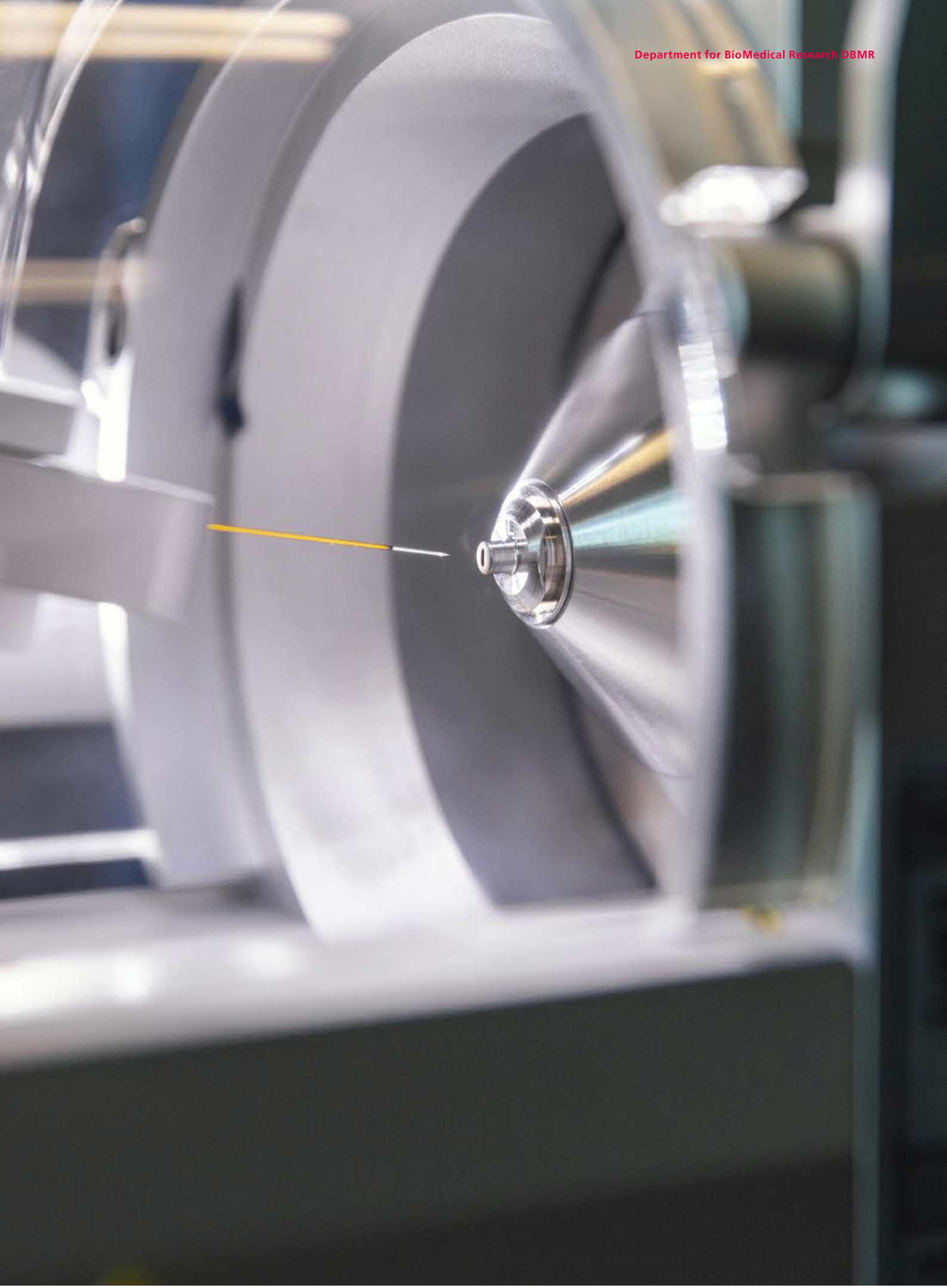
Rosado Díez A, Genomics unit at CNIC, Madrid, SP



Financing of the DBMR and Implementation of User Fees (2025)

Since July 2023, the Department for BioMedical Research (DBMR) has been in discussions with the Faculty of Medicine leadership about the adequacy of its current financing model. These discussions have shown that current funding levels are insufficient to cover the full scope of operational costs and obligations. This shortfall is driven by the continued growth of DBMR membership, responsibility for infrastructure across multiple buildings, and the need to maintain state-of-the-art Core Facilities.

On January 23, 2024, the Faculty of Medicine leadership approved a series of measures to improve the financial sustainability of the DBMR. A key component of these measures was the introduction of a user-based contribution model to cover variable operating costs, as proposed by a dedicated commission.

On December 19, 2024, the directors of the university hospitals and affiliated institutes, along with researchers at the DBMR, were formally informed of the planned implementation of a user fee, effective in 2025.

Following further evaluation, it was determined that the most effective implementation approach would be to bill clinics directly based on the number and type of users affiliated with the DBMR. The user fee model consists of two tiers:

- **Full Fee:** Covers the comprehensive range of variable operational costs
- **Light Fee:** Applies to limited usage, covering only DBMR campus account-related costs

The user fees are calculated on a cost-recovery basis and are intended to cover expenses, including:

- DBMR campus accounts
- Safety materials
- Gas consumption
- General laboratory consumables
- Maintenance of laboratory equipment

This model ensures a transparent, equitable, and sustainable framework to support the DBMR's infrastructure and service provision.

Key Events

Special Seminars

May 23, 2025
Prof. Cory Abate-Shen
Columbia University, Vagelos College of Physicians and Surgeons, New York, NY, USA
Of mice and man: learning about prostate cancer by studying mouse models

October 21, 2025
Prof. Lisa Horvath
Director of Research and Chief Clinical OfficerChris O'Brien Lifehouse, University of Sydney, Australia
Targeting lipid metabolic vulnerabilities in metastatic prostate cancer

DBMR Research Conference 2025

January 13, 2025
Prof. Paul Kubes
Canada Excellence Research Chair in Immunophysiology and Immunotherapy, Queen's University, Kingston, Ontario, Canada
Studying the immune response in liver throughout life

February 7, 2025
Prof. Marcel van Vugt
University Medical Center, Department of Medical Oncology, University of Groningen, NL
Processing of replication lesions during mitosis by the CIP2A-TOPBP1 complex

April 7, 2025
Prof. Marianna Tryfonidou
Department of Clinical Sciences, Faculty of Veterinary Medicine, Utrecht University, Utrecht, NL
iPS-based therapy for disc regeneration / iPspine: Where Dreams Ignite and Ideas Take Shape Through Teamwork

September 8, 2025
Prof. Andrea Lunardi
Molecular Biology, Department of Cellular, Computational and Integrative Biology – CIBIO, University of Trento, Italy / The Armenise-Harvard Laboratory of Cancer Biology & Genetics, University of Trento, Italy
Challenging adult progenitor homeostasis, on the road to prostate tumorigenesis

October 6, 2025
Dr. Kamel Laghmani
Directeur de Recherche CNRS, Centre de Recherche des Cordeliers, Sorbonne Université, Paris, France
Mitochondrial dysfunction rewires adrenal steroidogenesis: from cortisol deficiency to androgen excess

November 3, 2025
Dr. Andrea Felser
Awardee of the Johanna Dürmüller-Bol DBMR Research Award 2024, Department of Pediatrics, Pediatric Endocrinology, Diabetology and Metabolism, Inselspital, University Children's Hospital, Bern
Mitochondrial dysfunction rewires adrenal steroidogenesis: from cortisol deficiency to androgen excess

December 8, 2025
Prof. Daniel Ahmed
Director of Acoustic Robotic Systems Lab (ARSL), Department of Mechanical and Process Engineering, Acoustic Robotics for Life Science and Healthcare, ETH Zurich
From Physics to Medicine: Translating Ultrasound Microrobotics from Preclinical Models toward Clinical Applications

Other Events

March 10-14, 2025
Study Week 'Biology & Medicine', organized by Swiss Youth in Science
Swiss Youth in Science offers in collaboration with the Universities of Bern, Geneva, Zurich and the EPFL the opportunity for ambitious students to work on a research project for one week. The fields covered are bioinformatics, cell biology, genetics & evolution, neurosciences and physiology. Prof. Ziad Al Nabhani and Prof. Mona Mohsen from the DBMR participated in 2025, working each with a group of students.

November 6, 2025
Dem Krebs auf der Spur – Ein exklusiver Einblick in neue Strategien gegen Prostata- und Lungenkrebs, organized by Swiss Cancer Research Foundation
As part of their fundraising activities, the Swiss Cancer Research Foundation organized smaller events for donors in the past two years. These events give major donors and representatives of foundations that contribute substantial amounts to research projects the opportunity to gain insight into the research the foundation supports. In 2025 this event was held at the DBMR with talks given by Prof. Mark Rubin and Prof. Thomas Marti, followed by a tour of the laboratories and a gathering with an apéro.

Day of BioMedical Research, Wednesday, July 2, 2025

Highlights of the event included the lectures of the keynote speakers Prof. Dr. Raphael Gottardo and Prof. Raphaëlle Luisier. In addition, the winners of several Poster Prizes, the Best DBMR Publication 2024, the DBMR Technician of the Year Award, and the Benoît Pochon Prize 2024 were announced. Dr. Bendetta Coppe was declared the winner of the Johanna Dürmüller-Bol DBMR Research Award 2025 for her research on the impact of cardiac injury on the male reproductive system.

Keynote speakers:

Prof. Dr. Raphael Gottardo
Director of the Biomedical Data Science Center, Lausanne University Hospital, Switzerland
Full Professor of Biomedical Data Science, University of Lausanne, Switzerland
Using data science to accelerate clinical and translational insights

Prof. Raphaëlle Luisier
Assistant Professor with Tenure Track for Omics Data Science for Transcriptomics, DBMR, University of Bern
Integrating imaging and omics data with AI to decode RNA in complex human disorders

Johanna Dürmüller-Bol Research Award 2025

Benedetta Coppe
Institute of Anatomy, University of Bern
Impact of Cardiac Injury on Male Reproductive System and Gametes Chromatin Accessibility

Poster Prizes of the Day of BioMedical Research 2025

Best Preclinical Project
Sebastian B. U. Jordi
Department of Visceral Surgery and Medicine, Bern University Hospital Bern
Systems Biomedicine of Cellular Development and Signaling in Health and Disease Research Program, DBMR, University of Bern
StrainCascade: An automated, modular workflow for high-throughput longread bacterial genome reconstruction and characterization

Best Clinical Project
Fabio Ryser
Department of Rheumatology and Immunology, University Hospital Bern
Graduate School for Health Sciences, University of Bern
Dupilumab Treatment is Associated with Clinical Improvement and a Shift towards a health-associated Nasal Passage Microbiota in Diffuse Type 2 Chronic Rhinosinusitis

Best Medical Project of a Medical Student
Berenice Maier
Cancer Therapy Resistance Research Program, DBMR, University of Bern
Targeting the Minor Spliceosome in RB1-Deficient Prostate Cancer

Research Prize Alumni MedBern 2025

Isabel Bärtschi
Systems Biomedicine of Cellular Development and Signaling in Health and Disease Research Program, DBMR, University of Bern
Department of Visceral Surgery and Medicine, University Hospital Bern
Assessment of Intestinal Composition and Function Using Transcriptional Recording Sentinel Cells

Prize for Best DBMR Publication 2024

Noëlle Dommann
Systems Biomedicine of Cellular Development and Signaling in Health and Disease Research Program, DBMR, University of Bern
In vivo DNA replication dynamics unveil aging-dependent replication stress
Published in October 2024 in Cell

Benoît Pochon Prize 2024

Liana Hayrapetyan
Supervisor: PD Dr. Michaela Medová, Co-advisor Prof. Dr. Antoine R. Adamantidis.
MET receptor serine 1014 phosphorylation in neurodevelopment and its relevance to autism spectrum disorder

DBMR Technician of 2025

Adrian Segiser
Cardiovascular Diseases Research Program, DBMR, University of Bern

Personnel Update

Academic Degrees

Associate Professor

Ramanjaneyulu Allam
BLOOD

Radu Olariu
Cardiovascular Diseases

Emrush Rexhaj
Cardiovascular Diseases

Assistant professors with tenure track

Raphaëlle Luisier
Omics Data Science for Transcriptomics

Lecturer

Susana Gomes Rodrigues
Systems Biomedicine of Cellular Development and Signaling in Health and Disease

Amanda Brosius Lutz
Regenerative Neuroscience

Ruben Bill
Translational Cancer Resarch

Marco Osterwalder
Cardiovascular Diseases

Stephanie Christine Ganal-Vonarburg
Systems Biomedicine of Cellular Development and Signaling in Health and Disease

Faik Imeri
BLOOD

PhD (Supervisor in parentheses)

Neda Salimi Afjani
(Prof. Dr. Yvonne Döring, Prof. Dr. Robert Rieben)
Investigating xenograft compatibility: testing genetically modified porcine endothelial cells in a novel in-vitro flow model and evaluating unconventional anti rejection drugs.

Ainhoa Asensio Aldave
(Prof. Dr. Deborah M. Keogh-Stroka)
Oxidative stress in metabolic liver disease and PCSK9-deficient livers: a focus on DNA damage and hepatocyte proliferation

Sven Patric Baumann
(Prof. Dr. Matthias Hediger)
Structural elements of the ZIP8 (SLC39A8) metal ion/bicarbonate cotransporter and its role in health and disease

Fabienne Esther Birrer
(Prof. Dr. Deborah M. Keogh-Stroka)
Characterization of the Mc4rKO mouse model to investigate the immune landscape in MASH livers

Katherine Briana Crump
(Prof. Dr. Benjamin Gantenbein)
Mechanobiology and pro-inflammatory cytokines in the intervertebral disc: an in vitro, ex vivo, and in silico investigation

Bryce Ridley Evans
(Prof. Dr. Yvonne Döring)
ChemR23 prevents phenotypic switching of vascular smooth muscle cells into macrophage like foam cells in atherosclerosis

Huixiang Ge
(PD Dr.phil.nat. Thomas Marti & PD. Dr. med. Patrick Dorn)
Targeting metabolic vulnerabilities in lung cancer: LDHB and GLDC regulate the role of glutathione in metastasis and ferroptosis

Jiaqi Li
(Prof. Dr. Benjamin Misselwitz, Prof. Dr. Bahtyiar Yilmaz)
Oxidative stress resilience of gut microbial strains under healthy and inflammatory conditions

Mariafrancesca Petrucci
(Dr. Daniela Casoni)
Unravelling pain in minipigs undergoing experimentally induced myocardial infarction. Can it also mirror ischaemic pain in humans?

Virginia Roland Victor
(Prof. Dr. Marco Osterwalder)
Functional architecture of cardiac TF regulatory landscapes in control of mammalian heart development

Matteo Zoia
(Prof. Dr. Marco Osterwalder)
Deciphering the cis-regulatory architecture of the Shox2 transcriptional regulator essential for embryonic development

Valentina Zollet
(Prof. Dr. Robert Rieben)
Extracellular traps and hypercitrullination in ischemia reperfusion injury, cancer and xenotransplantation

MD, PhD (Supervisor in parentheses)

Isabel Arenas Hoyos, MD PhD
(Prof. Dr. Robert Rieben, PD Dr.med. Radu Olariu, Dr. Nicoletta Sorvillo)
Vascularized composite allotransplantation: a model for understanding graft rejection

Wanli Cheng, MD PhD
(Prof. Dr. Marianna Kruithof-de Julio, Dr. Sofia Karkampouna)
Novel therapeutic strategies exploiting mechanisms and vulnerabilities in castration-resistant prostate cancer

Shuimu Chen, MD PhD
(Prof. Dr. Benjamin Gantenbein)
A mechanistic study of different intervertebral disc phenotypes and their effects on spinal fusion

Shuang Li, MD PhD
(Prof. Dr. Marianna Kruithof-de Julio)
Molecular investigation of prostate cancer residual disease in a model of bone microenvironment

Siavash Rahimi, MD PhD
(Prof. Dr. Eliane Jasmine Müller)
The role of cell adhesion in tissue self-organization and regeneration: a systems biology approach to Pemphigus vulgaris

Jingyi Zhang, MD PhD
(Prof. Dr. Ren Wang Peng)
Ferroptosis evasion via cancer–immune cell crosstalk as a barrier to KRAS inhibitor therapies

Staff Changes

New Staff

Vera Fuchs
Cancer Therapy Resistance
Lab Technician (since Jan)

Marine Eve Cuiller
Cancer Therapy Resistance
PhD student (since May)

César Muñoz Arenas
IT support (since February)

Aurelio Franchi
Technical and Facility Services (since May)

Cédric Mike Lüthi
Technical and Facility Services (since Jul)

Lácoln Holenstein
Technical and Facility Services (since Oct)

Prof. Raphaelle Luisier
Omics Data Science for Transcriptomics
Assistant Professor with Tenure (since Jun)

Michael Jopiti
Omics Data Science for Transcriptomics
PhD student (since Oct)

Aloïs Thomas
Omics Data Science for Transcriptomics
Intern (since Oct)

Cédric Vincent-Cuaz
Omics Data Science for Transcriptomics
PostDoc (since Nov)

Zhi Ming Xu
Omics Data Science for Transcriptomics
PostDoc (since Jun)

Conclusion of Temporary Appointments

Virginia Roland Victor
Cardiovascular Diseases
PhD Student (until May)

Matteo Zoia
Cardiovascular Diseases
PhD Student (until Apr)

Mitra Lovelin Gultom
Cardiovascular Diseases
PostDoc (until Dec)

Neda Salimi Afjani
Cardiovascular Diseases
PhD Student (until May)

Paulina Stoklosa
Blood
Research Assistant (until Jan)

Aino Alise Paasinen Sohns
Cancer Therapy Resistance
Lab Technician (until Apr)

William Vincent Hariton
Molecular Dermatology & Stem Cell Research
PostDoc (until Dec)

Patrizia Sauta
Molecular Dermatology & Stem Cell Research
Research Assistant (until Dec)

Siavash Rahimi
Molecular Dermatology & Stem Cell Research
PhD Student (until Dec)

Roger Aeschbacher
Molecular Dermatology & Stem Cell Research
Lab technician (until Dec)

Taravat Shojaeian
Molecular Dermatology & Stem Cell Research
Research Assistant (until Dec)

Niels van der Valk
Molecular Dermatology & Stem Cell Research
Administrative Assistant (until Dec)

Resignations

Jasmine Stiefel
Secretary of the Director (until Apr)

Ricardo Miguel Fernandes Filipe
Technical and Facility Services (until Jun)

Retirement

Prof. Eliane Jasmine Müller
Molecular Dermatology & Stem Cell Research
Lab Head (until Dec)

René Johann Aeberhard
Molecular Dermatology & Stem Cell Research
Executive Assistant (until Dec)

Susanne Widmer
Technical and Facility Services (until Mar)

Short Employment

Mirjam Susanna Kiener
Secretary of the Director (Aug-Sept)

Polina Filchak
Cardiovascular Diseases
Intern (Jan – July)

Titaporn Janjumratsang
Omics Data Science for Transcriptomics
Intern (Oct-Dec)

Anna Lavrenko
Omics Data Science for Transcriptomics
Intern (July-Dec)

Lena Loye
Omics Data Science for Transcriptomics
Intern (Sept-Dec)

Publications

Blood

Briggeler-Mani J, et al. Paroxysmal Nocturnal Hemoglobinuria with Large Clones in Non-Hypoplastic Myelodysplastic Syndrome: Report of Two Cases. Acta Haematologica. 2025:1-8. PMID:40920603. 10.1159/000548287

Prince Adnani R, et al. Enhancing hemostasis potency in hemophilia with a small interfering RNA targeting protein S. Journal of Thrombosis and Haemostasis. 2025;23:2133-2150. PMID:40154791. 10.1016/j.jtha.2025.03.021

Prince Eladnani R, et al. Protein S as a therapeutic target. Journal of Thrombosis and Haemostasis. 2025. PMID:41197807. 10.1016/j.jtha.2025.10.024

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Bone & Joint

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Cancer Therapy Resistance

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Kruithof-de Julio M. Elevating prostate cancer diagnostics through extracellular vesicle miRNAs. Gene. 2025:149662. PMID:40645387. 10.1016/j.gene.2025.149662

Moreira-Silva F, et al. Translating G9a epigenetics' role: From cell machinery to cancer therapy. Gene. 2025:149681. PMID:40716586. 10.1016/j.gene.2025.149681

Mosele FC, et al. Adiponectin receptor agonist, AdipoRon, reduces the growth of prostate cancer cells and patient-derived organoids. Life Sci. 2025;387:124175. PMID:41456807. 10.1016/j.lfs.2025.124175

Radic M, et al. Patient-derived Organoids in Bladder Cancer: Opportunities and Challenges. European Urology Focus. 2025;11:62-70. PMID:39232905. 10.1016/j.euf.2024.08.008

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Cardiovascular Diseases

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Gultom ML, et al. Sustained Vascular Inflammatory Effects of SARS-CoV-2 Spike Protein on Human Endothelial Cells. Inflammation. 2025;48:2531-2547. PMID:39739157. 10.1007/s10753-024-02208-x

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Pais M-A, et al. Bioglass/Ceria Nanoparticle Hybrids for the Prophylactic Treatment of Seroma: A Comparative Short-Term Study in Rats. ACS Pharmacology & Translational Science. 2025;8(9):3170-3181. PMID:40969883. 10.1021/acsptsci.5c00327

Salimi-Afjani N, et al. Pulsatile-flow culture: a novel system for assessing vascular-cell dynamics. Lab on a Chip. 2025;25(7):1755-1766. PMID:40019369. 10.1039/d4lc00949e

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Emerging and Difficult to Treat Infections

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Lung Precision

Brigger D, et al. Age-Related Increase in Anaphylaxis Severity Is Associated With Enhanced Sensitivity to Allergic Mediators. Allergy. 2025. PMID:41020414. 10.1111/all.70082

Brunner M, et al. Pro-Inflammatory Properties of Salivary Gland-Derived Fibroblasts-Implications in Sjögren's Disease. Cells. 2025;14(8). PMID:40277884. 10.3390/cells14080558

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Scalise MC, et al. Modulation of allergic airways disease employing bio-mimetic nanoparticles with TLR agonists. Frontiers in Allergy. 2025;6. 10.3389/falgy.2025.1633293

Oncology-Thoracic Malignancies Program

Deng H, et al. LDHB silencing enhances the effects of radiotherapy by impairing nucleotide metabolism and promoting persistent DNA damage. Scientific Reports. 2025;15(1):10897. PMID:40158058. 10.1038/s41598-025-95633-3

Deng H, et al. Ubiquinol-mediated suppression of mitochondria-associated ferroptosis is a targetable function of lactate dehydrogenase B in cancer. Nature Communications. 2025;16(1):2597. PMID:40090955. 10.1038/s41467-025-57906-3

Lin Y, et al. Inhibition of LDHB triggers DNA damage and increases cisplatin sensitivity in pleural mesothelioma. Oncogenesis. 2025;14(1):28. PMID:40790017. 10.1038/s41389-025-00571-4

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Zhang T, et al. POLR1A inhibits ferroptosis by regulating TFAM-mediated mitophagy and iron homeostasis. Redox Biology. 2025;85:103758. PMID:40669210. 10.1016/j.redox.2025.103758

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Regenerative Neuroscience

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Systems Biomedicine of Cellular Development and Signaling in Health and Disease

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de Brito Nunes M, et al. Post-Banding Ulcer Bleeding After Endoscopic Ligation: Incidence, Risk Factors and Outcomes in Patients With Cirrhosis. Alimentary Pharmacology and Therapeutics. 2025. PMID:41368816. 10.1111/apt.70495

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Yilmaz B and Macpherson AJ. Delving the depths of 'terra incognita' in the human intestine - the small intestinal microbiota. Nature Reviews Gastroenterology & Hepatology. 2025;22(1):71-81. PMID:39443711. 10.1038/s41575-024-01000-4

Translational Cancer Research

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Translational Immunology

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Bähler L, et al. IL-18 in atopic dermatitis - A multifaceted driver of skin inflammation. Journal of Allergy and Clinical Immunology. 2025. PMID:40783003. 10.1016/j.jaci.2025.07.025
Engeroff P. Pathogenic T Follicular Helper Cells in Bullous Pemphigoid: Lessons from a Murine Model. Journal of Investigative Dermatology. 2025. PMID:40856668. 10.1016/j.jid.2025.07.012
Engeroff P and Vogel M. IgE in the Regulation of Adaptive Immune Responses. Immunological Reviews. 2025;331(1):e70030. PMID:40322927. 10.1111/imr.70030
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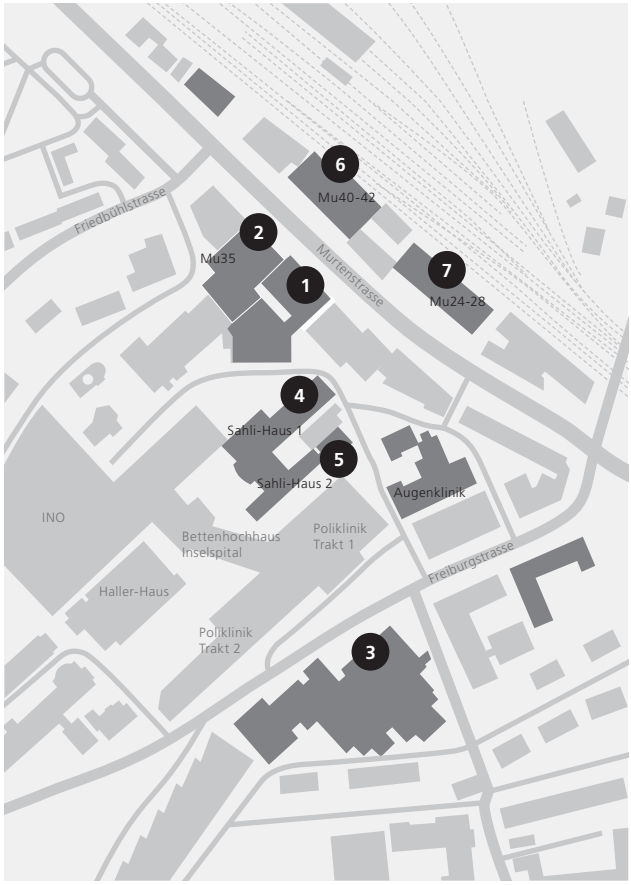
DBMR Locations



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