

Microscopy Imaging Center (MIC)

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Chair,
Representative
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Faculty



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Representative
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Faculty



Prof. Olivier Pertz
Representative
of the Faculty of
Science



Prof. Ruth Lyck
MIC coordinator

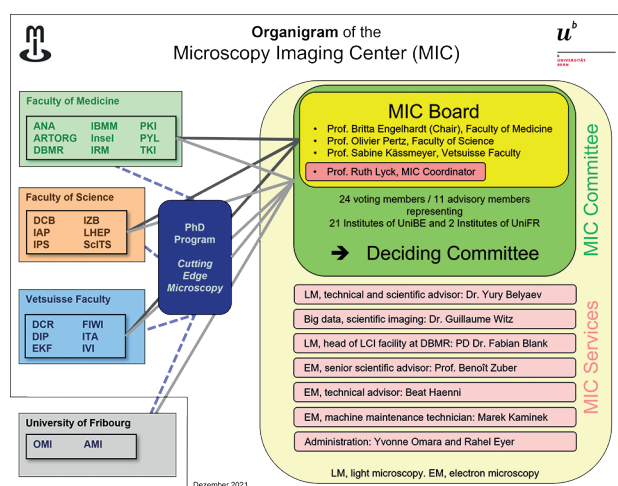


Dr. Guillaume Witz
scientific
assistance
Biolmaging and
BigData



Dr. Yury Belyaev
scientific
assistance
Light Microscopy
BigData

Structure

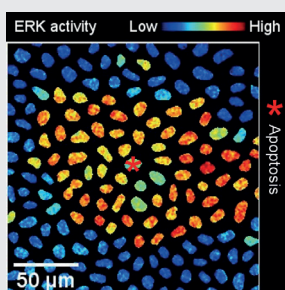


The MIC is the center of excellence for high-end microscopy in the life sciences at the University of Bern. A tight collaboration with the Science IT support (SciTS) unit of the University of Bern ensures high quality support in data handling and image analysis. Currently, 71 instruments are registered at the MIC. Amongst these are 21 confocal light microscopes, 10 electron microscopes, two atomic force microscopy systems, one imaging mass cytometer and one micro-computed tomography (micro-CT) instrument. In 2021, this equipment was used by 445 researchers.

The MIC committee consists of 35 microscopy experts from the Medical, Science and Vetsuisse Faculties. The MIC instrument portfolio is provided by 20 institutes of the three participating faculties.

Profile

- Mission: Disseminate expert knowledge and provide technical support in high-end microscopy. Implementation of new technologies. Administer MIC instrument portfolio and ensure central access to equipment.
- Teaching and events: Lecture series on Advanced Microscopy. MIC workshops, MIC trainings, Instrument demos, MIC research day, MIC symposium. PhD program Cutting Edge Microscopy (CEM). In 2021, the MIC organized a 2-day summer school for the CEM students and a virtual visit to the Paul Scherrer Institute (PSI).
- Portfolio: Multidimensional imaging of living and fixed samples from the organelle to the organism level; light, electron and atomic force microscopy; micro-computed tomography.
- Services: Imaging and image and data analysis, handling of large data sets, sample preparation, training, newsletter, publication of news, courses, events and other activities on the MIC webpage (www.mic.unibe.ch).
- Internal activities: The MIC Committee meets four times per year to take decisions.
- External partners: Swiss Society for Optics and Microscopy (SSOM); Life Sciences Switzerland (LS2), Intersection Microscopy; Swissphotonics; Scientific Volume Imaging b.v. (SVI); Swiss Microscopy and Imaging Core Facility Network; Science IT Support Unit of the University of Bern.



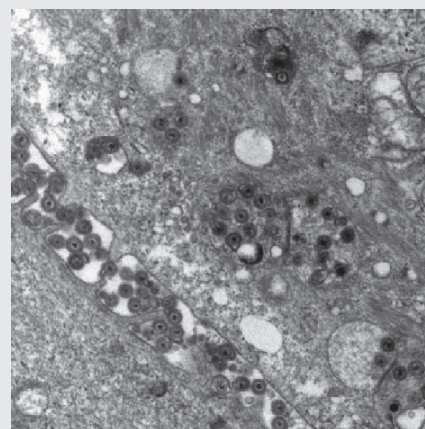
Visualization of ERK activity

Highlight from the Faculty of Science

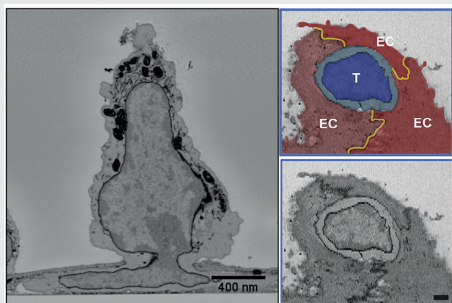
Using time-lapse microscopy, fluorescent biosensors and optogenetics, the Pertz lab has discovered that apoptotic events trigger multicellular waves of ERK and Akt activity, which are two important signaling kinases. These waves are important to maintain epithelial homeostasis. Each wave generates a local survival effect where apoptosis is suppressed for 3-4 hours. This survival effect regulates the spatio-temporal occurrence of apoptotic events, ultimately controlling epithelial homeostasis and epithelial barrier function. Paolo Armando Gagliardi et al. 2021, *Developmental Cell*, 10.1016/j.devcel.2021.05.007.

Highlight from the Faculty of Veterinary Medicine

Amphibians are undergoing an unprecedented mass extinction around the globe with a dramatic loss in biodiversity. It is becoming increasingly clear that infectious diseases are critical factors in this complex process. Starting from two recently discovered herpes viruses, similarities and differences between the infected hosts and viruses were studied. Findings indicate that the skin lesions observed in infected frogs and toads result from a virus-associated dermatitis. This study provides a basis to address the clinical relevance of these viruses regarding their potential impact on amphibian biodiversity and conservation. Francesco C. Origi et al. 2021, *Veterinary Pathology*; 10.1177/03009858211006385.



Virus particles within and between cells



Highlight from the Faculty of Medicine

Combining the expertise of Britta Engelhardt and Benoit Zuber in live-cell imaging and serial block face scanning electron microscopy (SBF-SEM) allowed to track transendothelial migration of T cells across the blood-brain barrier under flow at the structural level. This study has identified the tricellular junctions as novel sites of T-cell diapedesis across the blood brain barrier (BBB). Mariana Castro Dias et al. 2021, *J Cell Sci*; 10.1242/jcs.253880.

SBF-SEM of a T cell crossing a tricellular junction in frontal and transversal view.



Michael Stoffel was ceremoniously bid farewell at the MIC symposium. He was one of the early MIC committee members and represented the Vetsuisse faculty on the MIC board for many years.

MIC Symposium 2021

The MIC Symposium 2021 on "3D electron microscopy" was held on-site in the UniS on November 19, 2021 and was attended by 110 participants. Wanda Kukulski, Michael Stoffel, Benoît Zuber and Dimitri Vanhecke formed the scientific committee. During the day, six scientific speakers from Germany, the Netherlands, and Switzerland covered most recent achievements in electron microscopy of molecular structures, virus-cell interactions, ciliary morphology and contact sites between intracellular lipid droplets. The representatives from industry discussed with the audience latest equipment for protein purification and automatic sample preparation for cryo imaging.