

CNB Newsletter

12 / 2024

Dear CNB members,

With the CNB Newsletter, we aim to inform you about upcoming CNB events, ongoing projects, and provide insights into the research topics of selected CNB members. In this edition, we reflect on the 19th Annual Meeting and look forward to Brain Week 2025, which will take place from March 10th to 13th, 2025. The topic of this year's Brain Week is "*Aktives Gehirn im Laufe des Lebens*", focusing on various aspects of brain health and function across all stages of life. The event will highlight multiple facets of this theme through inspiring lectures and lively discussions.

As part of Brain Week, we will once again host a Researchers' Night with a poster session, open to all young researchers. Please note that graduate students may obtain credits for presenting their posters.

The CNB provides excellent opportunities for exchanging ideas and fostering innovative collaborations within the University of Bern neuroscience community. This issue showcases the versatility of CNB by introducing two new CNB Research Group Leaders from different fields.

Prof. Annekatrin Steinhoff (University Hospital of Child and Adolescent Psychiatry and Psychotherapy) focuses on youth mental health, self-harm, and risk-taking behaviors from a developmental and biopsychosocial perspective. Prof. Kathleen Seidel (Department of Neurosurgery, Inselspital Bern) leads the Clinical and Research Unit of Intraoperative Neurophysiology and specializes in neuro-oncological surgery. Her work emphasizes improving patient safety during brain and spinal cord tumor surgeries through innovative neurophysiological techniques, brain connectivity analysis, and the integration of AI-driven intraoperative guidance systems.

Additionally, we are currently updating and upgrading the CNB website. Please feel free to contact Ms. Alessia Carlucci (alessia.carlucci@unibe.ch) if you would like to update your research group page (e.g., add photos, videos, or team members).

If you follow us on X (formerly Twitter), we'd be delighted to repost your research articles to help spread the word about your science. Our X handle is [@clin_neurobern](https://twitter.com/clin_neurobern).

We hope you enjoy reading the December 2024 edition.

Prof. Dr. Mirjam Heldner
President CNB

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19th CNB Annual Meeting – Extended Brain

Friday, 6th of September, 9.00-17.30

This year's Annual Meeting was held at the Inselspital, in the Ettore Rossi Auditorium. The welcome address, held by Prof. Kristina Adorjan, was followed by the first keynote speakers, Prof. Manuela Eugster and Prof. Stefan Weber.

Prof. Manuela Eugster and Prof. Stefan Weber provided a multifaceted perspective on how medical robotics can enhance the capabilities of surgeons. They gave insights into the historical roots of robotics and the development of the first medical robots as well as into implemented products that have emerged from the research work at the ARTORG Center. These innovations are now actively improving patient well-being in clinical practice.



At this year's Annual Meeting, four remarkable research projects presented significant findings, offering insights into the mechanisms of fear-related memories, adolescent brain development, metabolic brain aging, and the neurological effects of infectious diseases.



Thomas Forro: Multiplicity of Fear-Related Memories in Ventral Hippocampal Circuits

Thomas Forro's study explored how fear-related memories are processed in the ventral hippocampus of mice using advanced virtual reality environments. The research revealed that specific neuron populations encode distinct emotional and mnemonic features, such as cues and contexts. Interestingly, while most neurons remained specialized, a subset bridged different memory types. These findings, supported by juxtacellular recording techniques, provide insights into how emotional memories are encoded at the cellular level, potentially paving the way for targeted therapies for anxiety disorders.

Salome Wild: Sleep May Impact Adolescent Brain Development: Findings from a Longitudinal MRI Study

Salome Wild presented compelling findings from a longitudinal MRI study on adolescents, emphasizing the impact of sleep on brain maturation. The study demonstrated that sleep duration, efficiency, and regularity influence structural changes in key brain regions, including the thalamus, precuneus, and amygdala. Adolescents with consistent and sufficient sleep showed more stable brain volumes over time, underlining the crucial role of healthy sleep habits in supporting optimal brain development during this critical life stage.

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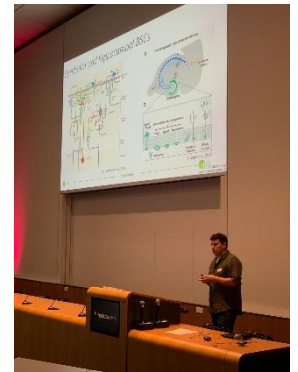
Laura Winiger: *Brain Aging in Patients with Phenylketonuria (PKU)*

Laura Winiger's research explores brain aging trajectories in patients with Phenylketonuria (PKU), a rare metabolic disorder affecting brain function. Using advanced MRI imaging and cognitive assessments, her study revealed accelerated aging patterns in specific brain regions, including the temporal lobe, occipital lobe, and insula, compared to healthy controls. Intriguingly, metabolic control, measured through blood phenylalanine levels, was significantly correlated with brain age differences, particularly in the cingulate cortex. These findings emphasize the critical role of metabolic regulation in mitigating brain aging in PKU patients and pave the way for targeted interventions aimed at improving long-term neurological health outcomes.

Simone Leoni: *An Ex Vivo Model for Studying Tick-Borne Encephalitis Virus and Evaluating Antiviral Efficacy*

Simone Leoni introduced an ex vivo brain slice culture model to study the tick-borne encephalitis virus (TBEV) and test antiviral therapies. The study identified specific brain cell populations, such as Purkinje cells in the cerebellum and progenitor neurons in the hippocampus, as key targets for viral infection.

In antiviral tests, Bemnifosbuvir demonstrated complete inhibition of viral replication, while Remdesivir showed partial efficacy. This promising discovery highlights Bemnifosbuvir as a potential antiviral candidate for TBEV and underscores the value of ex vivo models for testing treatments against neurotropic viruses.



The second keynote lecture was held by guests from the University of Groningen, Prof. Eggen and Prof. Boddeke. In their lecture, “Microglia States in Alzheimer's Disease – From a Multi-Omics Perspective”, Prof. Eggen and Prof. Boddeke highlighted the crucial role of microglia, the immune cells of the brain, in the development and progression of Alzheimer's disease. They demonstrated how modern multi-omics approaches – including genomics, transcriptomics, and proteomics – enable a comprehensive analysis and characterization of the various functional states of these cells. This detailed perspective reveals how microglia contribute to neuroinflammation and outlines potential pathways for new diagnostic and therapeutic strategies.



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After the morning program, the poster session and lunch provided young researchers with an excellent opportunity to exchange ideas and discuss current research.

It was a fantastic showcase of local neuroscience research in Bern. At the end of the poster session, three poster awards were presented by the Poster Award Committee.

1. Céline Mollet (Category: Clinical Research)
Title: *"Evaluating the usage of closed fontanelle as a criterion for health in small breed dogs."*
2. Salome Wild (Category: Basic Research Human)
Title: *"Sleep may impact adolescent brain development: Findings from a longitudinal MRI study."*
3. Sina Livia Schmid (Basic Research Animal)
Title: *"Modulation of neuronal activity in the anterior cingulate cortex in neuropathic pain."*



In the afternoon, three parallel symposia provided diverse insights into cutting-edge research topics:

- *"Quantifiable Endpoints of Studies in Neurological Diseases"* by Prof. Dr. Iris-Katharina Penner and Prof. Dr. Andrew Chan

- *"Exploring the Intersection of Science, Law, and Ethics: The Implications of Organoid Technology"* by Prof. Dr. Volker Enzmann and Dr. iur. Inesa Fausch
- *"Neuro-Kids – Advances in Neuropediatrics"* by Prof. Dr. Regula Everts.

Following a short break, two additional parallel symposia continued the program:

- *"Neuromodulation"* chaired by Prof. Dr. Maxime Baud
- *"News from Bernese Vertigo and Balance Research"* led by PD Dr. Tatiana Brémová-Ertl and PD Dr. Matthias Ertl.

During the Group Leader's Meeting, Prof. Annkatrin Steinhoff, Prof. Kathleen Seidel, Prof. Iris-Katharina Penner, Prof. Claudio Pollo, and Prof. Vincent Pernet were warmly welcomed as new Research Group Leaders of the CNB. The group leaders further discussed the outlook for 2024 and 2025, including plans for the upcoming Annual Meeting and Brain Week, as well as the integration of additional new members.

Please consider updating your information on the CNB website (www.neuroscience.unibe.ch).

Thank you all once again for contributing to an excellent Annual Meeting filled with inspiring talks, engaging interactions, and outstanding poster presentations. We are already looking forward to next year!

The next Annual Meeting will take place on **September 5, 2025**.

The program and further details will be published on our website (www.neuroscience.unibe.ch) and shared via email. If you would like to participate as a speaker, assist with the organization, or share your ideas for the next Annual Meeting, please do not hesitate to reach out to any member of the Executive Committee. We are excited to receive your input, suggestions, and support.

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Introducing the New Research Group Leaders

Prof. Dr. Annekatriin Steinhoff

Annekatriin Steinhoff, Assistant Professor and SNSF Starting Grantee, University Hospital of Child and Adolescent Psychiatry and Psychotherapy, Faculty of Medicine, University of Bern.

Annekatriin Steinhoff conducts research on youth mental health, self-harm, and risk-taking behaviors from a developmental and biopsychosocial perspective. She is the principal investigator of an SNSF Starting Grant (CHF 1.8 million) that examines the emergence and maintenance of self-harm in adolescents. Prof. Steinhoff is also affiliated with the z-proso International Research Network (zIREN) and serves as Associate Editor for *The Journal of Early Adolescence* and Consulting Editor for *The Journal of Research on Adolescence*.

She earned her PhD in Sociology from the University of Münster and undertook research visits at the Max Planck Institute for Human Development in Berlin, Wilfrid Laurier University, and the University of Toronto. From 2015 to 2022, she worked as a postdoctoral researcher at the Jacobs Center for Productive Youth Development at the University of Zurich, collaborating with interdisciplinary teams on adolescent development. In August 2022, she joined the University Hospital of Child and Adolescent Psychiatry and Psychotherapy in Bern.

How are stressful experiences and developmental processes across social, psychological, and biological domains linked to adolescent mental health? This is the central question guiding Prof. Steinhoff's research group. Their work focuses on early detection and prevention of severe risk-taking behaviors, self-harm, and related emotional and behavioral issues among adolescents.

Risk-taking behaviors and self-harm, such as self-cutting, are major public health concerns. Nearly one in five adoles-



cents in the general population engages in direct self-harm, with rates rising to one in two among clinical populations. These behaviors are often used to regulate emotions in response to stress and are linked to psychiatric and social impairments that can persist into adulthood.

Prof. Steinhoff's team draws on and collects prospective-longitudinal data on various aspects of adolescent development, such as social and emotional experiences, pubertal changes, and stress responses. They combine smartphone-based ecological momentary assessments collected in daily life with long-term developmental data collected in laboratory contexts. The latter include data from diagnostic interviews, behavioral tests, and biological samples. An overarching goal is to advance an integrative biopsychosocial research methodology to better understand the changes and development of psychological impairments during adolescence.

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Prof Dr. Kathleen Seidel

Senior Attending Physician

Intraoperative Neurophysiology and Neurooncological Surgery

Department of Neurosurgery

Inselspital Bern, Bern University Hospital, Switzerland

Kathleen Seidel is associate professor and staff physician at the Department of Neurosurgery of Prof. Andreas Raabe at the Inselspital, Bern University Hospital in Switzerland. She is head of the Clinical and Research Unit of Intraoperative Neurophysiology and the coordinator of the Neurooncology Cancer Center.

Kathleen Seidel is a neurooncological neurosurgeon in the team of Prof. Philippe Schucht and she is a neuroscientist focusing on improving patient outcome during treatment of brain and spinal cord tumors. She was trained in the field of intraoperative neurophysiology (IOM) during a fellowship in New York supervised by Prof. Vedran Deletis. Following from this fellowship period and the productive cooperation that ensued many research projects have been successfully developed (Ulkatan et al., 2017, Deletis et al., 2018, Tellez et al., 2021).

To achieve maximal surgical tumour resection while ensuring patient safety, she developed several neurophysiological techniques to identify and preserve functional integrity during brain and spinal cord tumour surgery. She established the clinical and the research unit of intraoperative neurophysiology and perioperative navigated transcranial magnetic stimulation (TMS) at the Inselspital Bern. One of her major scientific achievements is the distance correlation from the tumour resection border to the corticospinal tract using subcortical mapping of white matter pathways – analogous to an electrical radar system (Seidel et al., 2013). Together with her chairman, Prof. Andreas Raabe, she developed a surgical instrument, which is now commercially available in more than 50 countries (dynamic mapping probe) (Raabe et al., 2014, Seidel et al., 2018,



Seidel et al., 2020, Asimakidou et al., 2021). She has published more than 60 research articles in the field of IOM and she is co-author of an important book on intraoperative neurophysiology. Kathleen Seidel regularly hosts international fellows as well as doctoral students and she is involved in several international research collaborations. In 2018, she was awarded the Theodor Kocher Prize of the University of Bern for excellence and innovation in interdisciplinary research. Currently, she serves as the president of the international society of intraoperative neurophysiology (ISIN).

Her clinical and the research unit of intraoperative neurophysiology consists of a highly multidisciplinary team. Besides focusing on improvement of patient safety and the establishment of reliable intraoperative warning criteria during high-risk surgery, the team is focusing on brain connectivity analysis. In a recent work, the team could demonstrate that language tracts in the brain can be assessed by neurophysiological recordings called cortico-cortical evoked potentials during brain tumor surgery in awake settings but also under general anesthesia (Seidel et al., 2024). Further, her group is working on machine learning and explainable AI to improve intraoperative neurophysiological guidance (Wermelinger et al, 2023; Parduzi et al, under review).



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Upcoming events

10 th -13 th March 2025	Brain Week Bern
12 th March 2025	CNB Poster Session with Apéro
05. September 2025	20 th Annual Meeting

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