

Research Project Documentation

(detailed List)

Total funds generated: CHF > 5'200'000
Thereof, total funds generated as PI: CHF > 5'000'000

AS PRINCIPAL INVESTIGATOR (PI) (2016-)

[NapBiome trial: Targeting gut microbiota to improve sleep rhythm and developmental and behavioral outcomes in early childhood in a birth cohort in Switzerland](#)

Project Grant Swiss National Science Foundation

Type: Competitive

Role: Co-PI alongside Petra Zimmermann, Nicholas Bokulich, Martin Stocker

Funding period: 2025-2029, 4 years

Funding: 2'400'000 CHF

Significant information gaps remain concerning cross-talk between the sleep ontogeny of infants and their gut microbiome. Particularly with regard to neurobehavioral development. The project combines paired longitudinal studies in infants, in vivo, in vitro, and in silico experiments to test causal effects of gut-sleep interactions using a multi-omics approach (metagenomes, viromes, stool and breath metabolomes, sleep, and behavior) and implement a multi-disciplinary, non-invasive, translational RCT approach to improve regulatory and neurodevelopmental outcomes in infants at-risk.

ABERRANTsleep: does antibiotic exposure alter sleep regulation and neurophysiology in the first two years of life?

Project Grant Forschungspool Universität Fribourg

Type: Competitive Institutional Funds

Role: Co-PI alongside Petra Zimmermann

Funding period: 2023-2024

Funding: 30'000 CHF

Despite being widely used, the impact of antibiotics on sleep is still unknown. We measure behavioral and neurophysiological sleep in a large prospective infant study to extensively examine the impact of antibiotic exposure on microbiota, sleep and brain development. By targeting a vulnerable period of the human lifespan, the implications of this study will inform medical decision-making.

GrumpyBiome: Synchronization of gut microbiota and sleep rhythm in infancy

Olga Mayenfisch Foundation (Medical Faculty Zurich, University of Zurich)

Type: Competitive

Role: Co-PI alongside Nicholas Bokulich

Funding period: 01.09.2022 - 31.08.2024

Funding: 50'263 CHF total, 25'124 CHF to SK

The composition of gut microbiota undergoes diurnal oscillations, and initial studies have shown a correlation between microbial profiles and sleep rhythms in rodents and adults. However, there are significant gaps in our understanding of how sleep-wake patterns and gut microbiota maturation are established during the vulnerable infancy period. This study sheds light on the synchronization between infant sleep and gut microbiome through a multidisciplinary, diurnal framework.

Development of sleep regulation - a window of opportunity for fostering healthy development (SNSF-181279)

Professorial Eccellenza Fellowship, Swiss National Science Foundation

Type: Competitive

Role: PI

Funding period: 01.09.2019 - 31.11.2024

Funding: 1'839'353 CHF

The objective of this project is to enhance our understanding of the role that sleep, as well as bacterial symbionts, play in cognitive and neurodevelopment. Through a multidisciplinary approach, involving neuroscience, psychology, and microbiology, we investigate the earliest stages of human rhythm development. Ultimately, we envision the improvement of cognitive development in at-risk groups by promoting healthy sleep regulation in infants.

N/A (Sponsoring Funds)

MES Forschungssysteme, Brain Products

Type: Industrial

Role: Applicant

Funding period: 2023

Funding: 1'500 CHF

As a previous member of the management board of the Competence Center Sleep & Health Zurich at the University of Zurich, this fund supported the monthly seminar and annual symposium.

New avenues of infant sleep: an imperative in brain development

Strategic Funds, Medical Faculty, University of Zurich

Type: Non-competitive

Role: PI

Funding period: 2019-2021

Funding: 150'000 CHF

The primary objective of this research was to establish a first foundation for investigating the individual and combined contributions of sleep and gut bacteria to neurodevelopment. Specifically, this project explored the relationship between gut bacteria and sleep in infants, evaluated the correlation between sleep-wake patterns and EEG maturational markers, and characterized the association between EEG markers and cognitive development.

Development of sleep regulation and gut microbiota in infants (SDEGU)

Forschungskredit, University of Zurich

Type: Competitive

Role: PI

Funding period: 2019-2020

Funding: 110'000 CHF

This study aimed to investigate the function of sleep in relation to brain development and the gut microbiome. Specifically, we quantified the correlation between sleep-wake behavior, EEG maturational markers, and gut bacterial profiles in infants at the age of 6 months.

The Next Sleep Research Generation

Zurich Center for Interdisciplinary Sleep Research, University of Zurich

Type: Non-competitive, career development grant

Role: Co-PI alongside Fiona Pugin, Helene Werner, Sarah Schoch

Funding period: 2018

Funding: 1'600 CHF

The New Sleep Research Generation Initiative provided a platform for early-career researchers to connect and exchange. In today's rapidly evolving working environment, job security is increasingly uncertain, and societal changes are impacting family and work-life structures. This initiative allowed for dialogue among young researchers to navigate these challenges by facilitating the sharing of experiences, strategies, and ideas among peers.

Development of sleep regulation and gut microbiota in infants with colic

Stiftung für Wissenschaftliche Forschung an der Universität Zürich, Universität Zürich

Type: Competitive

Role: Co-PI alongside Reto Huber

Funding period: 2017

Funding: 24'480 CHF

This study investigated whether excessive infant crying (colic) in the first weeks of life emerges from the interaction of sleep regulation and gut microbial build-up. We hypothesized specifically that infant colic during development results from an imbalance of gas-producing vs. gas-degrading gut bacteria, leading to overall gas buildup, and thus pain. We also hypothesized that gut bacterial activity is aligned with sleep patterns over the 24-h period, amplifying this effect.

Monitoring infant sleep by actigraphy - State of the art and future

Zurich Center for Interdisciplinary Sleep Research (ZiS) and Clinical Research Priority Program "Sleep and Health (SHZ), University of Zurich
Type: Non-competitive, career development grant
Role: Co-PI alongside Helene Werner, Sarah Schoch, Fiona Pugin
Funding period: 2017
Funding: 3'976 CHF

Actigraphy is a cost-effective method for objectively assessing sleep over extended periods in natural settings. However, the lack of standardized methodology has hindered cross-comparisons across studies. To address this issue, an interdisciplinary workshop spanning two semesters was organized to provide an overview of the actigraphy devices used in research and clinical settings for infants and toddlers. Participants discussed analytic approaches and existing challenges while exchanging ideas with other research groups. Additionally, a student course in Biomedicine was conducted to support methodological evaluation and a scientific article was published as part of this grant.

Development of sleep regulation and gut microbiota in infants with colic

Olga Mayenfisch Stiftung, Medical Faculty Zurich, University of Zurich
Type: Competitive
Role: PI
Funding period: 2017
Funding: 25'000 CHF

Ongoing analyses of this study investigate whether excessive infant crying (colic) in the first weeks of life emerges from the interaction of sleep regulation and gut microbial build-up. We hypothesize specifically that infant colic during development results from an imbalance of gas-producing vs. gas-degrading gut bacteria, leading to overall gas buildup, and thus pain. We also hypothesize that gut bacterial activity is aligned with sleep patterns over the 24-h period, amplifying this effect.

Women in Science

Clinical Research Priority Program, Sleep and Health, University of Zurich
Type: Non-competitive, career development grant
Role: Co-PI
Funding period: 2016
Funding: 4'000 CHF

This project supported the promotion and networking of young female scientists. It provided a platform for dialogue related to being a female in science, as well as issues related to career advancement.

Sleep, brain development and gut microbiota in infancy

Clinical Research Priority Program "Sleep and Health", University of Zurich
Type: Competitive, Young Investigator Start-up Grant
Role: PI
Funding period: 2016-2018
Funding: 450'000 CHF

Ample sleep is crucial for the establishment of brain connectivity during the period of development, and sleep during this vulnerable period is directly related to fundamental outcomes of brain functioning later in life, as seen in animals. However, the mechanistic links between sleep and neurodevelopmental plasticity in humans are not well understood. This Junior Start-up Grant allowed me to pinpoint this relationship during infancy, including also interactions with proximal and distal environments. It also initiated the examination of the role of gut microbiota in the sleep-brain axis in a large birth cohort with 150 families. Several publications have resulted from this grant, and follow-up assessments at school-age are currently in progress.

AS POSTDOCTORAL RESEARCHER (2012-2016)

Bringing Cutting Edge Neuroscience Research to Elementary Classrooms to Improve Public Health

University of Colorado Boulder, Boulder, CO, USA

Type: Non-competitive, outreach grant

Role: postdoc with Co-PI's Monique LeBourgeois, Nicole Speer etc

Funding period: 2013

Funding: 23'600 USD

This program sent researchers and students into classrooms to teach children and adolescents about the brain through a series of fun and engaging activities and exercises. The science ambassadors brought the concepts to life in ways that were understandable and engaging for the school-age children.

Sleep and White Matter Maturation in Childhood and Early Adolescence

Jacob's Foundation Research Grant, Providence, RI, USA

Type: Competitive

Role: postdoc (PI: Sean Deoni)

Funding period: 2012

Funding: 42'030 USD

This project investigated the relationship between the topographical distribution of deep sleep slow wave activity during childhood and adolescence and brain white matter microstructure (water myelin fraction, MRI). The results of this study were published in a series of publications that supported the hypothesis that sleep topography and homeostatic dynamics across a night of sleep play a prognostic role in the process of human brain myelination, particularly in school-age years.

Sleep and Brain Connectivity in Early Childhood

Intermountain Neuroimaging Consortium Grant, Boulder, CO, USA

Type: Non-competitive

Role: postdoc (PI: Monique LeBourgeois)

Funding period: 2012

Funding: 5'000 USD

Through this grant, the postdoctoral SNSF project was supported in implementing high-resolution sleep EEG and myelin-specific MRI in preschool children. This work resulted in several publications, which revealed important parallels between neuroanatomical maturation and sleep neurophysiological topographical maps.

Brain Connectivity and Sleep in Preschool Children

Swiss National Science Foundation Grant Prolongation, postdoctoral fellowship), Boulder, CO, USA;

Type: Competitive

Role: PI (Mentor: Monique LeBourgeois)

Funding period: 2012

Funding: 21'150 CHF

This project extension aimed to establish high-resolution EEG during sleep in the homes of families and perform myelin-specific MRI in children from toddlerhood to early school age. The results revealed a region-specific reflection of neuro-anatomical maturation visible in neurophysiological sleep maps and unraveled linkages of local sleep maps to cognitive maturation. Several publications resulted from this work.

Wie wirkt sich intensiver Koffeinkonsum von Jugendlichen auf deren Entwicklung aus? [How does intense caffeine consumption in adolescents affect their development?]

EMDO Foundation, Zurich, CH

Type: Competitive

Role: postdoc (PI: Reto Huber)

Funding period: 2011

Funding: 40'000 CHF

Caffeine is the most commonly ingested psychoactive drug worldwide, with increasing consumption rates among young individuals. While caffeine leads to decreased sleep quality in adults, studies investigating how caffeine consumption affects children's and adolescents' sleep remains scarce. This study investigated the relationship of regular caffeine consumption with sleep behavior and sleep neurophysiology in children and adolescents. The results showed that high caffeine consumption related to later bedtimes and reduced slow-wave activity (SWA), a well-established marker of sleep depth and the core indicator of sleep homeostasis. Since SWA is crucial for neuronal recovery processes, further research is needed to identify the interactions between caffeine and neuronal network refinement processes.

Brain Connectivity and Sleep in Preschool Children

Swiss National Science Foundation Grant for Prospective Researchers: postdoctoral fellowship), Boulder, USA

Type: Competitive

Role: PI (Mentor: Monique LeBourgeois)

Funding period: 2011

Funding: 44'300 CHF

This project involved implementing high-resolution EEG and myelin-specific MRI in children from toddlerhood to early school age and assessing behavioral metrics of cognitive function, which resulted in several publications on the relationships between sleep structure and brain function in healthy developing humans.

Publication Award

Sponsors Award for Outstanding Basic Sleep Research at the Annual SSSSC (Swiss Society of Sleep Research, Sleep Medicine and Chronobiology) Meeting in St. Gallen, CH

Type: Competitive Award

Role: PhD student (Mentor: Reto Huber)

Funding period: 2011

Funding: 5'000 CHF

Awarded Paper: [Mapping of cortical activity in the first two decades of life: a high-density sleep electroencephalogram study](#)

PROPOSAL UNDER EVALUATION

LUMINIS – Light, Temperature, and Stress Modulation in Maternal-Infant Sleep Intervention Study

Role: Co-PI alongside Andjela Markovic, Alexandre Datta, Beatrice Mosimann, with project partners Tobias Kowatsch, Marcia Nissen, Christian Cajochen, Christine Blume

In evaluation as SNSF Project Grant

Funding: 1'570'000 CHF

This collaborative clinical project investigates whether prenatal chronotherapeutic interventions can improve maternal, fetal, and infant circadian alignment and reduce long-term health risks. The project integrates structured light exposure, temperature modulation, and digital stress reduction in the third trimester, tracking their effects on physiological, metabolic, and behavioral rhythms from fetal stages through infancy. Using wearable fetal monitoring, umbilical cord biomarkers, infant sleep EEG, and digital tools, we aim to define modifiable rhythms shaping neurodevelopment. This interdisciplinary, translational project targets both healthy and high-risk pregnancies to inform scalable, cost-effective strategies for perinatal health promotion and early-life intervention.

PROPOSALS NOT YET FUNDED

SLEEPFLUENCER: A sleep-awareness promoting school program for adolescents

Agora Project Proposal, Swiss National Science Foundation

Type: Competitive (not funded)

Role: Co-PI alongside Caroline Lustenberger and Paul André

Funding period: Proposed for 2022–2023, 12 months

Funding: 163'030 CHF (not funded)

Adolescents face increasing sleep deprivation due to biological shifts and socio-environmental demands. The SLEEPFLUENCER project proposed a scalable, school-based sleep education initiative designed to raise awareness and improve sleep behavior among 12–16-year-olds. The program combined digital and analog educational tools, gamification elements, peer reflection, and science communication training to empower adolescents to become "sleepfluencers." It aimed to translate developmental sleep research into action via the school system, while fostering long-term health and resilience. Though positively evaluated, the proposal was not funded in this round.