GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN / GERMANY

International Max Planck Research School

Neurosciences

MSc/PhD/MD-PhD Program

YEARBOOK 2018 / 2019

Yearbook 2018/2019

MSc/PhD/MD-PhD Neuroscience Program

at the University of Göttingen

International Max Planck Research School

Index

Letter from the President

Success for a comprehensive research university such as our Georg-August University of Göttingen is rooted in excellent science and its integration into an optimal learning environment to educate competent and critical young academics. I am very glad that our university in cooperation with the local Max-Planck Institutes and the German Primate Center has been able to establish conditions, which make top interdisciplinary science possible in an international setting enabling us all to feel the Göttingen Spirit.

The two international MSc/PhD programs in Neurosciences and Molecular Biology truly have contributed to our continued strive for excellence in science-oriented training both by integrating faculty members from university and non-university institutes across institutional borders and by providing comprehensive services especially for international students on the Göttingen Research Campus. Based on the proven concepts and the experience of these programs the Göttingen Graduate School for Neurosciences, Biophysics and Molecular Biosciences (GGNB) was established, which is continuously supported by the federal Excellence Initiative since 2007.

The Neuroscience and Molecular Biology programs remain unique within the GGNB in offering integrated MSc/PhD curricula with a fast track option which allow excellent BSc graduates to directly enter the PhD phase after successfully absolving the initial 1st year training phase. For over a decade these international programs have been particularly successful in attracting high numbers of worldwide applicants of good academic quality providing the basis for the selection of the very best candidates. New ideas introduced by these programs have meanwhile been adopted by the Georg-August University School of Science (GAUSS) and other graduate schools for the benefit of the entire University.

While maintaining their successful structure the content and focus of the training curriculum of the programs has continuously been adapted to the changing research topics. Consequently, new faculty members are integrated to reflect novel developments in research. They will further ensure optimal individual supervision and up-to-date research-oriented training. Beyond academia both programs keep close contact with the relevant industries to enhance the opportunities of the graduates for a successful professional career in the private sector.

I would very much like to thank all colleagues and institutions for their committed support of these international programs and, last but not least, the German Academic Exchange Service (DAAD), the Lower Saxony Ministry of Science and Culture, and the various generous donors. The Georg-August University of Göttingen will continue to support these programs to promote international exchange at all levels and for further interaction with our partners worldwide.

Prof. Dr. Ulrike Beisiegel

(President of the Georg August University Göttingen)

Letter from the Max Planck Society

The mission of the Max Planck Society is to conduct basic research in science and humanities at the highest level. More than 80 Max Planck Institutes are located on scientific campuses across Germany, most of them close to universities.

Scientific ties between Max Planck Institutes and universities are traditionally strong. In 1998, during the 50th year celebration of the Max Planck Society in Göttingen, the Max Planck Society, together with the Hochschulrektorenkonferenz, launched the International Max Planck Research Schools as a new joint program to further intensify cooperation.

The goals of the International Max Planck Research Schools are

- to attract excellent students from all around the world to intensive Ph.D. training programs in Germany, preparing them for careers in science,
- to integrate Max Planck scientists in top-level scientific training of junior scientists,
- to intensify the ties to the universities owing to the participation of internationally renowned Max Planck scientists in joint teaching activities, and
- to strengthen international relationships by providing individual support to each student and by exposing foreign students to German culture and the German language.

By now, 67 International Max Planck Research Schools have been established involving 73 Max Planck Institutes, 36 German universities and 26 universities abroad. About 3,200 PhD students from 123 countries are presently enrolled.

Since their foundation in the year 2000, the Göttingen International Max Planck Research Schools in Neurosciences and Molecular Biology have met with extraordinary success. Every year, the programs receive hundreds of applications, with the quality of the students consistently being very high. Most students graduated so far have moved on to postdoctoral positions, many at prestigious international institutions. In the past years, the Göttingen Schools received unanimous acclaim during external evaluations and won national awards. For instance they are the only Life Science Programs within Germany that were selected for the “Top Ten International Master’s Degree Courses 2006”. The Schools have also re-shaped the local scientific community, strengthening the ties between the participating institutions, and initiated new scientific collaborations that augment the international reputation of Göttingen as a center of scientific excellence. Furthermore, the Schools served as role models and founding members of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences, thus being instrumental for the continued support by the German Excellence Initiative provided to the university. We hope that in the years to come the students of the International Max Planck Research Schools will be successful in their professional careers. We also hope that they will remember their training period in Göttingen as an exciting and stimulating phase in their lives.

Martin Stratmann
President
Max Planck Society

Nils Brose
Dean of the IMPRS
Neurosciences

Overview

This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Program for Neurosciences in Göttingen, Germany, which was established in 2000. In addition to general information on the program, the yearbook introduces the current year's students, the faculty members, the program committee, and the coordination team.

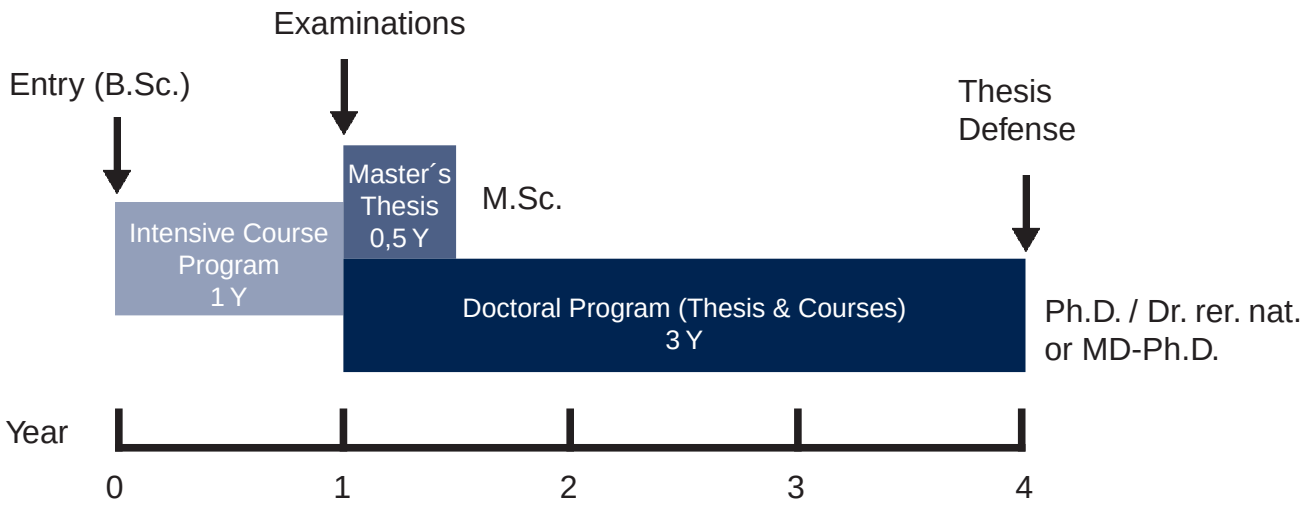
The program is a member of the Göttingen Graduate Center for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the University of Göttingen, the Max Planck Institute for Biophysical Chemistry (MPIbpc), the Max Planck Institute for Experimental Medicine (MPIem), the Max Planck Institute for Dynamics and Self-Organization (MPIds), the German Primate Center (DPZ), and the European Neuroscience Institute (ENI). Further to their active participation in the Neuroscience Program, the above mentioned partners closely cooperate in the Cluster of Excellence and DFG Research Center Nanoscale Microscopy and Molecular Physiology of the Brain (CNMPB), the Göttingen Center for Molecular Biosciences (GZMB), the Center for Systems Neuroscience (ZNV), in several collaborative research centers (Sonderforschungsbereiche, SFB), and in interdisciplinary doctoral programs (Graduiertenkollegs, GK).

The International MSc/PhD/MD-PhD Neuroscience Program qualifies students for professional work in the neurosciences. The program is open to students from Germany and from abroad, who hold a Bachelor's degree (or equivalent) in the biosciences, medicine, psychology, physics, or related fields. All courses are held in English. Scholarships are available. The academic year starts in October and is preceded by a three week orientation program. Applications may be submitted until January 15 of the year of enrollment. To ensure a high standard of individual training, the number of participants is limited to 20 students per year.

All students initially participate in one year of intensive course work. This first segment of the program comprises lectures, tutorials, seminars, methods courses, and independent, individually supervised research projects (laboratory rotations). The traditional German structure of academic semesters is not followed. The condensed schedule allows students to accumulate 90 credits (ECTS) within one year, which would normally require three semesters.

Subsequently, two separate segments are offered:

- **PhD Program:** Good to excellent results after the first year qualify for direct admission to a three-year doctoral project in one of the participating research groups. The Master's thesis requirement is waived in this case. After successful defense of a doctoral thesis, the degree Doctor of Philosophy (Ph.D.) or the equivalent title Doctor rerum naturalium (Dr. rer. nat.) is conferred. Students who finished medical school can apply for an MD-Ph.D. title.
- **MSc Program:** Alternatively, students may conclude the program with a Master's thesis, based on six months of experimental scientific research. The degree Master of Science (M.Sc.) is awarded upon successful completion of the Master's thesis.



Intensive Course Program (First Year)

Throughout the first year, current topics in the neurosciences are covered by

- lectures
- tutorials
- methods courses
- laboratory rotations
- seminars
- skills courses

Lectures and Tutorials (Theoretical Modules)

A comprehensive lecture series is organized into a sequence of 4-6 week units. The following topics are taught on an advanced level throughout the first year (36 weeks, 4 hours per week):

A. (Module M.Neuro.11) Neuroanatomy, Development

B. (Module M.Neuro.12) Physiology and Basic Statistics

C. (Module M.Neuro.13) Modelling, Autonomous Nervous System, Pharmacology

D. (Module M.Neuro.14) Molecular Biology, Development, Neurogenetics

E. (Module M.Neuro.15) Sensory and Motor Functions

F. (Module M.Neuro.16) Clinical Neurosciences and Higher Brain Functions

G. Specialization Seminars and Tutorials

Each lecture is accompanied by a tutorial session, where students meet with a tutor in small groups. Tutorials involve exercises, review of lecture material, and discussion of related topics.

Methods Courses (Practical Modules)

During the first months of the Neuroscience Program, students participate in a series of methods courses to introduce them to principles and practical aspects of basic scientific techniques and the handling of model organisms. The practical courses and tutorials comprise the following topics:

M.Neuro.21 Histology & Cytology

- comparative development of the vertebrate brain
- cytology and ultrastructure of the human brain
- functional neuroanatomy of sensory and motor systems
- immunocytochemical techniques and single neuron recording
- development and neuroanatomy of invertebrate models

M.Neuro.22 Electrophysiology

- introduction to medical statistics and programming languages
- electrophysiological techniques
- membrane physiology / synaptic transmission
- FLIM / Ca-imaging / FCS techniques / confocal microscopy
- sensory and behavioral physiology

M.Neuro. 23 Microscopy & Imaging

- neuronal modelling
- behavioral analysis
- neuroendocrinology / neuropharmacology
- protein separation techniques

M. Neuro.24 Zoo-Physiology

- cell culture methods
- methods in molecular biology
- genetics of transgenic mouse models

Laboratory Rotations (Practical Module M.Neuro.25)

Starting in January, every student carries out three independent research projects (laboratory rotations) in participating laboratories. Each project is individually supervised and involves seven weeks of experimental work, followed by one week for data analysis and presentation. For each project, a report must be completed in the format of a scientific publication. The laboratory rotations must cover at least two different subjects.

Seminars

Seminars start in March. The class meets weekly for two hours to discuss two or three student presentations. The presentations are research reports based on work from the laboratory rotations.

Examinations

After the first year of intensive training, all students take one written and two oral Master's examinations. The Master's examinations explore the students' theoretical background in topics covered by lectures and tutorials. All candidates are examined both in the field of anatomy and physiology in two separate oral exams.

PhD Program

Students who have passed the Master's examinations with good or excellent results qualify for direct admission to a three-year doctoral project in one of the participating research groups without being required to complete a Master's thesis first.

The PhD program emphasizes independent research on the part of the students. Doctoral students select three faculty members as their doctoral thesis committee which closely monitors progress and advises students in their research project. Laboratory work is accompanied by seminars and lecture series, a wide variety of advanced methods courses, training in scientific writing and oral presentation skills, courses in intercultural communication, bioethics and research ethics, elective courses, and participation in international conferences or workshops.

At the end of the PhD training program, a doctoral thesis is submitted either in the traditional format, or as a collection of scientific publications in internationally recognized journals along with a general introduction and a discussion of the results. The degree Ph.D. or, alternatively, Dr. rer. nat. will be awarded after the successful defense of the doctoral thesis. Having fullfilled all PhD degree requirements, medical students may apply for the degree of an MD-Ph.D. at the Medical Faculty.

Master's Program

After the first year of intensive training, students may conclude the program with a six-month thesis project, leading to a Master of Science degree. The thesis project involves experimental work under the supervision of faculty members of the Neuroscience Program. Students have the opportunity to conduct their Master's thesis project at an affiliated research institution abroad.

Orientation, Language Courses, Social Activities

A three-week orientation prior to the program provides assistance and advice for managing day-to-day life, including arrangements for bank account, health insurance, residence permit, housing, and enrollment. Students have the opportunity to meet faculty members and visit laboratories of the participating institutions. In addition, the orientation program informs students about computing and library facilities, the city and university of Göttingen, sports facilities, and cultural events.

An intensive basic language course in German is offered in cooperation with the *Lektorat Deutsch als Fremdsprache* to facilitate the start in Göttingen. Additional language courses and social activities accompany the program.

Application, Selection, and Admission 2018

Applicants must hold a Bachelor's degree or equivalent in biology, medicine, psychology, physics, chemistry, or related fields. Applicants who are not native speakers of English should demonstrate adequate competence of the English language by acceptable results in an internationally recognized test.

In the year 2018, the coordination office received 481 applications from 70 countries.

Continent	Applications	Admissions *
Europe (total)	**76**	**10**
Germany	37	7
other West Europe / Middle Europe	30	2
East Europe	9	1
America (total)	**51**	**0**
North America	21	0
Central/South America	30	0
Africa (total)	**88**	**2**
North Africa	24	2
Central/South Africa	64	0
Asia (total)	**265**	**7**
Near East	82	1
Central Asia / Far East	183	6
Australia	**1**	**0**

*Incl. 3 NEURASMUS students (from Armenia, Egypt, Sudan).

Students 2018/2019

Name		Home Country
Hebatallah	Abdelrasol*	Egypt
Mohammed	Abdelwahab Osman*	Sudan
Lukas	Amann	Germany
Mathis	Baßler	Germany
Jasmina	Bier	Germany
Max	Crayen	Germany
Julia	Dziubek	Poland
Jonas	Hemesath	Germany
Nare	Karagulyan*	Armenia
Priyanka	Kislai	India
Anna	Liashenko	Ukraine
Selene	Lickfett	Germany
Yifan	Mayr	P.R. China
Tor	Memhave	Denmark
Aditi	Methi	India
Andrew	Sasmita	Indonesia
Patricia	Schikorra	Germany
Ivan	Skorodumov	Russian Federation

* NEURASMUS student

Neurasmus is an Erasmus Mundus Joint Master Degree program (EMJMDs) which is based on the cooperation of 5 partner universities, comprising Université de Bordeaux/ France, Vrije Universiteit Amsterdam/Netherlands, Universitätsmedizin Göttingen/ Germany, Charité - Universitätsmedizin Berlin/Germany and Université Laval/Canada.

For details please refer to the Neurasmus website:
http://www.neurasmus.u-bordeaux2.fr/

Egypt

Hebatallah Abdelrasol

EDUCATION

College / University:

Helwan University / Faculty of Pharmacy, Egypt

Highest Degree:

B.Sc.

Major Subjects:

Pharmaceutical Science, Molecular Biology, Microbiology, Clinical Pharmacy and Pharmacy Practice

Lab Experience:

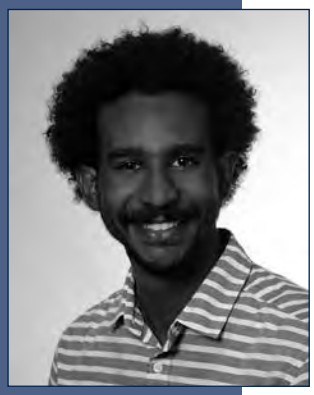
Basic pharmacological lab techniques (including mouse handling, e.g. narcosis, topical drug application, injection), ELISA, western blotting, immunohistrochemistry and cell cultures, enzymology, antimicrobial activity assessment, microbial bioactive compounds production (broth and solid agar media).

Projects / Research:

06 – 09/2010: Internship, Chemistry of Natural and Microbial Products Department, Pharmaceutical and Drug Industries Division, National Research Center, Cairo (Egypt)

Scholarships:

2018 – 2020: Erasmus Mundus Scholarship



Sudan

Mohammed Abdelwahab Osman Mohammed

EDUCATION

College / University:

University of Khartoum

Highest Degree:

MBBS

Major Subjects:

Medicine and Surgery

Lab Experience:

Basic techniques in Molecular Biology and Genetics: DNA and RNA extraction, PCR and gel electrophoresis, cell culture, immunohistochemistry, immunocytochemistry, cell sorting, confocal microscopy.

Projects / Research:

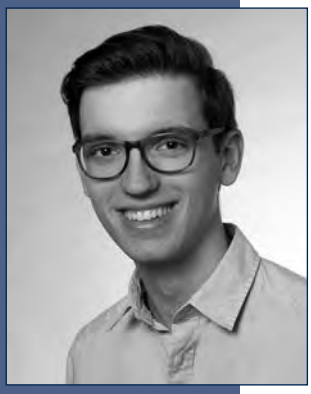
07 – 10/2017: “Characterization of bone marrow derived stromal cells as a source of cells in neurodegenerative diseases” (Tania Ramos-Moreno, Stem Cell Centre, Lund University)

2016 – 2017: Internship at Central Research lab, virology department, Sudan “Detection of oncogenic viruses in brain tumor” (Khalid Enan, Head Department)

Scholarships:

2018 – 2020: Erasmus Mundus Scholarship

Lukas Amann



Germany

Lukas Amann

EDUCATION

College / University:

Georg-August-Universität Göttingen

Highest Degree:

B.Sc.

Major Subjects:

Molecular Medicine

Lab Experience:

Immunohistochemistry, immunofluorescence, cell culturing, qRT-PCR, Western Blot, capillary electrophoresis, mass spectrometry, light and fluorescence microscopy.

Projects / Research:

2017: Internship “Identification of Vasa interaction domain in Buc during early Zebrafish Embryogenesis”, Department of Biochemistry, University Medical Center Göttingen, Germany

2017: Internship “Protein identification using mass spectrometry”, Department of Cellular Biochemistry, University Medical Center Göttingen, Germany

2017: Internship “Molecular Pathology of Alzheimer dementia”, Department of Molecular Psychiatry, University Medical Center Göttingen, Germany.

2018: Bachelor´s thesis: “The role of the fragmentation of Apolipoprotein E in Alzheimer dementia”, Department of Molecular Psychiatry, University Medical Center Göttingen, Germany

Scholarships:

2018–2019: Stipend by the International Max Planck Research School

Mathis Bassler

Germany

Mathis Bassler

EDUCATION

College / University:

University of Heidelberg, Germany

National University of Singapore (NUS

Highest Degree:

B.Sc.

Major Subjects:

Biosciences

Lab Experience:

In vivo electrophysiology, Nissl staining, FELASA training course category B, Programming: Python, R

Projects / Research:

03/2018 – 08/2018: B.Sc. Thesis project on spatially selective neurons in the parahippocampal region, Department of Clinical Neurology at the DKFZ/ Heidelberg University Hospital

08/2017 – 12/2017: Internship at Brain & Consciousness Laboratory, Neuroscience and Behavioral Disorders Program, Duke-NUS, Singapore

10/2016 – 12/2016: Two-month internship in Stochastic Optical Reconstruction Microscopy (STORM), IZN Heidelberg

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

Since 2015: German Academic Scholarship Foundation

Jasmina Bier

Germany

Jasmina Bier

EDUCATION

College / University:

Jacobs University, Bremen, Germany

Highest Degree:

B.Sc.

Major Subjects:

Medicinal Chemistry and Chemical Biology

Lab Experience:

PCR, gel electrophoresis, immunofluorescence staining, flow cytometry, antibiotic resistance assay, photolabeling of enzymes, enzymatic assays, PAMPA, reaction optimization (organic chemistry), column chromatography, NMR.

Projects / Research:

2018: Bachelor's thesis "The stereo- and regioselective reactions of a diketone: organocatalyzed α-amination and α-aminoxylation", Prof. Dr. Thomas Nugent, Jacobs University Bremen, Germany

2017: Project "Development of a protocol for ILC2 identification in mouse lung tissue sections", Dr. Elia Tait Wojno, Cornell University, Ithaca, USA

2016: Amgen Scholars "Collagen deposition in *Heligmosomoides polygyrus* worm infected mice", Dr. Susanne Nylèn, Karolinska Institutet Stockholm, Sweden

Scholarships:

2018 – 2019: Scholarship by the International Max Planck Research School

2017 – 2018: August-Wilhelm von Hofmann scholarship

2017: Fulbright travel scholarship for a semester abroad at Cornell University

2015 – 2018: Jacobs University merit-based scholarship

Max Arwed Crayen

Germany

Max Arwed Crayen

EDUCATION

College / University:

Johannes-Gutenberg University Mainz

Highest Degree:

B.Sc.

Major Subjects:

Biology

Lab Experience:

Behavioral analysis of *Drosophila melanogaster*, handling and crossings, neuroanatomy, preparation and staining of the nervous system of *Drosophila*; basic techniques of cell biology and biochemistry (including SDS-PAGE, ELISA, *in situ* hybridization, immunohistochemistry, voltage/current clamp); high resolution confocal and fluorescence microscopy; software use including ImageJ/Fiji, Excel, R

Projects / Research:

11/2017 – 05/2018: Bachelor thesis "Identification of GAL4-Lines to characterize body-size memory in *Drosophila melanogaster*", Institute of Developmental Biology and Neurobiology, Prof. Roland Strauss, Johannes-Gutenberg University Mainz, Germany

04 – 05/2018: Internship, Forensic Institute, Dr. Schneider, Hessisches Landeskriminalamt, Wiesbaden, Germany

Scholarships:

2018 – 2019 Stipend by the International Max Planck Research School

Poland

Julia Dziubek

EDUCATION

College / University:

University of Wroclaw

Highest Degree:

B.Sc. in Genetics and Experimental Biology

Major Subjects:

General and Molecular Genetics, Molecular Cell Biology, Developmental Biology, Physiology and Neurobiology

Lab Experience:

Primary neuronal cultures, HEK cultures, *D. melanogaster* husbandry, molecular cloning, proteins crystallization, Western blotting, PCR, CoIP, immunohistochemistry, immunofluorescence

Projects / Research:

07 – 08/2018: "SOCE in Neurons – Interactions of STIM Proteins", Ph.D. Gruszczyńska–Biegała, Institute of Molecular and Cell Biology, Warsaw

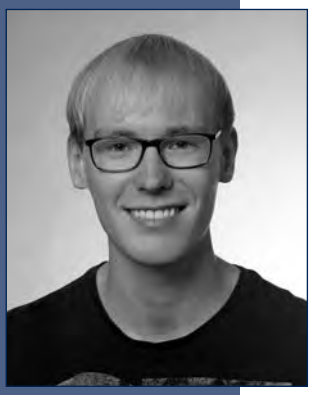
05/2017 – 06/2018: Bachelor Thesis "The evaluation of autophagy level in *Drosophila Melanogaster* individuals expressing various variants of Hsp67Bc protein", Ph.D. Dubińska-Magiera, University of Wrocław

07 – 08/2017: "Multistep preparation process of enzymes from extremophiles and their crystals", Ph.D. Bejger, Institute of Bioorganic Chemistry, Polish Academy of Science

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

2016 – 2018: Rector's scholarships for outstanding students of University, Wroclaw



Germany

Jonas Hemesath

EDUCATION

College / University:

Georg-August-Universität Göttingen

Highest Degree:

B.Sc.

Major Subjects:

Molecular Medicine

Lab Experience:

Basic biochemical technics, western blotting, cell culture, clonogenic survival assay, tube formation assay, histological staining, PCR, basics in mass spectrometry, lab diagnosis of dementia diseases

Projects / Research:

05 – 08/2018: Bachelor thesis "Radiosensitizing effect of metal-based nanoparticles in prostate cancer cells, their cellular uptake and intracellular distribution", Prof. Alves, Max Planck Institute of Experimental Medicine, Göttingen, Germany, and Prof. Volkov, Trinity College Dublin, Ireland

08 – 09/2017: Internship, Prof. Wilting, Institute of Anatomy and Cell Biology, Göttingen, Germany

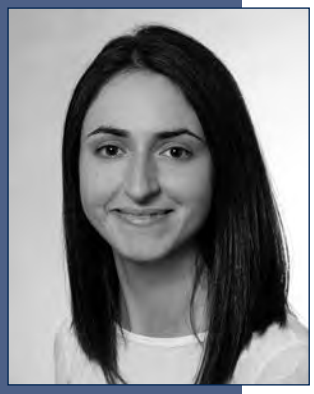
02 – 03/2017: Internship, Dr. Jahn, MPI of Experimental Medicine, Göttingen

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

05 – 08/2018: Erasmus+ scholarship, Eurolife Research Stream

12/2017: Lower Saxony Scholarship



Armenia

Nare Karagulyan

EDUCATION

College / University:

Yerevan State University

Highest Degree:

B.Sc.

Major Subjects:

Biophysics

Lab Experience:

Two electrode voltage clamp, basic patch clamp, site directed mutagenesis, RNA synthesis

Projects / Research:

02/2016 – 08/2018: "Investigation of the role of Zn^{2+} finger domain of Kv2 potassium channels via mutational analysis", Institute of Molecular Biology NAS RA (Group of Molecular Neurology, Dr. Vitya Vardanyan)

Scholarships:

2018 – 2020: Erasmus Mundus Scholarship

India

Priyanka Kislai

EDUCATION

College / University:

St. Xavier's College, Mumbai, India

Highest Degree:

M.Sc.

Major Subjects:

Life Science

Lab Experience:

Animal cell culture techniques, biochemistry of body fluids, basic hematology, Neuronal enzyme assays, molecular biology, medical microbiology, protein biochemistry, immunohistochemistry, forensic science, statistics and cognitive function tests

Projects / Research:

06/2017 – 04/2018: "Effect of zinc toxicity on the nervous system of *Caenorhabditis elegans*"

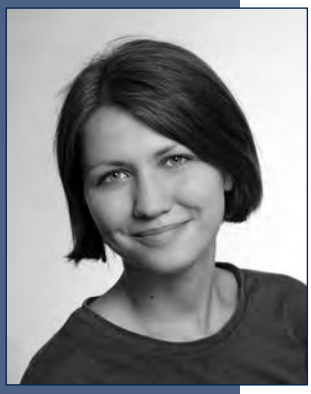
01/2016 – 03/2016: "Structural insights on vegetable based TSH stimulating compounds against human iodide symporter (HIS) - A molecular docking study"

06/2015 – 12/2015: "Impact of dietary glucosinolate on hypothyroidism"

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

2015: Research grant from Vision Group of Science and Technology, DST, Govt. of Karnataka, India



Ukraine

Anna Liashenko

EDUCATION

College / University:

Taras Shevchenko National University of Kyiv

Highest Degree:

B.Sc.

Major Subjects:

Biology

Lab Experience:

Stereotactic surgery, patch-clamp electrophysiology, eukaryotic cell cultures and data analysis via Clampfit

Projects / Research:

2017 – 2018: Trafficking of T-type Calcium channels in health and disease (ALS and epilepsy) under supervision of Ph.D. Norbert Weiss at the Institute of Organic Chemistry and Biochemistry, Prague, Czech Republic

2016 – 2017: Characteristic of afferent inputs of the lamina I dorsal root projection neurons of rat spinal cord under supervision of Ph.D. Pavel Belan at the Bogomoletz Institute of Physiology, NAS of Ukraine, Kyiv, Ukraine

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

2014 – 2018: Ukrainian State Scholarship for students with high academic achievements awarded after each semester

Germany

Selene Lickfett

EDUCATION

College / University:

Ulm University

Highest Degree:

B.Sc.

Major Subjects:

Molecular Medicine

Lab Experience:

Basic molecular and cellular techniques; animal models: mouse, *Xenopus laevis*; cell culturing (inclusive DRG preparation); immunocytochemistry, immunohistochemistry; fluorescence microscope, electron microscope, life cell imaging (Olympus Microscope)

Projects / Research:

2018: Bachelor Thesis: “The impact of self-assembling peptides on neurite outgrowth of primary mouse neurons”, Prof. Bernd Knöll, Institute of Physiological Chemistry, Ulm University

2017: Internship, Department of Molecular Neuroscience, Osaka University, Japan

2016: Internship, Institute of Biochemistry and Molecular Biology, Ulm University

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

Yifan Mayr

P.R. China

Yifan Mayr

EDUCATION

College / University:

Johannes Kepler University Linz

University of South Bohemia

Highest Degree:

B.Sc., double degree

Major Subjects:

Biology, Chemistry

Lab Experience:

Two-photon polarization microscopy, atomic force microscopy, fluorescence microscopy, cell cultivation and maintenance, single-cell electrophysiology, immunohistochemistry, tissue cryosectioning, gel electrophoresis, ELISA, qPCR

Projects / Research:

10/2017 – 02/2018: “The role of lipophilicity and electrostatic charges in MDMA-membrane interaction”

07 – 08/2017: “Investigation of voltage-sensitivity of the genetically modified fluorescent protein DHX-cleGFP”

07 – 08/2016: “Experimental determination of transition dipole moment direction in the cyan fluorescent protein mTurquoise2”

11/2015 – 06/2016: “Anti-inflammatory effects of tick salivary protease inhibitors on mouse microglial cells”

06 – 08/2014: “The effect of pericytic laminin on the blood-brain barrier”

Scholarships:

2018 – 2019: Scholarship by the International Max-Planck Research School

Tor Rasmus Memhave

Denmark

Tor Rasmus Memhave

EDUCATION

College / University:

University of Copenhagen

Highest Degree:

B.Sc.

Major Subjects:

Chemistry

Lab Experience:

Bioinorganic Chemistry: capillary electrophoresis, circular dichroism spectroscopy, fluorescence spectroscopy, FTIR spectroscopy, mass spectrometry, metal catalyzed oxidation, SDS-Page, and UV-Vis spectroscopy; MATLAB analysis of medical images; organic chemical synthesis; semi-empirical computational methods

Projects / Research:

06 – 10/2017: Computational chemistry: semi-empirical methods ability to predict reaction energies of metalloproteins

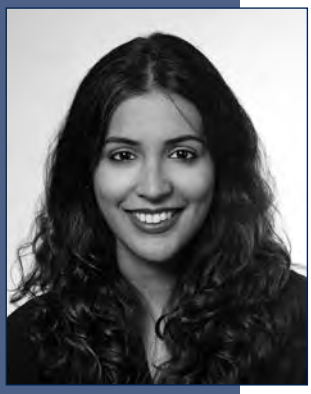
02 – 06/2018: Bachelor’s Thesis: “Metal Catalyzed Oxidation of β-lactoglobulin: Using β-lactoglobulin to look at oxidative protein damage in relation to neurodegenerative diseases”

Scholarships:

2018 – 2019: Scholarship by the International Max-Planck Research School

2018 – 2019: Danish State Educational Grant

2015: Zerlangs Legat



India

Aditi Methi

EDUCATION

College / University:

Indian Institute of Technology Madras (IITM), Chennai, India

Highest Degree:

Integrated B.S. & M.S. in Biological Sciences

Major Subjects:

Cell and Molecular Biology, Microbiology, Bioinformatics, Immunology

Lab Experience:

Molecular and cell biology techniques, microbiology, animal cell-culture techniques, computational biology and bioinformatics, MATLAB

Projects / Research:

01/2017 – 05/2018: Master's Thesis: "Sequence and structure-based analysis of variants in proteins associated with neurodegenerative disorders", Prof. Dr. Gromiha, IIT Madras, India

05 – 07/2016: "Investigation of the developmental sequence of apical and basal neural progenitors in the mammalian neocortex", Dr. Livet, Institut de la Vision, Paris, France

05 – 07/2015: "Analysis of mechanisms of human attentional selection in a change blindness paradigm", Dr. Devarajan, IISc Bangalore, India

05 – 07/2014: "Exome and metabolic profile analysis for human glioblastoma U87-MG cell line", Dr. Raghunathan, National Chemical Laboratory, Pune, India

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

05/2016 – 07/2016: Stipend for summer internship by UPMC, France

08/2013 – 05/2017: INSPIRE Merit Scholarship by the DST, Govt. of India

Indonesia

Andrew Octavian Sasmita

EDUCATION

College / University:

International Medical University, Malaysia

Highest Degree:

B.Sc.

Major Subjects:

Medical Biotechnology

Lab Experience:

Cell culture, rodent handling, PDTX extraction, Western blot, genotyping, PCR, flow cytometric analysis, fluorescence microscopy, immunohistochemistry, immunofluorescence, and biochemical assays

Projects / Research:

2017 – 2018: "Development of novel algorithms for flagging in full blood count analyzers to distinguish abnormal and normal hematological samples", Hospital Ampang, Malaysia

2017: "*In vitro* and *in vivo* assessment of molecular checkpoint inhibitors on oral cancer models derived from patients", Cancer Research Malaysia, Malaysia

2016 – 2017: "Investigation of the anti-neuroinflammatory properties of madecassoside on microglial cell culture", International Medical University, Malaysia

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

2012 – 2014: UCSI University Trust Scholarship

Patricia Schikorra

Germany

Patricia Schikorra

EDUCATION

College / University:

University Duisburg-Essen

Highest Degree:

B.Sc. in Medical Biology

Major Subjects:

Molecular biology, Physiology, Biochemistry

Lab Experience:

6 weeks internship at Bergmannsheil Bochum (Germany)

12 weeks internship at the Neurobiological institute of UNAM Juriquilla (Querétaro, Mexico)

18 weeks internship at the Biomedical institute of Seville (Spain)

11 weeks internship at the Centre of excellence in neural and behavioural sciences (Tallinn, Estonia)

Projects / Research:

Methods in Neuro-oncology and Neuro-immunology

Physiology of glial cells in the MNTB in ASD

Effects of GDNF on the neuro-inflammatory response in Parkinson

COX activity mapping in ketamine model of schizophrenia

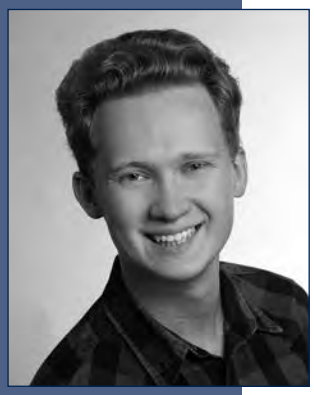
Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

RISE weltweit (DAAD) for Mexico

Erasmus+ for Sweden, Spain and Estonia

Ivan Skorodumov



Russian Federation

Ivan Skorodumov

EDUCATION

College / University:

Lomonosov Moscow State University

Highest Degree:

Specialist

Major Subjects:

Pharmacy

Lab Experience:

Behavioural tests in mice and rats (forced swim test, elevated plus-maze, open field test, sucrose preference test), video-tracking software (SMART 3.0), high-performance liquid chromatography, gas chromatography, fluorescent microscopy, neuronal culture staining techniques, GLP/GCP principles

Projects / Research:

2016 – 2017: Specialist thesis “Development of depression in animals with monoamine deficiency”, Institute of Pharmacology named after V.V.Zakusov, Moscow

2015 – 2016: “Development of a non-invasive method for therapeutic drug monitoring of topiramate”, Research Center of Neurology, Moscow

2014 – 2015: “Glutamate-induced delayed calcium dysregulation: morphometric study of primary culture of cerebellum granular cells”, National Medical Research Center of Children’s Health, Moscow

Scholarships:

2018 – 2019: Stipend by the International Max Planck Research School

2011 – 2017: State academic scholarship of Lomonosov Moscow State University

Faculty

Name		Department	Institute
Andrea	Antal	Clinical Neurophysiology	U Göttingen
Mathias	Bähr	Neurology	U Göttingen
Thomas	Bayer	Molecular Psychiatry	U Göttingen
Susann	Boretius	Functional Imaging Laboratory	DPZ
Henrik	Bringmann	Sleep and Waking	MPI bpc
Nils	Brose	Molecular Neurobiology	MPI em
Wolfgang	Brück	Neuropathology	U Göttingen
Jan	Clemens	Neural Computation and Behavior	ENI
Camin	Dean	Trans-synaptic Signaling	ENI
Peter	Dechent	Cognitive Neurology	U Göttingen
Thomas	Dresbach	Anatomy and Embryology	U Göttingen
Hannelore	Ehrenreich	Clinical Neurosciences	MPI em
Gregor	Eichele	Genes and Behavior	MPI bpc
André	Fiala	Molecular Neurobiology of Behavior	U Göttingen
André	Fischer	German Center for Neurodegenerative Diseases	U Göttingen
Alexander	Flügel	Neuroimmunology	U Göttingen
Jens	Frahm	Biomedical NMR Research	MPI bpc
Tim	Friede	Medical Statistics	U Göttingen
Alexander	Gail	Sensorimotor Transformations	DPZ
Tim	Gollisch	Ophthalmology	U Göttingen
Martin	Göpfert	Cellular Neurobiology	U Göttingen
Robert	Gütig	Theoretical Neuroscience	MPI em
Ralf	Heinrich	Cellular Neurobiology	U Göttingen
Stefan	Hell	NanoBiophotonics	MPI bpc
Swen	Hülsmann	Experimental Neuroanesthesiology	U Göttingen
Reinhard	Jahn	Neurobiology	MPI bpc
Siegrid	Löwel	Systems Neuroscience	U Göttingen
Ira	Milosevic	Synaptic Vesicle Dynamics	ENI
Tobias	Moser	Auditory Neuroscience & InnerEarLab	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Tiago	Outeiro	Neurodegeneration and Restaurative Research	U Göttingen
Luis	Pardo	Molecular Biology of Neuronal Signals	MPI em
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Arezoo	Pooresmaeili	Perception and Cognition	ENI
Jeong Seop	Rhee	Neurophysiology	MPI-em
Michael	Rickmann	Neuroanatomy	U Göttingen
Silvio O.	Rizzoli	Neuro- and Sensory Physiology	ENI
Annekathrin	Schacht	CRC Text Structures	U Göttingen
Hansjörg	Scherberger	Neurobiology	DPZ
Oliver	Schlüter	Molecular Neurobiology	ENI
Manuela	Schmidt	Somatosensory Signaling	MPI em
Michael	Sereda	Molecular and Translational Neurology	MPI em
Marion	Silies	Visual Processing	U Göttingen
Jochen	Staiger	Neuroanatomy	U Göttingen
Anastassia	Stoykova	Molecular Developmental Neurobiology	MPI bpc
Stefan	Treue	Cognitive Neurosciences	DPZ
Melanie	Wilke	Cognitive Neurology	U Göttingen
Sonja	Wojcik	Neurotransmitter Systems	MPI em
Fred	Wolf	Theoretical Neurophysics	MPI ds
Fred	Wouters	Molecular and Cellular Systems	U Göttingen

U Göttingen = Georg August University, MPI bpc = Max Planck Institute for Biophysical Chemistry, MPI em = Max Planck Institute for Experimental Medicine, MPI ds = Max Planck Institute for Dynamics and Self-Organization, DPZ = German Primate Center, ENI = European Neuroscience Institute

Address

Göttingen University
Medical School
Dept. of Clinical
Neurophysiology
Robert-Koch-Straße 40

37075 Göttingen
Germany

phone: + 49-551-39 8461
fax: + 49-551-39 8126
e-mail: aantal@gwdg.de

Further Information

http://www.neurologie.uni-goettingen.de/andrea-antal.html

Andrea Antal

Professor at the Clinical Neurophysiology

- 1990 Diploma in Biology, Attila József University of Sciences, Szeged, Hungary
- 1993 University Doctor, Attila József University of Sciences, Szeged, Hungary
- 1998 Ph.D., Albert Szent-Györgyi Medical University, Szeged, Hungary
- 2005 Habilitation Georg-August University, Göttingen, Germany
- 2010 Extraordinary professor, Georg-August University, Göttingen, Germany

Major Research Interests

Neuroplasticity became one central topic of neuroscience research in the last decades. Dynamic modifications of neuronal networks are an important substrate for learning and memory formation. Furthermore, pathological neuroplasticity might be one foundation of numerous central nervous system diseases.

The primary aim of our recent work is to develop and establish new non-invasive brain stimulation methods to induce physiological changes in the central nervous system in order to investigate cognition and complex information processing. Transcranial direct current stimulation (tDCS) was developed by our group as a non-invasive tool to induce neuroplasticity in the human cerebral cortex. tDCS as a tool aims to induce prolonged neuronal excitability and activity alterations in the human brain via alterations of the neuronal membrane potential. Accordingly, this method is a promising tool in the treatment of diseases that are accompanied by changes of cortical excitability. Transcranial alternating current stimulation (tACS) and random noise stimulation (tRNS) are new external stimulation techniques influencing cortical activity. tACS and tRNS permit, due to the oscillating stimulation, external interference with the cortical oscillations. They can particularly modulate the temporary connections of cortical areas during a given task. Neuronal oscillations in the brain are associated with the processing of sensory information, learning, cognition, arousal, attention and also pathological conditions (e.g. Parkinson's tremor, epilepsy). Therefore, the external modulation of cortical oscillations could be an important component of induced cerebral plasticity. In terms of effectiveness tRNS seems to have at least the same therapeutic potential for the treatment of diseases such as depression and chronic pain as rTMS and tDCS.

Selected Recent Publications

Stagg CJ, Antal A, Nitsche MA (2018) Physiology of Transcranial Direct Current Stimulation. Journal of ECT, in press

de Lara GA, Alekseichuk I, Turi Zs, Lehr A, Antal A, Paulus W (2018) Perturbation of theta-gamma coupling at the temporal lobe hinders verbal declarative memory. Brain Stimulation 11: 509-517

Antal A, Paulus W, Rohde V (2017) New Results on Brain Stimulation in Chronic Pain. Neurology International Open 1: E312-E315

Huang YZ, Lu MK, Antal A, Classen J, Nitsche MA, Ziemann U, Ridding M, Hamada M, Ugawa Y, Jaberzadeh S, Suppa A, Paulus W, Rothwell J (2017) Plasticity induced by non-invasive transcranial brain stimulation: a position paper. Clinical Neurophysiology 128: 2318-2329

De Lara GA, Knechtges PN, Paulus W, Antal A (2017) Anodal tDCS over the left DLPFC did not affect the encoding and retrieval of verbal declarative information. Frontiers in Neuroscience 11: 452

Antal A, Alekseichuk I, Bikson M, Brockmöller J, Brunoni AR, Chen R, Cohen LG, Dowthwaite G, Ellrich J, Flöel A, Fregni F, George MS, Hamilton R, Haueisen J, Herrmann CS, Hummel FC, Lefaucheur JP, Liebetanz D, Loo CK, McCaig CD, Miniussi C, Miranda PC, Moliadze V, Nitsche MA, Nowak R, Padberg F, Pascual-Leone A, Poppendieck W, Priori A, Rossi S, Rossini PM, Rothwell J, Rueger MA, Ruffini G, Schellhorn K, Siebner HR, Ugawa Y, Wexler A, Ziemann U, Hallett M, Paulus W (2017) Low intensity transcranial electric stimulation: Safety, ethical, legal regulatory and application guidelines. Clinical Neurophysiology 128: 1774-1809

Address

Department of Neurology
University of Göttingen
Medical School
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 66603
fax: + 49-551-39 9348
e-mail: mbaehr@gwdg.de

Further Information

http://www.baehrlab.med.uni-goettingen.de/

Mathias Bähr

Professor of Neurology

- 1985 MD, University of Tübingen Medical School, Training in Neurology at University Hospitals in Tübingen and Düsseldorf
- DFG and Max Planck Fellow at the Max Planck Institute for Developmental Biology Tübingen and at the Department of Anatomy and Cell Biology, Washington University St.Louis
- Schilling-Foundation Professor for Clinical and Experimental Neurology, University of Tübingen
- Director at the Department of Neurology, University of Göttingen since 2001

Major Research Interests

Neuronal cell loss is not only a major feature of human neurodegenerative diseases like Parkinson's disease (PD), Alzheimer's disease (AD) or stroke, but can also be observed in neuroinflammatory conditions like Multiple Sclerosis (MS) or after traumatic lesions, e.g. of the optic nerve. We examine the cellular and molecular mechanisms of neuronal dysfunction and neuronal cell death in animal models of the respective disorders with the ultimate goal to detect new targets for a therapeutic neuroprotective intervention.
We have used for many years the retino-tectal system in rodents as our standard model to study de-and regeneration *in vitro* and *in vivo*. Our group has in detail analysed the cellular and molecular cascades that follow lesions of the optic nerve and ultimately lead to cell death of the retinal ganglion cells. To monitor the changes that occur directly after lesions we succeeded in implementing *in vivo* life-imaging of the rat and mouse optic nerve, which offers us a unique opportunity to study the complex processes that follow traumatic or inflammatory lesions of CNS fibre tracts.
In classical neurodegeneration research we have choosen PD as our topic. In this field, a multidisciplinary research team with our participation in the area C2 of the excellence cluster CNMPB examines the role of a-synuclein aggregation for dopaminergic dysfunction and cell death and characterizes other disease related proteins in order to develop new neuroprotective strategies.
In all our model systems we use AAV-mediated viral gene transfer to express different disease-or de-/regeneration associated genes as research tools and also as potential therapeutic factors to manipulate the respective molecular events *in vitro* and *in vivo*. To that end, we have e.g. developed regulatory elements that allow a controlled gene expression in complex *in vivo* models.
The final aim of our research approaches is to describe in detail the molecular pathophysiology that leads to axonal and neuronal loss and to develop new therapeutic strategies, some of which have already been translated into proof of concept studies in human patients.

Selected Recent Publications

Tolö J, Taschenberger G, Leite K, Stahlberg MA, Spehlbrink G, Kues J, Munari F, Capaldi S, Becker S, Zweckstetter M, Dean C, Bähr M, Kügler S (2018) Pathophysiological consequences of neuronal α-synuclein overexpression: Impacts on ion homeostasis, stress signaling, mitochondrial integrity, and electrical activity. Front Mol Neurosci

Maass F, Michalke B, Leha A, Boerger M, Zerr I, Koch JC, Tönges L, Bähr M, Lingor PJ (2018) Elemental fingerprint as a cerebrospinal fluid biomarker for the diagnosis of Parkinson's disease. Neurochem

Eckermann K, Kügler S, Bähr M. (2015) Dimerization propensities of Synucleins are not predictive for Synuclein aggregation. Biochim Biophys Acta 1852(8): 1658-64

Ribas VT, Schnepf B, Challagundla M, Koch JC, Bähr M, Lingor P (2015) Early and sustained activation of autophagy in degenerating axons after spinal cord injury. Brain Pathol 25(2): 157-70

Kretzschmar B, Hein K, Moinfar Z, Könnecke B, Sättler MB, Hess H, Weissert R, Bähr M (2014) Treatment with atacicept enhances neuronal cell death in a rat model of optic neuritis. J Neuroimmunol Mar 15;268(1-2): 58-63

Tereshchenko J, Maddalena A, Bähr M, Kügler S (2014) Pharmacologically controlled, discontinuous GDNF gene therapy restores motor function in a rat model of Parkinson's disease. Neurobiol Dis 65: 35-42

Address

Dept. of Molecular Psychiatry
University of Göttingen
Von-Siebold-Str. 5

37075 Göttingen
Germany

phone: + 49-551-39 22912
fax: + 49-551-39 10291
e-mail: tbayer@gwdg.de

Further Information

http://www.alzheimer-bayer.de/

Thomas Bayer

Professor of Molecular Psychiatry

- 1984 – 1989 Diploma in biology, University of Stuttgart and Whitney Lab Florida
- 1989 – 1993 PhD at the University of Cologne (PhD Thyssen Graduate School)
- 1993 Postdoctoral Research Fellow, University of Cologne, Cologne
- 1993 – 1997 Postdoctoral Research Fellow, Institute of Neuropathology, University of Bonn Medical Center, Bonn
- 1997 – 2002 Lab leader, Department of Psychiatry, University of Bonn Medical Center, Bonn
- 2002 – 2007 Head of Neurobiology Lab, University of Saarland Medical Center, Homburg
- 2004 Appointment to apl Professor at the University Medical Center Saarland
- 2007 – present University Professor in “Molecular Psychiatry” at the Georg-August-University Göttingen, University Medicine Göttingen
- 2006 – 2011 Coordinator of the European Commission funded International Alzheimer PhD School «Neurodegeneration in Alzheimer’s disease – mechanism, consequence and therapy»
- Personal tutor of the Studienstiftung at the Georg-August-University Göttingen

Major Research Interests

Pathogenesis of Alzheimer’s disease, neuronal cell death mechanisms, pre-clinical proof-of-concept studies; characterization and development of mouse models for Alzheimer’s disease (neuropathology, anatomy, biochemistry, behavioural tests), preclinical therapy studies in mouse models, blood and CSF biomarker analysis, coordination and design of a phase II clinical study with Alzheimer’s disease patients.

Selected Recent Publications

Dietrich K, Bouter Y, Müller M, Bayer TA (2018) Synaptic alterations in mouse models for Alzheimer Disease - a Special Focus on N-truncated Abeta 4-42. Molecules 23(4). pii: E718

Noguerola JSL, Giessen NME, Ueberück M, Meißner JN, Pelgrim C, Adams J, Wirths O, Bouter Y, Bayer TA (2018) Synergistic effect on neurodegeneration by N-truncated Aβ4-42 and pyroglutamate Aβ3-42 in a mouse model of Alzheimer’s Disease. Front. Aging Neurosci 10: 64

Storck SE, Meister S, Nahrath J, Meißner JN, Schubert N, Di Spiezio A, Baches S, Vandenbroucke RE, Bouter Y, Prikulis I, Korth C, Weggen S, Heimann A, Schwaninger M, Bayer TA and Pietrzik CU (2016) Endothelial LRP1 transports amyloid-? 1-42 across the blood-brain barrier. J Clin Invest 126: 123-36

Antonios G, Borgers H, Richard BC, Brauß A, Meißner J, Weggen S, Pena V, Pillot T, Davies SL, Bakrania P, Matthews D, Brownlees J, Bouter Y, Bayer TA (2015) Alzheimer therapy with an antibody against N-terminal Abeta 4-X and pyroglutamate Abeta 3-X. Scientific Reports 5: 17338 | DOI: 10.1038/srep17338

Bouter Y, Noguerola JSL, Tucholla P, Crespi GAN, Parker MW, Wiltfang J, Miles LA and Bayer TA (2015) Abeta targets of the biosimilar antibodies of Bapineuzumab, Crenezumab, Solanezumab in comparison to an antibody against N-truncated Abeta in sporadic Alzheimer disease cases and mouse models. Acta Neuropathol 130(5)713-729

Bayer TA (2015) Proteinopathies, a core concept for understanding and ultimately treating degenerative disorders? European Neuropsychopharmacology 25: 713-724

Bayer TA, Wirths O (2014) Focusing the amyloid cascade hypothesis on N-truncated Abeta peptides as drug targets against Alzheimer’s disease. Acta Neuropathol 127(6): 787-801

Address

Functional Imaging
German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-3851 390
e-mail: sboretius@dpz.eu

Further Information

http://www.dpz.eu/de/abteilung/funktionelle-bildgebung/

Susann Boretius

Professor of Functional Imaging at the German Primate Center

- 1994: License to practice veterinary medicine
- 2000: Doctor of veterinary medicine, University of Leipzig
- 2003: Diploma in Physics, Georg-August-University of Göttingen
- 2003-2011: Scientific assistant, Max-Planck-Institute for Biophysical Chemistry, Göttingen, Biomedizinische NMR Forschungs GmbH (Prof. J. Frahm)
- 2011-2015: Professor of Biomedical Imaging with focus on magnetic resonance technologies, Christian-Albrechts University of Kiel, Germany
- 2013-2015: Head of the Molecular Imaging North Competence Center, Christian-Albrechts University of Kiel
- 2015-today: Professor of Functional Imaging, Faculty of Biology and Psychology, Georg-August University Göttingen and head of the Functional Imaging Laboratory, German Primate Center, Göttingen

Major Research Interests

Magnetic resonance imaging (MRI) and spectroscopy (MRS) Neurosciences: basic and translational research

Our research is focused on the development and improvement of magnetic resonance (MR) methods for application in basic biomedical and applied clinical research especially in the fields of neurosciences. We are particularly interested in applying this method on experimental animals, but we do complementary studies in humans as well. As truly non-invasive techniques, MRI and MRS are important methods for translational research, because almost the same methods can be applied in animals and humans. In this context, our research and development activities aim to continuously improve the spatial and temporal resolution of MRI and MRS in rodents, in non-human primates and in humans. With the help of these techniques we are “watching” the brain while it thinks and aiming to better understand what happens with the brain during maturation and aging, and under healthy and pathological conditions as well. Moreover, by using appropriate animal models and more advanced contrast mechanism like diffusion based techniques, magnetization transfer and susceptibility mapping our goal is to increase the sensitivity and specificity of these MR methods for more precise diagnostics and for a more specific and early detection of the response to therapeutic intervention.

Selected Recent Publications

Poggi G, Boretius S, Möbius W, Moschny N, Baudewig J, Ruhwedel T, Hassouna I, Wieser GL, Werner HB, Goebbels S, Nave KA, Ehrenreich H (2016) Cortical network dysfunction caused by a subtle defect of myelination. GLIA 2016 64(11): 2025-40

Dommaschk M, Peters M, Gutzeit F, Schütt C, Näther C, Sönnichsen FD, Tiwari S, Riedel C, Boretius S, Herges R (2015) Photoswitchable Magnetic Resonance Imaging Contrast by Improved Light-Driven Coordination-Induced Spin State Switch. J AM CHEM SOC 137: 7552-7555

Boretius S, Tammer R, Michaelis T, Brockmöller J, Frahm J (2013) Halogenated volatile anesthetics alter brain metabolism as revealed by proton magnetic resonance spectroscopy of mice *in vivo*. NEUROIMAGE 69: 244-55

Fünfschilling U*, Supplie LM*, Mahad D*, Boretius S*, Saab AS, Edgar J, Brinkmann BG, Kassmann CM, Tzvetanova ID, Möbius W, Diaz F, Meijer D, Suter U, Hamprecht B, Sereda MW, Moraes CT, Frahm J, Goebbels S, Nave K (2012) Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. NATURE 485: 517-21

Boretius S, Kasper L, Tammer R, Michaelis T, Frahm J (2009) MRI of cellular layers in mouse brain *in vivo*. NEUROIMAGE 47: 1252-60

Address

Dept. of Sleep and Waking
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1358
fax: +49-551-3899 715
e-mail: henrik.bringmann@
mpibpc.mpg.de

Further Information

http://www.mpibpc.
mpg.de/english/research/
ags/bringmann/

Henrik Bringmann

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

- PhD at the Max Planck Institute for Cell Biology and Genetics, Dresden
- Postdoctoral fellow at the Laboratory of Molecular Biology, Cambrigde, UK
- Max Planck Research Group Leader since 2009

Major Research Interests

Sleep states occur in the life of every animal studied. While the function of waking is obvious, the function of sleep is unknown. Sleep has been suggested to serve a restorative function in the nervous system. Our lab is trying to understand the function and regulation of sleep by studying different model organisms. We have started our studies by looking at sleep in the larva of the nematode *Caenorhabditis elegans*, and are also working with mice.

We are combining behavioral assays with genetics and functional imaging. We recently found a single sleep-inducing neuron in *C. elegans* that is homologous to mammalian sleep neurons. This highly simplified sleep-inducing system in a tractable genetic model provides a great starting point to understand the regulation of sleep and to manipulate sleep in order to study the function of sleep.

Selected Recent Publications

Turek M, Besseling J, Bringmann H (2015) Agarose microchambers for long-term calcium imaging of *Caenorhabditis elegans*. J Vis Exp Jun 24;(100): e52742

Turek M, Lewandrowski IL, Bringmann H (2013) An AP2 transcription factor is required for a sleep-active neuron to induce sleep-like quiescence in *C. elegans*. Current Biology 23 (22): 2215-2223

Schwarz J, Lewandrowski IL, Bringmann H (2011) Reduced activity of a sensory neuron during a sleep-like state in *Caenorhabditis elegans*. Curr. Biol. 21 (24): R983-R984

Redemann, S.; Schloissnig, S.; Ernst, S.; Pozniakowsky, A.; Ayloo, S.; Hyman, A. A.; Bringmann H (2011) Codon adaptation-based control of protein expression in *C. elegans*. Nature Methods 8: 250-252

Address

Dept. of Molecular Neurobiology
Max Planck Institute for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 725
fax: +49-551-3899 715
e-mail: brose@em.mpg.de

Further Information

http://www.em.mpg.de/

Nils Brose

Professor, Director at the Max Planck Institute for Experimental Medicine

- Undergraduate studies in Biochemistry, Eberhard Karls University, Tübingen, Germany (1981 – 1985)
- MSc in Physiology with Marianne Fillenz, University of Oxford, Oxford, UK (1987)
- PhD in Biology with Reinhard Jahn, Ludwig Maximilians University, Munich, Germany (1990)
- Postdoctoral training with Stephen F. Heinemann (Salk Institute, La Jolla, CA, USA) and Thomas C. Südhof (University of Texas Southwestern Medical Center, Dallas, TX, USA) (1991 – 1995)
- Research Group Leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (1995 – 2001)
- Director, Department of Molecular Neurobiology, Max Planck Institute of Experimental Medicine, Göttingen, Germany (since 2001)

Major Research Interests

Our research focuses on the molecular mechanisms of nerve cell development and synapse formation and function in the vertebrate central nervous system. To this end, we combine biochemical, morphological, mouse genetic, physiological, and behavioral methods to elucidate the molecular basis of nerve cell differentiation, synapse formation, transmitter release, and postsynaptic transmitter sensing. In selected cases, we explore the dysfunction of corresponding biological processes in neuropsychiatric diseases. Our work in the field of nerve cell development focuses on the role of SUMOylation in cell polarity formation, cell migration, and neuritogenesis, our synaptogenesis research concentrates on synaptic cell adhesion proteins and their role in synapse formation and function, and our studies on the molecular mechanisms of neurotransmitter release focus on components of the presynaptic active zone and their regulatory function in synaptic vesicle fusion.

Selected Recent Publications

Sigler A, Oh WC, Imig C, Altas B, Kawabe H, Cooper BH, Kwon H-B, Rhee J-S*, Brose N* (2017) Formation and maintenance of functional spines in the absence of presynaptic glutamate release. Neuron 94: 304-311 (*joint corresponding authors)

Kawabe H, Mitkovski M, Kaeser PS, Hirrlinger J, Opazo F, Nestvogel D, Kalla S, Fejtova A, Verrier SE, Bungers SR, Cooper BH, Varoqueaux F, Wang Y, Nehring RB, Gundelfinger ED, Rosenmund C, Rizzoli SO, Südhof TC, Rhee J-S, Brose, N. (2017) ELKS1 localizes the synaptic vesicle priming protein bMunc13-2 to a specific subset of active zones. J Cell Biol 216: 1143-1161

Lipstein N, Verhoeven-Duif NM, Michelassi FE, Calloway N, van Hasselt PM, Pienkowska K, van Haaften G, van Haelst MM, van Empelen R, Cuppen I, van Teeseling HC, Evelein AMV, Vorstman JA, Thoms S, Jahn O, Duran KJ, Monroe GR, Ryan TA, Taschenberger H, Dittman JS, Rhee J-S, Visser G, Jans JJ*, Brose N* (2017) Synaptic UNC13A protein variant causes increased synaptic transmission and dyskinetic movement disorder. J Clin Invest 127: 1005-1018 (*joint corresponding authors)

Hammer M, Krueger-Burg D, Tuffy LP, Cooper BH, Taschenberger H, Goswami SP, Ehrenreich H, Jonas P, Varoqueaux F, Rhee J-S, Brose N (2015) Perturbed hippocampal synaptic inhibition and gamma-oscillations in a Neuroligin-4 knock-out mouse model of autism. Cell Rep 13: 516-523

Soykan T, Schneeberger D, Tria G, Buechner C, Bader N, Svergun D, Tessmer I, Poulopoulos A, Papadopoulos T, Varoqueaux F, Schindelin H, Brose N (2014). A conformational switch in Collybistin determines the differentiation of inhibitory postsynapses. EMBO J 18: 2113-2133

Address

Department of
Neuropathology
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 22700
fax: + 49-551-39 8472
e-mail: wbrueck@med.uni-goettingen.de

Further Information

http://www.uni-goettingen.de/en/57922.html

Wolfgang Brück

Professor of Neuropathology

- 1986 MD Johannes Gutenberg University in Mainz, 1994 national boards in neuropathology
- 1996 – 2002 Associate professorships for neuropathology at the University of Göttingen and the Charité in Berlin
- Since 2002 full professor and director of the Department of Neuropathology, University of Göttingen

Major Research Interests

- Immunopathology of multiple sclerosis
- Brain-specific mechanisms of immune response in multiple sclerosis
- Axonal damage in inflammatory demyelination and mechanisms of remyelination
- Mechanisms and consequences of microglial activation

Selected Recent Publications

Lagumersindez-Denis N, Wrzos C, Mack M, Winkler A, van der Meer F, Reinert MC, Hollasch H, Flach A, Brühl H, Cullen E, Schlumbohm C, Fuchs E, Linington C, Barrantes-Freer A, Metz I, Wegner C, Liebetanz D, Prinz M, Brück W, Stadelmann C, Nessler S (2017) Differential contribution of immune effector mechanisms to cortical demyelination in multiple sclerosis. Acta Neuropathol 134: 15-34

Fard MK, van der Meer F, Sánchez P, Cantuti-Castelvetri L, Mandad S, Jäkel S, Fornasiero EF, Schmitt S, Ehrlich M, Starost L, Kuhlmann T, Sergiou C, Schultz V, Wrzos C, Brück W, Urlaub H, Dimou L, Stadelmann C, Simons M (2017) BCAS1 expression defines a population of early myelinating oligodendrocytes in multiple sclerosis lesions. Sci Transl Med 2017 Dec 6;9(419)

Romanelli E, Merkler D, Mezydlo A, Weil MT, Weber MS, Nikić I, Potz S, Meinl E, Matznick FE, Kreutzfeldt M, Ghanem A, Conzelmann KK, Metz I, Brück W, Routh M, Simons M, Bishop D, Misgeld T, Kerschensteiner M (2016) Myelinosome formation represents an early stage of oligodendrocyte damage in multiple sclerosis and its animal model. Nat Commun 2016 Nov 16;7: 13275

Kinzel S, Lehmann-Horn K, Torke S, Häusler D, Winkler A, Stadelmann C, Payne N, Feldmann L, Saiz A, Reindl M, Lalive PH, Bernard CC, Brück W, Weber MS. (2016) Myelin-reactive antibodies initiate T cell-mediated CNS autoimmune disease by opsonization of endogenous antigen. Acta Neuropathol 132: 43-58

Jürgens T, Jafari M, Kreutzfeldt M, Bahn E, Brück W, Kerschensteiner M, Merkler D. (2016) Reconstruction of single cortical projection neurons reveals primary spine loss in multiple sclerosis. Brain 139: 39-46

Pfeifenbring S, Bunyan RF, Metz I, Röver C, Huppke P, Gärtner J, Lucchinetti CF, Brück W (2015) Extensive acute axonal damage in pediatric multiple sclerosis lesions. Ann. Neurol., 77: 655-667

Metz I, Weigand SD, Popescu BF, Frischer JM, Parisi JE, Guo Y, Lassmann H, Brück W*, Lucchinetti CF* (2014) Pathologic heterogeneity persists in early active multiple sclerosis lesions. Ann Neurol 75: 728-738

Address

Jan Clemens
European Neuroscience Institute
Neural Computation and Behavior group
Grisebachstrasse 5

37077 Göttingen
Germany

phone: +49-551-39 61351
e-mail: j.clemens@eni-g.de

Further Information

http://www.janclemenslab.org

Jan Clemens

Group leader, European Neuroscience Institute

- 2012 PhD in Computational Neuroscience, Humboldt-Universität zu Berlin, BCCN Berlin
- 2012 – 2017 Postdoctoral Fellow, Princeton University
- since 2017 Group leader, European Neuroscience Institute

Major Research Interests

The “Neural Computation and Behavior” works on how acoustic communication signals are processed to inform behavior. Acoustic communication is widespread in the animal kingdom - yet it’s neural basis is only poorly understood. Like songbirds or crickets - fruit flies also produce mating songs during courtship. We use high-throughput behavioral assays and computer vision to precisely quantify how song influences behavior on multiple time scales – from changes in locomotion in response to the song over tens of milliseconds to a mating decision based on song accumulated over several minutes of courtship. We then exploit the genetic toolbox available in Drosophila to identify the neural substrates of these behaviors: Using optogenetics, we activate or inactivate individual neurons in the fly brain during courtship interactions – quantitative models of the behavior then allow us to identify the time scales and components of the behavior controlled by these neurons. Having found individual neurons involved in processing song, we then use electrophysiology and two-photon Calcium imaging to interrogate the dynamical neural representations of song to determine how song is encoded in the brain and how these neural codes give rise to behavior.

Selected Recent Publications

Clemens J, Deutsch D, Thiberge S, Murthy M (2018) Shared song object detector neurons in *Drosophila* male and female brains drive divergent, sex-specific behaviors. biorxiv

Clemens J, Coen P, Roemschied FA, Pereira T, Mazumder D, Pacheco D, Murthy M (2018) Discovery of a new song mode in *Drosophila* reveals hidden structure in the sensory and neural drivers of behavior. Current Biology 28: 2400–2412

Clemens J, Ozeri N, Murthy N (2018) Fast intensity adaptation enhances the encoding of sound in *Drosophila*. Nature Communications 9: 134

Stern D, Clemens J, Coen P, Calhoun A, Shirangi T, Hogenesch J, Arthur B, Murthy M (2017) Experimental and statistical reevaluation provides no evidence for *Drosophila* courtship song rhythms. PNAS 114(37): 9978-9983

Coen P, Xie M, Clemens J, Murthy M (2016) Sensorimotor transformations underlying variability in song intensity during *Drosophila* courtship. Neuron 89(3): 629–644

Clemens J, Girardin C, Coen P, Guan G, Dickson B, Murthy M (2015) Connecting neural codes with behavior in the auditory system of *Drosophila*. Neuron 87(6): 1332-1343

Address

European Neuroscience Institute
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 13903
fax: +49-551-39 20150
e-mail: c.dean@eni-g.de

Further Information

http://www.eni.gwdg.de/index.php?id=324

Camin Dean

Group Leader Trans-synaptic Signaling

- 2003: Ph.D. University of California, Berkeley, and Columbia University
- 2004 – 2010: Postdoctoral Fellow, University of Wisconsin, Madison
- since 2010: Group Leader, European Neuroscience Institute Göttingen

Major Research Interests

Our lab is interested in the mechanisms by which individual synapses, neurons and circuits dynamically adjust their transmission properties in response to changes in neuronal network activity. To accomplish this, neurons signal to each other not only unidirectionally via classical pre to post-synaptic transmission, but also bidirectionally via pre or post-synaptic release of neuropeptides and neurotrophins. This bidirectional channel of communication is essential for the modulation of synapse and circuit strength, via regulation of distinct membrane fusion events on both sides of the synapse, including synaptic vesicle exocytosis, post-synaptic receptor recycling, and adhesion molecule recycling. We investigate the mechanisms by which these trans-synaptic signaling events are regulated, at the level of single synapses, single neurons and neuronal networks, using a combination of live imaging approaches, electrophysiology, and biochemistry in neuronal cell culture and brain slices. Our overall goal is to understand how neurons communicate changes in activity to affect circuit function, and ultimately behavior, during learning and memory acquisition, or to counteract aberrant brain states such as seizure activity.

Selected Recent Publications

Awasthi A, Ramachandran B, Ahmed S, Benito E, Shinoda Y, Nitzan N, Heukamp A, Rannio S, Martens H, Barth J, Burk K, Wang YT, Fischer A, Dean C. Synaptotagmin-3 drives AMPA receptor endocytosis, depression of synapse strength, and forgetting. Science, in press

Bharat V, Siebrecht M, Burk K, Ahmed S, Reissner C, Kohansal-Nodehi M, Steubler V, Zweckstetter M, Ting JT, Dean C (2017) Capture of dense core vesicles at synapses by JNK-dependent phosphorylation of synaptotagmin-4. Cell Rep Nov 21;21(8):2118-2133.

Hurtado-Zavala JI, Ramachandran B, Ahmed S, Halder R, Bolleyer C, Awasthi A, Wagener RJ, Anderson K, Drenan RM, Lester HA, Miwa JM, Staiger JF, Fischer A, Dean C (2017) TRPV1 regulates excitatory innervation of OLM neurons in the hippocampus. Nat Commun Jul 19;8: 15878

Burk K, Ramachandran B, Ahmed S, Hurtado-Zavala JI, Awasthi A, Benito E, Faram R, Ahmad H, Swaminathan A, McIlhinney J, Fischer A, Perestenko P, Dean C (2017) Regulation of Dendritic Spine Morphology in Hippocampal Neurons by Copine-6. Cereb Cortex Feb 3: 1-18

Wolfes AC, Ahmed S, Awasthi A, Stahlberg MA, Rajput A, Magruder DS, Bonn S, Dean C (2017) A novel method for culturing stellate astrocytes reveals spatially distinct Ca2+ signaling and vesicle recycling in astrocytic processes. J Gen Physiol Jan;149(1): 149-170

Ramachandran B, Ahmed S, Dean C (2015) Long-term depression is differentially expressed in distinct lamina of hippocampal CA1 dendrites. Front Cellular Neurosci Feb 5;9: 23

Shinoda Y, Ahmed S, Ramachandran B, Bharat V, Brockelt D, Altas B, Dean C (2014) BDNF enhances spontaneous and activity-dependent neurotransmitter release at excitatory terminals but not at inhibitory terminals in hippocampal neurons. Front Synaptic Neurosci Nov 10;6: 27

Dean C, Dunning FM, Liu H, Bomba-Warczak E, Martens H, Bharat V, Ahmed S, Chapman ER (2012) Axonal and dendritic synaptotagmin isoforms revealed by a pHluorin-syt functional screen. Mol Biol Cell May 23(9): 1715-27

Address

Department of
Cognitive Neurology
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 13140
fax: + 49-551-39 13243
e-mail: kognitive-neurologie.sekretariat@med.uni-goettingen.de

Further Information

http://www.mrforschung.med.uni-goettingen.de

Peter Dechent

Research Group Leader, Cognitive Neurology

- 1991 – 2001 Studies of Biology, University of Mainz
- 1994 Scientific Assistant at the Biophysical Institute, University of Mainz
- 1995 – 1996 Scholarship of the Erasmus-Program, University of Manchester, England
- 1996 Research Fellow at the Neuroscience Department, Karolinska Institute, Stockholm, Sweden
- 1997 – 1998 Diploma Thesis at the 'Biomedical NMR Research' at the Max-Planck-Institute for Biophysical Chemistry, Göttingen; Diploma in Biology
- 1998 – 2001 Doctoral thesis at the 'Biomedical NMR Research'; Dr.rer.nat. (Biology)
- 2001 – 2003 Postdoc at the 'Biomedical NMR Research' (Laboratory of Prof. Dr. J. Frahm)
- since 2004 Head of the Research Group 'MR-Research in Neurology and Psychiatry' Medical Faculty, University Göttingen

Major Research Interests

- Combination of functional magnetic resonance imaging (fMRI) with non-invasive brain stimulation techniques like transcranial Direct / Alternating Current Stimulation (tDCS/tACS) and Transcranial Magnetic Stimulation (TMS) to modulate functional brain networks in healthy and pathologic conditions.
- Characterization of hemodynamic processes, the basis of blood oxygenation level dependent (BOLD) changes in standard fMRI investigations.
- Application of modern MR techniques to investigate the human brain in healthy and pathologic conditions. Applied methods comprise:
  - Structural MRI
  - Diffusion-weighted- and diffusion-tensor-imaging (DWI/DTI)
  - Localized MR-spectroscopy (MRS)

Selected Recent Publications

Wilke M, Schneider L, Dominguez-Vargas AU, Schmidt-Samoa C, Miloserdov K, Nazzal A, Dechent P, Cabral-Calderin Y, Scherberger H, Kagan I, Bähr M (2018) Reach and grasp deficits following damage to the dorsal pulvinar. Cortex 99: 135-149

Wilke M, Dechent P, Bähr M (2017) Sarcoidosis Manifestion Centered on the Thalamic Pulvinar Leading to Persistent Astasia. Mov Disord Clin Pract. 4(6): 898-900

Barke A, Preis MA, Schmidt-Samoa C, Baudewig J, Kröner-Herwig B, Dechent P (2016) Neural correlates differ in high and low fear-avoidant chronic low back pain patients when imagining back-straining movements. J Pain 17(8): 930-43

Cabral-Calderin Y, Weinrich C, Schmidt-Samoa C, Poland E, Dechent P, Bähr M, Wilke M (2016) Transcranial alternating current stimulation affects the BOLD signal in a frequency and task-dependent manner. Hum Brain Mapp 37(1): 94-121

Cabral-Calderin Y, Williams K, Dechent P, Opitz A, Wilke M (2016) Transcranial alternating current stimulation modulates spontaneous low frequency fluctuations as measured with fMRI. Neuroimage 2016 Jul 5. [Epub ahead of print]

August JM, Rothenberger A, Baudewig J, Roessner V, Dechent P (2015) May Functional Imaging be Helpful for Behavioral Assessment in Children? Regions of Motor and Associative Cortico-Subcortical Circuits Can be Differentiated by Laterality and Rostrality. Front Hum Neurosci 9: 314

Goya-Maldonado R, Weber K, Trost S, Diekhof E, Keil M, Dechent P, Gruber O (2015) Dissociating pathomechanisms of depression with fMRI: bottom-up or top-down dysfunctions of the reward system. Eur Arch Psychiatry Clin Neurosci 265(1): 57-66

Address

Center of Anatomy
Dept. of Anatomy and Embryology
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: + 49-551-39 7004
fax: + 49-551-39 7043
e-mail: thomas.dresbach@med.uni-goettingen.de

Further Information

http://www.embryologie.uni-goettingen.de/select.php?lang=en&nav=for&p=thomas.dresbach

Thomas Dresbach

Professor of Anatomy

- Dr. rer. nat. (Biology), 1996, University of Bonn
- DFG research fellow and postdoctoral Fellow with E. Gundelfinger at the Leibniz Institute for Neurobiology, 1997 – 2003
- Teacher and independent research group leader at the University of Heidelberg, Institute for Anatomy and Cell Biology (Dept. Prof. Dr. J. Kirsch), 2003 – 2010
- Professor at the School of Medicine, University of Göttingen, 2010

Major Research Interests

Our group studies synapse formation with particular focus on the biogenesis of presynaptic nerve terminals. Our goal is to understand the mechanisms of synaptogenesis in enough detail to pinpoint molecular causes of synaptopathies. We study neuronal cultures to unravel fundamental mechanisms operating at the heart of synaptogenesis, and we have begun to study specialized synapses such as the giant synapses of the mammalian auditory system to determine how these mechanisms act together to generate the remarkable specification and heterogeneity of synapses in the brain.
Using live imaging, molecular biological and ultrastructural approaches, we currently analyze
- the role of novel, vertebrate-specific presynaptic proteins in synaptic function
- the trafficking and assembly of synaptic organelles and protein complexes
- the transsynaptic signalling events controlling presynaptic differentiation.
These efforts should help us understand both the common principles by which the various types of synapses are generated, and how they are fine-tuned for specific tasks, such as a particular strength, reliability or adaptivity.

Selected Recent Publications

Körber C, Horstmann H, Venkataramani V, Herrmannsdörfer F, Kremer T, Kaiser M, Schwenger DB, Ahmed S, Dean C, Dresbach T, Kuner T (2015) Modulation of Presynaptic Release Probability by the Vertebrate-Specific Protein Mover. Neuron 87: 521-33

Mendoza Schulz A, Jing Z, Sánchez Caro JM, Wetzel F, Dresbach T, Strenzke N, Wichmann C, Moser T (2014) Bassoon-disruption slows vesicle replenishment and induces homeostatic plasticity at a CNS synapse. EMBO J 33: 512-27

Ahmed S, Wittenmayer N, kremer T, Hoeber J, Kiran Akula A, urlaub H, Islinger M, Kirsch J, Dean C, Dresbach T (2013) Mover is a homomeric phospho-protein present on synaptic vesicles. PLoS One 8: e63474

Stan A, Pielarski KN, Brigadski T, Wittenmayer N, Fedorchenko O, Gohla A, Lessmann V, Dresbach T, Gottmann K (2010) Essential co-operation of N-Cadherin and Neuroligin-1 in the transsynaptic control of vesicle accumulation. Proc Natl Acad Sci USA 107: 11116-111121

Wittenmayer N, Kremer T, Varoqueaux N, Brose N, Dresbach T (2009) Neuroligin 1 promotes the maturation of presynaptic boutons. Proc Natl Acad Sci USA 106: 13564-13569

Address

Max Planck Institute
of Experimental Medicine
Clinical Neuroscience
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: + 49-551-3899 615
fax: + 49-551-3899 670
e-mail: ehrenreich
@em.mpg.de

Further Information

http://www.em.mpg.de/site/index.php?id=36

Hannelore Ehrenreich

Professor of Neurology and Psychiatry, Head, Clinical Neuroscience, MPI-EM

- 1981 Doctor of Veterinary Medicine, University of Munich
- 1983 Elective Period, University of Newcastle-upon-Tyne, England
- 1985 Guest Lecturer, University of the Philippines, Manila
- 1985 – 1986 Clinical Fellow, Department of Internal Medicine, University of Munich
- 1987 Graduation (Medicine), University of Munich
- 1987 – 1988 Residency, Department of Neurology, University of Munich
- 1989 Doctor of Medicine, University of Munich
- 1989 – 1991 Postdoctoral Fellow NIAID, NIH, Bethesda, MD, USA
- 1992 – 1994 Residency, Departments of Neurology and Psychiatry, University of Göttingen
- 1994 Habilitation (Neurology and Psychiatry)
- 1994 – present Head, Clinical Neuroscience, MPIEM
- 1995 – present Consultant & Professor of Neurology & Psychiatry, University of Göttingen
- 2008 Professor of Biology and Psychology (Honorary), University of Göttingen
- 2016 Member of the Leopoldina, German National Academy of Science

Major Research Interests

Translational Neuroscience
Research with particular focus on:
(1) Genetic and environmental underpinnings of neuropsychiatric diseases;
(2) Endogenous neuroprotection and neuroregeneration as therapeutic strategies for patients: Research centering on the brain erythropoietin system and hypoxia;
(3) Autoimmune and inflammatory processes contributing to neuropsychiatric phenotypes.

Selected Recent Publications

Mitjans M et al (2018) Violent aggression predicted by multiple pre-adult environmental hits. Mol Psychiatry May 24. doi: 10.1038/s41380-018-0043-3. [Epub ahead of print]

Pan H et al (2018) Uncoupling the widespread occurrence of anti-NMDAR1 autoantibodies from neuropsychiatric disease in a novel autoimmune model. Mol Psychiatry Feb 9. doi: 10.1038/s41380-017-0011-3. [Epub ahead of print]

Ehrenreich H et al (2018): OTTO: A new strategy to extract mental disease-relevant combinations of GWAS hits from individuals. Mol Psychiatry Feb 23(2):476-486

Janova H et al (2018) Microglia ablation alleviates myelin-associated catatonic signs in mice. J Clin Invest 128(2): 734-745

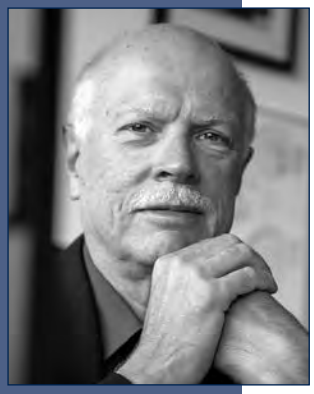
Castillo-Gomez E et al (2017): All naturally occurring autoantibodies against the NMDA receptor subunit NR1 have pathogenic potential irrespective of epitope and immunoglobulin class. Mol Psychiatry 22(12): 1776-1784

Hassouna I et al (2016): Revisiting adult neurogenesis and the role of erythropoietin for neuronal and oligodendroglial differentiation in the hippocampus. Mol Psychiatry, 21(12): 1752-1767

Stepniak B et al (2015): Accumulated common variants in the broader fragile X gene family modulate autistic phenotypes. EMBO Mol Med 7(12):1565-79.

PGC (2014) Biological insights from 108 schizophrenia-associated genetic loci. Nature 511(7510): 421-7

Stepniak B et al (2014) Accumulated environmental risk determining age at schizophrenia onset, Lancet Psychiatry, 1(6): 444-53



Address

Dept.of Genes
and Behavior
Max Planck Institute
for Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 2701
fax: +49-551-201 2705
e-mail: gregor.eichele@
mpibpc.mpg.de

Further Information

https://www.mpibpc.mpg.
de/de/eichele

Gregor Eichele

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1976 – 1980 Ph.D. protein crystallography (J. N. Jansonius, Biocenter, University of Basel, Switzerland)
- 1981 – 1984 Postdoctoral training in Developmental Biology (B. M. Alberts, University of California, San Francisco)
- 1985 – 1989 Assistant Professor of Cellular and Molecular Physiology, Harvard Medical School, Boston, USA
- 1989 – 1990 Associate Professor of Cellular and Molecular Physiology, Harvard Medical School, Boston, USA
- 1991 – 1992 Associate Professor of Biochemistry, Baylor College of Medicine, Houston, USA
- 1992 – 1998 Professor of Biochemistry and Neuroscience, Baylor College of Medicine, Houston, USA
- 1998 – 2006 Director at the Max Planck Institute of Experimental Endocrinology, Dept. of Molecular Embryology, Hanover, Germany
- 2006 – Director at the Max Planck Institute of Biophysical Chemistry, Dept. Genes and Behavior, Goettingen, Germany

Major Research Interests

Dynamic interplay between gene expression, brain development and architecture and behavior.

Selected Recent Publications

Faubel R, Westendorf C, Bodenschatz E, Eichele G (2016) Cilia-based flow network in the brain ventricles. Science 353(6295): 176-8

Hammerschmidt K, Whelan G, Eichele G, Fischer J (2015) Mice lacking the cerebral cortex develop normal song: insights into the foundations of vocal learning. Sci Rep (5): 8808

Husse J, Leliavski A, Tsang AH, Oster H, Eichele G (2014) The light-dark cycle controls peripheral rhythmicity in mice with a genetically ablated suprachiasmatic nucleus clock. FASEB J (11): 4950-4960

Diez-Roux G et al (2011) A high-resolution anatomical atlas of the transcriptome in the mouse embryo. PLoS Biology 9: e1000582

Kiessling S, Eichele G, Oster H (2010) Adrenal glucocorticoids have a key role in circadian resynchronization in a mouse model of jet lag. Journal of Clinical Investigation 120: 2600-2609

Lein ES et al (2007) Genome-Wide Atlas of Gene Expression in the Adult Mouse Brain. Nature 445: 168-176

Address

Dept. of Molecular
Neurobiology of Behavior
Schwann-Schleiden
Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177920
fax: +49-551-39 177921
e-mail: afiala@gwdg.de

Further Information

http://www.uni-goettingen.de/de/111890.html

André Fiala

Professor of Molecular Neurobiology of Behavior

- 1996 Degree (Diploma) in Biology, Free University of Berlin
- 1996 – 1999 PhD student, Free University of Berlin
- 2000 – 2001 Research Fellow, Memorial Sloan-Kettering Cancer Center, New York
- 2001 – 2008 Research Assistant, University of Würzburg
- 2008 Habilitation in Neurobiology and Genetics, University of Würzburg
- 2008 Professor of Molecular Neurobiology of Behavior, University of Göttingen

Major Research Interests

We study neuronal mechanisms underlying olfaction, learning and memory, and goal-directed behavior using the model organism Drosophila melanogaster. The fruit fly *Drosophila* offers the advantage of expressing transgenes in almost any population of it's about 100.000 neurons. Transgenes used by us are, for example, fluorescent sensor proteins that allow us to monitor the spatio-temporal activity of neurons, or light-sensitive proteins by which neuronal activity can be stimulated through illumination. Using these optogenetic techniques in combination with behavioral analyses we aim at unraveling the functioning of dedicated neuronal circuits, and how these circuits contribute to organizing behavior. In addition, molecular mechanisms underlying learning and memory processes are investigated.

Selected Recent Publications

Martelli C, Pech U, Kobbenbring S, Pauls D, Bahl B, Sommer MV, Pooryasin A, Barth J, Arias CWP, Vassiliou C, Luna AJF, Poppinga H, Richter FG, Wegener C, Fiala A, Riemensperger T (2017) SIFamide Translates Hunger Signals into Appetitive and Feeding Behavior in *Drosophila*. Cell Rep 20: 464-478

Gupta VK, Pech U, Bhukel A, Fulterer A, Ender A, Mauermann SF, Andlauer TF, Antwi-Adjei E, Beuschel C, Thriene K, Maglione M, Quentin C, Bushow R, Schwärzel M, Mielke T, Madeo F, Dengjel J, Fiala A, Sigrist SJ (2016) Spermidine Suppresses Age-Associated Memory Impairment by Preventing Adverse Increase of Presynaptic Active Zone Size and Release. PLoS Biol 14: e1002563

Riemensperger T, Kittel RJ, Fiala A (2016) Optogenetics in Drosophila neuroscience. Methods Mol Biol 1408: 167-75

Pooryasin A, Fiala A (2015). Identified serotonin-releasing neurons induce behavioral quiescence and suppress mating in *Drosophila*. J Neurosci 35: 12792-812

Pech U, Revelo NH, Seitz KJ, Rizzoli SO, Fiala A (2015) Optical dissection of experience-dependent pre- and postsynaptic plasticity in the *Drosophila* brain. Cell Rep 10: 2083-95

AzimiHashemi N, Erbguth K, Vogt A, Riemensperger T, Rauch E, Woodmansee D, Nagpal J, Brauner M, Sheves M, Fiala A, Kattner L, Trauner D, Hegemann P, Gottschalk A, Liewald JF (2014) Synthetic retinal analogues modify the spectral and kinetic characteristics of microbial rhodopsin optogenetic tools. Nat Commun 5: 5810

Andlauer TF, Scholz-Kornehl S, Tian R, Kirchner M, Babikir HA, Depner H, Loll B, Quentin C, Gupta VK, Holt MG, Dipt S, Cressy M, Wahl MC, Fiala A, Selbach M, Schwarzel M, Sigrist SJ (2014) Drep-2 is a novel synaptic protein important for learning and memory. Elife 2014 Nov 13;3. doi: 10.7554/eLife.03895

Dawydow A, Gueta R, Ljaschenko D, Ullrich S, Hermann M, Ehmann N, Gao S, Fiala A, Langenhan T, Nagel G, Kittel RJ (2014) Channelrhodopsin-2-XXL, a powerful optogenetic tool for low-light applications. Proc Natl Acad Sci U S A 111: 13972-7

Address

Dept. for Psychiatry and Psychotherapy
University Medical Center
German Center for Neurodegenerative Diseases (DZNE)
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 10378
fax: +49-551-39 9836
e-mail: afische2@gwdg.de

Further Information

http://fischerlab.uni-goettingen.de/index.php

André Fischer

Professor for Psychiatry and Psychotherapy

- 2003 – 2006: Postdoctoral Associate in the lab of Li-Huei Tsai; Harvard Medical School, Department of Pathology, Boston, USA; Picower Center for Learning and Memory, M.I.T, Cambridge, USA
- 2007 – 2011: Independent Group Leader at ENI
- since 2011: W3 Professor at the Department for Psychiatry and Psychotherapy, University Medical Center Göttingen
- since 2011: Speaker of the German Center for Neurodegenerative Diseases (DZNE) site Göttingen

Major Research Interests

The long-term goal of our research is to understand the cellular and molecular mechanisms underlying brain diseases and to develop neuroprotective and neurodegenerative therapeutic approaches. There is now accumulating evidence that on an individual level health or disease critically depends on the interaction between genes and environment. Epigenetic mechanisms such as histone-modification, DNA-methylation and non-coding RNA-mediated processes are key-regulators of gene-environment interactions. Importantly, such epigenetic mechanisms have recently been implicated with the pathogenesis of neurodegenerative and psychiatric diseases. Thus our current hypothesis is that deregualtion of genome-environment interactions, especially via epigenetic gene-expression, is a key feature of neurodegenerative diseases such as Alzheimer's disease. We combine studies in patient material, mouse and cellular models, behavioral, molecular, genetic, and bioinformatic techniques to address these questions.

Selected Recent Publications

Bahari-Javan S, Varbanov H, Halder R, Benito E, Kaurani L, Burkhardt S, Anderson-Schmidt H, Anghelescu I, Budde M, Stilling RM, Costa J, Dietrich D, Figge C, Folkerts H, Gade K, Heilbronner U, Koller M, Konrad C, Nussbeck SY, Scherk H, Spitze C, Stierl S, Stöckel J, Thiel J, Hagen M, Zimmermann J, Zitzelsberger A, Schulz A, Schmitt A, Delalls I, Falkai P, Schulze TG, Dityatev A, Sananbenesi F, Fischer A (2017) Hdac1 as a target for individualized therapy of schizophrenia patients. PNAS. Epub ahead of print

Benito E, Urbanke U, Ramachandran B, Barth J, Halder R, Awasthi A, Jain G, Capece V, Burkhardt S, Navarro-Sala M, Nagarajan N, Schütz AL, Johnsen SA, Bonn SA, Lührmann R, Dean C, Fischer A (2015) Reinstating transcriptome plasticity and memory function in models for cognitive decline. Journal of Clinical Investigation 125(9): 3572-84

Zovoilis A, Agbemenyah HY, Agis-Balboa RC, Stilling RM, Edbauer D, Rao P, Farinelli L, Delalle I, Schmitt A, Falkai P, Bahari-Javan S, Burkhardt S, Sananbenesi F, Fischer A (2011) microRNA-34c is a novel target to treat dementias. EMBO J 30(20): 4299-308. doi: 10.1038/emboj.2011.327

Peleg S, Sananbenesi F, Zovoilis A, Burkhardt S, Bahari-Javan S, Agis-Balboa RC, Cota P, Wittnam JL, Gogol-Doering A, Opitz L, Salinas-Riester G, Dettenhoffer M, Farinelli L, Chen W, Fischer A (2010) Altered histone H4 lysine 12 acetylation is associated with age-dependent memory impairment in mice. Science 328: 753

Address

University Medical Center
Göttingen
Institute for
Neuroimmunology and
Multiple Sclerosis Research
Von-Siebold-Str. 3a

37075 Göttingen
Germany

phone: +49-551-39 13332
fax: +49-551-39 13348
e-mail: fluegel@med.uni-goettingen.de

Further Information

http://www.neuroimmunologie.uni-goettingen.de/

Alexander Flügel

Professor of Neuroimmunology

- 1993 MD Ludwig-Maximilians-University (LMU) Munich
- 2002 – 2007 Group leader at the Institute of Neuroimmunology, Max-Planck-Institute for Neurobiology, Martinsried, Munich
- 2008 Associate professor for Experimental Immunology at the Institute for Immunology, LMU Munich
- since 12/2008 Full professor and director of the Institute for Neuroimmunology and Multiple Sclerosis Research, University of Göttingen

Major Research Interests

- Neuroimmunology
- T cell biology
- Intravital imaging

The focus of my interest lies on the mechanisms and factors that allow T cells to enter the central nervous system, to communicate in this milieu and to influence the brain tissue.
My colleagues and I pursue the following aims, i) development of new models and tools to study CNS autoimmunity; ii) revealing the basics of pathogenesis in (auto-)immune diseases of the nervous system; iii) deducing and developing new therapeutical approaches; and iv) analyzing the mechanisms of action for (adverse) effects of new therapeutical procedures.

Selected Recent Publications

Schläger C*, Körner H*, Krueger M, Vidoli S, Haberl M, Mielke D, Brylla E, Issekutz T, Cabañas C, Nelson PJ, Ziemssen T, Rohde V, Bechmann I, Lodygin D, Odoardi F*, Flügel A* (2016) Effector T-cell trafficking between the leptomeninges and the cerebrospinal fluid. Nature 530: 349-353. *equal contribution

Flach A*, Litke T*, Strauss J*, Haberl M, Cordero Gómez C, Reindl M, Saiz A, Fehling HJ, Wienands J, Odoardi F, Lühder F§, Flügel A§ (2016) Autoantibody-boosted T-cell reactivation in the target organ triggers manifestation of autoimmune CNS disease. PNAS 113: 3323-3328. *§equal contribution

Lodygin D, Odoardi F, Schläger C, Körner H, Kitz A, Nosov M, van den Brandt J, Reichardt HM, Haberl M, Flügel A (2013) A combination of fluorescent NFAT and H2B sensors uncovers dynamics of T cell activation in real time during CNS autoimmunity. Nature Medicine 19: 784-790

Odoardi F, Sie C, Streyl K, Ulaganathan VK, Schläger C, Lodygin D, Heckelsmiller K, Nietfeld W, Ellwart J, Klinkert WE, Lottaz C, Nosov M, Brinkmann V, Spang R, Lehrach H, Vingron M, Wekerle H, Flügel-Koch C, Flügel A (2012) T cells become licensed in the lung to enter the central nervous system. Nature 488: 675-679

Bartholomäus I, Kawakami N, Odoardi F, Schläger C, Miljkovic D, Ellwart JW, Klinkert WE, Flugel-Koch C, Issekutz TB, Wekerle H, Flügel A (2009) Effector T cell interactions with meningeal vascular structures in nascent autoimmune CNS lesions. Nature 462: 94-98

Address

Biomedical NMR
Max Planck Institute
for Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1721
fax: +49-551-201 1307
e-mail: jfrahm@gwdg.de

Further Information

http://www.biomednmr.mpg.de/

Jens Frahm

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1974 Diploma in Physics, Univ. of Göttingen
- 1977 Doctorate in Physical Chemistry, Univ. of Göttingen
- 1977 – 1982 Postdoctoral Researcher, MPI for Biophysical Chemistry
- 1982 – 1992 Head, Independent Research Group (BMFT grant)
- since 1993 Director, Biomedical NMR, MPI for Biophysical Chemistry
- 1994 Habilitation, Faculty of Chemistry, Univ. of Göttingen
- since 1997 Adjunct Professor, Faculty of Chemistry, Univ. of Göttingen
- since 2011 External Scientific Member, MPI for Dynamic and Self-Organization

Major Research Interests

- Development and application of novel magnetic resonance imaging (MRI) techniques: noninvasive studies of organ systems, physiological processes and body functions
- Real-time MRI: image reconstruction as solution to a nonlinear inverse problem
- Quantitative parametric mapping: model-based reconstructions

Selected Recent Publications

Wang X, Roeloffs VB, Klosowski J, Tan Z, Voit D, Uecker M, Frahm J (2018) Model-based T1 mapping with sparsity constraints using single-shot inversion-recovery radial FLASH. Magn Reson Med 79: 730-740

Tan Z, Roeloffs V, Voit D, Joseph AA, Untenberger M, Merboldt KD, Frahm J (2017) Model-based reconstruction for real-time phase-contrast flow MRI – Improved spatiotemporal accuracy. Magn Reson Med 77: 1082-1093

Klosowski J, Frahm J (2017) Image denoising for real-time MRI. Magn Reson. Med 77: 1340-1352

Merrem A, Hofer S, Voit D, Merboldt KD, Klosowski J, Untenberger M, Fleischhammer J, Frahm J (2017) Rapid diffusion-weighted MRI of the brain without susceptibility artifacts: Single-shot STEAM with radial undersampling and iterative reconstruction. Invest Radiol 52: 428-433

Wang X, Joseph AA, Kalentev O, Merboldt KD, Voit D, Roeloffs V, van Zalk M, Frahm J (2016) High-resolution myocardial T1 mapping using single-shot inversion-recovery fast low-angle shot MRI with radial undersampling and iterative reconstruction. Br J Radiol 89: 20160255

Address

Dept. of Medical Statistics
University of Göttingen
Humboldtallee 32

37073 Göttingen
Germany

phone: +49-551-39 4990
fax: +49-551-39 4995
e-mail: tim.friede@med.uni-goettingen.de

Further Information

http://www.ams.med.uni-goettingen.de/index-en.shtml

Tim Friede

Professor of Biostatistics

- 1998 Dipl.-Math. (Master's degree in Mathematics), University of Karlsruhe, Germany
- 2001 Dr .sc. hum. (PhD), University of Heidelberg, Germany
- 2001 – 2004 PostDoc / lecturer, Dept. of Mathematics and Statistics, Lancaster University, UK
- 2004 – 2006 Expert Statistical Methodologist, Novartis Pharma AG, Basel, Switzerland
- 2006 – 2009 Associate Professor of Medical Statistics, University of Warwick, UK
- since 1/2010 Professor of Biostatistics and Director, Dept. of Medical Statistics, University Medical Center Göttingen

Major Research Interests

Clinical biostatistics including designs for clinical trials (in particular flexible adaptive designs) and systematic reviews / meta-analyses

Selected Recent Publications

Nicholas RS, Han E, Raffel J, Chataway J, Friede T (2018) Over three decades study populations in progressive multiple sclerosis have become older and more disabled, but have lower on-trial progression rates: a systematic review and meta-analysis of 43 randomized placebo-controlled trials. Multiple Sclerosis Journal (in press)

Stork L, Ellenberger D, Beißbarth T, Friede T, Lucchinetti CF, Brück W, Metz I (2018) Differences in the reponses to apheresis therapy of patients with 3 histopathologically classified immunopathological patterns of multiple sclerosis. JAMA Neurology 75: 428-435

Varges D, Manthey H, Heinemann U, Ponto C, Schmitz M, Krasnianski A, Breithaupt M, Fincke F, Kramer K, Friede T, Zerr I (2017) Doxycycline in early CJD ? double-blinded randomized phase II and observational study. Journal of Neurology, Neurosurgery & Psychiatry 88: 119-125

Raffel J, Wallace A, Gveric D, Reynolds R, Friede T, Nicholas R (2017) Patient-reported outcomes and survival in multiple sclerosis: a 10-year retrospective cohort study using the MSIS-29. PLOS Medicine 14(7): e1002346

Gold SM, Enck P, Hasselmann H, Friede T, Hegerl U, Mohr DC, Otto C (2017) Control conditions for randomized trials of behavioral interventions in psychiatry: A decision framework. Lancet Psychiatry 4: 725–732

Stellmann JP, Krumbholz M, Friede T, Gahlen A, Borisow N, Fischer K, Hellwig, Pache F, Ruprecht K, Havla J, Kümpfel T, Aktas O, Hartung HP, Ringelstein M, Geis C, Kleinschnitz C, Berthele A, Hemmer B, Angstwurm K, Young KL, Schuster S, Stangel M, Lauda F, Tumani H, Mayer C, Zeltner L, Ziemann U, Linker RA, Schwab M, Marziniak M, Then Bergh F, Hofstadt-van Oy U, Neuhaus O, Zettl U, Faiss J, Wildemann B, Paul F, Jarius S, Trebst C, Kleiter I on behalf of NEMOS (Neuromyelitis Optica Study Group) (2017) Immunotherapies in neuromyelitis optica spectrum disorder: Efficacy and predictors of response. Journal of Neurology, Neurosurgery and Psychiatry 88(8): 639-647

Nicotra A, Claus Newman C, Eremin O, Friede T, Malik O, Nicholas R (2016) Peripheral nerve dysfunction in middle-aged subjects born with thalidomide embryopathy. PLoS ONE 11(4): e0152902. doi:10.1371/journal.pone.0152902

Mollenhauer B, Zimmermann J, Sixel-Döring F, Focke NK, Wicke T, Ebentheuer J, Schaumburg M, Lang E, Trautmann E, Zetterberg H, Taylor P, Friede T, Trenkwalder C & the DeNoPa Study Group (2015) Monitoring of thirty marker candidates in early Parkinson?s disease as progression markers. Neurology 87: 168-77

Address

Sensorimotor
Transformations
German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-3851 358
fax: +49-551-3851 425
e-mail: agail@gwdg.de

Further Information

http://www.dpz.eu/smg
http://www.bccn-goettingen.de/Groups/gail

Alexander Gail

Professor for Sensorimotor Neuroscience and Neuroprosthetics at the German Primate Center

- 1997: Physics Diploma, Philipps University, Marburg
- 2002: Dr. rer. nat. (Physics) Philipps University, Marburg
- 2002 – 2003: Postdoc (Neurophysics Laboratory of R. Eckhorn, Marburg)
- 2003 – 2006: Postdoc (Laboratory of R. Andersen, Pasadena, CA, USA)
- 2006 – present: Head of Sensorimotor Research Group, German Primate Center and Bernstein Center for Computational Neuroscience
- 2012 – present: Professor for Sensorimotor Neuroscience and Neuroprosthetics, Georg-August University Göttingen

Major Research Interests

Sensorimotor integration, cognitive movement planning, neuroprosthetics, neuronal synchronization, visual object coding; methods: awake monkey electrophysiology, extracellular multi-channel microelectrode recordings, psychophysics in human and non-human primates, correlation and spectral coherence analysis, pattern recognition

Selected Recent Publications

Martinez-Vazquez P, Gail A (2018) Directed interaction between monkey premotor and posterior parietal cortex during motor-goal retrieval from working memory. Cerebral Cortex

Morel P, Ulbrich P, Gail A (2017) What makes a reach movement effortful? – Physical effort discounting supports common minimization principles in decision making and motor control. PLOS Biology, PLoS Biol 15(6): e2001323

Kuang S, Morel P, Gail A (2016) Planning movements in visual and physical space in monkey posterior parietal cortex. Cerebral Cortex 26(2): 731-747

Suriya-Arunroj L, Gail A (2015) I Plan Therefore I Choose: Free-Choice Bias Due to Prior Action-Probability but Not Action-Value. Front Behav Neurosci 9: 315

Taghizadeh B, Gail A (2014) Spatial task context makes short-latency reaches prone to induced Roelofs illusion. Front Hum Neurosci 8(673)

Klaes C, Schneegans S, Schöner G, Gail A (2012) Sensorimotor learning biases choice behavior: A learning neural field model for decision making. PLOS Computational Biology 8(11): e1002774

Klaes C, Westendorff S, Chakrabarti S, Gail A (2011) Choosing goals, not rules: Deciding among rule-based action plans. Neuron 70: 536-548

Westendorff S, Klaes C, Gail A (2010) The cortical timeline for deciding on reach motor-goals. J Neurosci 30: 5426-5436

Gail A, Klaes C, Westendorff S (2009) Implementation of Spatial Transformation Rules for Goal-Directed Reaching via Gain Modulation in Monkey Parietal and Premotor Cortex. J Neurosci 29: 9490-9499

Gail A, Andersen RA (2006) Neural dynamics in monkey parietal reach region reflect context-specific sensorimotor transformations. J Neurosci 26: 9376-9384

Address

Dept. of Sensory Processing in the Retina
University Medical Center Göttingen
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 13542
fax: +49-551-39 13541
e-mail: tim.gollisch@med.uni-goettingen.de

Further Information

http://www.retina.uni-goettingen.de/

Tim Gollisch

Professor for Sensory Processing in the Retina

- Diploma in Physics, University of Heidelberg, 2000
- PhD in Biophysics, Humboldt University Berlin, 2004
- Postdoctoral Researcher, Harvard University, Dept. of Molecular and Cellular Biology, 2004-2007
- Max Planck Research Group Leader, Max Planck Institute of Neurobiology, Munich-Martinsried, 2007-2010
- Professor for Sensory Processing in the Retina, School of Medicine, University of Göttingen since 2010

Major Research Interests

We are interested in how the neuronal network of the retina processes visual signals. The focus of our work is on studying the function of the various neuron types in the retina and their synaptic connections. One goal is to better understand the "neural code" of the retina: how do the patterns of electrical activity in retinal neurons transmit information about the visual environment to downstream brain areas? Another goal is to better understand "neural computation" in the retina: how do the cells in the retinal network interact to produce a specific, useful response? On the basis of these questions, we also study how dysfunction of the retinal circuitry, for example in retinal diseases, compromises sensory processing.
Our investigations are based on various techniques of recording the activity of neurons in the retina while stimulating the network with different visual images or movies. We use multi-electrode array recordings, whole-cell patch-clamp recordings, and fluorescence imaging and combine the experiments with statistical analyses and mathematical modeling.

Selected Recent Publications

Liu JK, Schreyer HM, Onken A, Rozenblit F, Khani MH, Krishnamoorthy V, Panzeri S, Gollisch T (2017) Inference of neuronal functional circuitry with spike-triggered non-negative matrix factorization. Nature Communications 8: 149

Krishnamoorthy V, Weick M, Gollisch T (2017) Sensitivity to image recurrence across eye-movement-like image transitions through local serial inhibition in the retina. eLife 6: 322431

Kühn NK, Gollisch T (2016) Joint encoding of object motion and motion direction in the salamander retina. J Neurosci 36:12203-12216

Liu JK, Gollisch T (2015) Spike-triggered covariance analysis reveals phenomenological diversity of contrast adaptation in the retina. PLoS Comput Biol 11: e1004425

Takeshita D, Gollisch T (2014) Nonlinear spatial integration in the receptive field surround of retinal ganglion cells. J Neurosci 34: 7548-7561

Garvert MM, Gollisch T (2013) Local and global contrast adaptation in retinal ganglion cells. Neuron 77: 915-928

Bölinger D, Gollisch T (2012) Closed-loop measurements of iso-response stimuli reveal dynamic nonlinear stimulus integration in the retina. Neuron 73: 333-346

Address

Dept. of Cellular Neurobiology
Schwann-Schleiden Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177955
fax: +49-551-39 177952
e-mail: mgoepfe@gwdg.de

Further Information

http://www.uni-goettingen.de/de/114662.html

Martin Göpfert

Professor for Cellular Neurobiology

- 1998 Degree in Biology, University of Erlangen-Nürnberg
- 1998 – 2002 DAAD and Leoplodina Research Fellow, Dept. Neurobiology, University of Zürich and School of Biological Sciences, University of Bristol
- 2002 – 2003 Royal Society University Research Fellow, School of Biological Sciences, University of Bristol
- 2003 – 2008 Independent group leader, Volkswagen Foundation Group 'Active auditory mechanics in insects', Dept. Animal Physiology, University of Cologne
- 2008 Associate Professor for Molecular Biology and Biophysics of Sensory Systems, University of Cologne
- 2008 Full Professor for Cellular Neurobiology, University of Göttingen

Major Research Interests

Our group studies fundamental processes in hearing. By combining mechanical measurements with genetics, molecular biology, immunohistochemistry, electrophysiology, calcium imaging, and biophysical modelling, we are trying to decipher how molecular processes shape the performance of an ear. Our preferred model system is the hearing organ of the fruit fly Drosophila melanogaster, the auditory sensory cells of which share conserved molecular modules with the hair cells in our ears.
Our work has uncovered striking parallels between fly and vertebrate hearing, including the functional equivalence of the auditory transduction and adaptation machineries, the motility of auditory sensory cells, transducer-based force generation, and the expression of homologous genes. Our work also provided first insights into the diverse roles of –and interactions between- transient receptor potential (TRP) ion channels in hearing, and a model of TRP-function in the fly's auditory system has been devised. Using a novel electrostatic actuation method, we were able to identify hair cell-like signatures of transducer gating and adaptation in the fly's auditory mechanics and could show that a simple transduction model as proposed to describe hair cell mechanics comprehensively explains the macroscopic behaviour of an ear. Based on these findings, we are currently devising a computational model that allows for the high-throughput characterization of genetic hearing defects. Candidate genes for hearing, in turn, are narrowed down by expression profiling using whole-genome microarrays. By testing how these genes contribute to auditory function and performance, we aim for a comprehensive molecules-to-system description of the functional workings of an ear.

Selected Recent Publications

Versteven M, Vanden Broeck L, Geurten B, Zwarts L, Decraecker L, Beelen M, Göpfert MC, Heinrich R, Callaerts P (2017) Hearing regulates *Drosophila* aggression. Proc Natl Acad Sci USA 114: 1958-1963

Andrés M, Seifert M, Spalthoff C, Warren B, Weiss L, Giraldo D, Winkler M, Pauls S, Göpfert MC (2016) Auditory efferent system modulates mosquito hearing. Curr Biol 26: 2028-2036

Guo Y, Wang Y, Zhang W, Meltzer S, Zanini D, Yu Y, Li J, Cheng T, Guo Z, Wang Q, Jacobs JS, Sharma Y, Eberl DF, Göpfert MC, Jan LY, Jan YN, Wang Z (2016) Transmembrane channel-like (tmc) gene regulates *Drosophila* larval locomotion. Proc Natl Acad Sci USA 113: 7243-7248

Göpfert MC, Hennig RM (2016) Hearing in Insects. Annu Rev Entomol 61: 257-276

Zhang W, Cheng LE, Kittelmann M, Li J, Petkovic M, Cheng T, Jin P, Guo Z, Göpfert MC, Jan LY, Jan YN. (2015) Ankyrin repeats convey force to gate the NOMPC mechanotransduction channel. Cell 162: 1391-1403

Address

Dept. of Theoretical Neuroscience
Max Planck Institute for Experimental Medicine
Hermann-Rein-Straße 3

37075 Göttingen
Germany

phone: +49-551-38 99490
e-mail: guetig@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=281

Robert Gütig

Group Leader Theoretical Neuroscience at the Max Planck Institute for Experimental Medicine

- Undergraduate studies in Physics and Psychology, FU Berlin, University of Cambridge and Heidelberg University (1993 – 1999)
- MPhil in Theoretical Pysics, University of Cambridge, UK (1997)
- PhD in Computational Neuroscience with Ad Aertsen, University of Freiburg (1999 – 2002)
- Postdoctoral training with Andreas Hertz, Institute of Theoretical Biology, HU Berlin (2003 – 2005)
- Postdoctoral training with Haim Sompolinsky, Interdisciplinary Center for Neural Computation, Hebrew University of Jerusalem, Israel (2005 – 2011)
- Max Planck Research Group Leader, Theoretical Neuroscience (since 2011)

Major Research Interests

We use analytical and numerical modeling techniques to identify the computational principles underlying spike based information processing and learning in central nervous systems and to understand how these principles are implemented by biological processes. Specifically, we focus on the role of action potential timing in subserving sensory neuronal representations and computation as well as in controlling synaptic plasticity. Projects center around the recently developed tempotron family of spiking neuronal network models and cover a broad range of topics including mathematical analyzes of information processing in spiking neuronal networks, spike-based learning in single and multilayer neuronal networks, sensory spike data analysis, temporal processing with short term synaptic dynamics, as well as applied development of visual and speech processing systems.

Selected Recent Publications

Gütig R (2016) Spiking neurons can discover predictive features by aggregate-label learning. Science 351: 1041 (aab4113–1-aab4113–14)

Gütig R (2014) To spike, or when to spike? Curr. Opin. Neurobiol 25C: 134-139

Gütig R, Gollisch T, Sompolinsky H, Meister M (2013) Computing complex visual features with retinal spike times. PLoS One 8: e53063

Gütig R, Sompolinsky H (2009) Time-warp-invariant neuronal processing. PLoS Biology 7: e1000141

Gütig R, Sompolinsky H (2006) The tempotron: a neuron that learns spike timing-based decisions. Nature Neuroscience 9: 420-428

Gütig R, Aharonov R, Rotter S, Sompolinsky H (2003) Learning input correlations through non-linear temporally asymmetric Hebbian plasticity. Journal of Neuroscience 23: 3697-3714

Address

Dept. of Cellular Neurobiology
Schwann-Schleiden Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177958
fax: +49-551-39 177952
e-mail: rheinri1@gwdg.de

Further Information

http://wwwuser.gwdg.de/~neuro/ag_heinrich/index.html

Ralf Heinrich

Professor, Department of Cellular Neurobiology

- 1995: Dr. rer. nat., University of Göttingen
- 1997 – 1999: Postdoctoral fellow, Harvard Medical School, Boston, USA
- 2004: Habilitation, Zoology
- 2002 – 2008: Junior professor for Molecular Neuropharmacology of Behavior, Göttingen
- since 2008: apl Professor, Dept. of Cellular Neurobiology

Major Research Interests

Vertebrates and invertebrates evolved from common ancestors that already possessed neurons, neurosecretory systems and structured central nervous systems. Though nervous systems of invertebrates are typically less complex than those of vertebrates (especially mammals) they share many molecular and functional characteristics. We study the neural basis of insect behaviors and mechanisms underlying neuroprotection and neuroregeneration in insect nervous systems with an evolutionary perspective.
1) The cytokine erythropoietin (Epo) mediates neuroprotective and neuroregenerative functions in insects similar to its beneficial effects described in mammals including humans. Similar structural and functional characteristics of the Epo-binding receptors, partly shared transduction pathways that prevent apoptosis and the functional implication in neuroprotective and neuroregenerative processes in both mammalian and insect species suggest that Epo-like signaling was already established in their common ancestors. We study insects, both with *in vitro* and *in vivo* approaches, to identify “ancient” Epo-like signals and neuroprotective Epo-receptors and to characterize the beneficial molecular mechanisms mediated by these signalling systems. We expect that this “detour through evolutionary history” will also foster research on Epo-mediated tissue protection in mammals.
2) Social behavior is the product of complex interactions between various types of neurons that integrate external sensory information with internal physiological states. We study the regulation of social behaviors by synaptic molecules (e.g. neuroligins, transmitters) and the neurochemical mechanisms of motivational states with a combination of neuroethological, pharmacological, electrophysiological, histochemical and immunocytochemical methods. Most studies focus on sex-specific mating and aggressive behaviors of acoustically communicating grasshoppers and fruit flies.

Selected Recent Publications

Hahn N, Knorr DY, Liebig J, Wüstefeld L, Peters K, Büscher M, Bucher G, Ehrenreich H, Heinrich R (2017) The insect orthologue of the human orphan cytokine receptor CRLF3 is a neuroprotective erythropoietin receptor in insects. Frontiers in Molecular Neuroscience 10: 223

Miljus N, Massih B, Weis MA, Rison JV, Bonnas CB, Sillaber I, Ehrenreich H, Geurten BRH, Heinrich R (2017) Neuroprotection and endocytosis: erythropoietin receptors in insect nervous systems. Journal of Neurochemistry 141: 63-74

Miljus N, Heibeck S, Jarrar M, Micke M, Ostrowski D, Ehrenreich H, Heinrich R (2014) Erythropoietin-mediated protection of insect brain neurons involves JAK and STAT but not PI3K transduction pathways. Neuroscience 258:218-227

Hahn N, Geurten B, Gurvich A, Piepenbrock D, Kästner A, Zanini D, Xing G, Xie W, Göpfert MC, Ehrenreich H, Heinrich R (2013) Monogenic heritable autism gene neuroligin impacts *Drosophila* social behaviour. Behavioural Brain Research 252: 450-457

Heinrich R, Kunst M, Wirmer A (2012) Reproduction-related sound production of grasshoppers regulated by internal state and actual sensory environment. Frontiers in Decision Neuroscience 6, 89: 1-9

Address

Dept. of NanoBiophotonics
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 2500
fax: +49-551-201 2505
e-mail: hell-office@
gwdg.de

Further Information

http://www.mpibpc.mpg.de/groups/hell/

Stefan Hell

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1987 Diploma in Physics, University of Heidelberg
- 1990 Doctorate in Physics, University of Heidelberg
- 1991 – 1993 Postdoctoral Researcher, EMBL (European Molecular Biology Laboratory)
- 1993 – 1996 Principal Investigator, Laser Microscopy Group; Univ. of Turku, Finland
- 1996 Habilitation in Physics, Univ. Heidelberg; Physics teaching since 02/1996
- 1997 – 2002 Head, Max-Planck Junior Group High Resolution Optical Microscopy, at the Max-Planck-Institute for Biophysical Chemistry Göttingen, Germany
- since 10/2002 Director at the Max Planck Institute for Biophysical Chemistry, Head of Department of NanoBiophotonics
- since 12/2003 Apl. Prof., Faculty of Physics, Univ. of Heidelberg
- 2003 – 2017 Head of High Resolution Optical Microscopy Division, DKFZ Heidelberg
- since 01/2004 Hon. Prof., Faculty of Physics, Univ. of Göttingen
- 2014 Nobel Prize in Chemistry
- 2014 Kavli Prize in Nanoscience
- since 11/2015 Director at the Max Planck Institute for Medical Research, Head of Department of Optical Nanoscopy

Major Research Interests

Optical microscopy beyond the diffraction barrier with far-field optics
Invention of STED, RESOLFT, GSDIM and 4Pi microscopy and related techniques

Selected Recent Publications

Eilers Y, Ta H, Gwosch KC, Balzarotti F, Hell SW (2018) MINFLUX monitors rapid molecular jumps with superior spatiotemporal resolution. Proc Natl Aacad Sci USA 115: 6117-6122

Balzarotti F, Eilers Y, Gwosch KC, Gynna AH, Westphal V, Stefani FD, Elf J, Hell SW (2017) Nanometer resolution imaging and tracking of fluorescent molecules with minimal photon fluxes. Science 355: 606-612

Heine J, Reuss M, Harke B, D'Este E, Sahl SJ, Hell SW (2017) Adaptive-illumination STED nanoscopy. Proc Natl Aacad Sci USA 114:9797-9802

Ta H, Keller J, Haltmeier M, Saka SK, Schmied J, Opazo F, Tinnefeld P, Munk A, Hell SW (2015) Mapping molecules in scanning far-field fluorescence nanoscopy. Nat Commun 6: 7977

Schneider J, Zahn J, Maglione M, Sigrist SJ, Marquard J, Chojnacki J, Kräusslich HG, Sahl SJ, Engelhardt J, Hell SW (2015) Ultrafast, temporally stochastic STED nanoscopy of millisecond dynamics. Nat Methods 12(9): 827-30

Hell SW (2015) Nanoscopy with Focused Light (Nobel Lecture). Angew Chem Int Ed Engl 54(28):8054-66

Berning S, Willig KI, Steffens H, Dibaj P, Hell SW (2012) Nanoscopy in a Living Mouse Brain. Science 335: 551

Eggeling C, Ringemann C, Medda R, Schwarzmann G, Sandhoff K, Polyakova S, Belov VN, Hein B, von Middendorff C, Schönle A, Hell SW (2009) Direct observation of the nanoscale dynamics of membrane lipids in a living cell. Nature 457: 1159-1163

Willig KI, Rizzoli SO, Westphal V, Jahn R, Hell SW (2006) STED-microscopy reveals that synaptotagmin remains clustered after synaptic vesicle exocytosis. Nature 440: 935-939

Address

University Medical Center Göttingen
Experimental Neuroanesthesiology
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 9592
fax: +49-551-39 9676
e-mail: shuelsm2@uni-goettingen.de

Further Information

http://www.neuro-physiol.med.uni-goettingen.de/groups/shuelsmann/de/home/index.php

Swen Hülsmann

Professor of Neurophysiology

- Dr. med., University of Münster, 1995
- Postdoctoral fellow, University of Münster Dept. of Neurosurgery, 1995 – 1996
- Postdoctoral fellow, University of Göttingen, Dept. of Neurophysiology, 1996 – 2001
- Group leader (Wissenschaftlicher Assistent) Neurophysiology, since 2001
- Principle Investigator at the DFG Research Center for Molecular Physiology of the Brain (CMPB) since 2002
- Habilitation, University of Göttingen, 2005

Major Research Interests

Most behavioral aspects of life are attributed to neurons, leaving many white spots of knowledge about the function of the different types of glial cells. Our group aims to identify and clarify the mechanisms that allow astrocytes to modulate and stabilize the most vital behavior of breathing.

Selected Recent Publications

Hülsmann S, Mesuret G, Dannenberg J, Arnoldt M, Niebert M (2016) GlyT2-dependent preservation of MECP2-expression in inhibitory neurons improves early respiratory symptoms but does not rescue survival in a mouse model of Rett syndrome Front. Physiol. doi: 10.3389/fphys.2016.00385

Rahman J, Besser S, Schnell C, Eulenburg V, Hirrlinger J, Wojcik SM, Hülsmann S (2015) Genetic ablation of VIAAT in glycinergic neurons causes a severe respiratory phenotype and perinatal death. Brain Struct Funct 220: 2835-2849

Schnell C, Shahmoradi A, Wichert SP, Mayerl S, Hagos Y, Heuer H, Rossner MJ#, Hülsmann S# (2015) The multispecific thyroid hormone transporter OATP1C1 mediates cell-specific Sulforhodamine 101-labeling of hippocampal astrocytes. Brain Struct Funct 220: 193-203

Winter SM, Fresemann J, Schnell C, Oku Y, Hirrlinger J, Hülsmann S (2009) Glycinergic interneurons are functionally integrated into the inspiratory network of mouse medullary slices. Pflügers Arch 458: 459-469

Grass D, Pawlowski PG, Hirrlinger J, Papadopoulos N, Richter DW, Kirchhoff F, Hülsmann S (2004) Diversity of functional astroglial properties in the respiratory network. J Neurosci 24: 1358-1365

Address

Dept. of Neurobiology
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1635
fax: +49-551-201 1639
e-mail: rjahn@gwdg.de

Further Information

http://www.mpibpc.mpg.de/groups/jahn/

Reinhard Jahn

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1981 Dr. rer. nat., University of Göttingen
- 1985 Assistant Professor, The Rockefeller University, New York (USA)
- 1986 Junior Group leader, Max Planck Institute for Psychiatry, Martinsried
- 1991 Associate Professor of Pharmacology and Cell Biology, Yale University, and Investigator, Howard Hughes Medical Institute, New Haven (USA)
- 1995 Professor of Pharmacology and Cell Biology, Yale University, New Haven
- 1997 Director, Max Planck Institute for Biophysical Chemistry, Göttingen
- 1997-2001 Adjunct Professor of Pharmacology, Yale University School of Medicine, New Haven, USA
- 2001 Adjunct Professor of Biology, University of Göttingen
- 2019 Emeritus Group Leader, Max Planck Institute for Biophysical Chemistry, Göttingen

Major Research Interests

Our group is interested in the mechanisms of membrane fusion, with the main emphasis on regulated exocytosis in neurons. Intracellular membrane fusion events are mediated by a set of conserved membrane proteins, termed SNAREs. For fusion to occur, complementary sets of SNAREs need to be present on both of the fusing membranes, which then assemble in a zipper-like fashion to initiate membrane merger. The neuronal SNAREs are among the best characterized. They are the targets of the toxins responsible for botulism and tetanus, and they are regulated by several addtional proteins including synaptotagmin, the calcium sensor for neurotransmitter release. To understand how these proteins mediate fusion, we study their properties in vitro with biochemical and biophysical approaches using native and artificial membranes.
In a second set of projects, we are interested in the mechanisms by which synaptic vesicles sequester and store neurotransmitters. Uptake is mediated by specific vesicular neurotransmitter transporters that are energized by an electrochemical proton gradient across the membrane. Presently we aim for a better understanding of the transport mechanisms using a variety of biochemical and biophysical approaches including imaging of single vesicles. Finally, we use quantitative proteomics to better understand how the presynaptic protein network contributes to the regulation of synaptic release, focusing on protein phosphorylation.

Selected Recent Publications

Jakharwal S, Lee CT, Urlaub H., Jahn R (2017) An activated Q-SNARE/SM protein complex as a possible intermediate in SNARE assembly. EMBO J in press

Farsi Z, Preobraschenski J, van den Bogaart G, Riedel D, Jahn R*, Woehler A (2016) Single-vesicle imaging reveals different transport mechanisms between glutamatergic and GABAergic vesicles. Science 351: 981-984. (*corresponding author)

Park Y, Seo JB, Fraind A, Pérez-Lara A, Yavuz H, Han K, Jung SR, Kattan I, Walla PJ, Choi M, Cafiso DS, Koh DS, Jahn R (2015) Synaptotagmin-1 binds to PIP(2)-containing membrane but not to SNAREs at physiological ionic strength. Nature Struct Mol Biol 22: 815-823

Jahn R, Fasshauer D. (2012) Molecular machines governing exocytosis of synaptic vesicles. Nature 490: 201-7

van den Bogaart G, Meyenberg K, Risselada JH, Amin H, Willig KI, Hubrich BE, Dier M, Hell SW, Grubmüller H, Diederichsen U, Jahn R (2011) Membrane protein sequestering by ionic protein-lipid interactions. Nature 479: 552-555

Address

Department of Systems Neuroscience
Johann-Friedrich-Blumenbach Institute for Zoology and Anthropology
University of Göttingen
von-Siebold-Str. 6

37075 Göttingen
Germany

phone: +49-551-39 20160
+49-551-39 20161
fax: +49-551-39 20162
e-mail: sloewel@gwdg.de

Further Information

http://systemsneuroscience.uni-goettingen.de/

Siegrid Löwel

Professor, Head of Department of Systems Neuroscience, University of Göttingen

- 1988 Dr. phil. nat., University of Frankfurt a. M. / Department of Neurophysiology (Prof. Dr. Wolf Singer), Max-Planck-Institut für Hirnforschung, Frankfurt a. M.
- 1997-2005 Head of Independent Research Group “Visual Development and Plasticity”, Leibniz-Institute for Neurobiology, Magdeburg
- 2002-2003 Associate Research Physiologist/Research Associate Professor, School of Medicine, Department of Physiology, University of California in San Francisco, USA
- 2003-2004 Dorothea-Erxleben-Guest Professorship, University of Magdeburg
- 2004-2005 Scholarship Hertie-Excellency Program “Neurosciences”
- 2005-2010 Professor of Neurobiology, University of Jena
- since 2010 Full Professor of Systems Neuroscience, Institute for Zoology and Anthropology, University of Göttingen

Major Research Interests

The Löwel lab is focussed on understanding the development and plasticity of neuronal circuits in the mammalian cortex. We use a combination of techniques, including optical imaging, 2-photon imaging, electrophysiology and virus-mediated knock-down to explore how experience and learning influence the structure and function of nerve cell networks. We hope that answering these key questions not only helps to understand the rules underlying brain development, functioning and learning but additionally will open up new avenues to develop clinically relevant concepts to promote regeneration and rehabilitation for diseased and injured brains. The Löwel lab has made major contributions to experience-dependent changes in nerve cell networks: We were e.g. the first to demonstrate that the learning rule for the development of long-range cortical circuits is correlated activity: “neurons wire together if they fire together” (Löwel & Singer, 1992, Science 255: 209-212).

Selected Recent Publications

Huang X*, Stodieck SK*, Goetze B, Schmidt K-F, Cui L, Wenzel C, Hosang L, Dong Y, Löwel S*, Schlüter OM* (2015) The progressive maturation of silent synapses governs the duration of a critical period. Proc Natl Acad Sci USA112: E3131-40. *equal contribution

van Wyk M, Pielecka-Fortuna J, Löwel S, Kleinlogel S (2015) Restoring the ON-switch in blind retinas: Opto-mGluR6, a next-generation, cell-tailored optogenetic tool. PLoS Biology 13(5): e1002143

Kalogeraki E, Greifzu F, Haack F, Löwel S (2014) Voluntary physical exercise promotes ocular dominance plasticity in adult mouse primary visual cortex. J Neurosci 34: 15476-15481

Greifzu F, Pielecka-Fortuna J, Kalogeraki E, Krempler K, Favaro PD, Schlüter OM, Löwel S (2014) Environmental enrichment extends ocular dominance plasticity into adulthood and protects from stroke-induced impairments of plasticity. Proc Natl Acad Sci USA 111: 1150-1155

Greifzu F, Schmidt S, Schmidt K-F, Kreikemeier K, Witte OW, Löwel S (2011) Global impairment and therapeutic restoration of visual plasticity mechanisms after a localized cortical stroke. Proc Natl Acad Sci USA 108: 15450-15455

Kaschube M, Schnabel M, Löwel S, Coppola DM, White LE, Wolf F (2010) Universality in the evolution of orientation columns in the visual cortex. Science 330: 1113-1116

Address

Synaptic Vesicle Dynamics
European Neuroscience Institute Göttingen
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 12379
fax: +49-551-39 12346
e-mail: i.milosevic@eni-g.de

Further Information

http://www.eni.gwdg.de/groups/synaptic-vesicle-dynamics

Ira Milosevic

Group Leader Synaptic Vesicle Dynamics

- 2001: Diploma (Dipl. Ing.) in Molecular Biology University of Zagreb, Zagreb, Croatia; thesis work performed at Eötvös Lorand University, Dept. of Biochemistry, Budapest, Hungary and Ruder, Boskovic Institute, Dept. of Molecular Genetics, Zagreb, Croatia (advisors: Prof. Ivana Weygand-Durasevic, Prof. Laszlo Nyitray)
- 2003: M.Sc., IMPRS Neurosciences, Georg August University Göttingen, Germany; thesis work performed at Max Planck Institute for Biophysical Chemistry, Dept. of Membrane Biophysics and Dept. of Biochemistry (advisors: Prof. Erwin Neher, Prof. Reinhard Jahn)
- 2006: Ph.D., IMPRS Neurosciences, Georg August University Göttingen, Germany; thesis work performed at Max Planck Institute for Biophysical Chemistry, Dept. of Membrane Biophysics and Dept. of Biochemistry (advisors: Prof. Erwin Neher, Prof. Reinhard Jahn)
- 2007 - 2012: PostDoc, HHMI and Yale University School of Medicine, Dept. of Cell Biology, New Haven, CT, USA (advisor: Prof. Pietro De Camilli)
- since December 2012: Independent Group Leader at the European Neuroscience Institute Göttingen

Major Research Interests

The laboratory investigates fundamental aspects of exocytosis, endocytosis and synaptic vesicle recycling that have relevance to neurological and neurodegenerative diseases, using mouse and mammalian cells as a model systems. We combine genomic engineering, biochemistry, imaging (light and electron microscopy), cell biology and electrophysiology to study the processes that regulate synaptic vesicle formation. In a distinct but related strand of work, we are exploring the signaling processes that originate from altered neurotransmission and lead to neurodegeneration.

Selected Recent Publications

Watanabe S, Mamer LE, Raychaudhuri S, Luvsanjav D, Eisen J, Trimbuch T, Söhl-Kielczynski B, Fenske P, Milosevic I, Rosenmund C, Jorgensen EM (2018) Synaptojanin and endophilin mediate neck formation during ultrafast endocytosis. Neuron 98(6): 1184-1197

Farsi Z, Gowrisankaran S, Matija K, Rammner B, Woehler A, Mim C, Jahn R, Milosevic I (2018) Clathrin coat controls vesicle acidification by blocking vacuolar ATPase activity. eLife 7, doi: 10.7554/eLife.32569

Fiuza M, Rostosky C, Parkinson G, Bygrave A, Halemani N, Baptista M, Milosevic I, Hanley J (2017) PICK1 regulates AMPA receptor endocytosis via direct interactions with AP2 α-appendage and dynamin. J Cell Biol 216(10): 3323-3338

Murdoch JD, Rostsoky C, Gowrisankaran S, Arora AS, Soukup SF, Vidal R, Capece V, Freytag S, Fischer A, Verstreken P, Bonn S, Raimundo N, Milosevic I (2016) Endophilin-A deficiency induces the FoxO3a-Fbxo32 network in the brain and causes dysregulation of autophagy and the ubiquitin-proteasome system. Cell Rep 17(4): 1071-1086

Villar-Piquéa A, Fonseca TL, Sant'Anna R, Fonseca-Ornelas L, Pinho R, Masaracchia C, Szegö EM, Milosevic I, Zweckstetter M, Ventura S, Outeiro TF (2016) Environmental and genetic factors support the dissociation between alpha-synuclein aggregation and toxicity. PNAS USA 113(42): E6506-15

Pechstein A*, Gerth F*, Milosevic I, Jäpel M, Eichhorn-Grünig M, Vorontsova O, Bacetic J, Maritzen T, Shupliakov O, Freund C, Haucke V (2015) Vesicle uncoating regulated by SH3-SH3 domain-mediated complex formation between endophilin and intersectin at synapses. EMBO Rep 16(2): 232-9

Giordano F, Saheki Y, Idevall-Hagren O, Colombo SF, Pirruccello M, Milosevic I, Gracheva EO, Bagriantsev SN, Borgese N, De Camilli P (2013) PI(4,5)P2-dependent and Ca^{2+}-regulated ER-PM interactions mediated by the extended synaptotagmins. Cell 153 (7): 1494-509

Address

Institute for Auditory Neuroscience
University Medical Center Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: +49-551-39 22803
fax: +49-551-39 22299
e-mail: tmoser@gwdg.de

Further Information

http://www.auditory-neuroscience.uni-goettingen.de/

http://www.innerearlab.uni-goettingen.de/

https://www.mpibpc.mpg.de/14722384/moser

http://www.dpz.eu/en/platforms/optogenetics/auditory-neuroscience.html

Tobias Moser

Professor of Auditory Neuroscience

- MD University of Jena, 1995
- Postdoc with E. Neher at the MPI for Biophysical Chemistry, 1994 – 1997
- Junior Group Leader at the at the MPI for Biophysical Chemistry, Göttingen 1997 – 2001
- Residency in Otolaryngology, University Medical Center Göttingen 1997 – 2002
- Group Leader at the Department of Otolaryngology, University Medical Center Göttingen since 2001
- Research Group Leader at MPI for Biophysical Chemistry, MPI for Experimental Medicine and German Primate Center, Göttingen since 2014
- Director, Institute for Auditory Neuroscience, University Medical Center Göttingen 2015

Major Research Interests

Auditory Neuroscience - Synaptic Physiology and Pathophysiology – Audiology and Neuroprosthetics

Our work focuses on the molecular physiology and pathophysiology of sound encoding at the hair cell ribbon synapse and its restoration. We have physiologically and morphologically characterized synapses of wild-type and mutant mice with defects in hair cell synaptic coding from the molecular to the systems level. This way we have contributed to the understanding of structure and function of the hair cell ribbon synapse and co-initiated the concept of auditory synaptopathy. Molecular dissection and detailed physiological characterization of ribbon synapse function employ a spectrum of molecular, biophysical, physiological, psychophysical and clinical approaches. Towards restoration of hearing we pursue the optogenetic stimulation of cochlea and gene replacement therapy.

Selected Recent Publications

Wrobel C, Dieter A, Huet A, Keppeler D, Duque-Afonso C, Vogl C, Hoch G, Jeschke M, Moser T (2018) Optogenetic stimulation of cochlear neurons activates the auditory pathway and restores auditory-driven behavior in deaf adult gerbils. Jul 11;10(449). pii: eaao0540

Hernandez VH, Gehrt A, Reuter K, Jing Z, Jeschke M, Mendoza Schulz A, Hoch G, Bartels M, Vogt G, Garnham CW, Yawo H, Fukazawa Y, Augustine GJ, Bamberg E, Kügler S, Salditt T, de Hoz, L, Strenzke N, Moser T (2014) Optogenetic stimulation of the auditory pathway. J Clin Investigation, 124(3): 1114-29

Chapochnikov NM, Takago H, Huang CH, Pangrsic T, Khimich, D, Neef J, Auge E, Göttfert F, Hell SW, Wichmann C, Wolf F, Moser T (2014) Uniquantal Release through a Dynamic Fusion Pore Is a Candidate Mechanism of Hair Cell Exocytosis. Neuron, 83: 1-15

Pangrsic T, Lasarow L, Reuter K, Takago H, Schwander M, Riedel D, Frank T, Tarantino LM, Bailey JS, Strenzke N, Müller U, Brose N, Reisinger E*, Moser T* (2010) Hearing requires otoferlin-dependent efficient replenishment of synaptic vesicles in hair cells. Nat Neurosci 13(7): 869-76

Meyer AC, Frank T, Khimich D, Hoch G, Riedel D, Chapochnikov, NM, Yarin YM, Harke B, Hell S, Egner A, Moser T (2009) Tuning of Synapse Number, Structure and Function in the Cochlea, Nat Neurosci 12: 444-534

Khimich D, Nouvian R, Pujol R, Tom Dieck S, Egner A, Gundelfinger ED, Moser T (2005) Hair Cell Synaptic Ribbons are Essential for Synchronous Auditory Signaling. Nature 434: 889-94

Address

Dept. of Neurogenetics
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 757
fax: +49-551-3899 758
e-mail: nave@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=34&no_cache=1

Klaus-Armin Nave

Director at the Max Planck Institute for Experimental Medicine

- 1987 PhD, University of California, San Diego
- 1987 – 1991 Postdoc, The Salk Institute, la Jolla, California
- 1991 Junior Group Leader, ZMBH, University of Heidelberg
- 1998 Professor of Molecular Biology (C4), ZMBH, University of Heidelberg
- since 1999 Director at the Max Planck Institute for Experimental Medicine

Major Research Interests

We are studying the interactions of neurons and glial cells in the mammalian nervous system with a special interest in the role of oligodendrocytes and Schwann cells, best known as myelin forming cells of the central and peripheral nervous system. These highly specialized glial cells enwrap axons with a multilayered sheath that provides electrical insulation for rapid impulse propagation. However the biology of these axon-glia interactions is complex. Using mouse genetics, originally to study the role of proteins in the myelin architecture and in neurogenetic disorders, we made the unexpected discovery of a novel function of oligodendrocytes, which even precedes myelin in nervous system evolution: the glial metabolic support of axonal conduction, axonal transport and long-term integrity. We determined that oligodendrocytes and Schwann cells take up glucose and deliver lactate, here the product of aerobic glycolysis, to the axonal compartment. This supportive function helps maintaining axon functions especially when ATP demands are increased at higher firing rates, also because access of axons to extracellular metabolites is restricted by myelin itself. Here, the fine architecture of the myelin sheath that we visualize with advanced electron microscopic techniques appears critical. Specialized cytoplasmic connections within the myelin sheath ('myelinic nanochannels') must provide a pathway of continuous communication between oligodendrocytes and the encapsulated axon. In neurological diseases, in which myelin is structurally affected or even destroyed, such as in multiple scleroses, leukodystrophies and various peripheral neuropathies, there is invariably secondary axonal degeneration that we propose is caused by the lack of adequate metabolic support. We are investigating the underlying molecular mechanisms of these diseases in detail, using corresponding animal models that we have generated with a range of genetic techniques. A further goal is to understand the role of myelinating glial cells in higher brain functions and psychiatric diseases, which we approach in close collaboration with the Department of Hannelore Ehrenreich at our institute.

Selected Recent Publications

Saab AS, Tzvetavona ID, Trevisiol A, Baltan S, Dibaj P, Möbius W, Kusch K, Goetze B, Jahn HM, Huang W, Steffens H, Schomburg ED, Pérez-Samartín A, Pérez-Cerdá F, Bakhtiari D, Matute C, Löwel S, Griesinger C Hirrlinger J, Kirchhoff F, Nave KA (2016) Oligodendroglial NMDA receptors regulate axonal energy metabolism. Neuron 91: 199-132

Goebbels S, Wieser GL, Pieper A, Spitzer S, Weege B, Yan K, Edgar JM, Yagensky O, Wichert S, Agarwal A, Karram K, Renier N, Tessier-Lavigne M, Rossner MJ, Káradóttir RT, Nave KA (2017) A neuronal PI(3,4,5)P3-dependent program of oligodendrocyte precursor recruitment and myelination. Nature Neuroscience 20: 10-15

Quintes S, Brinkmann BG, Ebert M, Fröb F, Kungl T., Arlt FA, Tarabykin V, Huylebroeck D, Meijer D, Suter U, Wegner M, Sereda MW, Nave KA (2016) Sip1 is essential for Schwann cell differentiation, myelination and nerve repair. Nature Neuroscience 19: 1050-1059

Fünfschilling U, Supplie LM, Mahad D, Boretius S, Saab AS, Edgar J, Brinkmann BG, Kassmann CM, Tzvetanova ID, Möbius W, Diaz F, Meijer D, Suter U, Hamprecht B, Sereda MW, Moraes CT, Frahm J, Goebbels S, Nave KA (2012). Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. Nature 485: 517-521

Nave KA (2010) Myelination and support of axonal integrity by glia. Nature 468: 244-252

Address

Dept. of Neurodegeneration and Restaurative Research
University Medical Center Göttingen
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 13544
fax: +49-551-39 22693
e-mail: tiago.outeiro@med.uni-goettingen.de

Further Information

http://www.neurodegeneration.uni-goettingen.de/

Tiago Fleming Outeiro

Professor of Aggregopathies, Director of the Department of Neurodegeneration and Restaurative Research

- 1994 – 1998 B.S. in Biochemistry Faculty of Sciences, University of Porto, Portugal
- 1999 – 2004 Ph.D. in Molecular and Cell Biology Whitehead Institute for Biomedical Research, MIT Cambridge, University of Chicago (UC), USA
- 2004 Consultant and Research Scientist, FoldRx Pharmaceuticals, Inc, Cambridge, USA: Ph.D. work was transferred to the start-up company FoldRx Pharmaceuticals, Inc.
- 2004 – 2007 Postdoctoral Research Fellow; advisor Dr. Brad Hyman, MGH Harvard University, USA
- 2007 – 2011 Principal Investigator and Group Leader at Instituto de Medicina Molecular, Lisbon, Portugal
- 2007 – 2008 Visiting Scientist, Massachusetts General Hospital, Harvard Medical School, Boston, USA
- 2007 – present Auxiliar Professor, Instituto de Fisiologia, Faculdade de Medicina da Universidade de Lisboa, Portugal
- 2010 – present: Full Professor of Aggregopathies, Director of the Department of Neurodegeneration and Restaurative Research, University Medical Center Göttingen

Major Research Interests

Our research interests are focused on the understanding of the molecular mechanisms which lead to neurodegeneration in diseases such as Parkinson's, Huntington's, or Alzheimer's disease. These diseases are intimately associated with protein misfolding and aggregation in specific regions of the brain.
Because the molecular pathways involved in protein homeostasis are highly conserved, we employ a wide variety of model organisms, from the simple but powerful budding yeast to mammalian cell culture and mice, to study the origin of the problems.
We are also developing novel *in vivo* imaging approaches based on multi-photon microscopy to observe protein misfolding and aggregation in the living brain.
Our ultimate goals are to develop novel therapeutic approaches for these and other related disorders. We are working closely together with clinicians in order to accelerate drug discovery efforts, translating basic research into clinical applications that will improve the lives of patients.

Selected Recent Publications

Vicente Miranda H, Szego ÉM, Oliveira LM, Breda C, Darendelioglu E, de Oliveira RM, Ferreira DG, Gomes MA, Rott R, Oliveira M, Munari F, Enguita FJ, Simões T, Rodrigues EF, Heinrich M, Martins IC, Zamolo I, Riess O, Cordeiro C, Ponces-Freire A, Lashuel HA, Santos NC, Lopes LV, Xiang W, Jovin TM, Penque D, Engelender S, Zweckstetter M, Klucken J, Giorgini F, Quintas A, Outeiro TF (2017) Glycation potentiates -synuclein-associated neurodegeneration in synucleinopathies. Brain 2017 Apr 10

de Oliveira RM, Vicente Miranda H, Francelle L, Pinho R, Szegö ÉM, Martinho R, Munari F, Lázaro DF, Moniot S, Guerreiro P, Fonseca-Ornelas L, Marijanovic Z, Antas P, Gerhardt E, Enguita FJ, Fauvet B, Penque D, Pais TF, Tong Q, Becker S, Kügler S, Lashuel HA, Steegborn C, Zweckstetter M, Outeiro TF (2017) Correction: The mechanism of sirtuin 2-mediated exacerbation of alpha-synuclein toxicity in models of Parkinson disease. PLoS Biol 2017 Apr 5;15(4): e1002601

Villar-Piqué A, Lopes da Fonseca T, Sant'Anna R, Szegö ÉM, Fonseca-Ornelas L, Pinho R, Carija A, Gerhardt E, Masaracchia C, Abad Gonzalez E, Rossetti G, Carloni P, Fernández CO, Foguel D, Milosevic I, Zweckstetter M, Ventura S, Outeiro TF (2016) Environmental and genetic factors support the dissociation between -synuclein aggregation and toxicity. Proc Natl Acad Sci U S A 2016 Oct 5

Address

Dept. of Molecular Biology
of Neuronal Signals
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 643
fax: +49-551-3899 644
e-mail: pardo@em.mpg.de

Further Information

http://www.uni-goettingen.de/en/127638.html

Luis A. Pardo

Professor of Molecular Biology of Neuronal Signals, Group Leader at the Max Planck Institute for Experimental Medicine

- 1986 M.D., University of Oviedo, Spain
- 1990 Ph.D. University of Oviedo, Spain
- 1991 – 1993 Postdoctoral fellow, Max-Planck Institute of Biophysical Chemistry
- 1994 – 1996 Researcher, University of Oviedo, Spain
- 1997 – 2000 Senior researcher, Max-Planck Institute of Experimental Medicine
- 2001 – 2003 Chief Scientific Officer, iOnGen AG
- since 2004 group leader at the Max-Planck Institute of Experimental Medicine
- since 2008 Max-Planck Research Group Leader
- since 2011 Appl. Professor, University Medical Center Göttingen

Major Research Interests

Our research interest focuses on the role of ion channels in the initiation and progression of tumors. For this, we take advantage of the knowledge of the physiology and molecular biology of channels and use electrophysiological techniques along with advanced microscopy, protein engineering and animal models. Most of our work has been on a particular potassium channel frequently expressed (75%) in human tumors. We try to take advantage of the particular features of ion channels (for example, their surface expression) to design novel diagnostic and therapeutic procedures.
We also try to understand the mechanisms underlying the role of ion channels in tumors, regarding both permeation properties as well as non-canonical functions.

Selected Recent Publications

Sánchez A, Urrego D, Pardo LA. (2016) Cyclic expression of the voltage-gated potassium channel KV10.1 promotes disassembly of the primary cilium. EMBO Rep 2016 May;17(5): 708-23. doi: 10.15252/embr.201541082. Epub 2016 Apr 20

Urrego D, Movsisyan N, Ufartes R, Pardo LA. (2016) Periodic expression of Kv10.1 driven by pRb/E2F1 contributes to G2/M progression of cancer and non-transformed cells. Cell Cycle 2016 Mar 18;15(6): 799-811. doi: 10.1080/15384101.2016.1138187

Mortensen LS, Schmidt H, Farsi Z, Barrantes-Freer A, Rubio ME, Ufartes R, Eilers J, Sakaba T, Stuehmer W, Pardo LA (2015) K(V)10.1 opposes activity-dependent increase in Ca^{2+} influx into the presynaptic terminal of the parallel fibre-Purkinje cell synapse. Journal of Physiology-London 593: 181-196

Lörinczi É, Gómez-Posada JC, de la Peña P, Tomczak AP, Fernández-Trillo J, Leipscher U, Stühmer W, Barros F, Pardo LA (2015) Voltage-dependent gating of KCNH potassium channels lacking a covalent link between voltage-sensing and pore domains. Nat Commun 6

Pardo LA, Stühmer W (2014) The roles of K^+ channels in cancer. Nat Rev Cancer 14: 39-48

Jimenez-Garduno AM, Mitkovski M, Alexopoulos IK, Sanchez A, Stuhmer W, Pardo LA, Ortega A (2014) KV10.1 $K^{(+)}$-channel plasma membrane discrete domain partitioning and its functional correlation in neurons. Biochim Biophys Acta 1838: 921-31

Address

Dept. of Clinical Neurophysiology
University of Göttingen
Robert Koch Str. 40

37075 Göttingen Germany

phone: +49-551-39 6650
fax: +49-551-39 8126
e-mail: wpaulus@med.uni-goettingen.de

Further Information

http://www.neurologie.uni-goettingen.de/

Walter Paulus

Professor of Clinical Neurophysiology

- Dr. med., University of Düsseldorf, 1978
- Training in Neurology at the Universities of Düsseldorf, UCL London and Munich
- Habilitation (Neurology and Clinical Neurophysiology) in Munich
- Prof. and Head of the Department of Clinical Neurophysiology 1992

Major Research Interests

We intend to understand and modulate cortical plasticity in man. This is mainly done on a behavioural, imaging and electrophysiological level. We use (motor) learning paradigms, evaluate them by behavioural techniques and by recording EMG; EEG or fMRI data in the context with connectivity analyses. We develop and/or apply stimulation techniques such as repetitive transcranial magnetic stimulation (rTMS), transcranial direct current stimulation, alternating current stimulation or random noise stimulation (tDCS, tACS, tRNS). TMS induces a short electric current in the human brain. Both rTMS and electric stimulation techniques offer the prospect of inducing LTD and LTP like effects in the human brain. Diseases in our focus are Parkinson's disease, epilepsy, migraine, stroke and dystonia.
The Department of Clinical Neurophysiology pursues other research areas such as Neurorehabilitation in conjunction with the Bernstein Centre of Computational Neuroscience and with the Company Otto Bock. Another focus concerns Hereditary Neuropathies in collaboration with the MPI for Experimental Medicine, speech disorders with a focus on stuttering and others (overview researcher ID A-3544-2009).

Selected Recent Publications

Alekseichuk et al. (2016) Spatial Working Memory in Humans Depends on Theta and High Gamma Synchronization in the Prefrontal Cortex. Current Biology 26: 1513-1521

Voss U, Holzmann R, Hobson A, Paulus W, Koppehele-Gossel J, Klimke A, Nitsche M A (2014) Induction of self awareness in dreams through frontal low current stimulation of gamma activity. Nat Neurosci 17(6): 810-2

Paulus W (2014) Transcranial brain stimulation: potential and limitations. e-Neuroforum doi:DOI 10.1007/s13295-014-0056-6

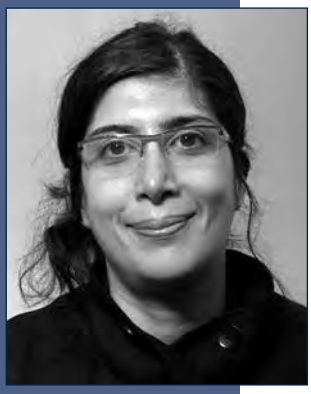
Sommer M, Norden C, Schmack L, Rothkegel H, Lang N, Paulus W (2013) Opposite optimal current flow directions for induction of neuroplasticity and excitation threshold in the human motor cortex. Brain Stimul 6(3): 363-70

Polanía R, Nitsche MA, Korman C, Batsikadze G, Paulus W (2012) The importance of timing in segregated theta phase-coupling for cognitive performance. Curr Biol 22: 1314-8

Antal A, Polania R, Schmidt-Samoa C, Dechent P, Paulus W. (2011) Transcranial direct current stimulation over the primary motor cortex during fMRI. Neuroimage. 2011 Mar 15;55(2): 590-6

Moliadze V, Antal A, Paulus W. Boosting brain excitability by transcranial high frequency stimulation in the ripple range. J Physiol 2010 588: 4891-904

Nitsche MA, Kuo MF, Karrasch R, Wächter B, Liebetanz D, Paulus W (2009) Serotonin affects transcranial direct current-induced neuroplasticity in humans. BIOL PSYCHIAT 66(5): 503-8



Address

Perception and Cognition
European Neuroscience
Institute (ENI)
Grisebachstrasse 5

37077 Göttingen
Germany

phone: +49-551-39 13909
e-mail: a.pooresmaeili
@eni-g.de

Further Information

http://www.eni.gwdg.de/
index.php?id=435

Arezoo Pooresmaeili

Group Leader Perception and Cognition

- 1994 – 2001 Tehran University School of Medicine and Health Sciences, obtained degree: MD
- 2003 – 2009 PhD projects exploring mechanisms of visual attention in the primary visual cortex and Frontal Eye Fields (under supervision of Dr. Pieter Roelfsema)
- 2009 – 2011 Postdoctoral fellow, Pisa Vision Lab, with Dr. Concetta Morrone and Dr. David Burr
- 2011 – 2014 Postdoctoral fellow, Berlin School of Mind and Brain, with Dr. Ray Dolan (Einstein Visiting Fellow)
- Since 2015 Group Leader, Perception and Cognition Group, European Neuroscience Institute, Göttingen, Germany

Major Research Interests

- Systems Neuroscience
    - Cognitive Neuroscience
        - Behavioral, Neuroimaging, Electrophysiology and Brain Stimulation Studies in humans
            - Sensory Perception
            - Attention
            - Reward Processing
            - Decision Making
            - Social Cognition

Selected Recent Publications

Arezoo Pooresmaeili, Aurel Wannig, Raymond J. Dolan (2015) Receipt of reward leads to altered estimation of effort. Proc Natl Acad Sci U S A 112(43): 13407-10. doi: 10.1073/pnas.1507527112. Epub 2015 Oct 12

Arezoo Pooresmaeili, Thomas H.B. FitzGerald, Dominik R. Bach, Ulf Toelch, Florian Ostendorf, Raymond J. Dolan (2014) Crossmodal effects of value on perceptual acuity and stimulus encoding. Proceedings of the National Academy of Sciences (PNAS) 111(42): 15244-9. doi: 10.1073/pnas.1408873111

Arezoo Pooresmaeili and Pieter Roelfsema (2014) A growth-cone model for the spread of object-based attention. Current Biology 24(24): 2869-77. doi: 10.1016/j

Arezoo Pooresmaeili, Jasper Poort, Pieter R Roelfsema (2014) Simultaneous selection by object-based attention in visual and frontal cortex. Proceedings of the National Academy of Sciences (PNAS) 111(17): 6467-72. doi: 10.1073/pnas.1316181111

Arezoo Pooresmaeili, Roberto Arrighi, Laura Biagi, Maria Concetta Morrone: (2013) Blood Oxygen Level-Dependent Activation of the Primary Visual Cortex Predicts Size Adaptation Illusion. Journal of Neuroscience 33(40): 15999-16008

Arezoo Pooresmaeili, Jasper Poort, Alexander Thiele, Pieter R Roelfsema (2010) Separable codes for attention and luminance contrast in the primary visual cortex. Journal of Neuroscience 30(38): 12701-11

Address

Dept. of Molecular Biology
of Neuronal Signals
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 643
fax: +49-551-3899 644
e-mail: pardo@em.mpg.de

Further Information

http://www.uni-goettingen.de/en/127638.html

Jeong Seop Rhee

Professor, Max Planck Institute for Experimental Medicine

- M.S. in Biology, Sogang University Master thesis, Seoul, Korea (1992)
- Ph. D. Kyushu University, School of Medicine Department of Physiology, Japan (1997)
- Assistant Professor, Kyushu University, Faculty School of Medicine Department of Physiology, Japan (1997 – 2000)
- Postdoctoral fellow, Max-Planck Institute Biophysical Chemistry, Department of Membranbiophysik, Germany (2000 – 2004)
- Assistant Professor, Baylor College of Medicine, Department of Human Genetics and Neuroscience, USA (2004 – 2006)
- Group Leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (since 2006)
- Professor, Georg August University Goettingen, Germany (since 2017)

Major Research Interests

We study that signaling between nerve cells in the brain is mainly mediated at synapses, which are specialized cellular contact sites. The transfer of information at synapses can be regulated dynamically, a process that is called synaptic plasticity. Our main research goal is to elucidate the molecular mechanisms that underlie synaptic plasticity at synapses in the central nervous system. For this purpose we mainly use electrophysiological methods, in combination with nerve cells from genetically modified mice or virus-mediated molecular perturbation of nerve cell function.
Neurotransmitter release is the first step in synaptic signaling. It is mediated by exocytosis of synaptic vesicles at highly specialized contact sites, the active zones of synapses. Neurotransmitters are stored in synaptic vesicles, which undergo a complex trafficking cycle in the presynaptic compartment in order to sustain the rapid and repetitive transfer of information between nerve cells. Synaptic vesicles are initially tethered at the active zone plasma membrane, a process termed docking. Subsequently vesicles undergo a prefusion reaction termed priming, which renders docked vesicles fusion competent, thus defining the readily releasable pool of vesicles. Triggered by the arrival of an action potential at the nerve terminal and the concomitant increase in the intracellular Ca^{2+} concentration, a fraction of fusion competent vesicles in the readily releasable pool fuse with the plasma membrane and release their content. After fusion, vesicular membrane and protein components are recycled by endocytosis and used for additional rounds of exocytosis.
Essentially, each step of the synaptic vesicle cycle can contribute to the regulation of synaptic plasticity. We combine mouse genetics, molecular biological and morphological methods, and patch clamp electrophysiological analyses of autaptic cultured neurons, organotypic brain slice cultures, acute brain slices, or acutely isolated neurons with active presynaptic terminals in order to identify the molecular mechanisms underlying the individual synaptic vesicle recycling steps. In the past, we characterized mutant mice lacking identified presynaptic protein components of the neurotransmitter release machinery. Experiments on mutant mouse neurons are complemented by virus mediated expression of proteins in cultured neurons, which allows us to perform detailed structure-function analyses of presynaptic proteins.

Selected Recent Publications

Lai Y, Choi UB, Leitz J, Rhee HJ, Lee C, Altas B, Zhao M, Pfuetzner RA, Wang A, Brose N, Rhee JS and Brunger AT (2017) Molecular mechanisms of synaptic vesicle priming by Munc13 and Munc18. Neuron, in press

Sigler A, Oh WC, Imig C, Altas B, Kawabe H, Cooper BH, Kwon HB, Rhee JS*, Borse N* (2017) Formation and Maintenance of Functional Spines in the Absence of Presynaptic Glutamate Release. Neuron 94: 304-311 (*joint corresponding authors)

Address

Department of Neuro- and Sensory Physiology
University Medical Center Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 5911
fax: +49-551-39 6031
e-mail: srizzol@gwdg.de

Further Information

http://rizzoli-lab.de/

Silvio O. Rizzoli

Professor, Director of Department of Neuro- and Sensory Physiology

- 1996 – 2000 BSc in Biochemistry at the University of Bucharest, Romania
- 2000 – 2004 PhD in Physiology at the University of Colorado, Denver, USA (Department of Physiology and Biophysics, Prof. W. J. Betz)
- 2004 – 2007 Postdoctoral Fellow, Dept. of Neurobiology, Max-Planck Institute for Biophysical Chemistry, Göttingen
- 2007 – 2012 Group Leader (STED Microscopy) at the European Neuroscience Institute Göttingen (ENI-G)
- 2012 – 2014 Professor (W3), University Medical Center Göttingen
- 2014 – Director of the Department of Neuro- and Sensory Physiology, University Medical Center Göttingen

Major Research Interests

Conventional fluorescence microscopy is limited by the diffraction of light: fluorescent objects that are close together cannot be discerned. Stimulated emission depletion (STED) is a recent advancement in optical physics that breaks the diffraction barrier, allowing microscopes to obtain much clearer images. The diffraction barrier has been particularly problematic for imaging synaptic vesicles, which are among the smallest known organelles (30-50 nm in diameter). They are located in small areas in the synapses (about 1 micron in diameter). The group takes advantage of the increased imaging resolution provided by STED to investigate synaptic vesicle function, with an emphasis on synaptic vesicle recycling. Since STED microscopy also allows imaging of protein domains, the group aims at studying the patterning of protein domains in the synapse, in order to understand its molecular architecture.

Selected Recent Publications

Vreja IC, Nikic I, Goettfert F, Bates M, Kröhnert K, Outeiro TF, Hell SV, Lemke EA, Rizzoli SO (2015) Super-resolution Microscopy of Clickable Amino Acids Reveals the Effects of Fluorescent Protein Tagging on Protein Assemblies. ACS Nano 9: 11034-41

Vreja IC, Kabatas S, Saka SK, Kröhnert K, Höschen C, Opazo F, Diederichsen U, Rizzoli SO (2015) Secondary-ion mass spectrometry of genetically encoded targets. Angew Chem Int Ed Engl 54: 5784-5788

Wilhelm BG, Mandad S, Truckenbrodt S, Kröhnert K, Schäfer C, Rammner B, Koo SJ, Claßen GA, Krauss M, Haucke V, Urlaub H, Rizzoli SO (2014) Composition of isolated synaptic boutons reveals the amounts of vesicle trafficking proteins. Science 344: 1023-1028

Revelo NH, Kamin D, Truckenbrodt S, Wong AB, Reuter-Jessen K, Reisinger E, Moser T, Rizzoli SO (2014) A new probe for super-resolution imaging of membranes elucidates trafficking pathways. J Cell Biol 205: 591-606

Saka SK, Honigmann A, Eggeling C, Hell SW, Lang T, Rizzoli SO (2014) Multi-protein assemblies underlie the mesoscale organization of the plasma membrane. Nat Commun 5: 4509

Address

Affective Neuroscience
and Psychophysiology
Gosslerstrasse 14

37073 Göttingen
Germany

phone: +49-551-39 20625
fax: +49-551-39 13570
e-mail: schacht@psych.
uni-goettingen.de

Further Information

https://www.psych.uni-goettingen.de/de/anap

Annekathrin Schacht

Professor of Affective Neuroscience and Psychophysiology

- 2004 – 2008: Research Scientist, Biological Psychology / Psychophysiology (Prof. Dr. Werner Sommer), Institute of Psychology, HU Berlin
- 2008: Dissertation (Dr. rer. nat., HU Berlin)
- 2009: Visiting Professor of Psychology of Motivation and Emotion (substitution), Department of Psychology, University of Potsdam
- 2010: Invited Junior Professor of Affective Neuroscience, Swiss Center for Affective Sciences (CISA), University of Geneva
- 2010: Visiting Professor of Cognitive Neuroscience, Institute of Psychology, Humboldt-Universitaet zu Berlin
- 2011: Habilitation (venia legendi) in Psychology (HU Berlin)
- since 10/2010: Junior Professor (tenure track), Courant Research Centre “Text Structures”, University of Goettingen
- since 2016: Professor of Affective Neuroscience and Psychophysiology, Institute of Psychology, University of Goettingen

Major Research Interests

Our main research activities focus on the interplay of cognition and emotion in several domains of human information processing, including faces and written and spoken language. Our work aims to identify the specification of the origins, dynamics, and boundary conditions of emotion effects within and between different stimulus domains and modalities, as well as to better define the emotional outcomes of cognitive operations. In order to answer our research questions, we employ a combination of well-established experimental paradigms with several psychophysiological measures, including event-related brain potentials (ERPs), eye movements, electrodermal and respiratory activity, facial muscle activity (via EMG recordings), and changes of pupil diameter.
Research areas:

- Affective and motivational impacts on visual sensory processing
- Emotion-cognition interplay in the processing of written and spoken language
- Face processing, including emotional expressions, attractiveness, and face identity
- Audiovisual integration of social signals in human communication

Selected Recent Publications

Bayer M, Ruthmann K, Schacht A (2017) The impact of personal relevance on emotion processing: evidence from event-related potentials and pupillary responses. Social Cognitive and Affective Neuroscience 2017, nsx075, DOI: 10.1093/scan/nsx075

Hammerschmidt W, Sennhenn-Reulen H, Schacht A (2017) Associated motivational salience impacts early sensory processing of human faces. NeuroImage 156: 466-474. DOI: 10.1016/j.neuroimage.2017.04.032

Rossi V, Vanlessen N, Bayer M, Grass A, Pourtois G, Schacht A (2017) Motivational salience modulates early visual cortex responses across task sets. Journal of Cognitive Neuroscience 29: 968-979. DOI: 10.1162/jocn_a_01093

Rellecke J, Sommer W, Schacht A (2012) Does processing of emotional facial expressions depend on intention? Time-resolved evidence from event-related brain potentials. Biological Psychology 90(1): 23 - 32. DOI: 10.1016/j.biopsycho.2012.02.002

Schacht A, Adler N, Chen P, Guo T, Sommer W (2012) Association with Positive Outcome induces Early Effects in Event-related Brain Potentials. Biological Psychology 89: 130-136. DOI: 10.1016/j.biopsycho.2011.10.001

Rellecke J, Palazova M, Sommer W, Schacht A (2011) On the automaticity of emotion processing in words and faces: Event-related brain potentials evidence from a superficial task. Brain and Cognition 77: 23-32

Address

Dept. of Neurobiology
German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-3851 494
fax: +49-551-3851 228
e-mail: hscherberger@dpz.eu

Further Information

http://dpz.eu/neurobiology

Hansjörg Scherberger

Professor of Primate Neurobiology at the German Primate Center

- Dipl. math. (MS Math), University of Freiburg, Germany, 1993
- Dr. med. (MD), University of Freiburg, Germany, 1996
- Postdoctoral Fellow, Dept of Neurology, University of Zürich, Switzerland, 1995 – 1998
- Postdoctoral Fellow, California Institute of Technology, 1998 – 2000
- Senior Postdoctoral Fellow, California Institute of Technology, 2000 – 2004
- Work group leader, Institute of Neuroinformatics, ETH / University of Zürich, Switzerland, 2004 – 2009
- Professor for Primate Neurobiology, University of Göttingen and Deutsches Primatenzentrum GmbH, since 2008

Major Research Interests

We are interested in how hand movements are generated in the primate brain and how intentions to grasp objects can be decoded for controlling a neural prosthesis. For this, we investigate the cortical representation of hand movements in motor-related cortical areas and their relation to sensory systems and decision making. Furthermore, we are developing brain-machine interfaces that can read out such movement intentions to control robotic devices. Such systems could be useful for future applications aiming to restore hand function in paralyzed patients.

Selected Recent Publications

Michaels JA, Dann B, Intveld RW, Scherberger H (2018). Neural dynamics of variable grasp movement preparation in the macaque fronto-parietal network. J Neuroscience 38: 5759-5773

Michaels JA, Scherberger H (2018) Population coding of grasp and laterality-related information in the macaque fronto-parietal network. Scientific Reports 8: 1710

Scherberger H (2017) Stirred, Not Shaken: Motor Control with Partially Mixed Selectivity. Neuron 95(3): 479-481

Michaels JA, Dann B, Scherberger H (2016) Neural Population Dynamics during Reaching Are Better Explained by a Dynamical System than Representational Tuning. PLoS Computational Biology 12(11): e1005175

Dann B, Michaels JA, Schaffelhofer S, Scherberger H (2016) Uniting functional network topology and oscillations in the fronto-parietal single unit network of behaving primates. eLife 5: e15719

Schaffelhofer S, Scherberger H (2016) Object vision to hand action in macaque parietal, premotor, and motor cortices. eLife 5: e15278

Michaels J, Dann B, Intveld RW, Scherberger H (2015) Predicting Reaction Time from the Neural State Space of the Premotor and Parietal Grasping Network. J Neuroscience 35: 11415-11432

Janssen P, Scherberger H (2015) Visual Guidance in Control of Grasping. Annual Review of Neuroscience 38: 69-86

Schaffelhofer S, Agudelo-Toro A, Scherberger H (2015) Decoding a Wide Range of Hand Configurations from Macaque Motor, Premotor, and Parietal Cortices. J Neuroscience 35: 1068-1081

Schaffelhofer S, Scherberger H (2012) A new method of accurate hand- and armtracking for small Primates. Journal of Neural Engineering 9: 026025

Address

Universitätsmedizin
Göttingen
Psychiatrie und
Psychotherapie
Von-Siebold-Str. 5

37075 Göttingen
Germany

phone: +49-551-39 65236
e-mail: oschlue@gwdg.de

Further Information

http://www.psychiatrie.med.uni-goettingen.de/de/content/forschung/752.html

Oliver Schlüter

Group Leader Molecular Neurobiology

- 1995 – 2001 M.D. Ph.D. with Thomas C. Südhof at the Max-Planck-Institute for Experimental Medicine in Göttingen
- 2000 Dr. rer. nat. (PhD), University of Hannover
- 2001 Dr. med. (Medical thesis), University of Göttingen
- 2001 – 2002 Postdoc with Christian Rosenmund and Reinhard Jahn at the Max-Planck-Institute for Biophysical Chemistry in Göttingen
- 2002 – 2006 Postdoc with Robert C. Malenka at Stanford University Medical Center (USA)
- 2006 – 2015 Independent group leader (Emmy-Noether/DFG) at the European Neuroscience Institute Göttingen (ENI-G), since 2006
- Assistant Professor at the Department of Neuroscience, University of Pittsburgh, since 2015
- since 2016 Adjunct Professor at the Department of Psychiatry and Psychotherapy, University Medical Center Göttingen

Major Research Interests

Activity-dependent modulations of synaptic transmission are important mechanisms of information processing and storage in neuronal circuits. A variety of related but mechanistically distinct forms of synaptic plasticity have been described in *in vitro* preparations of brain slices.
A major goal of my laboratory is to elucidate the underlying molecular events, leading to and regulating changes in synaptic efficacy. Newly developed techniques of molecular replacement, using mouse genetics and/or viral-mediated gene transfer allow us to manipulate the molecular composition of single neurons in a spatial and temporal controlled manner.
In particular, we are able to investigate the effects of heterologously expressed proteins on the background of wild-type neurons, or neurons, in which the endogenous protein expression is diminished. We combine this technique with simultaneous dual whole cell patch clamp recordings from rodent brain slices to monitor changes in synaptic efficacy in the manipulated cell in comparison to the neighboring control cell.
Knowledge gained from the understanding of molecular mechanisms of synaptic transmission and plasticity will ultimately provide important clues for the function of neuronal circuits and potentially the functioning of the brain.

Selected Recent Publications

Liu Y, Cui L, Schwartz MK, Dong Y, Schlüter OM (2017) Adrenergic gate release in spike timing-dependent synaptic potentiation. Neuron 93(2): 394-408

Shukla A, Beroun A, Panopoulou M, Neumann PA, Grant SGN, Olive MF, Dong Y, Schlüter OM (2017) Calcium permeable AMPA receptors and silent synapses in cocaine-conditioned place preference. EMBO J 36(4):458-474

Huang X, Stodieck SK, Goetze B, Cui L, Wong MH, Wenzel C, Hosang L, Dong Y, Löwel S#, Schlüter OM# (2015) Progressive Maturation of Silent Synapses Governs the Duration of a Critical Period. PNAS. 112(24): E3131-40

Lee BR*, Ma Y*, Huang YH, Wang X, Otaka M, Ishikawa M, Neumann PA, Graziane NM, Brown TE, Suska A, Guo C, Lobo MK, Sesack SR, Wolf ME, Nestler EJ, Shaham Y, Schlüter OM, Dong Y# (2013) Maturation of silent synapses in amygdala-accumbens projection contributes to incubation of cocaine craving. Nat Neurosci 16(11): 1644-51

Krüger JM, Favaro PD, Liu M, Kitlinska A, Huang X, Raabe M, Akad DS, Liu Y, Urlaub H, Dong Y, Xu W, Schlüter OM# (2013) Differential roles of Postsynaptic Density-93 isoforms in regulating synaptic transmission. J Neurosci 33(39): 15504-17

Bonnet SA, Akad DS, Samaddar T, Liu Y, Huang X, Dong Y, Schlüter OM (2013) Synaptic state-dependent functional interplay between Postsynaptic Density-95 and Synapse-associated Protein 102. J Neurosci 33(33): 13398-409

Address

Somatosensory Signaling Group
Max Planck Institute for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 572
fax: +49-551-3899 573
e-mail: mschmidt@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=311

Manuela Schmidt

Group Leader Somatosensory Signaling at the Max Planck Institute for Experimental Medicine

- 1997 – 2002: Diploma, Biology, University of Wuerzburg, Germany
- 2001 – 2002: Master, Neurosciences, International Max Planck School Neurosciences, Goettingen, Germany
- 2002 – 2006: PhD, Neurosciences, International Max Planck School Neurosciences, Laboratory of Stephan Sigrist, ENI-G, Goettingen, Germany
- 2007 – 2012: Postdoc with Ardem Patapoutian, The Scripps Research Institute, La Jolla, California, USA
- Since 2012: Emmy Noether Group Leader

Major Research Interests

The perception of and appropriate reaction to external and internal stimuli is critical for survival. In vertebrates, chemical, mechanical (from pleasant touch to painful contact) and thermal stimuli are detected by specialized somatic sensory neurons which transfer these signals via the spinal cord to the brain. An important subset of these neurons, so-called nociceptors, senses noxious stimuli. Consequently, their activation mediates nociception and leads to the sensation of pain. Pain is the single most common symptom for which patients seek medical assistance. While acute pain has served as a protective mechanism throughout evolution to guard the body against injury, pain can also become chronic and highly debilitating. Unfortunately, chronic pain imposes substantial challenges to medical practice: current therapies can be effective for short-term treatment however many do not provide sufficient relief to chronic conditions or cause strong side-effects. Therefore, a deeper understanding of the specific molecular mechanisms underlying both, acute and chronic pain is crucially needed.
Our research focuses on the comparative and quantitative analysis of somatosensory signaling networks in established mouse models of acute and chronic pain. To this purpose our lab employs an integrative approach from comprehensive proteome profiling via mass spectrometry, biochemistry, calcium-imaging, and electrophysiology to virus-mediated gene transfer in mice and mouse behavioral studies.

Selected Recent Publications

Barry et al. (2018) Region resolved quantitative proteome profiling reveals molecular dynamics associated with chronic pain in the PNS and spinal cord. Frontiers Molecular Neuroscience

Gomez-Varela D, Schmidt M (2018) The proteomics and metabolomics of pain—opportunities for systems medicine. The Oxford Handbook of the Neurobiology of Pain Edited by John N. Wood, Subject: Neuroscience, Sensory and Motor Systems

Narayanan P, Hütte M, Kudryasheva G, Taberner FJ, Lechner SG, Rehfeldt F, Gomez-Varela D, Schmidt M (2018) Myotubularin related protein-2 and its phospholipid substrate PIP2 control Piezo2-mediated mechanotransduction in peripheral sensory neurons. Elife. 7, e32346-e32346

Narayanan P, Sondermann J, Rouwette T, Karaca S, Urlaub H, Mitkovski M, Gomez-Varela D, Schmidt M (2016). Native Piezo2 Interactomics Identifies Pericentrin as a Novel Regulator of Piezo2 in Somatosensory Neurons. J Proteome Res, 5;15(8): 2676-87. doi: 10.1021/acs.jproteome.6b00235

Avenali L, Narayanan P, Rouwette T, Cervellini I, Sereda M, Gomez-Varela D, Schmidt M (2014). Annexin A2 Regulates TRPA1-Dependent Nociception. J Neurosci 34(44):14506-16. doi: 10.1523/JNEUROSCI.1801-14

Address

AG “Molecular and
Translational Neurology”
Max Planck Institute
for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 745
+49-551-3899 757
fax: +49-551-3899 753
e-mail: sereda@
em.mpg.de

Further Information

http://www.em.mpg.de/
index.php?id=122&L=1

Michael Sereda

Professor of Molecular and Translational Neurology, Group Leader at the Max Planck Institute for Experimental Medicine

- 2007 Group leader ”Molecular and Translational Neurology“, Max Planck Institute of Experimental Medicine
- 2008 Board certification in Neurology (Facharzt für Neurologie)
- 2008 Attending Neurologist and Head Neurogenetics Outpatients Clinic, Dept. of Clinical Neurophysiology, University of Göttingen (UMG)
- 2010 Associate Professorship “Neurology and Neurogenetics” (Habilitation)
- 2012 DFG-Heisenberg Professorship “Hereditary Neuropathies”, Dept. of Clinical Neurophysiology, UMG
- 2017 Tenured Professorship of Neurology, Dept. of Clinical Neurophysiology, UMG

Major Research Interests

We pursue a basic research interest in glia cell biology, axon-glia interaction and mechanisms of diseases of the peripheral nervous system (PNS). We have generated a transgenic rat model of the most frequent human neuropathy, Charcot-Marie-Tooth disease type 1A (CMT1A). This disease is associated with a partial duplication of chromosome 17 which leads to an overexpression of the tetraspan protein PMP22. Transgenic “CMT rats” expressing additional copies of this gene share characteristic clinical features of the human disease, including muscle weakness, reduced nerve conduction velocities, and marked Schwann cell hypertrophy resulting in onion bulb formation. The CMT rat allows a better understanding of the cellular disease mechanism operating in human CMT1A, and is helpful in the analysis of modifier genes, epigenetic factors, and in the evaluation of experimental treatment strategies. In an attempt to translate findings from the animal model to humans we were able to identify biomarkers of disease severity in the skin of CMT1A patients, which could already be validated in patients from across Europe. Currently, within CMT-NET, a national BMBF funded network on rare diseases coordinated by Prof. Sereda, we aim at transferring our results from skin to easily accessible blood samples from CMT patients, which would facilitate the performance of clinical trials in the near future.

Selected Recent Publications

Fledrich R, Abdelaal T, Rasch L, Bansal V, Schütza V, Brügger B, Lüchtenborg C, Prukop T, Stenzel J, Rahman RU, Hermes D, Ewers D, Möbius W, Ruhwedel T, Katona I, Weis J, Klein D, Martini R, Brück W, Müller WC, Bonn S, Bechmann I, Nave KA, Stassart RM, Sereda MW (2018) Targeting myelin lipid metabolism as a potential therapeutic strategy in a model of CMT1A neuropathy. Nat Commun 9(1): 3025

Fledrich R, Mannil M, Leha A, Ehbrecht C, Solari A, Pelayo-Negro AL, Berciano J, Schlotter-Weigel B, Schnizer TJ, Prukop T, Garcia-Angarita N, Czesnik D, Haberlová J, Mazanec R, Paulus W, Beissbarth T, Walter MC, Triaal C, Hogrel JY, Dubourg O, Schenone A, Baets J, De Jonghe P, Shy ME, Horvath R, Pareyson D, Seeman P, Young P, Sereda MW (2017) Biomarkers predict outcome in Charcot- Marie-Tooth disease 1A. J Neurol Neurosurg Psychiatry 88: 941-9522

Quintes S, Brinkmann BG, Ebert M, Fröb F, Kungl T, Arlt FA, Tarabykin V, Huylebroeck D, Meijer D, Suter U, Wegner M, Sereda MW*, Nave KA* (2016) Zeb2 is essential for Schwann cell differentiation, myelination and nerve repair. Nat Neuro 9: 1050-9 *Co-corresponding

Epplen DB, Prukop T, Nientiedt T, Albrecht P, Arlt FA, Stassart RM, Kassmann CM, Methner A, Nave KA, Werner HB, Sereda MW (2015) Curcumin therapy in a Plp1 transgenic mouse model of Pelizaeus-Merzbacher disease. Ann Clin Transl Neurol 2: 787-796

Pehlivan D, Beck CR, Okamoto Y, Harel T, Akdemir ZH, Jhangiani SN, Withers MA, Goksungur MT, Carvalho CM, Czesnik D, Gonzaga-Jauregui C, Wiszniewski W, Muzny DM, Gibbs RA, Rautenstrauss B, Sereda MW, Lupski JR (2016) The role of combined SNV and CNV burden in patients with distal symmetric polyneuropathy. Genet Med 18(5): 443-51

Address

AG Visual Processing
European Neurosciene
Institute Göttingen (ENI)
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 13905
e-mail: msilies@eni-g.de

Further Information

http://www.eni.gwdg.de/index.php?id=356

Marion Silies

Group Leader Visual Processing

- PhD in Biology, University of Münster, 2009
- Postdoctoral Fellow, Stanford University, 2009 - 2014
- Group leader, European Neuroscience Institute Göttingen, since 2014

Major Research Interests

We aim to understand how neural networks perform critical computations. In sensory systems, a variety of computations extract information from the environment to guide behavior. Our understanding of these processes remains fragmentary: in some systems, specific neurons have been identified that respond to distinct sensory cues; in others, specific behavioral outputs or computational models that predict physiology or behavior are known. We want to get a complete understanding of how neurons gain specific physiological properties, how they are organized in circuits and how these circuits guide distinct behaviors.

Animals ranging from insects to humans use visual motion to navigate through the environment, capture prey, or escape predators. Because motion vision requires circuits to integrate visual information over both space and time it has long been considered a paradigmatic computation for understanding brain function and models that describe how motion information can be extracted have long existed. However, the neural circuits that implement these models are still incompletely understood. Moreover, many molecular and cellular mechanisms regulate synaptic activity or modulate cellular properties in identified neurons, but they have only rarely been associated with specific, behaviorally relevant computations. My lab intends to achieve this by studying motion detection in a genetic model organism, the fruit fly Drosophila. In flies, motion-guided behaviors have been studied in detail and described computationally. We use cell biological and genetic approaches to manipulate critical neurons in motion detecting circuits. In combination with physiology and quantitative behavioral analysis, we hope to identify the mechanisms by which a nervous system can integrate molecular, cellular and circuit mechanisms to compute behaviorally critical outputs from specific inputs.

Selected Recent Publications

Fischer YE, Leong JCS, Sporar K, Ketkar MD, Gohl DM, Clandinin TR, Silies M (2015) A visual pathway with wide field properties is required for elementary motion detection. Current Biology 22: 3178-3189

Fisher YE*, Silies M* and Clandinin TR (2015) Orientation selectivity sharpens correlation based elementary motion detection in *Drosophila*. Neuron 88: 390-402.*equal contribution

Silies M*, Gohl DM*, Fisher YE, Freifeld L, Clark DA and Clandinin TR (2013) Modular use of peripheral input channels tunes motion-detecting circuitry. Neuron 79: 111-127 *equal contribution

Gohl DM, Silies MA, Gao XJ, Bhalerao S, Luongo FJ, Lin CC, Potter CJ and Clandinin TR (2011) A genetically convertible enhancer trap for directed combinatorial dissection of gene expression patterns. Nature Methods 8: 231-237

Silies M, Klämbt C (2010) APC/C-Fzr/Cdh1 dependent regulation of cell adhesion controls glial migration in the *Drosophila* PNS. Nature Neuroscience 13: 1357-1364

Address

Center of Anatomy
Dept. of Neuroanatomy
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: +49-551-39 7051
fax: +49-551-39 14016
e-mail: jochen.staiger@med.uni-goettingen.de

Further Information

http://neuro.ukat.gwdg.de/barrels/

Jochen Staiger

Professor of Neuroanatomy

- 1993 Graduation as Dr. med. at the Medical Faculty of the Justus-Liebig-University Giessen; grade: summa cum laude
- 1994 – 2000 Post-doc at the C. & O. Vogt-Institute for Brain Research, Düsseldorf, (Head: Prof. Dr. K. Zilles); Leader of the research group „Cortical microcircuits“
- 2000 Habilitation and Venia legendi for Anatomy at the Medical Faculty of the Heinrich-Heine-University Düsseldorf
- 2006 Appointment as W3 Univ.-Professor for Cell Biology at the Albert-Ludwigs-University Freiburg
- Since 2010 Full professor and director of the Department of Neuroanatomy at the Georg-August-University Göttingen

Major Research Interests

- Developmental plasticity induced by early postnatal deprivation of sensory stimulation in mice with intact or genetically altered thalamocortical projections
- Thalamo-cortical interactions as the first stage of cortical information processing
- Microcircuits in columnar modules – examining the Bauplan of synaptic connectivity of neocortex
- Tactile learning: Genomic regulation of experience-dependent plasticity in the trigeminal somatosensory system

Selected Recent Publications

Walker F, Möck M, Feyerabend M, Guy J, Wagener RJ, Schubert D, Staiger JF*, Witte M* (2016) Parvalbumin- and vasoactive polypeptide-expressing neocortical interneurons impose differential inhibition on Martinotti cells. Nature Communications 7: 13664

Wagener RJ, Witte M, Guy J, Mingo-Moreno N, Kugler S, Staiger JF (2016) Thalamocortical Connections Drive Intracortical Activation of Functional Columns in the Mislaminated Reeler Somatosensory Cortex. Cereb Cortex 26: 820-837

Guy J, Wagener RJ, Mock M, Staiger JF (2015) Persistence of Functional Sensory Maps in the Absence of Cortical Layers in the Somatosensory Cortex of Reeler Mice. Cerebral Cortex 25: 2517-2528

Prönneke A, Scheuer B, Wagener RJ, Mock M, Witte M, Staiger JF (2015) Characterizing VIP Neurons in the Barrel Cortex of VIPcre/tdTomato Mice Reveals Layer-Specific Differences. Cerebral Cortex 25: 4854-4868

De Felipe J, Lopez-Cruz PL, Benavides-Piccione R, Bielza C, Larranaga P, Anderson S, Burkhalter A, Cauli B, Fairen A, Feldmeyer D, Fishell G, Fitzpatrick D, Freund TF, Gonzalez-Burgos G, Hestrin S, Hill S, Hof PR, Huang J, Jones EG, Kawaguchi Y, Kisvarday Z, Kubota Y, Lewis, DA, Marin O, Markram H, McBain CJ, Meyer HS, Monyer H, Nelson SB, Rockland K, Rossier J, Rubenstein JL, Rudy B, Scanziani M, Shepherd GM, Sherwood CC, Staiger JF, Tamas G, Thomson A, Wang Y, Yuste R, Ascoli GA (2013) New insights into the classification and nomenclature of cortical GABAergic interneurons. Nature Reviews Neuroscience 14: 202-16

Address

Dept. of Genes and Behavior
Max Planck Institute for Biophysical Chemistry
Am Faßberg 11

37077 Göttingen
Germany

phone: +49-551-201 1710
e-mail: astoyko@gwdg.de

Further Information

https://www.mpibpc.mpg.de/stoykova

Anastassia Stoykova

Adj. Professor of Developmental Biology

- 1972 M.D., Institute of Medicine, Plovdiv, Bulg. Medical Academy
- 1973 – 1988 Research Associate, Bulgarian Academy of Sciences, Sofia
- 1987 Ph.D., Neurobiology, Institute Molecular Biology, Bulg.Acad.Sci, Sofia
- 1989 Habilitation (neurochemistry), Sofia
- 1989 – 1991 Assistant Research Professor, Inst. Mol. Biol., Bulg. Acad. Sci., Sofia
- 1991 – 2002 Senior Research Scientist, Max Planck Institute for Biophysical Chemistry, Dept. Molecular Cell Biology, Göttingen
- 1989 Habilitation (developmental biology), Faculty of Medicine, University Göttingen
- 2002 – 2008 Research Group Leader, Dept. Mol Cell Biol, MPIPBC, Göttingen
- since 2008 Independent Research Group Leader MPI-bpc (W2, MPG Minerva Program)
- since 2010 Adj. Professor at the University of Göttingen

Major Research Interests

Our research interest is focused on molecular mechanisms of patterning and neurogenesis in developing and adult brain with an emphasis on the mammalian corticogenesis. In mammalian cortex billions of neurons are ordered in six layers and multiple functional domains, acting as integrative and executive centers. The complex organization of the cortex arises during embryogenesis from a limited number of neural stem cells through processes, controlled by cell-type specific and temporally distinct transcriptional programs. We are interested to understand genetic mechanisms, controlled by transcription factors, for the specification of neuronal subtype identity, layer, and area formation in developing cortex. In another line of studies we are addressing epigenetic control mechanisms of cortical neurogenesis through the chromatin remodeling BAF-complex (mSWI/SNF) in developing and adult brain. The main niche for neurogenesis in the adult brain is the subventricular zone (SVZ) of the forebrain. In ongoing collaborative effort, we aim to elucidate at a genomic level the differential gene expression in SVZ upon ischemic injury of the primate (monkey) brain. The generated data base is useful in providing primite brain specific gene candidates, possibly involved in determining the limited reparative capacity of the damaged human brain.

Selected Recent Publications

Doeppner TR, Herz J, Bähr M, Tonchev AB, Stoykova A (2018) Zbtb20 regulates developmental neurogenesis in the olfactory bulb and gliogenesis after adult brain injury. Molecular Neurobiology, May 11

Nguyen H, Kerimoglu C, Pirouz M, Pham, L, Kiszka KA, Sokpor G, Sakib MS, Rosenbusch J, Teichmann U, Seong RH, Stoykova A, Fischer A, Steiger J, Tuoc T (2018) Epigenetic regulation of BAF complexes limits neural stem cell proliferation by suppressing Wnt signaling in late embryonic development. Stem Cell Report 10: 11734-1750

Tuoc T, Dere E, Radyushkin K, Pham L, Nguyen H, Tonchev AB, Sun G, Ronnenberg A, Shi Y, Steiger JF, Ehrenreich H, Stoykova A (2017) Ablation of BAF170 in developing and postnatal dentate girus affects neural stem cell proliferation, differentiation, and learning. Molecular Neurobiology 564: 4618-4635

Tonchev AB, Tuoc TC, Rosenthal EH, Studer M, Stoykova A (2016) Zbtb20 modulates the sequential generation of neuronal layers in developing cortex. Molecular Brain (9) 65

Narayanan R, Pirouz M, Kerimoglu C, Pham L, Wagener RJ, Kiszka KA, Rosenbusch J, Seong RH, Kessel M, Fischer A, Stoykova A, Staiger JF, Tuoc T(2015) Loss of BAF (mSWI/SNF) complexes causes global transcriptional and chromatin state changes in forebrain development. Cell Reports13: 1842 -1854

Paul V, Tonchev AB, Henningfeld KA, Pavlakis E, Rust B, Pieler T, Stoykova A (2014) Scratch2 modulates neurogenesis and cell migration through antagonism of bHLH proteins in the developing neocortex. Cerebral Cortex 24 (3): 754-772

Address

Cognitive Neuroscience Laboratory
German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-3851 115
fax: +49-551-3851 452
e-mail: treue@gwdg.de

Further Information

http://www.dpz.eu/en/unit/cognitive-neurosciences/about-us.html

Stefan Treue

Professor, Director of the German Primate Center
Head of the Cognitive Neuroscience Laboratory

- 1992: Ph.D. Massachusetts Institute of Technology
- 1992 – 1993: Postdoctoral Fellow, MIT
- 1993 – 1995: Postdoctoral Fellow, Baylor College of Medicine, Houston, Texas
- 1995 – 2001: Work Group Leader, Laboratory of Cognitive Neuroscience, University of Tübingen
- 2000 – 2001: Professor of Animal Physiology, University of Tübingen
- 2001: Professor of Cognitive Neuroscience and Biological Psychology, University of Göttingen

Major Research Interests

Research at the Cognitive Neuroscience Laboratory is aimed at understanding the neural basis of visual perception. Vision is an active process that is far more than a passive registration of our environment. Rather, on its way from the eyes to and through the cortex, visual information is modulated by numerous processes that enhance some aspects while diminishing others. One of these processes is attention, i.e. the ability to filter out unwanted information and concentrate the brain´s processing abilities on relevant information.
The accurate representation of visual motion in the environment is one of the most important tasks of the visual system. Correspondingly, research in the laboratory concentrates on this ability as a model for sensory information processing in general.
We use various techniques. While our emphasis is on electrophysiology, i.e. the recording of the activity of neurons in the visual cortex of macaque monkeys and measuring human perceptual abilities with psychophysical methods, we also use theoretical approaches and functional brain imaging.
Using these techniques, we have been able to elucidate how motion information is represented in primate cortical area MT and how attention changes that representation and correspondingly the percept of the visual environment.

Selected Recent Publications

Yao T, Treue S, Krishna BS (2016) An attention-sensitive memory trace in macaque MT following saccadic eye movements. PLoS Biol 14:e1002390

Niebergall R, Khayat PS, Treue S, Martinez-Trujillo J (2011) Multifocal attention filters out distracter stimuli within and beyond receptive field boundaries of primate MT neurons. Neuron 72:1067-1079

Anton-Erxleben K, Stephan VM, Treue S (2009) Attention reshapes center-surround receptive-field structure in macaque cortical area MT. Cerebral Cortex 19: 2466-2478

Busse L, Katzner S, Treue S (2008) Temporal dynamics of neuronal modulation during exogenous and endogenous shifts of visual attention in macaque area MT. Proceedings of the National Academy of Sciences 105(42): 16380-16385

Womelsdorf T, Anton-Erxleben K, Pieper F, Treue S (2006) Dynamic shifts of visual receptive fields in cortical area MT by spatial attention. Nature Neuroscience 9 (19): 1156-1160

Martinez-Trujillo JC, Treue S (2004) Feature-based attention increases the selectivity of population responses in primate visual cortex. Current Biology 14: 744-751

Martinez-Trujillo JC, Treue S (2002) Attentional modulation strength in cortical area MT depends on stimulus contrast. Neuron 35: 365-370

Treue S, Hol K, Rauber HJ (2000) Seeing multiple directions of motion – Physiology and psychophysics. Nature Neuroscience 3 (3): 270-276

Address

Dept. of Cognitive Neurology
University Medical Center Göttingen
Robert-Koch-Straße 40

37075 Göttingen
Germany

phone: +49-551-39 13131
fax: +49-551-39 13243
e-mail: melanie.wilke@med.uni-goettingen.de

Further Information

http://www.cognitive-neurology.med.uni-goettingen.de/index.html/

Melanie Wilke

Professor of Cognitive Neurology

- 1997-2001: M.A. in Psycholinguistics, Neuropsychology and Neurobiology, Ludwig-Maximilians-University, Munich, Germany
- 2001-2005: PhD student at the Max Planck Institute for Biological Cybernetics, Tübingen, Advisor: Dr. D.A. Leopold
- 2005-2008: Postdoctoral Fellow in the Laboratory of Neuropsychology, NIMH, Bethesda, Advisor: Dr. D.A. Leopold
- 2008-2010: Postdoctoral Fellow in the Division of Biology, Caltech, Pasadena; Advisor: Prof. R.A. Andersen
- since 2011: Co-Investigator in the “Decision and Awareness” group (DAG) at the German Primate Center (DPZ)
- since 2011: Schilling Foundation Professor (W3), Director of the department of Cognitive Neurology and Head of the MR-Research Unit, UKG, Georg August University Göttingen

Major Research Interests

The long-term goal of our research is to understand how neural activity gives rise to spatial awareness and how distributed information is integrated to guide the selection of movement goals. Furthermore we are dedicated to perform translational research from monkey models of cognitive disorders to human patients. Current research focuses on the question how thalamic nuclei and cortical areas interact during visual perception and decision making. Another line of research is concerned with the neural mechanisms underlying spatial neglect, which is a frequent and severe consequence of brain damage in humans. Specifically, we are investigating pathological and compensatory changes in large-scale brain networks in human stroke patients by means of imaging (DTI, fMRI) and stimulation (tACS, tDCS, TMS) methods. We develop and employ monkey models of spatial neglect to study the underlying neural mechanisms by means of fMRI, electrophysiological recordings, inactivation and stimulation techniques with the goal to develop new therapeutic interventions.

Selected Recent Publications

Storm F, Boly M, Casali M, Massimini M, Olcese M, Pennartz CMA, Wilke M (2017) Consciousness regained: disentangling mechanisms, brain systems, and behavioral responses. J of Neuroscience, (in press)

Wilke M, Dechent P, Bähr M (2017) Sarcoidosis manifestion centered on the thalamic pulvinar leading to persistent astasia. Movement Disorders: Clinical Practice, (in press)

Dominguez-Vargas A, Schneider L, Wilke M*, Kagan I* (2017) Electrical Microstimulation of the Pulvinar Biases Saccade Choices and Reaction Times in a Time-Dependent Manner. J of Neuroscience 37(8): 2234-2257. *equal contribution

Cabral-Calderin Y, Williams K, Dechent P, Opitz A, Wilke M (2016) Transcranial alternating current stimulation modulates spontaneous low frequency fluctuations as measured with fMRI. 2016. Neuroimage 141: 88-107

Cabral-Calderin Y, Weinrich C, Schmidt-Samoa C, Poland E, Dechent P, Bähr M, Wilke M (2016) Transcranial alternating current stimulation affects the BOLD signal in a frequency and task-dependent manner. Hum Brain Map 37(1): 94-121

Tsuchiya N, Wilke M, Frässle S, Lamme V (2015) No-report paradigms: Extracting the true neural correlates of consciousness. Trends Cogn Sci 19(12): 757-70

Hwang E, Hauschild M, Wilke M, Andersen RA (2014) Spatial and Temporal Eye-Hand Coordination Relies on the Parietal Reach Region. J of Neuroscience 34: 12884-92

Hwang EJ, Hauschild M, Wilke M, Andersen RA (2012) Inactivation of the parietal reach region causes optic ataxia, impairing reaches but not saccades. Neuron 76(5): 1021-9

Address

Max Planck Institute for
Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 722
fax: +49-551-3899 715
e-mail: wojcik@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=101&L=1

Sonja M. Wojcik

Group Leader at the Max Planck Institute for Experimental Medicine

- Diploma in Biology, RWTH Aachen, Germany (1994)
- Ph.D. in Molecular and Cellular Biology, Baylor College of Medicine,
- Houston, TX, USA (2000)
- Postdoctoral fellow, Department of Molecular Neurobiology, Max Planck Institute of Experimental Medicine, Göttingen, Germany (2001)
- Group leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (2008)
- Habilitation, Medical Faculty of the Georg August University Göttingen, Germany (2014)

Major Research Interests

We study the molecular processes underlying neurotransmitter release and the functional consequences of alterations in these processes at the cellular and network levels.
In the past, projects were mainly focused on analyzing the role of vesicular neurotransmitter transporters in neurons as determining factors in the establishment and maintenance of glutamatergic, GABAergic and glycinergic synaptic phenotypes.
Current projects include the analysis of regulatory mechanisms that control the release of non-classical neurotransmitters from large dense-core vesicles in neuroendocrine chromaffin cells and peptidergic neurons.

Selected Recent Publications

Wüstefeld L, Winkler D, Janc OA, Hassouna I, Ronnenberg A, Ostmeier K, Muller M, Brose N, Ehrenreich H, Wojcik SM (2015) Selective expression of a constitutively active erythropoietin receptor in GABAergic neurons alters hippocampal network properties without affecting cognition. J Neurochem doi: 10.1111/jnc.13445. [Epub ahead of print]

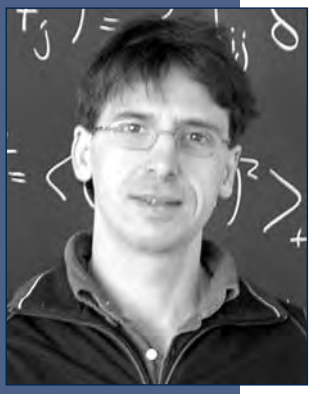
Man KM, Imig C, Walter AM, Pinheiro PS, Stevens DR, Rettig J, Sorensen JB, Cooper BH, Brose N, Wojcik SM (2015) Identification of a Munc13-sensitive step in chromaffin cell large dense-core vesicle exocytosis. eLife 4, doi: 10.7554/eLife.10635

Rahman J, Besser S, Schnell C, Eulenburg V, Hirrlinger J, Wojcik SM Hulsmann S (2015) Genetic ablation of VIAAT in glycinergic neurons causes a severe respiratory phenotype and perinatal death. Brain Struct Funct 220: 2835-2849

Wojcik SM, Tantra M, Stepniak B, Man KN, Muller-Ribbe K, Begemann M, Ju A, Papiol S, Ronnenberg A, Gurvich A, Shin Y, Augustin I, Brose N, Ehrenreich H (2013) Genetic Markers of a Munc13 Protein Family Member, BAIAP3, Are Gender-Specifically Associated with Anxiety and Benzodiazepine Abuse in Mice and Humans. Mol Med 19: 135-148

Wojcik SM, Katsurabayashi S, Guillemin I, Friauf E, Rosenmund C, Brose N, Rhee JS (2006) A Shared Vesicular Carrier Allows Synaptic Corelease of GABA and Glycine. Neuron 50: 575-587

Herzog E, Takamori S, Jahn R, Brose N, Wojcik SM (2006) Synaptic and vesicular co-localization of the glutamate transporters VGLUT1 and VGLUT2 in the mouse hippocampus. J Neurochem 99: 1011-1018



Address

Dept. of Nonlinear Dynamics
Max Planck Institute for Dynamics and Self-Organization
Bunsenstr. 10

37073 Göttingen
Germany

phone: +49-551-5176 423
fax: +49-551-5176 409
e-mail: fred@nld.ds.mpg.de

Further Information

http://www.uni-goettingen.de/en/58058.html

Fred Wolf

Group Leader Theoretical Neurophysics at the Max Planck Institute for Dynamics and Self-Organization

- 1999 Dr. phil. nat., J.W. Goethe Universität, Frankfurt
- 2000 Amos de Shalit Fellow, Racah Institute of Physics and Interdisciplinary Center for Neural Computation, Hebrew Univ., Jerusalem (Israel)
- 2001 – 2004 Research Associate, Max-Planck-Institut für Strömungsforschung, Göttingen
- Fall 2001, 2003, 2004 Visiting Scholar, Kavli Institute for Theoretical Physics, UC Santa Barbara (USA)
- Since 2004 Head of the Research Group “Theoretical Neurophysics”, Department of Nonlinear Dynamics, Max-Planck-Institut für Strömungsforschung, Göttingen

Major Research Interests

- Theoretical neuroscience and nonlinear dynamics
- Dynamics and synchronization in cortical neural networks
- Function and development of the visual cortex
- Sensory processing in the auditory system

The brains of humans and animals arguably are among the most complex systems in nature. Over the past decade, theoretical neuroscience - the use of quantitative theories, mathematical modelling and advanced quantitative data analysis methods for the study of brain function - has started to provide powerfull new approaches for understanding the neuronal basis of preception, learning, memory, and other higher brain functions. This is because, even during the neuronal processing of the most elementary sensory stimulus large ensembles of interacting nerve cells distributed throughout the brain are activated, the collective operations of which are often hard to understand by means of purely qualitative reasoning.
The primary focus of our research in theoretical neuroscience is self-organisation in the dynamics of cortical networks. In particular, we have developed novel approches to model and predict the dynamics and and neuronal plasticity of the visual cortex. To quantitatively connect theory and experiment in this system, we recently also designed methods that enable to quantify the organization of visual cortical functional architecture with high precision. Another important focus of our work is the mathematical analysis of the dynamics of large and complex networks of pulse-coupled neuron models. The concepts and tools for the representation of the dynamics of cortical circuits developed enable a rational and transparent design of models of higher cortical functions such as the processes underlying perceptual learning phenomena.

Selected Recent Publications

Palmigiano A, Geisel T, Wolf F jsa, Battaglia D (2017) Flexible information routing by transient synchronization. Nature Neurosci doi: 10.1038/nn.4569

Chapochnikov N M, Takago H, Huang C-H, Pangrsic T, Khimich D, Neef J, Auge E, Göttfert F, Hell S W, Wichmann C, Wolf F jsa, Moser T (2014) Uniquantal Release through a Dynamic Fusion Pore Is a Candidate Mechanism of Hair Cell Exocytosis. Neuron 83(6): 1389-1403, doi: 10.1016/j.neuron.2014.08.003

Kaschube M, Schnabel M, Löwel S, Coppola DM, White LE, and Wolf F (2010) Universality in the Evolution of Orientation Columns in the Visual Cortex. Science 330: 1113

Naundorf B, Wolf F jsa, Volgushev M (2006) Unique features of action potential initiation in cortical neurons. Nature 440: 1060

Wolf F, Geisel T (1998) Spontaneous pinwheel annihilation during visual development. Nature 395: 73-78

Address

Laboratory for Molecular and Cellular Systems
Dept. of Neuro- and Sensory Physiology
Centre II, Physiology and Pathophysiology
University of Göttingen
Humboldtalee 23

37073 Göttingen
Germany

phone: +49-551-39 12368
fax: +49-551-39 12266
e-mail: fred.wouters@gwdg.de

Further Information

http://www.uni-goettingen.de/en/58060.html

Fred Wouters

Professor for Molecular and Cellular Systems

- 1997 Dr. (Ph. D.), Faculty of Chemistry, University of Utrecht, The Netherlands
- 1997 – 2000 Postdoctoral fellow, Imperial Cancer Research Fund (ICRF), London UK
- 2000 – 2001 Postdoctoral fellow, European Molecular Biology laboratory (EMBL), Heidelberg
- 2001 Appointed as group leader at the European Neuroscience Institute, Göttingen
- 2006 PD (habilitation), Physiology, Göttingen University
- since July 2007 Professor

Major Research Interests

The focus of our research is the regulation and role of the neuronal cytoskeleton in the modulation of neuronal shape and motility during chemotactic processes. The growing neuronal growth cone probes its environment for the chemical composition of its substrate and the presence of neighbouring cells. The former information is sampled by cell adhesion receptors in focal adhesion structures that, next to their sensing function also perform a structural function in that they provide the cell with a means to exert force on its substrate. We are primarily interested in the signal transduction processes that regulate these effects and the cross-talk between the different motility systems.
The main interest areas in this question are; 1. The role and molecular mechanism of lipid raft-resident cell adhesion molecules in the remodelling of the membrane cytoskeleton, 2. Dynamic control of growth cone protein content by local proteolysis and chaperone function during chemotactic responses, 3. Role and mechanism of the neuronal exocyst complex as critical landmarks for dendritic/axonal neuritogenesis.
Our group has a related interest in the pathophysiological mechanism of neurodegeneration by intracellular aggregation of the tau protein, as occurs in Alzheimer's disease. As tau is an intrinsically unstructured protein that can undergo remarkable conformational changes upon binding to microtubules and in the Alzheimer-related aggregation condition, it presents an ideal model system for the biophysical analysis of protein conformational change and protein interactions.
Our research depends on the development and application of advanced microscopy techniques, primarily; fluorescence lifetime imaging microscopy (FLIM), and Förster resonance energy transfer (FRET) microscopy, in combination with a range of GFP-based optical biosensors and novel bioconjugation approaches for organic dyes, and protein biochemical/molecular biological techniques to resolve and quantify biochemical reactions and conditions in living cells.

Selected Recent Publications

de Castro MA, Bunt G, Wouters FS (2016) Cathepsin B launches an apoptotic exit effort upon cell death-associated disruption of lysosomes. Cell Death Discov. 2016 Feb 29;2: 16012

Schmitz M, Wulf K, Signore SC, Schulz-Schaeffer WJ, Kermer P, Bähr M, Wouters FS, Zafar S, Zerr I (2014) Impact of the cellular prion protein on amyloid-ć and 3PO-tau processing. J Alzheimers Dis 38(3): 551-65

Schulz O, Pieper C, Clever M, Pfaff J, Ruhlandt A, Kehlenbach RH, Wouters FS, Großhans J, Bunt G, Enderlein J (2013) Resolution doubling in fluorescence microscopy with confocal spinning-disk image scanning microscopy. Proc Natl Acad Sci U S A 2013 Dec 24;110(52): 21000-5

Deeg S, Gralle M, Sroka K, Bähr M, Wouters FS*, Kermer P* (2010) BAG1 restores formation of functional DJ-1 L166P dimers and DJ-1 chaperone activity. J Cell Biol 188(4): 505-13. *equal contribution.

van den Bogaart G, Holt MG, Bunt G, Riedel D, Wouters FS, Jahn R (2010) One SNARE complex is sufficient for membrane fusion. Nature Struct Mol Biol 17: 358-365

Graduate Program Committee

Prof. Dr. Nils Brose (Spokesperson IMPRS)
Prof. Dr. Alexander Gail
Prof. Dr. Martin Göpfert (Program Director)
Prof. Dr. Ralf Heinrich (Chair Examination Board)
Prof. Dr. Silvio Rizzoli
Prof. Dr. Jochen Staiger
Helena Maria (Linda) Olsthoorn
Albert Lehr
Selene Lickfett
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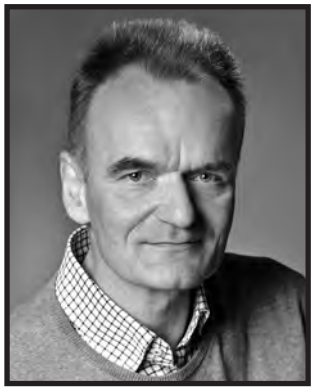
Program Coordination

Neuroscience Program



In memory of our dear colleague Michael Hörner

Sandra Drube
(Administrative Coordinator)

Franziska Kühne
(Program Assistant)

Coordination Office Neurociences
European Neuroscience Institute
Georg-August-Universität
Grisebachstraße 5

37077 Göttingen
Germany

phone:
+49 – 551 – 39 61369 / 61379
fax:
+49 – 551 – 39 61389
e-mail:
gpneuro@gwdg.de

Further Information

www.gpneuro.uni-goettingen.de

Molecular Biology Program

Dr. Steffen Burkhardt
(Program Coordinator)

Kerstin Grüniger
(Program Assistant)

Further Information:
www.gpmolbio.uni-goettingen.de

Imprint

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Notes

Georg-August-Universität
Göttingen

Max Planck Institutes for
- Biophysical Chemistry
- Experimental Medicine
- Dynamics and Self-Organization

German
Primate Center

European
Neuroscience Institute
Göttingen

www.gpneuro.uni-goettingen.de