Yearbook 2007/08

MSc/PhD/MD-PhD Neuroscience Program
at the University of Göttingen

International Max Planck
Research School

Imprint

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The international Master's / PhD Programs Molecular Biology and Neurosciences were established by the Georg August University Göttingen, together with the Max Planck Society for the Advancement of Science, in the year 2000 to attract excellent students from all over the world and provide them with an outstanding, research-oriented graduate program. Both programs are taught in English by internationally renowned scientists and offer a high level of services and individual support.

Several hundred students from all over the world apply for the 20 study places available in each of the programs every year. Both programs have introduced and combined elements of international recruitment, competitive admission procedures, advanced curricula, research training, social integration programs, extracurricular support and evaluation procedures into successful working structures. They have achieved excellent recommendations in several external evaluations and have been awarded the 2004 prize for excellent support services for foreign students by the German Federal Foreign Office. For the newly established Georg August University School of Science (GAUSS) and other graduate schools in Göttingen, the Molecular Biology and Neuroscience Programs are considered exemplary and serve as best practice models.

In October 2006, the two programs were awarded the label "Top 10 International Master's Degree Courses made in Germany" by the "Stifterverband für die Deutsche Wissenschaft" and the German Academic Exchange Service (DAAD) in a national contest, in which 121 Master's programs of 77 universities participated. The Göttingen Molecular Biology and Neuroscience programs were the only Master's programs in the natural sciences and medicine which received this award. Both programs are members of the Göttingen Graduate School for Neurosciences and Molecular Biosciences (GGNB), which was successful in the recent Excellence Competition by the German Federal and State Governments to promote science and research at German universities.

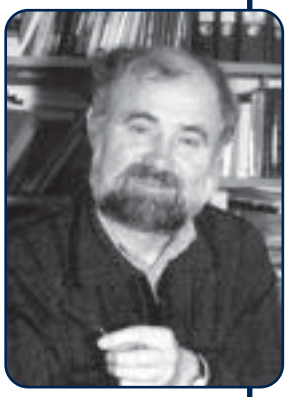
Five Göttingen University faculties, three Göttingen Max Planck Institutes as well as the German Primate Center participate in the programs. International guest lecturers are also involved. The Max Planck Society contributes through its newly established International Max Planck Research Schools. Both programs keep close contacts with the relevant industries to further enhance the chances of the graduates for a successful professional career.

I would very much like to thank all scientific bodies and institutions for their committed support in establishing 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 is proud of its long-standing international experience the two attractive and innovative programs have already become an integral part of. The university will continue to support these programs within the setting of Göttingen's lively urban, cultural and social life, in itself a prerequisite for creative teaching and research.

Prof. Dr. Kurt von Figura
(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, 49 International Max Planck Research Schools have been established involving 63 Max Planck Institutes, 47 German universities with 73 participating faculties and more than 15 universities abroad. More than 1900 (mostly PhD-) students from 87 countries are presently enrolled. Approximately 800 PhD students have graduated to date from an International Max Planck Research School.

Since their foundation in the year 2000, the Göttingen International Max-Planck Research Schools in Molecular Biology and Neurosciences 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”. 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 and Molecular Biosciences, thus were being instrumental for the success of the University in the German Excellence Initiative. 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.

Peter Gruss
President
Max Planck Society

Erwin Neher
Dean of the IMPRS
Neurosciences

Overview

This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Neuroscience Program 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.

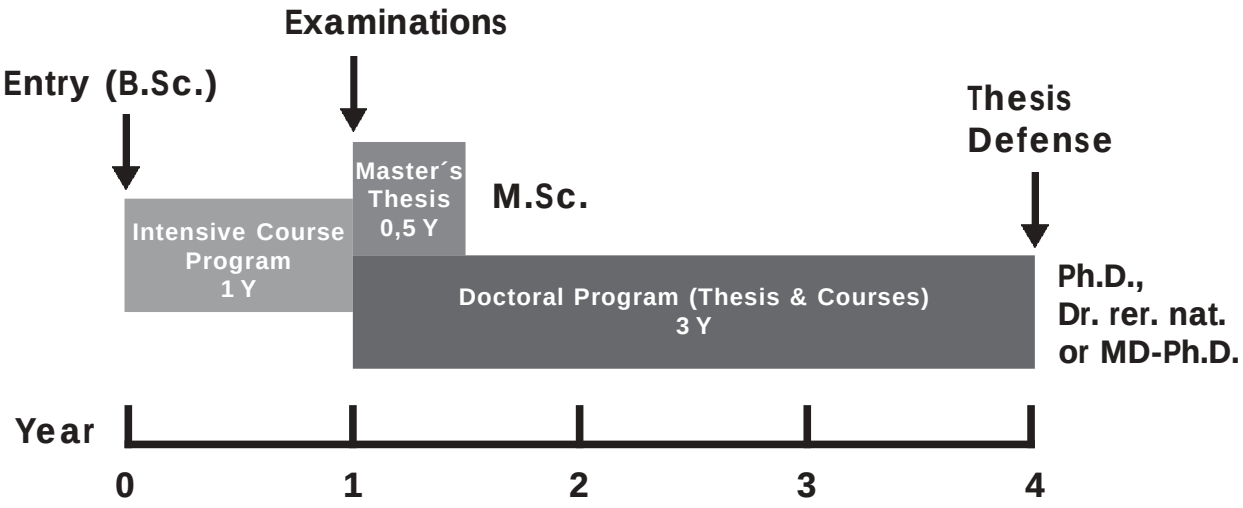
The program member of the recently founded Göttingen Graduate School for Neurosciences and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the University of Göttingen, the Max Planck Institute for Biophysical Chemistry (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 DFG Research Center for Molecular Physiology of the Brain (CMPB), 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-PhD 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 (MSc) is awarded upon successful completion of the Master's thesis.



Funding of the Program

The Neuroscience Program thanks the following institutions and funding initiatives, who contributed to the success of the Neuroscience Program:

DAAD

German Academic Exchange Service (DAAD), Bonn, Germany, http://www.daad.de

International Degree Programs - Auslandsorientierte Studiengänge (AS)

IPP made in Germany

International Postgraduate Programs – Internationale Promotionsprogramme (IPP)

Max Planck Society for the Advancement of Science, Munich, Germany, http://www.mpg.de

International Max Planck Research Schools

Niedersächsisches Ministerium für Wissenschaft und Kultur

Ministry of Lower Saxony for Science and Culture, Hannover, Germany, http://www.mwk.niedersachsen.de/home/

Innovationsoffensive

Doctoral Programs - Promotionsprogramme

Stifterverband für die Deutsche Wissenschaft

Stifterverband für die Deutsche Wissenschaft, Essen, Germany, http://www.stifterverband.org

Exzellenzstiftung zur Förderung der Max-Planck-Gesellschaft, http://www.exzellenzstiftung.de

Donors

The Neuroscience Program thanks the following companies for their donations, which were used to financially support students during the first year of studies:

Bayer AG, Leverkusen, Germany

Carl Zeiss Lichtmikroskopie, Göttingen, Germany

Degussa AG, Düsseldorf, Germany

DeveloGen AG, Göttingen, Germany

Heka Elektronik GmbH, Lambrecht / Pfalz, Germany

Hellma GmbH & Co. KG, Müllheim / Baden, Germany

KWS Saat AG, Einbeck, Germany

Leica Microsystems GmbH, Bensheim, Germany

Luigs & Neumann, Ratingen, Germany

Olympus Deutschland GmbH, Hamburg, Germany

Roche Diagnostics GmbH, Penzberg, Germany

Sartorius AG, Göttingen, Germany

Solvay Pharmaceuticals, Hannover, Germany

Springer Verlag, Heidelberg, Germany

Vossius & Partner, München, Germany

Intensive Course Program (First Year)

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

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

Lectures and Tutorials

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. Neuroanatomy

B. Physiology and Basic Statistics

C. Modelling, Autonomous Nervous System, Pharmacology

D. Molecular Biology, Development, and Neurogenetics

E. Sensory and Motor Systems

F. 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

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:

I Neuroanatomy

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

II Physiology and Basic Statistics

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

III Modelling, Autonomous Nervous System, Pharmacology

- neuronal modelling
- behavioral analysis
- Neuroendocrinology / Neuropharmacology

IV Molecular Biology, Development, and Neurogenetics

- cell culture methods
- methods in molecular biology

Laboratory Rotations

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 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 PhD 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-PhD 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 a 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 2007

Applicants must hold a Bachelor's degree or equivalent in biology, medicine, psychology, physics, 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 2007, the coordination office received 150 applications from 50 countries.

Continent	Applications	Admissions
Europe (total)	**37**	**6**
Germany	20	3
other West Europe	6	0
East Europe	11	3
America (total)	**14**	**2**
North America	4	0
Central/South America	10	2
Africa (total)	**5**	**2**
North Africa	1	1
Central/South Africa	4	1
Asia (total)	**93**	**5**
Near East	11	1
Central Asia/ Far East	82	4
Australia	**1**	**0**

Students 2007/2008

Name		Home Country
Hope	Agbemenyah	Ghana
Derya	Akad	Turkey
Alonso	Barrantes Freer	Costa Rica
Pitchaiah	Cherukuri	India
Ahmed	El Hady	Egypt
Aniket	Ghosh	India
Irina	Ionescu	Romania
Sadim	Jawhar	Qatar
Cemil	Kerimoglu	Turkey
Natalia	Manrique Hoyos	Colombia
Sünke	Mortensen	Germany
Chor Hoon	Poh	Singapore
Andreas	Schindler	Germany
Mayur	Vadhvani	India
Nora	Wender	Germany

Hope Agbemenyah

First Name
Hope Yao

Last Name
Agbemenyah

Date of Birth
5 August 1982

Country
Ghana

EDUCATION

College / University
University of Ghana
Highest Degree:
B.Sc. Chemistry
Major Subjects:
Chemistry, Physics, Biology
Lab Experience:
Analytical skills, TLC, organic synthesis
Projects / Research:
Synthesis of benzocaine and its sunscreen effect
Extraction of active ingredient in chloroquin
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

The size of the brain compared to the body is relatively small but all cognitive activities are controlled by the brain. I am interested in the neural basis of cognition, stem cells and also in understanding degeneration of brain cells.

Derya Akad

First Name
Derya

Last Name
Akad

Date of Birth
17 November 1984

Country
Turkey

EDUCATION

College / University
2002 - 2007: Bogaziçi University, Turkey
Highest Degree:
B.Sc. (Honours)
Major Subjects:
Molecular Biology and Genetics
Lab Experience:
Basic molecular biology techniques; PCR, gel electrophoresis, chromatography, cloning and expression studies of bacteria proteins, protein assay studies
Projects / Research:
Feb 07 - June 07: Sequencing and Comparison of Ts genes of different Thermophilic bacteria species
Sep 06 - Jan 07: Comparison of *Geobacillus anatolicus* Ribosomal Proteins with *E. coli* ribosomal proteins via 2-D Gel Electrophoresis
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
Aug 2006: International Summer School Scholarship of DAAD, Germany
2002 - 2004: Scholarship of Bogazici University, Turkey

SCIENTIFIC INTERESTS AND GOALS

My major area of interest lies in neuropsychology and understanding of memory. Therefore, my scientific goal is to study the underlying molecular mechanisms of emotions and overt behaviour. In addition, I hope to gain a deep insight in synaptic plasticity which plays a major role in learning and memory.

Alonso Barrantes Freer

First Name
Alonso

Last Name
Barrantes Freer

Date of Birth
15 May 1981

Country
Costa Rica

EDUCATION

College / University
1999 - 2006: Universidad de Costa Rica
Highest Degree:
M.D.
Major Subjects:
Medicine and Surgery
Lab Experience:
Training in behavioral neuroscience: Stereotaxic surgery, behavioral tests, brain perfusion, and brain neurochemistry (HPLC-EC)
Projects / Research:
Practical training in 6-OHDA rat model of Parkinson´s Disease, as well as in a rat model of Depression based on housing conditions. Neuroscience Research Program, University of Costa Rica
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
1999 - 2007: “Stimulus Scholarship” (exemption from tuition fees), University of Costa Rica

SCIENTIFIC INTERESTS AND GOALS

My main interest is the study of biological circuits, in physiological as well as in pathological conditions. I am fascinated by the way the brain circuitry integrates different stimuli and how this input can finally be expressed as many different outputs. I think that a deeper knowledge of the anatomical-physiological configuration is extremely important for the final understanding of the brain.

Pitchaiah Cherukuri

First Name
Pitchaiah

Last Name
Cherukuri

Date of Birth
4 April 1982

Country
India

EDUCATION

College / University
2005 - 2007: National Brain Research Centre (NBRC), India
2002 - 2005: Bharati Vidyapeeth Deemed University, India
Highest Degree:
M.Sc.
Major Subjects:
Molecular Biology, Systems Neuroscience
Lab Experience:
Immunocytochemistry, immunoblotting
Projects / Research:
2006 - 2007: Morphological, Biochemical, and behavioral characterization of an inducible mouse model of retinal degeneration
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
2005 - 2007: DBT fellowship through NBRC, India

SCIENTIFIC INTERESTS AND GOALS

The brain is an amazing assembly capable of doing remarkable jobs. During the normal course of ageing and neuropathology, the functions of this organ are affected. My interests are to understand the mechanisms of neuronal loss in the adult brain and the development of strategies to minimize/rescue neuronal loss.

Ahmed El Hady

First Name
Ahmed Tarek

Last Name
El Hady

Date of birth
5 May 1984

Country
Egypt

EDUCATION

College / University
Faculty of Pharmacy, Cairo University
Highest Degree:
B.Sc.
Major Subjects:
Pharmaceutical and Biological Sciences
Lab Experience:
Basic chromatographic techniques, HPLC, UV, IR, western blotting, electrophoresis, and endothelial cell culturing
Projects / Research:
June - July 2005: 'Role of PP2Cß in atherosclerosis', Marburg Institute for Pharmacology and Toxicology, Germany
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

One of the greatest scientific achievements that inspired me a lot is Darwin 's evolutionary theory. The ability of natural selection to explain several biological phenomena encouraged me to address questions at the interface of neurosciences and evolutionary biology such as how can genetics techniques be used to identify genes that played a crucial role in brain evolution? Which specific genes were crucial in development of unique human linguistic abilities? How can computational modelling of neuronal circuits explain emergence of complex traits in Homo sapiens? Could these complex traits be mimicked in artificial systems?
By addressing these questions, we could be able to provide novel techniques and models for studying brain evolution which remains one of the most challenging areas of evolutionary biology. 'Understanding our brain history should enable us to predict our brain's future'.

Aniket Ghosh

First Name
Aniket

Last Name
Ghosh

Date of birth
24 December 1983

Country
India

EDUCATION

College / University
2007 - 2005: University of Calcutta
2002 - 2005: Presidency College
Highest Degree:
M.Sc.
Major Subjects:
Neuroscience, Genetics, Molecular Biology, Physiology
Lab Experience:
Histology, experimental physiology (nerve muscle recordings, perfusion experiments on cardiac and smooth muscle), work physiology (measurement of physical fitness indices), DNA isolation, PCR, cloning, transformation, site-directed mutagenesis, DNA/protein gel electrophoresis
Projects / Research:
Jun - Jul 06: Effect of REM sleep deprivation on Na-K-ATPase in Jawaharlal Nehru University
2004: Evaluating physiological parameters (cardiovascular, anthropometric, haematological, socio-economic, and nutritional) in a field survey of tribal inhabitants in the North-Eastern part of India
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
2007: qualified GATE
2000, 2002: merit certificate in National Scholarship Scheme

SCIENTIFIC INTERESTS AND GOALS

My scientific interest is in the understanding of molecular mechanism of Alzheimer's disease. I would like to work on the Reelin signaling pathway which is involved in Alzheimer's disease as well as in the synaptic plasticity. Unraveling of this pathway in great details might correlate the amyloid deposition with tau hyperphosphorylation and ApoE4 polymorphism.

Irina Ionescu

First Name
Irina

Last Name
Ionescu

Date of Birth
30 August 1985

Country
Romania

EDUCATION

College / University
Bayer. Julius Maximilians University Würzburg
Highest Degree:
B.Sc.
Major Subjects:
Biomedicine
Lab Experience:
Basic techniques in molecular and cell biology and biochemistry, DNA cloning techniques, working with bacteria and cell cultures, methods of diagnostic, protein expression and interaction analysis, FRET, …
Projects / Research:
“Purification and viral vector-mediated transduction of murine hematopoietic stem cells”, supervisor: PD Dr. Carsten Scheller, Institute of Virology and Immunobiology, Würzburg
Scholarships:
Since Oct 2004: DAAD scholarship for especially gifted alumni of German schools abroad for the entire duration of studies at a German university

SCIENTIFIC INTERESTS AND GOALS

I find neurosciences to be such a fascinating field that it is as yet difficult for me to limit my interests to certain areas only. I am very interested in the processes of neurodegenerative diseases (due to aging or infections) as well as in defining their genetic components which lead to increased susceptibility for these diseases in certain individuals; I am also fascinated by the possibilities of inducing neuroregeneration in brain neurons through activation of stem cell differentiation. Another area that has captivated my interest consists of the processes leading to synaptic plasticity and the mechanisms by which information is accumulated and passed on from short-term to long-term memory.
I hope that after completing this MSc/PhD program in Neurosciences I will be able to turn my energy in the direction of applied research.

Sadim Jawhar

First Name
Sadim

Last Name
Jawhar

Date of Birth
25 October 1984

Country
Palestenian/
Lebanese document

EDUCATION

College / University
Qatar University
Highest Degree:
B.Sc. (Honours)
Major Subjects:
Biomedical Sciences
Lab Experience:
Clinical chemistry, histology, hematology, blood banking, microbiology, parasitology, clinical immunology, basic practice in Molecular Biology and Genetics, analytical chemistry
Projects / Research:
Sep 05 - Jan 06: ”The Effects of Different Diets on the Behavior of Male Sprague Dawley Rats”
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
April 2006: Scholarship from Qatar University to present the graduation project at the Experimental Biology Meeting San Francisco 2006
2001 - 2006: Scholarship from the State of Qatar

SCIENTIFIC INTERESTS AND GOALS

What makes us behave as we do? What produces our thoughts and moods? And what gives us different personal characteristics? I am deeply interested in studying the environmental and genetical factors that modulate brain parts involved in mood and cognitive processes. I also wish to find out how different neurotransmitters interact to affect the brain functionally and histologically. A dream of mine is to work in human behavior research that covers neural, psychological, and psychiatric aspects in order to achieve better understanding of the human being.

Cemil Kerimoglu

First Name
Cemil

Last Name
Kerimoglu

Date of Birth
26 August 1984

Country
Turkey

EDUCATION

College / University
2003 - 2007: Middle East Technical University, Turkey
Highest Degree:
B.Sc. in Molecular Biology and Genetics
Major Subjects:
Molecular Biology, Genetics, Biochemistry, Cell Biology, Neurobiology, Animal Behaviour
Lab Experience:
Techniques in molecular & cell biology and biochemistry, cell culture, fluorescent microscopy, cloning and bacterial transformation, using water maze
Projects / Research:
Mar - June 2007: Project on identifying an insertion at TMEM49 gene and near miR21 gene in MCF7 cells, and its potential oncogenicity
Summer 2006: Project on testing temperature sensitive N-degrons in *Drosophila*
Jan - May 2006: Project on electrophoretic DNA mutation analysis using MEMS
Summer 2005: Project on the effects of alcohol on spatial memory
Publications:
Bolender J, Erdeniz B, Kerimoglu C; "Hominid Uniqueness, Cognition by Description and Procedural Memory"; New Ideas in Psychology (under review)
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
Summer 2006: British Genetics Society Summer Studentship, UK

SCIENTIFIC INTERESTS AND GOALS

I am interested in the neural and molecular mechanisms underlying human cognition and behaviour. In this regard, synaptic plasticity – especially its implications in cognition – attracts my interest to a great extent. I am also interested in the evolution of human cognition, behaviour and language. In the long term, my aim is to explain the concepts of cognitive and/or behavioural sciences in terms of molecular biology.

Natalia Manrique Hoyos

First Name
Natalia

Last Name
Manrique Hoyos

Date of Birth
28 March 1984

Country
Colombia

EDUCATION

College / University
Pontificia Universidad Javeriana - Bogota, Colombia
Highest Degree:
B.Sc. in Biology
Major Subjects:
Genetics, Molecular Biology, Neurobiochemistry, Population Genetics, Animal Physiology, Evolution
Lab Experience:
Basic techniques in Molecular Biology
Projects / Research:
Jan - May 2006: Internship at the Population Genetics & Evolutionary Biology, Pontificia Universidad Javeriana. Standardization of heterologue rDNA nuclear and microsatellite markers PCR protocol for Palythoa caribaeorum
Aug 2006 - May 2007: Undergraduate research: "Gene flow analysis of Palythoa caribaeorum populations from the Colombia Caribbean using a nuclear rDNA marker"
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

My interest is mainly focused on neurogenetics and immunogenetics. As the nervous system is the main command and control unit of living beings, I wish to understand the processes through which such a self-regulated, advanced system collapses. My principal interests are genetic expression and molecular mechanisms of neurological diseases. Other topics that interest me are: neuroimmunology, CNS disorders, neural transplantation, and recovery of spinal cord function after injury.

Sünke Mortensen

First Name
Lena Sünke

Last Name
Mortensen

Date of Birth
10 February 1983

Country
Germany

EDUCATION

College / University
Westfälische Wilhelms-Universität Münster
Highest Degree:
B.Sc.
Major Subjects:
Biology
Lab Experience:
Basic techniques in molecular biology and behavioural testing
Projects / Research:
2007: Inhibition of the NMDA receptor in the honey bee brain by RNAi and its implication in memory formation, Freie Universität Berlin
2006: Variants in the genes for the monoamine metabolism and their contribution to the pathogenesis and treatment of Affective Disorders, Westfälische Wilhelms-Universität Münster
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I am interested in the cellular and molecular bases of complex behaviour and conscious states, communication between neurons and the involved signalling pathways and learning and memory. To approach these topics I would like to employ various techniques like neurogenetics / cell biology, electrophysiology, and mathematical and computer-based modelling because I think it is essential to integrate different approaches to gain insight into our highly complex brain.

Chor Hoon Poh

First Name
Chor Hoon

Last Name
Poh

Date of Birth
20 February 1985

Country
Singapore

EDUCATION

College / University
Mahidol University International College, Thailand
Highest Degree:
B.Sc. (Honours)
Major Subjects:
Biological Sciences
Lab Experience:
Immunofluorescence microscopy, immunohistochemistry, Western blotting
Projects / Research:
Transfer of Arylsulfatase-A (AS-A) to mouse sperm surface via epididymosomes during epididymal residence
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

100,000,000,000 nerve cells in the brain is not only complex but intriguing; this is where my interest for neuroscience stems from. My research interest lies in cognition and neurodegenerative diseases. It would be a challenge to investigate not only the biochemical but molecular and physiological mechanisms underlying neurodegenerative diseases. I would like also to discover the neurological basis of cognitive control and how these in turn influence the sensory input or motor output, thus establishing a link between neuromodulating systems and cognitive control. Through my research I hope to use a multidisciplinary approach to contribute to treatment for patients.

Andreas Schindler

First Name
Andreas

Last Name
Schindler

Date of Birth
4 July 1982

Country
Germany

EDUCATION

College / University
Georg-August-Universität Göttingen
Highest Degree:
Vordiplom
Major Subjects:
Biology
Lab Experience:
Basic techniques in biochemistry, microbiology, and cell culture
Basics in psychological experimental design
Practical training: MPI for Biological Cybernetics Tübingen, Dept. Neurophysiology (psychophysics, matlab, first contacts to fmri techniques)
MPI for Biophysical Chemistry Göttingen, Dept. Neurobiology (insights in cell culture and fluorescence microscopy)
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

The title of a textbook I worked with during my studies encapsulates my field of interest in the best possible manner: 'Neuroscience. From the Molecule to Cognition'. I am striving to better understand the functioning of the human brain, as I have always been immensely amazed by the human's complex cognitive abilities.
So the chance to enhance my understanding of the brain's functioning on a molecular respectively physiological, functional level – and the promising prospect of some day being able to make accurate predictions about it – is more than thrilling to me.
Furthermore, I intend to first deepen my knowledge about the molecular/cellular fundamentals and then, in a second step, focus on complex cognitive problems.

Mayur Vadhvani

First Name
Mayur

Last Name
Vadhvani

Date of Birth
26 October 1982

Country
India

EDUCATION

College / University
TATA Institute of Fundamental Research
Highest Degree:
M.Sc. in Biology
Major Subjects:
Neurosciences
Lab Experience:
Basic molecular biology techniques, protein expression analysis, gene expression analysis, animal handling and behavior paradigms including electroconvulsive seizure treatment and anxiety tests, stereotaxic surgeries for intra-hippocampal infusions and transcardial perfusions, *Drosophila* genetics, brain and imaginal disc dissections, Epi-Fluorescence Microscopy and Laser Scanning Confocal Microscopy
Projects / Research:
Jan 2006 - July 2007: Role of norepinephrine in regulation of structural plasticity in adult rodent piriform cortex
Jan 2006 - July 2007: Activity mediated regulation of sonic hedgehog pathway in adult mammalian brain
May 2003 - July 2003: Transient expression and isolation of chimeric recombinant antibody against human chorionic gonadotropin (hCG) in various plant species
Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
Aug 2004 - July 2007: Junior Research Fellowship funded by the Department of Biotechnology (DBT), India

SCIENTIFIC INTERESTS AND GOALS

My scientific interests mainly lie in understanding the stem cell biology. I am interested in studying various aspects of mechanisms underlying cell fate specification and function of the neural stem cells. Furthermore, I hope to work at the interface of basic science and applied medicine and would like to devise ways to translate the knowledge of stem cell biology to clinical applications.

Nora Wender

First Name
Nora

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Wender

Date of Birth
4 January 1985

Country
Germany

EDUCATION

College / University
2004 - 2007: University of Heidelberg

Highest Degree:
B.Sc. in Molecular Biotechnology

Major Subjects:
Bioinformatics, Drug research, Biophysics

Lab Experience:
Basic techniques in molecular biology, microbiology, biochemistry, and biotechnology; cell culture and cellular assay systems (Alpha Screen, FLIPR)

Projects / Research:
2007: Cellular assays with metabotrophic glutamate receptors for studying dose-response relationships
2005 - 2006: Reconstruction of neurons stained with biocytin

Scholarships:
2007 - 2008: Stipend International Max Planck Research School, Germany
2005 - 2008: Scholarship “Studienstiftung des deutschen Volkes“

SCIENTIFIC INTERESTS AND GOALS

I am interested in the molecular understanding of and therapy opportunities for neurodegenerative diseases. I would like to be able to contribute to these research fields since they are getting more and more important as a consequence of recent changes in the age distribution of the European society. Furthermore I would like to learn more about differences between human and primate brains, especially the development of language. In addition, I am fascinated by the formation of neuronal networks as well as the neuronal processes underlying human vision and other senses which combine perceiving, analyzing, and associating in a very effective way. Moreover I am interested in the field of epigenetics.

Faculty

(Senior Faculty, Group Leaders, Lecturers)

Mathias	Bähr	Neurology	U Göttingen
Nils	Brose	Molecular Neurobiology	MPI em
Wolfgang	Brück	Neuropathology	U Göttingen
Edgar	Brunner	Medical Statistics	U Göttingen
Stefan	Eimer	Molecular Neurogenetics	ENI
Wolfgang	Engel	Human Genetics	U Göttingen
André	Fischer	Laboratory for Aging and Cognitive Diseases	ENI
Gabriele	Flügge	Neurobiology	DPZ
Jens	Frahm	Biomedical NMR Research / Physical Chemistry	MPI bpc
Eberhard	Fuchs	Animal Physiology / Neurobiology	DPZ
Theo	Geisel	Nonlinear Dynamics	MPI ds
Ralf	Heinrich	Neurobiology	U Göttingen
Michael	Hörner	Cell Biology	U Göttingen
Swen	Hülsmann	Neuro- and Sensory Physiology	U Göttingen
Reinhard	Jahn	Neurobiology	MPI bpc
Hubertus	Jarry	Clinical and Experimental Endocrinology	U Göttingen
Jürgen	Klingauf	Membrane Biophysics	MPI bpc
Kerstin	Krieglstein	Neuroanatomy	U Göttingen
Till	Marquardt	Developmental Neurobiology	ENI
Tobias	Moser	Otolaryngology	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Erwin	Neher	Membrane Biophysics	MPI bpc
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Evgeni	Ponimaskin	Neuro- and Sensory Physiology	U Göttingen
Diethelm W.	Richter	Neuro- and Sensory Physiology	U Göttingen
Michael	Rickmann	Neuroanatomy	U Göttingen
Detlev	Schild	Molecular Neurophysiology	U Göttingen
Oliver	Schlüter	Molecular Neurobiology	ENI
Jörg B.	Schulz	Neurodegeneration	U Göttingen
Stephan	Sigrist	Neuroplasticity	ENI
Jakob	Sørensen	Molecular Mechanisms of Exocytosis	MPI bpc
Nicole	von Steinbüchel	Medical Psychology and Medical Sociology	U Göttingen
Anastassia	Stoykova	Molecular Cell Biology	MPI bpc
Walter	Stühmer	Molecular Biology of Neuronal Signals	MPI em
Andreas	Stumpner	Neurobiology	U Göttingen
Victor	Tarabykin	Molecular Biology of Neuronal Signals	MPI em
Stefan	Treue	Cognitive Neuroscience and Biological Psychology	DPZ
Andreas	Wodarz	Stem Cell Biology	U Göttingen
Fred	Wolf	Nonlinear Dynamics	MPI ds
Fred	Wouters	Cellular Biophysics	U Göttingen
Weiqi	Zhang	Neuro- and Sensory Physiology	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

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

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Major Research Interests

We are interested to understand 2 basic questions in cellular and molecular neurobiology:
1. Which factors support survival of adult CNS neurons?
2. What kills these cells under pathological conditions?

Up to now, only little is known about the mechanisms that support survival of a postmitotic cell like a human neuron for eventually more than 100 years under physiological conditions. However, by examining the molecular regulation of cell survival and cell death during development and in the lesioned adult CNS, one may get some clues to answer this question.

In our group, several *in vitro* and *in vivo* model systems are used which allow examination of neuronal de- and regeneration. Our basic model is the rodent retino-tectal projection. Here, we can study development, de- and regeneration of the respective projection neurons, the retinal ganglion cells (RGCs) in single cell cultures, explants or *in vivo*. Transection or crush-axotomy of the optic nerve induces retrograde death more than 80% of RGCs within two weeks. This secondary cell loss is mainly apoptotic and involves specific changes in gene expression pattern of transcription factors (e.g. c-jun or ATF-2), pro- and anti-apoptotic genes (e.g. bcl-2 or bax) and growth-associated genes (like GAP-43). Thus, long term survival and initiation of regeneration programmes of RGCs critically depends on inhibition of apoptotic cell death. To that end, we have used a variety of techniques to interfere with the cell death cascades that follow lesions of the optic nerve in adult rats. Inhibition of neuronal apoptosis can be afforded by pharmacological administration of trophic factors or by gene therapy approaches using adeno- or adeno-associated virus vectors that can deliver neurotrophic or anti-apoptotic factors directly into neurons or into surrounding glial cells. These, and other new strategies like using peptide-transduction-domains to deliver anti-apoptotic proteins across the blood-brain-barrier are now used to develop new experimental therapy strategies in animal models of human neurological disorders like stroke, trauma, multiple sclerosis or neurodegenerative diseases (e.g. Alzheimer´s or Parkinson´s disease).

Selected Recent Publications

Meyer R, Weissert R, de Graaf K, Diem R, Bähr M (2001) Acute neuronal apoptosis in a rat model of multiple sclerosis. J Neurosci 21: 6214-6220

Kilic E, Dietz GPH, Herrmann DM, Bähr M (2002) Intravenous TAT-Bcl-XL is protective when delivered before and after middle cerebral artery occlusion in mice. Ann Neurol 52(5): 617-22

Diem R, Hobom M, Maier K, Weissert R, Storch MK, Meyer R, Bähr M (2003) Methyprednisolone increases neuronal apoptosis during autoimmune CNS inflammation by inhibition of an endogenous neuroprotective pathway. J Neurosci 23(18): 6993-7000

Dietz GPH and Bähr M (2004) Delivery of Bioactive Molecules into the Cell: The Trojan Horse Approach. Mol Cell Neurosci 27(2): 85-131

Diem R, Sättler MB, Merkler D, Demmer I, Maier K, Stadelmann C, Ehrenreich H and Bähr M (2005) Combined therapy with methylprednisolone and erythropoietin in a model of multiple sclerosis. Brain 128: 375-85

Lingor P, Koeberle P, Kügler S and Bähr M (2005) Downregulation of apoptosis mediators by RNA interference inhibits axotomy-induced retinal ganglion cell death *in vivo*. Brain 128: 550-558

Nils Brose

Professor, Director at the Max Planck Institute for Experimental Medicine

- Dr. rer. nat. (Ph.D.) 1990, Ludwig Maximilians University Munich
- Appointed as Director at the Max Planck Institute for Experimental Medicine 2001

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Major Research Interests

Research in the Department of Molecular Neurobiology focuses on the molecular mechanisms of synapse formation and function in the vertebrate central nervous system. Typically, synapses are formed between cellular processes of a sending and a receiving nerve cell. They are the central information processing units in the vertebrate brain where some 10^{12} nerve cells are connected by 10^{15} synapses to form an elaborate and highly structured neuronal network that is the basis for all forms of behaviour. Signal transmission at synapses is mediated by the regulated release of signal molecules (neurotransmitters) which then diffuse to the receiving nerve cell and change its physiological state. In the Department of Molecular Neurobiology, we combine biochemical, morphological, mouse genetic, behavioural, and physiological methods to elucidate the molecular basis of synapse formation and transmitter release processes. Our synaptogenesis research concentrates on synaptic cell adhesion proteins and their role in synapse formation. 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

Rhee J-S, Betz A, Pyott S, Reim K, Varoqueaux F, Augustin I, Hesse D, Südhof TC, Takahashi M, Rosenmund C, Brose N (2002) Beta Phorbol ester- and diacylglycerol-induced augmentation of transmitter release is mediated by Munc13s and not by PKCs. Cell 108: 121-133

Roßner S, Fuchsbrunner K, Lange-Dohna C, Hartlage-Rübsamen M, Bigl V, Betz A, Reim K, Brose N (2004) Munc13-1-mediated vesicle priming contributes to secretory APP processing. J Biol Chem 279: 27841-27844

Junge H, Rhee J-S, Jahn O, Varoqueaux F, Spiess J, Waxham MN, Rosenmund C Brose N (2004) Calmodulin and Munc13 form a Ca^{2+}-sensor/effector complex that controls short-term synaptic plasticity. Cell 118: 389-401

Reim K, Wegmeyer H, Brandstätter JH, Xue M, Rosenmund C, Dresbach T, Hofmann K, Brose N (2005) Structurally and functionally unique Complexins at retinal ribbon synapses. J Cell Biol 169: 669-680

Varoqueaux F, Aramuni G, Rawson RL, Mohrmann R, Missler M, Gottmann K, Zhang W, Südhof TC, Brose N (2006) Neuroligins determine synapse maturation and function. Neuron 51: 741-754

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

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Major Research Interests

- Immunpathology 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

Kuhlmann T, Remmington L, Maruschak B, Owens T, Brück W (2007) Nogo-A is a reliable oligodendroglial marker in human and mouse adult CNS as well as in demyelinated lesions. J Neuropathol Exp Neurol 66: 238-246

Albert M, Antel J, Brück W, Stadelmann C (2007) Extensive cortical remyelination in patients with chronic multiple sclerosis. Brain Pathol 17: 129-138

Metz I, Lucchinetti CF, Openshaw H, Garcia-Merino A, Lassmann H, Freedman MS, Azzarelli B, Kolar OJ, Atkins HL, Brück W (2007) Autologous hematopoietic stem cell transplantation fails to stop demyelination and neurodegeneration in multiple sclerosis. Brain 130: 1254-1262

Jack C, Antel J, Brück W, Kuhlmann T (2007) Contrasting potential of nitric oxide and peroxynitrite to mediate oligodendrocyte injury in multiple sclerosis. Glia 55: 926-934

Schwartz M, Butovsky O, Brück W, Hanisch UK (2006) Microglial phenotype: Is the commitment reversible? Trends Neurosci 29: 68-74

Merkler D, Ernsting T, Kerschensteiner M, Brück W*, Stadelmann C* (2006) A new focal EAE model of cortical demyelination: MS-like lesions with rapid resolution of inflammation and extensive remyelination. Brain 129: 1972-1983

Patrikios P, Stadelmann C, Kutzelnigg A, Rauschka H, Schmidbauer M, Laursen H, Sorensen P, Brück W, Lucchinetti C, Lassmann H (2006) Remyelination is extensive in a subset of Multiple Sclerosis patients. Brain 129: 3165-3172

Zhou D, Srivastava R, Nessler S, Grummel V, Sommer N, Brück W, Hartung HP, Stadelmann C, Hemmer B (2006) Identification of a Pathogenic Antibody Response to Native Myelin Oligodendrocyte Glycoprotein in Multiple Sclerosis. PNAS 103: 19057-19062

Gutenberg A, Buslei R, Fahlbusch R, Buchfelder M, Brück W (2005) Immunopathology of primary hypophysitis: implications for pathogenesis. Am J Surg Pathol 29: 329-38

Keegan M, König F, McClelland R, Brück W, Morales Y, Bitsch A, Panitch H, Lassmann H, Weinshenker B, Rodriguez M, Parisi J, Lucchinetti CF (2005) Humoral Multiple Sclerosis Pathology Correlates With Response To Therapeutic Plasma Exchange. The Lancet 366: 579-582

Merkler D, Boretius S, Stadelmann C, Ernsting T, Michaelis T, Frahm J, Brück W (2005) Multicontrast MRI of remyelination in the central nervous system. NMR Biomed 18: 395-403

Edgar Brunner

Professor of Medical Statistics

- Student: WS 64/65 - SS 69, Technical University of Aachen
- Diploma: April 1969, Mathematics
- Promotion: 12. May 1971, (Dr. rer. nat.), Technical University of Aachen
  Title: Eine Beziehung zwischen dem Holm-Test und dem Kolmogorov-Smirnov-Test (A Relation between Holm's Test and the Kolmogorov-Smirnov-Test)
- Habilitation: 11.11.1973, Medical Statistics
- Professor: 01.01.1976 University of Göttingen, Dept. of Medical Statistics, 01.03.1976 Head of the Department
- Editor: Biometrical Journal
- Associate Editor: Journal of Statistical Planning and Inference

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Major Research Interests

Nonparametric Statistics

- Asymptotic distribution of rank statistics
- Multi-factor designs
- Adjustment for covariates

Longitudinal data

Ordered categorical data

Design and analysis of diagnostic trials

Statistical methods for the analysis of microarray data

Analysis of high-dimensional data

Selected Recent Publications

Bretz F, Landgrebe J, Brunner E, (2006) Efficient Design and Analysis of Two Color Factorial Microarray Experiments. Computational Statistics and Data Analysis 50: 499-517

Chen T-W, Lin B-J, Brunner E, Schild D, (2006) *In Situ* Background Estimation in Quantitative Fluorescence Imaging. Biophysical Journal 90: 2534-2547

Kaufmann J, Werner C, Brunner E, (2005) Nonparametric methods for analyzing the accuracy of diagnostic tests with multiple readers. Statistical Methods in Medical Research 14: 129-146

Brunner E, Domhof S, Langer F (2002) Nonparametric Analysis of Longitudinal Data in Factorial Designs. Wiley: New York

Brunner E, Munzel U (2002) Nichtparametrische Datenanalyse. Springer. Heidelberg

Brunner E, Munzel U, Puri ML (2001) The multivariate nonparametric Behrens-Fisher-Problem. J. Statist Plann and Inf 108: 37-53

Brunner E, Munzel U, Puri ML (1999) Rank-Score Tests in Factorial Designs with Repeated Measures. Journal of Multivariate Analysis 70: 286-317

Akritas MG, Arnold SF, Brunner E (1997) Nonparametric hypotheses and rank statistics for unbalanced designs. Journal of the American Statistical Association 92: 258-265

Stefan Eimer

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Further Information

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Group Leader Molecular Neurogenetics/ Neurodegeneration

- Ph.D. 2003 at the Gene Center of the Ludwig-Maximilian University (LMU) in Munich
- 2003 Postdoc at the Ecole Normale Superieure in Paris, France
- since Oct 2005 independent group leader of the Center for Molecular Physiology of the Brain (CMPB) at the European Neuroscience Institute (ENI) in Goettingen

Major Research Interests

Neuotransmitter gated ion channels are involved in a large subset of neuronal events ranging from fast synaptic transmission to the modulation of neuronal circuits that lead to memory formation and cognition. En route to the cell surface these multimeric receptors have to undergo multiple assembly, quality control, and sorting steps to eventually reach the synapse.
Our group aims to understand the mechanisms and rules that control the trafficking and sorting of ligand gated ion channels within the secretory apparatus. In particular, we are focusing on the nicotinic acetylcholine receptor family of ligand gated ion channels, which have been implicated in numerous neurological and neurodegenerative diseases. To find new molecules involved in these processes, we take advantage of the nematode *Caenorhabditis elegans* as a main model system, and use a combination of genetic, cell biological, and biochemical approaches as well as electro-physiology and electron-microscopy. As our main model system were are studying cholinergic neurotransmission at the neuro-muscular junction (NMJ) of *C. elegans*. Through genetic screens we have identified novel evolutionary conserved integral membrane proteins that regulate nAChR sorting at the Golgi-Endosomal interface. Further studies have implicated these molecules in the regulation and activation of small GTPases at Golgi complex. Based on these findings we have also started to study systematically how these GTPases are required for structure and function of the Golgi apparatus and how their activity affects the trafficking and neurotransmission at the NMJ of *C. elegans*.

Selected Recent Publications

Eimer S, Lakowski B, Donhauser R, and Baumeister R (2002) Loss of spr-5 bypasses the requirement for the presenilin *sel-12* by stage-specific derepression of *hop-1*. EMBO Journal 21: 5787-5796

Lakowski B, Eimer S, Göbel C, Bottcher A, Wagler B, Baumeister R (2003) Two suppressors of *sel-12* encode C2H2 zinc finger proteins that regulate presenilin transcription in *Caenorhabditis elegans*. Development 130: 2117-2128

Gally C, Eimer S, Richmond JE, Bessereau J-L (2004) A transmembrane protein required for acetylcholine receptor clustering in *C. elegans*. Nature 431: 578-582

Yamasaki A, Eimer S, Okochi M, Smialowska A, Kaether C, Baumeister R, Haass C, Steiner H (2006) The GxGD motif of presenilin contributes to catalytic function and substrate identification of gamma-secretase. J Neurosci 26(14): 3821-8

Eimer S, Gottschalk A, Richmond JE, Hengartner M, Schafer W, Bessereau J-L (2007) Regulation of nicotinic receptor trafficking by the transmembrane Golgi protein UNC-50. EMBO J

Wolfgang Engel

Professor of Human Genetics

- Dr. med., University of Freiburg, 1967
- Physician, Hospital Schorndorf, 1966 - 1968
- Postdoc, Institute of Human Genetics and Anthropology, University of Freiburg, 1968 - 1977
- Habilitation (Human Genetics), University of Freiburg, 1974
- Professor of Human Genetics and Director of the Institute, University of Göttingen, 1977

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Major Research Interests

Our research is focussed on the molecular analysis of normal human variability and genetic disturbances of development and differentiation. Isolated genes are being analyzed in detail with respect to their functional properties by animal models (transgenic and knock-out-mice). For suitable genetic diseases therapeutic strategies (substitution; gene therapy) are being developed and initial evaluation of such strategies is done in the mouse. - We are working on the genotype - phenotype correlations in neurological and cardiovascular diseases (e. g. Spastic paraplegia, Rett syndrome, mental retardation by subtelomeric microdeletions, molybdenum cofactor deficiency; cardiomypathies, Noonan syndrome) and several genetically determined malformation syndromes (e. g. Townes-Brocks syndrome, Okihiro syndrome, Morbus Osler).We are also engagend in the molecular and cellular basis of initiation events of cancer, specifically in prostate cancer, medulloblastoma and rhabdomyosarcoma. - One main interest in our institute is the analysis of structure, expression and function of genes involved in differentiation of male gametes. The knowledge of the function of those genes can help us to clarify the genetic causes of male infertility.

We have isolated spermatogonial stem cells (SSCs) from adult mouse testis and demonstrated that these cells are as pluripotent as embryonic stem cells (ESCs). Our main interest is now to isolate and proliferate SSCs from adult human testis. These cells would be of great interest for regenerative medicine.

Selected Recent Publications

Nayernia K, Li M, Jaroszynski L, Khusainov R, Wulf G, Schwandt I, Korabiowska M, Michelmann HW, Meinhardt A Engel W (2004) Stem cell based therapeutical approach of male infertility by teratocarcinoma derived germ cells. Human Molecular Genetics 14: 1451-1460

Lee H-J, Göring W, Ochs M, Mühlfeld C, Steding G, Paprotta I, Engel W, Adham IM (2004) Sox15 is required for skeletal muscle regeneration. Molecular and Celluar Biology 19: 8428-8436

Guan K, Nayernia K, Maier LS, Wagner S, Dressel R, Lee JH, Nolte J, Wolf F, Li M, Engel W, Hasenfuß G (2006) Pluripotency of spermatogonial stem cells from adult mouse testis. Nature 440: 1199-1203

Lee JH, Engel W, Nayernia K (2006) Stem cell protein Piwil2 modulates expression of murine spermatogonial stem cell expressed genes. Moleculare Reproduction and Development 73: 173-179

Nayernia K, Nolte J, Michelmann HW, Lee JH, Rathsack K, Drusenheimer N, Dev A, Wulf G, Ehrmann IE, Elliott DJ, Okpanyi V, Zechner, Haaf T, Meinhardt A, Engel W (2006) *In vitro*-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice. Developmental Cell 11: 125-132

Nayernia K, Lee JH, Drusenheimer N, Nolte J, Wulf G, Dressel R, Gromoll J, Engel W (2006) Derivation of male germ cells from bone marrow stem cells. Laboratory Investigation 86: 654-663

André Fischer

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Group Leader Laboratory for Aging and Cognitive diseases

- 2002: Dr. rer. nat.(PhD). University Goettingen/Max Planck Institute for Experimental Medicine, Germany
- 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
- since 2006 independent group leader at the European Neuroscience Institute (ENI) in Goettingen

Major Research Interests

Our group aims to understand the molecular mechanisms underlying learning and memory processes under physiological and pathological conditions. To this end we combine molecular, biochemical, pharmacological and behavioral approaches using mice as model organisms.
We are particularly interested to understand cognitive impairment associated with normal aging as well as the pathogenesis of mental and neurodegenerative diseases, such as anxiety disorders and Alzheimer's disease.
Using animal models we deeply aim to identify therapeutic strategies that would help to reinstate neuroplasticity, learning behavior and the retrieval of lost long-term memories in patients suffering form such devastating diseases.

Selected Recent Publications

Fischer A, Sananbenesi F, Wang XY, Dobbin M, Tsai LH Recovery of learning and memory is associated with chromatin remodeling. Nature, doi:10.1038/nature05772

Fischer A, Radulovic M, Schrick C, Sananbenesi F, Godovac-Zimmermann J, Radulovic J (2006) Hippocampal Mek/Erk signaling mediates extinction of contextual freezing behavior. Neurobiology of Learning and Memory 87: 149-58

Shu T, Tseng HC, Zhou Y, Fischer A, Stern P, Coquelle F, Reiner O, Tsai LH (2006) Doublecortin-like Kinase Controls Neurogenesis by Regulating the Mitotic Spindle. Neuron, 49: 25-39

Fischer A, Sananbenesi F, Pang PT, Lu B, Tsai LH (2005) Opposing roles of transient and prolonged expression of p25 in synaptic plasticity and hippocampus dependent memory. Neuron, 48: 825-83

Park SK, Nguyen MD, Fischer A [shared co-authorship], Affar EB, Luke M, Dieffenbach B, Shi Y, Tsai LH (2005) Modulation of Dopamine Signaling by Prostate Apoptosis Response 4 via Direct Interaction with Dopamine D2 Receptor. Cell 122: 275-287

Fischer A, Sananbenesi F, Schrick C, Spiess J, Radulovic J (2004) Distinct roles of hippocampal protein synthesis and actin rearragnement in extinction of conditioned fear. J Neurosci 24: 1962-1966

Sananbenesi F, Fischer A, Schrick C, Spiess J, Radulovic J (2003) Corticotropin-releasing factor receptor 2 induces mitogen-activated protein kinase signaling in the hippocampus: A possible link between stress and fear memory. J Neurosci 36: 11436-11443

Fischer A, Sananbenesi F, Spiess J, Radulovic J (2003) Cdk5 in the adult non-demented brain. Current drug targets CNS 2: 61-72

Fischer A, Sananbenesi F, Spiess J, Radulovic J (2003) Cdk5: a novel role in learning and memory. NeuroSignals 12: 200-208

Fischer A, Sananbenesi F, Schrick C, Spiess J, Radulovic J (2003) Regulation of contextual fear conditioning by baseline and inducible septo-hippocampal cyclin-dependent kinase 5. Neuropharmacology 44: 1089-1099

Sananbenesi F, Fischer A [shared first-authorship], Schrick C, Spiess J, Radulovic J (2002) Phosphorylation of hippocampal Erk-1/2, Elk-1, and p90-Rsk-1 during contextual fear conditioning: interactions between Erk-1/2 and Elk-1. Mol Cell Neurosci 3: 463-476

Gabriele Flügge

Apl. Professor, Experimental Neuroscience

- Dr. rer. nat., University of Munich, 1979
- Senior Scientist, Clinical Neurobiology Laboratory at the German Primate Center

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Major Research Interests

In humans, stressful or traumatic life events such as death of a close relative often represent a strong psychological load that may induce psychopathologies such as depression. The central nervous mechanisms that lead to such diseases are still not clear. We therefore investigate processes that occur in the course of chronic psychosocial stress in the brains of animals that show similar symptoms as depressed patients. Using molecular techniques, we identify central nervous genes that are regulated by stress; quantitative real time PCR, in situ hybridization and immunocytochemistry serve to localize changes in neurotransmitter systems, receptors, transporters and other molecules in distinct neurons of the brain. Similar tools are used to clarify the mechanisms that underlie the beneficial effects of antidepressant drugs. In conjunction with behavioral studies we are able to find molecular factors that play a role in central nervous processes underlying depression.

Selected Recent Publications

Abumaria N, Rygula R, Hiemke C, Fuchs E, Havemann-Reinecke U, Rüther E, Flügge G (2007). Effect of chronic citalopram on serotonin-related and stress-upregulated genes in the dorsal raphe nucleus of the rat. Eur Neuropsychopharm 17: 417-429

Perez-Cruz C, Muller-Keuker JIH, Heilbronner U, Fuchs E, Flügge G (2007) Morphology of pyramidal neurons in the rat prefrontal cortex: lateralized dendritic remodeling by chronic stress. Neural Plasticity, Vol. 2007, article ID 462 76; 14 pages

Rygula R, Abumaria N, Flügge G, Hiemke C, Fuchs E, Rüther E, Havemann-Reinecke U (2006) Citalopram counteracts depressive symptoms evoked by chronic social stress in rats. Behav Pharm 17: 19-29

Alfonso J, Fernandez M, Cooper B, Flügge G, Frasch AC (2005) The stress-regulated protein M6a is a key modulator for neurite outgrowth and filopodium/spine formation. Proc Natl Acad Sci USA 102: 17196-17201

Palchaudhuri M, Flügge G (2005) $5HT_{1A}$-receptor expression in pyramidal neurons of cortical and limbic brain regions. Cell & Tiss Res 321: 159-172

Heilbronner U, van Kampen M, Flügge G (2004) The alpha-2B adrenoceptor in the paraventricular thalamic nucleus is persistently upregulated by chronic psychosocial stress. Cell Mol Neurobiol 24: 815-831

Flügge G, van Kampen M, Mijnster MJ (2004) Perturbations in brain monoamine systems during stress. Cell & Tiss Res 315: 1-14

Fuchs E, Czeh B, Flügge G (2004) Examining novel concepts of the pathophysiology of depression in the chronic psychosocial stress paradigm in tree shrews. Behav Pharmacol 15: 315-325

Alfonso J, Pollevick GD, Van Der Hart MG, Flügge G, Fuchs E, Frasch AC (2004) Identification of genes regulated by chronic psychosocial stress and antidepressant treatment in the hippocampus. Eur J Neurosci 19: 659-666

Flügge G, van Kampen M, Meyer H, Fuchs E (2003) Alpha2A and alpha2C-adrenoceptor regulation in the brain: alpha2A changes persist after chronic stress. Eur J Neurosci 17: 917-28

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Major Research Interests

General

- development and application of magnetic resonance imaging (MRI) techniques for noninvasive studies of the central nervous system of humans and animals

Methodology

- functional neuroimaging
- localized neurospectroscopy
- diffusion tensor imaging

Brain Research

- non-invasive neurobiology, human neuroscience
- structural, metabolic, and functional studies of the central nervous system
- functional mapping of neuronal activation, cognitive information processing in humans
- MRI of animal models (nonhuman primates, rats, transgenic mice, insects)

Selected Recent Publications

Merboldt KD, Baudewig J, Treue S, Frahm J (2002) Functional MRI of Self-Controlled Stereoscopic Depth Perception. Neuroreport 13: 1721-1725

Dechent P, Frahm J (2003) Functional Somatotopy of Finger Representations in Human Primary Motor Cortex. Hum Brain Mapp 18: 272-283

Frahm J, Baudewig J, Dechent P, Merboldt KD (2004) Advances in Functional MRI of the Human Brain. Progr NMR Spectr 44: 1-32

Watanabe T, Frahm J, Michaelis T (2004) Functional Mapping of Neural Pathways in Rodent Brain *In Vivo* Using Manganese-Enhanced Three-Dimensional Magnetic Resonance Imaging. NMR Biomed 17: 554-568

Hofer S, Frahm J (2006) Topography of the Human Corpus Callosum Revisited - Comprehensive Fiber Tractography Using Magnetic Resonance Diffusion Tensor Imaging. NeuroImage 32: 989-994

Eberhard Fuchs

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- 1977: Dr. rer. nat., University of München
- 1996 - 2000: Professor (Animal Physiology), University of Karlsruhe
- 2000 - 2003: Professor for Animal Physiology, University of Göttingen
- since 2003: Professor for Neurobiology, Department of Neurology, Medical School, University of Göttingen

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Major Research Interests

The Clinical Neurobiology Laboratory (CNL) at the German Primate Center is an interdisciplinary research laboratory using neuroanatomical, neuropharmacological, behavioral and molecular techniques to investigate functioning of the brain in animal models of psychiatric and neurodegenerative diseases. The aim of our work is to elucidate brain structures, circuits, pathways and mechanisms that underlie normal and pathological behavior. This work integrates inputs from other research fields with the ultimate aim of developing new therapeutic strategies for psychiatric and neurodegenerative diseases. The laboratory specializes in the development, validation and investigation of animal models to detect abnormal cognitive, motor and emotional expressions of brain pathology. Currently, we are engaged in the investigation of central nervous and behavioral phenomena associated with stress and depression. In addition, we provide service platforms to study Parkinson's disease and multiple sclerosis..

Selected Recent Publications

Czéh B, Müller-Keuker JIH, Rygula R, Abumaria N, Hiemke C, Domenici E, Fuchs E (2007) Chronic social stress inhibits cell proliferation in the adult medial prefrontal cortex: hemispheric asymmetry and reversal by fluoxetine treatment. Neuropsychopharmacology 32: 1490-1503

Czéh B, Simon M, Schmelting B, Hiemke C, Fuchs E (2006) Astroglial plasticity in the hippocampus after chronic psychosocial stress and concomitant fluoxetine treatment. Neuropsychopharmacology 31:1616-26

Fuchs E, Flügge G, Czéh B (2006) Remodeling of neuronal networks by stress. Front Biosci 11: 2746-2758

Fuchs E, Czéh B, Kole MHP, Michaelis T, Lucassen PJ (2004) Alterations of neuroplasticity in depression: The hippocampus and beyond. Europ Neuropharmacol 14: 481-490

Lucassen PJ, Fuchs E, Czéh B (2004) Antidepressant treatment with tianeptine prevents apoptosis in the hippocampal dentate gyrus and temporal cortex. Biol Psychiatry 55: 789-796

Coe CL, Kramer M, Czéh B, Gould E, Reeves AJ, Kirschbaum C, Fuchs E (2003) Prenatal stress diminishes neurogenesis in the dentate gyrus of juvenile rhesus monkeys. Biol Psychiat 54: 1025-1034

Czéh B, Michaelis T, Watanabe T, Frahm J, de Biurrun G, van Kampen M, Bartolomucci A, Fuchs E (2001) Stress-induced changes in cerebral metabolites, hippocampal volume and cell proliferation are prevented by antidepressant treatment with tianeptine. Proc Natl Acad Sci USA 98: 12796-12801

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- Heisenberg fellow (1983 - 1987)
- Professor of Theoretical Physics, Universities of Würzburg (1988 - 1989), Frankfurt (1989 - 1996), and Göttingen (since 1996)
- Director, Max Planck Institute for Dynamics and Self-Organization, Göttingen (since 1996)

Major Research Interests

How do the myriads of neurons in our cortex cooperate when we perceive an object or perform another task? How do they self-organize in the preceding learning process? Questions like these address the complex dynamics of spatially extended and multi-component nonlinear systems, which still reserve many surprises. In networks of sufficiently many spiking neurons e.g. we find unstable attractors, a phenomenon which would neither have been guessed nor understood without mathematical modelling and which many physicists consider an oxymoron. They can provide a neuronal network with a high degree of flexibility to adapt to permanently changing tasks. The tools and mathematical methods developed in studies of chaotic behaviour in the past can now help us clarify the dynamics and function of complex networks and spatially extended systems and reveal the biological role of dynamical phenomena like unstable attractors.

These methods lend themselves to applications in neuroscience from the level of single cells to the level of cell assemblies and large cortical networks, from the time scales of action potentials (milliseconds) to the time scales of learning and long-term memory (up to years). My work in the past has dealt among others with studies of stochastic resonance of single neurons under periodic and endogenous stimulation, detailed investigations of the properties, functions, and conditions of neuronal synchronization, and the development of neuronal maps in the visual cortex. We have elucidated the influence of the network topology on synchronization and other dynamical properties and demonstrated the existence of speed limits to network synchronization due to disordered connectivity. Besides, I am also focusing on other applications of nonlinear dynamics, e.g. in mathematical models for the description and forecast of the spread of epidemics. Basins of attraction of synchronized states in a network of spiking neurons.

Selected Recent Publications

Levina A, Herrmann JM, Geisel T (2007) Dynamical Synapses Causing Self-Organized Criticality in Neural Networks. Nature Physics, in press

Brockmann D, Hufnagel L, Geisel T (2006) The Scaling Laws of Human Travel. Nature 439: 462-465

Wolf F, Timme M, Geisel T (2004) Topological speed limits to network synchronization. Phys Rev Lett 92: 074101

Hufnagel L, Brockmann D, Geisel T (2004) Forecast and Control of Epidemics in a Globalized World. PNAS 101: 15124

Denker M, Timme M, Diesmann M, Wolf F, Geisel T (2004) Breaking Synchrony by Heterogeneity in Complex Networks. Phys Rev Lett 92: 974193

Wolf F, Geisel T (2003) Universality in visual cortical pattern formation. Journal of Physiology - Paris 97: 253-264

Timme M, Wolf F, Geisel T (2002) Prevalence of unstable attractors in networks of pulse-coupled oscillators. Phys Rev Lett 89(15): 154105

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- Dr. rer. nat., University of Göttingen, 1995
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Major Research Interests

Behavior results from integration of sensory information with internal physiological states involving complex interactions between various types of neurons. In order to study cellular and molecular mechanisms that contribute to the selection and control of situation-specific behavior, invertebrate preparations can offer unique advantages over more complex nervous systems of vertebrates, especially mammals. The nervous systems of invertebrates contain smaller numbers of neurons, many of which can be individually identified, and their behavioral repertoires are rather limited to combinations of genetically determined stereotyped components.

Studies are conducted with intact or partially dissected behaving animals (insects, crustaceans, annelids) and with isolated nervous systems or cultured organs and cells. Projects for experimental theses usually combine two or more of the following methods: neuroethology, pharmacology, electrophysiology, histology and immunocytochemistry, cell culture and molecular biology. Examples of current research projects are

- Acoustic communication in grasshoppers: control of sound production by con verging signaling pathways (transmitters and second messengers) in the cen tral complex neuropil of the brain.

- Physiological characterization of neurosceretory neurons that mediate general physiological states e.g. serotonin-releasing neurons of leeches and crustaceans.

- Control of agonistic behavior and the formation of hierarchies in crustaceans, crickets and fruitflies.

- Presence and function of erythropoietin in invertebrate nervous systems: devel opment, regeneration and hypoxia-related functions.

Selected Recent Publications

Gocht D, Heinrich R (2007) Postactivation inhibition of spontaneously active neurosecretory neurons in the medicinal leech. J Comp Physiol A 193: 347-361

Heinrich R, Ganter GK (2007) The role of NO in insect behavior. Advances in Experimental Biology 1: 107-127

Wenzel B, Kunst M, Günther C, Ganter GK, Lakes-Harlan R, Elsner N, Heinrich R (2005) Nitric oxide/cyclic GMP-signaling in the central complex of the grasshopper brain inhibits singing behavior. J Comp Neurol, 488: 129-139

Wenzel B, Elsner N, Heinrich R (2002) mAChRs in the grasshopper brain mediate excitation by activation of the AC/PKA and the PLC second-messenger pathways. J Neurophysiol, 87: 876-888

Heinrich R, Wenzel B, Elsner N (2001) A role for muscarinic excitation: Control of specific singing behavior by activation of the adenylate cyclase pathway in the brain of grasshoppers. Proc Nat Acad Sci USA 98: 9919-9923

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- Postdoctoral Fellow, Medical University of Kiel, Dept. Physiology, 1989 - 1990
- Assistant Professor, Institute for Zoology and Anthropology, Göttingen, 1990 - 1997
- Habilitation (Zoology), 1997
- Associate Professor, Institute for Zoology and Anthropology, Göttingen, 1997 - 2002
- Guest Professor, University of Science & Technology, Hongkong, 2002 - 2004
- Apl. Professor, Inst. for Zoology, Anthropol. and Develop. Biol., Göttingen, since 2004

- Research Assistant, MPI for Ethology, Seewiesen, 1985/1986
- Research Fellow, Arizona Research Labs, Tucson, USA, 1993/1996
- Feodor-Lynen/Humboldt Fellow, Harvard Medical School, Boston, USA, 1994 - 1995
- Research Fellow Marine Biological Labs, Woods Hole, USA, 1992/1997

Major Research Interests:

Molecular Mechanisms Of Synaptic And Non-Synaptic Modulation

Biogenic amines such as serotonin, dopamine, histamine or octopamine (OA), the pendant of norepinephrine in invertebrates, are widely distributed within the animal kingdom. These evolutionary conserved neuroactive substances are involved in the control of vital functions in both vertebrates and invertebrates. Biogenic amines often initiate long-lasting neuro-modulatory effects in their targets, which is due to diffusion following non-synaptic release activating G-protein coupled to intracellular pathways. My work is focussed on the investigation of cellular and molecular mechanisms underlying the modulation of neuronal signaling in identified networks in invertebrate model systems. Using electrophysiological, pharmacological and immunocytochemical techniques in combination with behavioral measurements, I am investigating mechanisms of aminergic modulation in identified neurons of defined networks in insects and crustacea. To address both mechanistic and functional questions, a parallel approach has been developed, which allows to investigate single identified neurons both *in-vivo* with intact synaptic connections and *in-vitro* in primary "identified" cell culture, where neurons are separated from connections to other neurons. The functional meaning of aminergic modulation on the cellular level in behaviorally-relevant circuits is assessed by quantitative behavioral measurements. The investigations show that OA enhances the responsiveness of a neuronal network in insects ("giant fiber pathway") which triggers a fast escape reaction. The reaction to sensory stimuli in the postsynaptic giant interneurons, which are monosynaptically coupled to sensory neurons via excitatory cholinergic synapses, is significantly enhanced by OA application. Characteristic changes of the action potentials *in-vivo* ("spike broadening") and patch-clamp recordings *in-vitro* suggest, that OA selectively affects slow K^+-conductances in postsynaptic giant interneurons.

Selected Recent Publications:

Kloppenburg P, Hörner M (1998) Voltage-activated currents in identified giant interneurons isolated from adult crickets, *Gryllus bimaculatus*. J Exp Biol 201(17): 2529-2541

Heinrich R, Cromarty SI, Hörner M, Edwards DH, Kravitz EA (1999) Autoinhibition of serotonin cells: An intrinsic regulatory mechanism sensitive to the pattern of usage of the cells. Proc Natl Acad Sci USA 96: 2473-2478

Ferber M, Hörner M, Cepok S, Gnatzy W (2001) Digger wasp versus cricket: Mechanisms underlying the total paralysis caused by the predators venom. J Neurobiol 47: 207-2222

Hörner M, Heinrich R, Cromarty SI, Kravitz EA (2002) Synaptic connectivity of amine-containing neurosecretory cells of lobsters: inputs to 5HT- and OCT- containing neurons. in: The Crustacean Nervous System. (ed. K. Wiese) Springer Verlag, Berlin, Heidelberg, New York, pp156-172

Rose T, Gras H, Hörner M (2006) Activity-dependent suppression of spontaneous spike generation in the Retzius neurons of the leech, *Hirudo medicinalis* L. Invertebrate Neuroscience 6: 169-176 (DOI 10.1007/s10158-006-0030-2)

Swen Hülsmann

Privatdozent, Department 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

The majority of cells in the human brain are glial cells, outranging the number of neurons by a factor of 10. However, most behavioral aspects of life are attributed to neurons, leaving a rather white spot of knowledge about the function of the different types of glial cells.
Our group aims to identify and clarify the mechanisms that allow glial cells, e.g. astrocytes to modulate and stabilize the most vital behavior of breathing.

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Selected Recent Publications

Hülsmann S, Oku Y, Zhang W, Richter DW (2000) Metabotropic glutamate receptors and blockade of glial Krebs cycle depress glycinergic synaptic currents of mouse hypoglossal motoneurons. Eur J Neurosci 12(1): 239-46

Hülsmann S, Oku Y, Zhang W, Richter DW (2000) Metabolic coupling between glia and neurons is necessary for maintaining respiratory activity in transverse medullary slices of neonatal mouse. Eur J Neurosci 12(3): 856-62

Gomeza J, Hülsmann S, Ohno K, Eulenburg V, Szöke K, Richter D, Betz H (2003) Inactivation of the glycine transporter 1 gene discloses vital role of glial glycine uptake in glycinergic inhibition. Neuron 40(4): 785-96

Gomeza J, Ohno K, Hülsmann S, Armsen W, Eulenburg V, Richter DW, Laube B, Betz H (2003) Deletion of the mouse glycine transporter 2 results in a hyperekplexia phenotype and postnatal lethality. Neuron 40(4): 797-806

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(6): 1358-65

Reinhard Jahn

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

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Major Research Interests

Our group is interested in the mechanisms of membrane fusion, with the main emphasis on regulated exocytosis in neurons. Since recent years it is known that 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. The neuronal SNAREs are among the best characterized. They are the targets of the toxins responsible for botulism and tetanus. To understand how these proteins make membranes fuse, we studied their properties in detail using biochemical and biophysical approaches. We found that they assemble into a tight complex which ties the membrane closely together and thus probably initiates bilayer mixing.

In our current approaches, we study membrane fusion at the level of isolated proteins as well as in semi-intact and intact cells. Thus, we are investigating conformational changes of the SNARE proteins before and during fusion. Furthermore, we use reconstitution of membrane fusion in cell-free assays and in proteoliposomes. Other projects of the group include the study of neurotransmitter uptake by synaptic vesicles and the function of Rab-GTPases in neuronal exocytosis.

Selected Recent Publications

Takamori S, Holt M, Stenius K, Lemke EA, Grønborg M, Riedel D, Urlaub H, Schenck S, Brügger B, Ringler P, Müller SA, Rammner B, Gräter F, Hub JS, De Groot BL, Mieskes G, Moriyama Y, Klingauf J, Grubmüller H, Heuser J, Wieland F, Jahn R (2006) Molecular anatomy of a trafficking organelle. Cell 127: 831-846

Zwilling D, Cypionka A, Pohl W, Fasshauer D, Walla PJ, Wahl MC, Jahn R (2007) Early endosomal SNAREs form a structurally conserved SNARE complex and fuse liposomes with multiple topologies. EMBO J 26: 9-18

Jahn R, Scheller RH (2006) SNAREs – engines for membrane fusion. Nature Reviews Mol Cell Biol 7: 631-643

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

Graf C, Riedel D, Schmitt HD, Jahn R (2005) Identification of functionally interacting SNAREs using complementary substitutions in the conserved '0' layer. Mol Biol Cell 16: 2263-2274

Schuette CG, Hatsuzawa K, Margittai M, Stein A, Riedel D, Küster P, König M, Seidel CAM, Jahn R (2004) Determinants of liposome fusion mediated by synaptic SNARE proteins. Proc Natl Acad Sci 101: 2858-2863

Jahn R, Lang T, Südhof TC (2003) Membrane fusion. Cell 112: 519-533

Hubertus Jarry

Professor of Clinical and Experimental Endocrinology

- 1976 - 1980 University of Göttingen, study of biology, diploma degree in bio chemistry, microbiology, organic chemistry
- 1980 - 1983 PhD thesis, Department of Biochemistry, University of Göttingen, PhD degree in biochemistry, microbiology, organic chemistry (summa cum laude)
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- March 1985 until March 1986 Michigan State University, Dept. Pharmacology and Toxicology
- Since April 1986 Research Associate Dept. Clinical and Experimental Endocrinology University of Göttingen
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Major Research Interests

The proper function of the GnRH pulse generator ist essential for reproduction of all mammals studied so far. GnRH pulses are a prerequisite for proper pituitary gonadotropin release. The neurochemical mechanisms leading to pulsatile GnRH release involve norepinephrine and gamma amino butyric acid (GABA) as most important neurotransmitters. In addition, other catecholamines, amino acid neurotransmitters and neuropeptides play a modulatory role in the function of the GnRH pulse generator. Many of the GABAergic neurons in the hypothalamus are estrogen-receptive. The mechanisms by which the estrogen receptors of the alpha and beta subtype regulate gene and protein expression of neurotransmitter-producing enzymes are at present a prime focus of interest. Induction of puberty is not a gonadal but a hypothalamic maturational process. The initiation of proper GnRH pulse generator function is the ultimate trigger signal for puberty which is currently investigated. Ageing involves also neuroendocrine mechanisms. The GnRH pulse generator function deteriorates in aged rats, mechanisms which involve a variety of catecholamines and amino acid neurotransmitters which are currently investigated. Steroidal feedback signals (of estradiol, progesterone, and glucocorticoids) are crucial for the development and proper function of the adult hypothalamus of which the molecular and neurochemical mechanisms are studied with cell biological and animal experimental tools. Proper function of the GnRH pulse generator is also of crucial importance for initiation of puberty and maintenance of normal menstrual cycles in women. Many of hitherto unexplained infertilities can be explained of malfunctioning GnRH pulse generators which are studied in a series of clinical experiments.

Selected Recent Publications

Bottner M, Leonhardt S, Wuttke W, Jarry H (2007) Changes of expression of genes related to the activity of the gonadotrophin-releasing hormone pulse generator in young versus middle-aged male rats. J Neuroendocrinol 19: 779-87

Zhou L, Lehan N, Wehrenberg U, Disteldorf E, von Lossow R, Mares U, Jarry H, Rune GM (2007) Neuroprotection by estradiol: a role of aromatase against spine synapse loss after blockade of GABA(A) receptors. Exp Neurol 203: 72-81

Breit A, Wolff K, Kalwa H, Jarry H, Buch T, Gudermann T (2006) The natural inverse agonist agouti-related protein induces arrestin-mediated endocytosis of melanocortin-3 and -4 receptors. J Biol Chem 281: 37447-56

Fester L, Ribeiro-Gouveia V, Prange-Kiel J, von Schassen C, Bottner M, Jarry H, Rune GM (2006) Proliferation and apoptosis of hippocampal granule cells require local oestrogen synthesis. J Neurochem 97: 1136-44

Jürgen Klingauf

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Major Research Interests

The focus of our research is the study of synaptic transmission, with the emphasis on presynaptic mechanisms. At the synapse, neurotransmitter is rapidly released from small vesicles which are triggered to fuse with the plasma membrane by the entry of Ca^{2+} ions. The maintenance of synaptic transmission requires that these vesicles be retrieved by a reverse process, i.e. endocytosis. How is this endocytic activity and subsequent formation of fusion-competent vesicles coupled to exocytosis? To delineate the mechanisms by which synaptic vesicles can be retrieved we employ high-resolution imaging techniques, like two-photon laser scanning and total internal reflection microscopy, electrophysiology, as well as biochemical approaches. By transfection of neurons in primary cell culture or the usage of knock-out models we can target or modulate specific proteins thought to be pivotal in synaptic vesicle endocytosis. Currently, we are mainly studying synapses of rodent hippocampus, down to the level of single fluorescently labeled vesicles in cultured or freshly isolated synaptic boutons. By making use of fluorescent styryl dyes with different kinetic properties we found that in central nervous synapses at least two kinetically distinct modes of endocytosis co-exist. We are now trying to characterize the respective molecular events underlying those different mechanisms using genetically encoded fluorescent probes.

Selected Recent Publications

Mueller VJ, Wienisch M, Nehring RB, Klingauf J (2004) Monitoring clathrin-mediated endocytosis during synaptic activity. J Neurosci 24(8): 2004-12

Jordan R, Lemke EL, Klingauf J (2005) Visualization of synaptic vesicle movement in intact synaptic boutons using fluorescence fluctuation spectroscopy. Biophys J 89(3): 2091-102

Lemke EL, Klingauf J (2005) Single synaptic vesicle tracking in individual hippocampal boutons at rest and during synaptic activity. J Neurosci 25(47): 11034-44

Vanden Berghe P, Klingauf J (2006). Synaptic vesicles in hippocampal boutons recycle to different pools in a use-dependent fashion. J Physiol London 572(Pt 3): 707-20

Diril MK, Wienisch M, Jung N, Klingauf J, Haucke V (2006) Stonin 2 is an AP-2-dependent endocytic sorting adaptor for synaptotagmin internalization and Recycling. Dev Cell 10(2): 233-44

Wienisch M, Klingauf J (2006) Vesicular proteins exocytosed and subsequently retrieved by compensatory endocytosis are non-identical. Nature Neurosci 9(8): 1019-27

Toonen RF, Kochubey O, de Wit H, Gulyas-Kovacs A, Konijnenburg B, Sørensen JB, Klingauf J, Verhage M (2006) Dissecting docking and tethering of secretory vesicles at the target membrane. EMBO J 25(16): 3725-37

Kochubey O, Majumdar A, Klingauf J (2006) Imaging clathrin dynamics in D. melanogaster hemocytes reveals a role for actin in vesicle fission. Traffic Oct 2, Epub ahead of print

Kerstin Krieglstein

Professor of Anatomy/Neuroanatomy

- Dr. rer. nat., University of Gießen, Germany, 1990
- Postdoctoral fellow, University of California, Irvine, 1990 - 1992
- Professor of Anatomy, University of Saarland, 1999 - 2001
- Appointed 2001 as head of the Department of Anatomy/Neuroanatomy, University of Göttingen

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Major Research Interests

The nervous system is a complex network of billions of neurons building appropriate connections and transmitting the information required. Although the nervous system has a lifelong synaptic plasticity, it is essentially built just once with very little regenerative capacity, meaning that neurons have to survive and function for lifetime. Loss of neurons will eventually lead to functional impairments such as those found in Alzheimer's, Parkinson's or ALS patients.

We are interested in the understanding of the regulation of neuronal survival and death. Recent advancements in the field have provided clear evidence that neuronal survival is caused by synergistic actions of neurotrophic factors along with other cytokines most prominently from the TGF-ß superfamily. Synergisms of TGF-ß in combination with neurotrophic factors, like GDNF or NGF, will be studied to establish their role in nervous system development and their therapeutic potential in brain repair. Specifically, we shall investigate such synergisms by utilising mouse mutants to understand the developmental role and by emplying genomic screens to identify new target genes for the establishment of new therapeutic strategies for human neurodegenerative disorders. Furthermore, as growth factors function not only in the decision of neuron survival or death, we shall explore their morphogenetic and differentiation capacities employing the powerful potential of embryonic (ES) and CNS stem cells.

Selected Recent Publications

Krieglstein K, Henheik P, Farkas L, Jaszai J, Galter D, Krohn K, Unsicker K (1998) GDNF requires TGF-ß for establishing its neurotrophic activity. J Neurosci 18: 9822-9834

Schober A, Hertel R, Arumäe U, Farkas L, Jaszai J, Krieglstein K, Saarma M, Unsicker K (1999) GDNF rescues target-deprived spinal cord neurons but requires TGF-ß as co-factor *in vivo*. J Neurosci 19: 2008-2015

Krieglstein K, Richter S, Farkas L, Schuster N, Dünker N, Oppenheim R W, Unsicker K (2000) Reduction of endogenous transforming growth factor beta prevents ontogenetic neuron death. Nature Neuroscience 3: 1085-1091

Peterziel H, Unsicker K, Krieglstein K (2002) TGFbeta induces GDNF responsiveness in neurons by recruitment of GFRalpha1 to the plasma membrane, J Cell Biol 159: 157-167

Farkas L, Dünker N, Roussa E, Unsicker K, Krieglstein K (2003) Transforming growth factor-beta(s) are essential for the development of midbrain dopaminergic neurons *in vitro* and *in vivo*. J Neurosci 23: 5178-5186

v Bohlen und Halbach O, Schober A, Krieglstein K (2004) Genes, proteins, and neurotoxins involved in Parkinson's disease. Prog Neurobiol 73: 151-177

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Group Leader Developmental Neurobiology Laboratory

- Since 2007: independent research group leader, DFG Emmy Noether group leader at the European Neuroscience Institute, Göttingen
- 2001 - 2006: postdoctoral research associate and staff scientist with Samuel L. Pfaff at the Salk Institute for Biological Studies in La Jolla, California, USA
- 2001: Ph.D. with Peter Gruss at the Max-Planck Institute of Biophysical Chemistry, University of Göttingen

Major Research Interests

Adequate control of body motion and posture depends on elaborate circuitries that connect both motor and sensory neurons with the musculature. The central importance of these connections is illustrated by the debilitating consequences of diseases affecting motor neurons, such as Amyotrophic Lateral Sclerosis (ALS) and diabetic neuropathy. Our research aims at understanding the molecular mechanisms driving the assembly of functional neuromuscular circuitries during embryonic and postnatal development. This includes the study of cell surface-based signaling molecules that control motor and sensory axon connectivity in mice. Another research focus of the lab aims at identifying and characterizing novel mechanisms driving the functional specification of motor neurons within the context of operative neuromuscular circuitry. We extensively take advantage of mouse genetics in order to selectively trace and manipulate specific neuron populations. We combine this genetic approach with live 3D fluorescence *(spinning disk)* microscopy, as well as electrophysiological methods to elucidate the role of cell surface and nuclear receptor proteins in sensory-motor connectivity and functional neuron specification.

Selected Recent Publications

Marquardt T, Shirasaki R, Ghosh S, Carter N, Andrews SE, Hunter T, Pfaff SL (2005) Co-expressed EphA receptors and ephrin-A ligands mediate opposing actions on growth cone navigation from distinct membrane sub-domains. Cell 121: 127-139

Marquardt T, Pfaff SL (2001) Cracking the transcriptional code for cell specification in the neural tube. Cell 106: 651-654

Marquardt T, Ashery-Padan RA, Andrejewski N, Scardigli R, Guillemot F, Gruss P (2001) Pax6 is required for the multipotent state of retinal progenitor cells. Cell 105: 43-55

Tobias Moser

Professor of Experimental and Clinical Audiology

- Dr. med. (M.D.) 1995, University of Jena
- Postdoctoral fellow with E. Neher at the MPI for Biophysical Chemistry, 1994 - 1997
- Group leader at the Department of Otolaryngology, University of Göttingen since 1997

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Major Research Interests

Our group focuses on the physiology and pathology of sound coding at the hair cell ribbon synapse. Molecular dissection and detailed physiological characterization of ribbon synapse function employ a spectrum of molecular and biophysical techniques such as single cell RT-PCR, immunohistochemistry of hair cells, auditory systems physiology (recordings of otoacoustic emissions, compound action potentials and auditory brainstem responses, single unit recordings), pre- or postsynaptic patch-clamp, optical methods (epifluorescence, evanescent wave and confocal imaging as well as flash photolysis of caged compounds).

The group has contributed to understanding normal hair cell ribbon synapse function (reviews in Nouvian et al., 2006 and Moser et al., 2006). In our previous work we have physiologically and in part morphologically characterized mutant mice with defects in hair cell synaptic coding (Brandt et al., 2003; Khimich et al., 2005, Roux et al., 2006) and auditory nerve function (Lacas-Gervais et al., 2004). The results demonstrated that defects of hair cell synaptic sound coding cause sensorineural hearing loss in animal models – auditory synaptopathy and confirmed impaired hearing in case of nerve disorders - auditory neuropathy.

Selected Recent Publications

Nouvian R, Beutner D, Parsons TD, Moser T (2006) Structure and function of the hair cell ribbon synapse. J Membr Biol 209: 153-65

Roux I, Safieddine S, Nouvian R, Grati M, Simmler MC, Perfettini I, Le Gall M, Rostaing P, Hamard G,Triller A, Avan P, Moser T, Petit C (2006) Otoferlin, defective in DFNB9 deafness, is essential for the Ca^{2+}-triggered synaptic exocytosis at the auditory hair cell ribbon synapse. Cell 127: 277-89

Moser T, Brandt A, Lysakowski A (2006) Hair cell ribbon synapses. Cell Tissue Res 326: 347-359

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

Brandt A, Khimich D, Moser T (2005) Few Ca_V 1.3 channels regulate a synaptic vesicle's exocytosis at the hair cell ribbon synapse. J Neurosci 25: 11577-11585

Beutner D, Voets T, Neher E, Moser T (2001) Calcium dependence of exocytosis and endocytosis at the cochlear inner hair cell afferent synapse. Neuron 29: 681-90

Moser T, Beutner D (2000) Kinetics of exocytosis and endocytosis at the cochlear inner hair cell afferent synapse of the mouse. Proc Natl Acad Sci USA 97: 883-888

Klaus-Armin Nave

Professor of Molecular Biology, Director at the Max Planck Institute for Experimental Medicine

- PhD 1987, University of California, San Diego, Postdoc, The Salk Institute, La Jolla, California
- 1991 Junior Group Leader, ZMBH,University of Heidelberg
- 1998 Professor of Molecular Biology (C4), ZMBH
- 2000 Director, Department of Neurogenetics Max Planck Institute for Experimental Medicine, Göttingen, and Professor of Biology, University of Heidelberg

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Major Research Interests

We are interested in the mechanisms of neuron-glia interactions in the higher nervous system, and in the genes that are required for normal glial cell function. Here, transgenic and mutant mice have become important to study developmental processes as well as genetic diseases. For example, oligodendrocytes are glial cells highly specialized for enwrapping CNS axons with multiple layers of membranes, known to provide electrical insulation for rapid impulse propagation. We found that oligodendrocytes are also essential for maintaining the long-term integrity of myelinated axons, independent of the myelin function itself. The mechanisms by which oligodendrocytes support long-term axonal survival are still under investigation. The importance of glial cells as the "first line of neuroprotection", however, is illustrated by several myelin-associated diseases in which axonal neurodegeneration contribute to progressive disability. These range in humans from peripheral neuropathies (CMT1) to spastic paraplegia (SPG2), and presumably multiple sclerosis (MS) and certain forms of psychiatric disorders. We are developing transgenic animal models for some of these diseases, in order to dissect the underlying disease mechanisms and, in the case of CMT1A, have used these models to design novel therapeutic strategies.
The glial "decision" to myelinate an axonal segment is partly controlled by the axon itself, but the signaling mechanism is not understood. We have found that axonal neuregulin-1 (NRG1) is the major determinant of myelination in the peripheral nervous system. We are now investigating NRG1 dysregulation also in CNS myelination, using quantifiable behavioural functions in mice. By combining genetics with enviromental risk factors for schizophrenia (in collaboration with H. Ehrenreich) we will explore the hypothesis that NRG1, a known human schizophrenia susceptibility gene, points to an important role of myelinating glia in some psychiatric disorders.

Future Projects and Goals
Mechanisms of neuron-glia signalling; function of myelin proteins and lipids; transcriptional profiling of single cells *in vivo*; novel mouse models of neuropsychiatric disorders.

Selected Recent Publications

Kassmann CM, Lappe-Siefke C, Baes M, Brügger B, Mildner A, Werner HB, Natt O, Michaelis Th, Prinz M, Frahm J, Nave K-A (2007) Axonal loss and neuroinflammation caused by peroxisome-deficient oligodendrocytes. Nature Genetics 8: 969-976

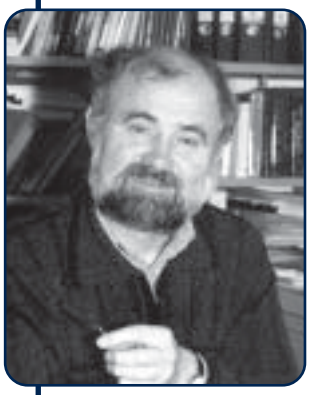
Dhaunchak A, Nave K-A (2007) A common mechanism of proteolipid protein misfolding leading to cysteine-mediated ER retention in oligodendrocytes and Pelizaeus-Merzbacher disease. Proc Natl Acad Sci USA (in press)

Kramer-Albers EM, Gehrig-Burger K, Thiele C, Trotter J, Nave K-A (2006) Perturbed interactions of mutant proteolipid protein/DM20 with cholesterol and lipid rafts in oligodendroglia: implications for dysmyelination in spastic paraplegia. J Neurosci 26: 11743-11752

Saher G, Brügger B, Lappe-Siefke C, Möbius W, Tozawa R, Wehr M, Wieland F, Ishibashi S, Nave K-A (2005) Cholesterol is essential and rate-limiting for myelin membrane growth. Nature Neuroscience 8: 468-475

Sereda MW, Meyer zur Hörste G, Suter U, Uzma N, Nave K-A (2003) Therapeutic administration of anti-progesterone in a PMP22-transgenic model of Charcot-Marie-Tooth disease (CMT1A). Nature Medicine 9: 1533-1537

Erwin Neher



Professor, Director at the Max Planck Institute for Biophysical Chemistry

- M.Sc. (Physics), University of Wisconsin, (1967)
- Ph.D. (Physics), Institute of Technology, Munich (1970)
- Research associate at the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany (1972 - 1975 and 1976 - 1982) and as a guest in the laboratory of Dr. Ch.F. Stevens at Yale University, Dept. of Physiology, New Haven, Conn. (1975 - 1976)
- Fairchild Scholar, California Institute of Technology; Pasadena, USA (1989)
- Director of the Membrane Biophysics Department at the Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, since 1983

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Major Research Interests

Molecular Mechanisms of Exocytosis, Neurotransmitter Release, and Short Term Synaptic Plasticity

In order to understand how the brain handles its information flow and adjusts synaptic connections on the second and subsecond timescale, one has to understand all aspects of synaptic transmission ranging from availability of vesicles for exocytosis, presynaptic electrophysiology, Ca^{++} signalling, the process of exocytosis, and postsynaptic neurotransmitter action. Our work concentrates on presynaptic aspects. We study the basic mechanisms of exocytosis, using adrenal chromaffin cells as a model system and the patch-clamp method. This work, in which intracellular Ca^{++} is manipulated (caged Ca^{++}) and measured on the single cell level aims at understanding the role of specific synaptic proteins in the maturation and exocytosis of secretory vesicles. We use neuronal cell cultures and brain slices for studying mechanisms of short term plasticity, such as depression and paired pulse facilitation. The Calyx of Held, a specialized synapse in the auditory pathway, offers unique possibilities for simultaneous pre- and postsynaptic voltage clamping. This allows a quantitative analysis of the relationship between $[Ca^{++}]$ and transmitter release.

Selected Recent Publications

Klingauf J, Neher E (1997) Modeling buffered Ca^{2+} diffusion near the membrane: Implications for secretion in neuroendocrine cells. Biophys J 72: 674-690

Neher E (1998) Vesicle pools and Ca^{2+} microdomains: new tools for understanding their roles in neurotransmitter release. Neuron 20: 389-399

Schneggenburger R, Neher E (2000) Intracellular calcium dependence of transmitter release rates at a fast central synapse. Nature 406: 889-893

Rettig J, Neher E (2002) Emerging roles of presynaptic proteins in Ca^{++}-triggered exocytosis. Science 298: 781-785

Sakaba T, Neher E (2003) Direct modulation of synaptic vesicle priming by $GABA_B$ receptor activation at a glutamatergic synapse. Nature 424: 775-778

Soerensen J, Nagy G, Varoqueaux F, Nehring RB, Brose N, Wilson MC, Neher E (2003). Differential control of the releasable vesicle pools by SNAP-25 splice variants and SNAP-23. Cell 114, 75-86

Sakaba T, Stein A, Jahn R, Neher E (2005) Distinct kinetic changes in neurotransmitter release after SNARE protein cleavage. Science 309: 491-494

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

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Major Research Interests

Our main research goal is to development new neurophysiologically based therapies for neurological diseases incorporating excitability changes of the brain. For this we use repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (TDCS). TMS induces a short electric current in the human brain. Both rTMS and TDCS 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.

Both methods may also be used to measure excitability changes in the motor cortex or alterations in visual perception thresholds. We also evaluate rTMS and TDCS induced changes in motor cortex excitability by functional MR imaging.

Selected Recent Publications

Kuo MF, Paulus W, Nitsche MA (2007) Boosting Focally-Induced Brain Plasticity by Dopamine. Cereb Cortex

Nitsche MA, Roth A, Kuo MF, Fischer AK, Liebetanz D, Lang N, Tergau F, Paulus W (2007) Timing-dependent modulation of associative plasticity by general network excitability in the human motor cortex. J Neurosci 27(14): 3807-12

Nitsche MA, Doemkes S, Karakose T, Antal A, Liebetanz D, Lang N, Tergau F, Paulus W (2007) Shaping the effects of transcranial direct current stimulation of the human motor cortex. J Neurophysiol 97(4): 3109-17. Epub 2007 Jan 24

Evgeni Ponimaskin

Privatdozent, Group Leader at the Centre for Molecular Physiology of the Brain

- 1994 Dr. rer. nat., Free University of Berlin, Germany
- 1994 - 2000 Postdoctoral training within the special research unit (Sonderforschungsbereich) "Cellular signal recognition and signal transduction"
- 2000 - 2002 Faculty member and group leader at the Departments of Neuro and Sensory Physiology, Medical School at the University of Göttingen
- Since October 2002 Tenure Track position within the Centre for Molecular Physiology of the Brain (ZMPG)

Major Research Interests

Our scientific activities are centered on the understanding of the time- and space-dependent interactions between different signalling proteins (in particular G-Protein Coupled Receptors and their downstream effectors), leading to the specific actions within the cell. As model system we use the serotonergic signaling, which is critically involved in regulation of different neuronal processes. This project addresses following aspects:

- Dynamic distribution and clustering of defined serotonin receptors (5-HTR) in different cell types. To study the activation-dependent changes in receptor distribution, individual receptor are coupled with fluorescence proteins (GFP, CFP, YFP) and analysed by confocal as well as 2-photon microscopy. We also analyse oligomerization state of different receptors by biochemical methods as well as by molecular imaging (i.e. FRET, single-cell FRET)
- Determination of G-proteins as well as downstream effectors specifically interacting with individual serotonin receptors. Cross-talk between GPCRs and specific effectors. To identify specific downstream effectors we apply biochemical, biophysical and electrophysiological methods. To get dynamic biochemical information we are establishing molecular imaging of high spatial and temporal resolution (single-cell FRET, fluorescence lifetime imaging microscopy (FLIM)). Combination of this nanotomographic fluorescence imaging with various forms of "patch clamping" will also be used for the parallel on-line measurement of physiological parameters in whole cell function. Using "patch-clamp" method will also allow the quantitative analysis of the transcription level for individual signalling molecules by using single-cell RT-PCR and TaqMan techniques, which are presently established in our lab.
- Functional role of post-translational protein modifications on G protein-coupled 5-HTR. Differential expression of receptors during development und after chronic application of drugs.

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Selected Recent Publications

Ponimaskin E, Heine M, Joubert L, Sebben M, Bickmeyer U, Richter DW, Dumuis A (2002) The 5-hydroxytryptamine(4a) receptor is palmitoylated at two different sites and acylation is critically involved in regulation of receptor constitutive activity. Journal of Biological Chemistry 277: 2534-2546

Ponimaskin E, Profirovic J, Vaiskunaite R, Richter DW, Voyno-Yasenetskaya T (2002) 5-hydroxytryptamine(4a) receptor is coupled to Galpha subunit of heterotrimeric G13 protein. Journal of Biological Chemistry 277: 20812-20819

Manzke T, Guenther U, Ponimaskin E, Haller M, Dutschmann M, Schwarzachwer S, Richter DW (2003) 5-HT4(a) receptors avert opioid-induced breathing depression without loss of analgesia. Science 301: 226-229

Richter DW, Manzke T, Wilken B, Ponimaskin EG (2003) Serotonin Receptors: Guardians for a Stable Breathing. Trends in Molecular Medicine 9: 542-548

Papoucheva K, Dumuis A, Sebben M, Richter D, Ponimaskin EG (2004) The 5-HT1A receptor is stably palmitoylated and acylation is critical for the receptor communication with Gi-protein. Journal of Biological Chemistry 279: 3280-3291

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Speaker of the European Neuroscience Institute Göttingen

- Wiss. Angestellter, I. Physiol. Inst., University of Saarland, 1969 - 1970
- Wiss. Assistent, I. Physiol. Inst., University of Saarland, 1970 - 1972
- Wiss. Assistent, I. Physiol. Inst., University of Munich, 1972 - 1974
- Universitätsdozent, I. Physiol. Inst., University of Munich, 1974
- Universitätsdozent, I. Physiol. Inst., University of Heidelberg, 1975 - 1976
- C-3 Professor, I. Physiol. Inst., University of Heidelberg, 1976 - 1988
- C-4 Professor, II. Physiol. Inst., University of Göttingen, 1988

Major Research Interests

Neurotransmitters, neuromodulators, and peptide hormones are known to activate metabotropic receptor proteins that control ion channels or second messenger cascades. These receptors regulate an intracellular network of interacting signal transduction pathways by means of G-proteins. Thus, receptors transmit extracellular signals to intracellular proteins and other chemical factors. These signals are normally not transduced in a stereotype manner, but they are integrated in a space- and time-dependent manner, resulting in highly dynamic and variable cellular responses. The specific nature of the cellular response depends on individual cell types that may differ in the expression pattern of receptor subtypes or of intracellular signaling factors. Our research group concentrates on the spatial organization of various subtypes of serotonin receptors and targets an understanding of the highly localized regulation of molecular interactions occurring simultaneously at many sites of a neuron. The goal is to achieve a refined understanding of the parallel signal processing within networks of chemical signal pathways and to clarify their effects on the properties of the neuron as a whole.

Another task addressing complex brain functions is to transfer this knowledge about molecular signaling within cells to the integrated function of neuronal networks. The problem is that modulation of network systems cannot be predicted simply on the basis of cellular reactions, because subgroups of diversely wired neurons mostly express heterogeneous receptor profiles.

Selected Recent Publications

Renner U, Glebov K, Lang T, Papusheva E, Balakrishnan S, Keller B, Richter DW, Jahn R, Ponimaskin E (2007) Localization of the 5-HT1A receptor in lipid microdomains depends on its palmitoylation and is involved in receptor-mediated signaling. Mol Pharmacol 72(3): 502-13

Stettner GM, Huppke P, Brendel C, Richter DW, Gartner J, Dutschmann M. (2007) Breathing dysfunctions associated with impaired control of postinspiratory activity in Mecp2- /y knockout mice. J Physiol 579(3): 863-76

Neusch C, Papadopoulos N, Müller M, Maletzki I, Winter SM, Hirrlinger J, Handschuh M, Bahr M, Richter DW, Kirchhoff F, Hülsmann S (2006) Lack of the Kir4.1 channel subunit abolishes K^+ buffering properties of astrocytes in the ventral respiratory group: impact on extracellular K^+ regulation. J Neurophysiol 95(3): 1843-52

Kvachnina E, Liu G, Dityatev A, Renner U, Dumuis A, Richter DW, Dityateva G, Schachner M, Voyno-Yasenetskaya TA, Ponimaskin EG (2005) 5-HT7 receptor is coupled to G alpha subunits of heterotrimeric G12-protein to regulate gene transcription and neuronal morphology. J Neurosci 25(34): 7821-30

Büsselberg D, Bischoff AM, Richter DW (2003) A combined blockade of glycine and calcium-dependent potassium channels abolishes the respiratory rhythm. Neuroscience 122(3): 831-41

Gomeza J, Ohno K, Hülsmann S, Armsen W, Eulenburg V, Richter DW, Laube B, Betz H (2003) Deletion of the mouse glycine transporter 2 results in a hyperekplexia phenotype and postnatal lethality. Neuron 40(4): 797-806

Detlev Schild

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- 1979 Diplom in Physics, University of Göttingen
- 1982 M.D., University of Göttingen
- 1985 Dr. rer.nat., University of Göttingen
- 1987 Dr. med., University of Göttingen
- 1997 Appointed head of the Department of Molecular Neurophysiology in the Center of Physiology and Pathophysiology, Medical School, University of Göttingen

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Major Research Interests

The olfactory system is able to detect and distinguish thousands of molecules in our environment. Receptor neurons are endowed with hundreds of different receptors to bind odorants and transduce the chemical signal into an electrical one. The receptor neurons convey their information onto the olfactory bulb where a neuronal image of odorants is generated. Using a combination of electrophysiological and high resolution imaging techiques, we are studying

- the biophysical details of the primary transduction processes,
- the synaptic transmission in the olfactory bulb,
- the generation of the neuronal chemotopic map and
- the mechanism of odor learning,
- single molecule behaviour in cells.

Selected Recent Publications

Czesnik D, Schild D, Kuduz J, Manzini I (2007) Endocannabinoid actions in the olfactory epithelium. Proc Natl Acad Sci USA 104: 2967-2972

Chen T-W, Lin B-J, Brunner E, Schild D (2006) (CMPB, BCCN) *In-situ* background estimation in quantitative fluorescence imaging. Biophys J 90: 2534 - 2547

Nezlin LP, Schild D (2005) Individual olfactory sensory neurons project into more than one glomerulus in *Xenopus laevis* tadpole olfactory bulb. J Comp Neurol 481: 233-9

Manzini I, Schild D (2004) Classes and narrowing selectivity of olfactory receptor neurons of *Xenopus laevis* tadpoles. J. Gen Physiol 123: 99 - 107

Manzini I, Schild D (2003) cAMP-independent olfactory transduction of amino acids in *Xenopus laevis* tadpoles. J Physiol 551: 115-123

Czesnik D, Rössler W, Kirchner F, Gennerich A, Schild D (2003) Neuronal representation of odorants in the olfactory bulb of *Xenopus laevis* tadpoles. Eur J Neurosci 17: 113-118

Gennerich A, Schild D (2002) Anisotropic diffusion in mitral cell dendrites of *Xenopus laevis* tadpoles Biophys J 83: 510-522

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Group Leader Molecular Neurobiology

- 1995 - 2001M.D. Ph.D. with Thomas C. Südhof at the Max-Planck-Institute for Experimental
  Medicine in Göttingen (Germany)
- Dr. rer. nat. (PhD) 2000, University of Hannover
- Dr. med. (Medical thesis), University of Göttingen
- 2002 - 2006 Postdoc with Robert C. Malenka at Stanford University Medical Center (USA)
- Independent group leader (Emmy-Noether/DFG) at the European Neuroscience Institute Göttingen (ENI-G), since 2006

Major Research Interests

Dynamics of biomolecules and nano-assemblies (amyloid systems), molecules at interfaces, molecular dynamics and elementary chemical reactions ("Femtochemistry"), cold molecules, electron dynamics in condensed matter, analytics (time-resolved) of complex systems, nanoscale imaging.

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

Schlüter* OM, Xu* W, Malenka RC (2006) Alternative N-terminal domains of PSD-95 and SAP97 govern activity-dependent regulation of synaptic AMPA receptor function. Neuron 51(1): 99-111

Schlüter OM, Basu J, Südhof TC, Rosenmund C (2006) Rab3 superprimes synaptic vesicles for release: implications for short-term synaptic plasticity. J Neurosci 26(4): 1239-46

Chandra S, Gallardo G, Fernandez-Chacon R, Schlüter OM, Südhof TC (2005) Alpha-synuclein cooperates with CSPalpha in preventing neurodegeneration. Cell 123(3): 383-96

Fornai F, Schlüter OM, Lenzi P, Gesi M, Ruffoli R, Ferrucci M, Lazzeri G, Busceti CL, Pontarelli F, Battaglia G, Pellegrini A, Nicoletti F, Ruggieri S, Paparelli A, Südhof TC (2005) Parkinson-like syndrome induced by continuous MPTP infusion: convergent roles of the ubiquitin-proteasome system and alpha-synuclein. PNAS 102(9): 3413-8

Schlüter OM, Schmitz F, Jahn R, Rosenmund C, Südhof TC (2004) A complete genetic analysis of neuronal Rab3 function. J Neurosci 24(29): 6629-37

Schlüter OM, Fornai F, Alessandri MG, Takamori S, Geppert M, Jahn R, Südhof TC (2003) Role of alpha-synuclein in 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine-induced parkinsonism in mice. Neuroscience 118(4): 985-1002

Schlüter* OM, Khvotchev* M, Jahn R, Südhof TC (2002) Localization versus function of Rab3 proteins. Evidence for a common regulatory role in controlling fusion. J Biol Chem 277(43): 40919-29

Jörg B. Schulz

Professor of Restorative Neurobiology, Director of the Department of Neurodegeneration and Restorative Research

- MD, University of Cologne Medical School, 1991
- Training in Neurology and Neuroscience at the Department of Neurology in Tübingen
- DFG Research Fellow at the Massachusetts General Hospital and Harvard Medical School, Boston
- Head of Neurodegeneration Laboratory, Hertie Institute for Clinical Brain Research and University of Tübingen, 1998 - 2004
- Habilitation, University of Tübingen, 1999
- Director of the Department of Neurodegeneration and Restorative Research, CMPB, University of Göttingen, since 2004

Major Research Interests

Our Department studies the mechanisms of degeneration in neurodegenerative disorders, including Parkinson's disease, Alzheimer's disease and cerebral ataxias. Because increased age is the major risk factor for developing a neurodegenerative disorder, we are highly interested in the mechanisms of neuronal aging. To study these mechanisms we use immortalized cell line models, primary neuronal culture models, Drosophila models, toxin-induced and transgenic mammalian (mice, rats, primates) models of Parkinson's disease. Once important pathogenetic steps have been identified we investigate their functional significance my using pharmacological or molecular tools including different transfection methods and viral gene transfer. The ultimate goal is to translate these findings into treatments that are applicable to patients. Therefore, the Department is enrolled in the outpatient clinics for Movemenet Disorders and Dementias and has a leading role in the German Network for Hereditary Movement Disorders (GeNeMove).

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Selected Recent Publications

Xia XG, Harding T, Weller M, Uney JB, Schulz JB (2001) Gene transfer of the JNK interacting protein-1 protects dopaminergic neurons in the MPTP model of Parkinson's disease. Proc Natl Acad Sci USA 98: 10433-10438

Wick A, Wick W, Waltenberger J, Weller M, Dichgans J, Schulz JB (2002) Neuroprotection by hypoxic preconditioning requires sequential activation of vascular endothelial growth factor receptor and Akt. J Neurosci 22: 6401-6407

Simons M, Krämer E-M, Macchi P, Rathke-Hartlieb S, Trotter J, Nave K-A, Schulz JB (2002) Overexpression of the Myelin Proteolipid Protein leads to accumulation of cholesterol and Proteolipid Protein in endosomes/lysosomes: implications for Pelizaeus-Merzbacher disease. J Cell Biol 157: 327-336

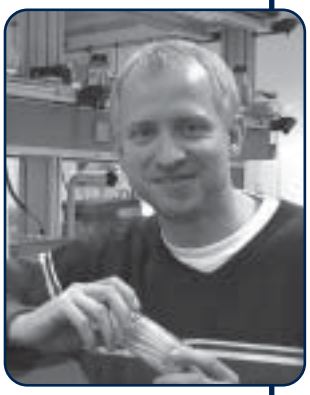
Simons M, Schwärzler F, Lütjohann D, von Bergmann K, Beyreuther K, Dichgans J, Wormstall H, Hartmann T, Schulz JB (2002) Treatment with simvastatin in normocholesterolemic patients with Alzheimer's disease: a 26-week randomised, placebo-controlled, double-blind trial. Ann Neurol 52: 346-350

Luft AR, Buitrago MM, Ringer T, Dichgans J, Schulz JB (2004) Motor skill learning depends on protein synthesis in motor cortex after training. J. Neurosci. 2004, 24: 6515-6520.

Beier CP, Wischhusen J, Gleichmann M, Gerhardt E, Pekanovic A, Krueger A, Taylor V, Suter U, Krammer PH, Endres M, Weller M, Schulz JB (2005) FasL (CD95L/APO-1L) resistance of neurons mediated by phosphatidylinositol 3-kinase-Akt/protein kinase B-dependent expression of lifeguard/neuronal membrane protein 35. J Neurosci 25: 6765-6774

Strauss K, Martins LM, Plun-Favreau H, Marx F, Kautzmann S, Berg D, Gasser T, Wszolek Z, Müller T, Bornemann A, Wolburg H, Downward J, Riess O, Schulz JB, Krüger R (2005) Loss of function mutations in the gene encoding Omi/HtrA2 in Parkinson's disease. Hum Mol Genet 14: 2099-2111

Stephan J. Sigrist



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Group Leader Molecular Mechanisms of Synaptic

- Dr. rer. nat (PhD) 1997, University of Tübingen
- From 2001 until 2006 Independent group leader position at the European Neuroscience Institute Göttingen (ENI-G)
- 1997 - 2001 Postdoc with Christoph Schuster at Friedrich Miescher Laboratory in Tübingen (Germany), Max Planck Society
- 1993 - 1997 Ph.D. with Christian F. Lehner at Friedrich Miescher Laboratory in Tübingen (Germany), Max Planck Society

Major Research Interests

Synaptic strengths change as neuronal circuits develop and are modified by experience, providing a cellular basis for the correct development of neuronal systems as for higher brain functions (e.g. learning and memory). Model system for our studies is the developing larval neuromuscular junction (NMJ) of Drosophila, offering access for physiological, ultrastructural and biochemical methods as well as for the powerful molecular-genetic and genetic approaches typical for Drosophila. Moreover, the optical transparence of the larva opens the way for the *in vivo* imaging of plasticity relevant processes using genetically encoded GFP-sensors.

At the NMJ, we have recently demonstrated the existence of large aggregates of translation factors very close to the synaptic sites. Increasing this subsynaptic translation stimulated synaptogenesis, neurotransmission as well as morphological outgrowth of the developing NMJ. Postsynaptic translation we found to provoke this substantial long-term strengthening by increasing the synaptic levels of a particular glutamate receptor subunit, DGluR-IIA.

In our ongoing work, mechanisms underlying synapse formation and growth at the Drosophila NMJ are characterized further. On one hand, newly designed genetic screens and a molecular analysis of the translational control mechanisms throughout plasticity will be the basis to identify molecules that regulate synaptic growth and function. Moreover, synaptic protein synthesis, glutamate receptor dynamics and synaptic growth are visualized live in developing larvae, using lines transgenic for GFP-tagged marker proteins in combination with confocal and 2-photon microscopy. Moreover, the fact that learning and memory paradigms are well established for adult Drosophila flies offers the possibility to assess the relevance of junctional plasticity-mechanisms for central synapses and brain functions in general.

Selected Recent Publications

Sigrist SJ, Ried G, Lehner CF (1995a) *Dmcdc2* kinase is required for both meiotic divisions during *Drosophila* spermatogenesis and is activated by the twine/cdc25 phosphatase. Mech of Dev 53: 247-260

Sigrist SJ, Jacobs H, Stratmann R, Lehner CF (1995b) Exit from mitosis is regulated by *Drosophila* fizzy and the sequential destruction of cyclins A, B and B3. EMBO J 14(19): 4827-38

Sauer K, Weigmann K, Sigrist SJ, Lehner CF (1996) Novel members of the *cdc2*-related kinase family in *Drosophila*: cdk4/6, cdk5, PFTAIRE, and PITSLRE kinase. Mol Biol Cell: 1759-69

Sigrist SJ, Lehner CF (1997) *Drosophila* fizzy-related down-regulates mitotic cyclins and is required for cell proliferation arrest and entry into endocycles. Cell 1997 (4): 671-81

Sigrist SJ, Thiel PR, Reiff D, Lachance PE, Lasko P, Schuster CM (2000) Postsynaptic translation affects the morphology and efficacy of neuromuscular junctions. Nature 405 (6790): 1062-1065

Jakob Sørensen

Group Leader at the Max Planck Institute for Biophysical Chemistry

- MSc 1996 in Biology, Copenhagen University, Denmark
- PhD 1999, Copenhagen University, Denmark
- 2000 - 2005 scientific assistant (postdoc) at the Max Planck Institute for Biophysical Chemistry, Göttingen
- since 2005 research group leader at the Max Planck Institute for Biophysical Chemistry
- 2006: Habilitation (Physiology); Faculty of Human Medicine, University of Göttingen

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Major Research Interests

The release of neurotransmitter happens by exocytosis of transmitter-filled vesicles. Both the high speed of this release process and the tight coupling to the intracellular calcium concentration is critical for normal synaptic transmission in the brain. We are interested in unraveling the molecular specializations behind both properties. Our model systems are adrenal chromaffin cells and cultured hippocampal neurons, where secretion can be monitored using fast electrophysiological (patch clamp) and electrochemical (amperometry) techniques. In order to manipulate presynaptic proteins we take advantage of cells isolated from knock-out mice, where a specific protein is removed, combined with overexpression using viral vectors (Semliki Forest Virus,
Adenovirus and Lentivirus). The expression of different protein isoforms, or mutated protein, in knock-out cells is used to assay the involvement of proteins in neurotransmitter release.
The major focus of our interest is the SNARE complex, the synaptotagmins and Munc18 proteins. The SNARE complex consists of SNAP-25, syntaxin and synaptobrevin, which is formed between the vesicle and plasma membrane during fusion. The synaptotagmins are C2-domain containing proteins, that can bind to calcium, phospholipids and SNAREs. They are usually assumed to be calcium-sensors for release. The Munc18 proteins bind to syntaxin and is necessary for docking vesicles to the plasma membrane.

Selected Recent Publications

Delgado-Martinez I, Nehring R, Sørensen JB (2007) Differential abilities of SNAP-25 homologues to support neuronal function. J Neurosci 27: 9380-9391

Gulyás-Kovács A, de Wit H, Kochubey O, Milosevic I, Toonen R, Klingauf J, Verhage M, Sørensen JB (2007) Munc18-1: sequential interactions with the fusion machinery stimulate vesicle docking and priming. J Neurosci 27: 8676-8686

Toonen RF, Kochubey O, de Wit H, Gulyas-Kovacs A, Konijnenburg B, Sørensen JB, Klingauf J, Verhage M (2006) Dissecting docking and tethering of secretory vesicles at the target membrane. EMBO J 25: 3725-3737

Sørensen JB, Wiederhold K, Müller EM, Milosevic I, Nagy G, de Groot BL, Grubmüller H, Fasshauer D (2006) Sequential N- to C-terminal SNARE complex assembly drives priming and fusion of secretory vesicles. EMBO J 25: 955-966

Nagy G, Kim JH, Pang ZP, Matti U, Rettig J, Sudhof TC, Sørensen JB (2006) Different effects on fast exocytosis induced by synaptotagmin 1 and 2 isoforms and abundance but not by phosphorylation. J Neurosci 26: 632-643

Nagy G, Milosevic I, Fasshauer D, Muller EM, de Groot BL, Lang T, Wilson MC, Sørensen JB (2005) Alternative Splicing of SNAP-25 Regulates Secretion through Nonconservative Substitutions in the SNARE Domain. Mol Biol Cell 16: 5675-5685

Milosevic I, Sørensen JB, Lang T, Krauss M, Nagy G, Haucke V, Jahn R, Neher E (2005) Plasmalemmal PI(4,5)P_2 level regulates the releasable vesicle pool size in chromaffin cells. J Neurosci 25: 2557-2565

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Professor, Medical Psychology and Medical Sociology

- 1993: Professor of Medical Psychology, Institute of Medical Psychology (IMP), Munich University (LMU)
- 1998 - 2002 Vice-chairperson of the German Society of Medical Psychology
- since 1998 editorship of the section “Quality of life and disease coping” of the “Zeitschrift für Medizinische Psychologie”
- 1999 Professor of the Dorothea-Erxleben Foundation, Magdeburg University
- 2001 Associate Professor of Gerontopsychology at Geneva University and Head of the Department of Neurogerontopsychology at the Unit of Psychogeriatrics at Geneva University Hospital
- 2001 - 2005 Member of the board of the Swiss Society of Psychology
- 2004 Director of the Department of Medical Psychology, Georg August University of Göttingen
- 2004 - 2005 Member of the board and vice-treasurer of the Academia Multidisciplinaria Neurotraumatologica
- since 2004 editor of the series “Psychomed Compact”, UTB textbooks series
- 2005 Director of the Department of Medical Psychology and Medical Sociology, Georg August University of Göttingen

Major Research Interests

- Cross-cultural Outcome
- Cognitive Neuroscience
- Neuropsychology
- Quality and communication improvement in medicine

Medical Sociology

- Assessment of the Consequences of Technology in Medicine
- Professionalisation

Selected Recent Publications

Bruggimann L, Annoni JM, Staub F, v. Steinbüchel N, van der Linden M, Bogousslavsky J (2006) Chronic posttraumatic stress symptoms after nonsevere stroke. Neurology 66(4), 513-516

v. Steinbüchel N, Lischetzke T, Gurny M, Eid M (2006) Assessing quality of life in older people: Psychometric properties of the WHOQOL-BREF. European Journal of Ageing 3, 116-122

v. Steinbüchel N, Petersen C, Bullinger M, and the QOLIBRI Group (2005) Assessment of health-related quality of life in persons after traumatic brain injury – development of the Qolibri, a specific measure. Acta Neurochirurgica 93, 43-49

v. Steinbüchel N, Richter S, Morawetz C, Riemsma R (2005) Assessment of subjective health and health-related quality of life in persons with acquired or degenerative brain injury. Current Opinion in Neurology 18, 681-691

Wittmann M, Burtscher A, Freis W, von Steinbüchel N (2004) Effects of brain-lesion size and location on temporal-order judgement. Neuroreport, 15 (15): 2401-2405

Kagerer F, Wittmann M, Szelag E, v. Steinbüchel N (2002) Cortical involvement in temporal reproduction: Evidence for differential roles of the hemispheres. Neuropsychologia 40 (3), 357-66

Wittmann M, v. Steinbüchel N, Szelag E (2001) Hemispheric specialisation for self-paced motor sequences. Cognitive Brain Research 10 (3), 341-344

Anastassia Stoykova

Privatdozentin, Developmental Biology

- M.D., 1972, Bulgarian Medical Academy
- Research Associate in Neurochemistry, 1973-1988, Bulgarian Academy of Sciences, Sofia
- Ph.D. (Neurochemistry), 1985, Bulgarian Academy of .Sciences, Sofia
- Postdoc, 1988-1989, Max Pianck Institute for Biophysical Chemisrty, Göttingen
- Habilitation (Neurochemistry), 1989, Bulgarian Academy of Sciences, Sofia
- Assistant Research Professor, 1989 -1991, Instutute of Molecular Biology, Bulg. Acad. Sci., Sofia
- Senior Research Scientist, 1991-2002, Dept. Mol. Cell Biol., MPI for Biophysical Chemistry, Göttingen
- Recognition of Habilitation (Developmental Biology), Faculty of Medicine, University of Göttingen
- Since 2002 Research Group Leader, Max Planck Institute for Biophysical Chemistry, Göttingen

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Major Research Interests

The neurons in mammalian cortex are highly specialized for the analysis of sensory inputs and performance of motor outputs, and underlay the perceptual and cognitive abilities. Composed of six cellular layers, the neocortex is a modular structure with numerous functional areas in which the neurons have specific number, morphology, connections and functions. Our group is interested in understanding the molecular and cellular mechanisms involved in generation of the immense diversity of the cortical neurons during development. Through a microarray screen, we have identified sets of genes with a differential expression between distinct domains and layers of the embryonic mouse cortex. To study the function of selected candidates, we combine approaches for targeted gene inactivation or activation in transgenic mice using the conventional and conditional knock-out strategies with biochemical, morphological, gene expression, tissue culture methods and techniques for gene transfer in isolated brain or living mouse embryos.

With one gene, the transcription factor Pax6, we are further ahead in understanding its function. Pax6 is a neurogenic factor for the pluripotent cortical radial glial progenitors. Mutations in the human PAX6 gene cause the inherited disease *Aniridia* characterized by ocular, neurological, and behavioral defects. Our current efforts concentrate on elucidation of Pax6-dependent genetic mechanisms in cortical layer and area formation with a recent focus on identification and analysis of Pax6 target genes in these processes. Experiments underway concern identification and functional analysis of Pax6-protein partners in cortical neurogenesis. Our ongoing and future goals include understanding the role of Pax6 in neurogenesis of the adult brain.

Selected Recent Publications

Berger J, Berger S, Tuoc TC, D´Amelio M, Cecconi F, Gorski JA, Jones KJ, Gruss P, Stoykova A (2007) Conditional activation of Pax6 in developinc cortex of transgenic mices causes progenitor apoptosis. Development 134: 1311-1322

Fimia GM, Stoykova A, Romagnoli A, Giunta L, Di Bartolomeo S, Nardacci R, Corazzari M, Fuoco C, Ucar A, Schwartz P, Gruss P, Pieacentini M, Chowdhury K, Cecconi F (2007) AMBRA1 regulates autophagy and development of the nervous system. Nature 447: 1121-1125

Mühlfriedel S, Kirsch F, Gruss P, Chowdhury K, Stoykova A (2007) Large scale microarray analysis of differential gene expression of the E16 mouse cerebral cortex. Eur J Neurosci 26: 33-50

Remedios R, Huilgol D, Saha B, Hari P, Bhatnagar L, Kowalczyk T, Hevner RH, Suda Y, Aizawa S, Ohshima T, Stoykova A, Tole S (2007) A novel stream of amygdaloid cells from the caudal telencephalon reveals a developmental link between the amygdala and the neocortex. Nature Neurosci 9: 1141-1150

Zembrzycki A, Griesel G, Stoykova A, Mansouri A (2007) Genetic interplay between the transcription factor *Sp8* and *Emx2* in the patterning of the forebrain. Neural Development 30 2: 8

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- 1978 - 1980 PhD with Dr. F. Conti in Camogli, Italy
- 1980 - 1983 Post Doc in the Department of Physiology and Biophysics in Seattle, USA, with Dr. W. Almers
- 1983 - 1992 group leader at the Max Planck Institute for Biophysical Chemistry in Göttingen with Dr. E. Neher
- 1992 - present Director of the Department Molecular Biology of Neuronal Signals at the Max Planck Institute for Experimental Medicine in Göttingen

Major Research Interests

The principal aim of the department "Molecular Biology of Neuronal Signals" is the study of signaling within cells and between cells. To this end, molecular biology, genetics and electrophysiology are used to elucidate structure-function relationships of membrane-bound proteins, expecially ion channels and receptors. Specific tools such as antibodies and toxins are developed and used to interfere with signaling pathways relevant for cell cycle control, ion selectivity and the secretion of cells in culture and in primary cells.

Selected Recent Publications

Jenke M, Sánchez A, Monje F, Stühmer W, Weseloh RM, Pardo LA (2003) C-terminal domains implicated in the functional surface expression of potassium channels. EMBO J 22: 395-403

Becherer U, Moser T, Stühmer W, Oheim M (2003) Calcium regulates exocytosis at the level of single vesicles. Nature Neurosci 6: 846-853

García-Ferreiro RE, Kerschensteiner D, Major F, Monje F, Stühmer W, Pardo LA (2004) Mechanism of block of hEag1 K^+ channels by imipramine and astemizole. J Gen Physiol 124: 301-317

Pardo LA, Contreras-Jurado C, Zientkowska M, Alves F, Stühmer W (2005) Role of voltage-gated potassium channels in cancer. J Membr Biol 205: 115-124

Weber C, Mello de Queiroz F, Downie F, Suckow A, Stühmer W, Pardo LA (2006) Silencing the activity and proliferative properties of the human Eag1 potassium channel by RNA interference. J Biol Chem 281: 13030-13037

Stühmer W, Alves F, Hartung F, Zientkowska M, Pardo LA (2006) Potassium channels as tumour markers. FEBS Letters 580: 2850-2852

Andreas Stumpner

Professor of Neuroethology

- Dr. rer. nat., University of Erlangen, Germany, 1988
- Postdoctoral fellow, Andrews University, Berrien Springs, USA, 1990 - 1991
- Habilitation, University of Göttingen, 1997
- Guest professor, University of Zurich, Switzerland, 2002 - 2003
- Since April 2003 Professor of Zoology at the University of Göttingen

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Major Research Interests

My research focuses on how a small nervous system recognises specific frequencies and temporal patterns (in the context of acoustic communication in insects, mainly in Orthoptera). Understanding these processes bears implications also for understanding function and evolution of the same performances of the vertebrate brain. I see the strength of the acoustic and invertebrate system *a)* in the precise temporal and spectral stimuli one can deliver and the clear (innate) responses on the behavioural and neuronal level, *b)* in the comparative potential (song recognition in groups of related species and differences in neuronal layout to related non-singing or non-hearing groups) allowing to understand what mechanisms might have played a role in evolution and how evolution of songs and recognition systems depend on each other, *c)* in the identified neurone-approach allowing to find homologous neurones in related species and indicating evolutionary changes on the cellular level and *d)* the potential to directly test hypotheses in behavioural experiments.
Recent findings from intracellular studies in bushcrickets are: Central neurons receive lateral frequency-dependent inhibitions. After blocking such inhibitions the frequency tuning broadens considerably. Species-specificity of a neuron in related species depends on specific inhibitions, not on specific excitations. And homologous neurons in more distantly related species may differ considerably in their properties.

Selected Recent Publications

Stumpner A, Allen GR, Lakes-Harlan R (2007) Hearing and frequency dependence of auditory interneurons in the parasitoid fly Homotrixa alleni (Tachinidae: Ormiini). J Comp Physiol A 193: 113-125

Stumpner A, Molina J (2006) Diversity of intersegmental auditory neurons in a bush cricket. J Comp Physiol A 192: 1359-1376

Molina J, Stumpner A (2005) Effects of pharmacological treatment and photoinactivation on the directional responses of an insect neuron. J Exp Zool 303A: 1085-1103

Hennig M, Franz A, Stumpner A (2004) Processing of auditory information in insect. Microsc Res Tech 63: 351-374

Stumpner A (2002) A species-specific frequency filter through specific inhibition, not specific excitation. J comp Physiol A 188: 239-248

Stumpner A (1999) Comparison of morphology and physiology of two plurisegmental sound-activated interneurones in a bushcricket. J Comp Physiol A 185: 199-205

Rust J, Stumpner A, Gottwald J (1999) Singing and hearing in an ancient bushcricket. Nature 399: 650

Victor Tarabykin

Group Leader at the Max Planck Institute for Experimental Medicine

- MD, Russian State Medical University, Moscow 1993
- PhD in Molecular Biology with S.Lukyanov, Russian Academy of Sciences, Moscow 1996
- Postdoctoral fellow with P.Gruss at the Max Planck Institute for Biophysical Chemistry, 1996 - 2001
- since 2002 Research Group Leader at the Max Planck Institute for Biophysical Chemistry; Department Molecular Cell Biology, Göttingen

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Major Research Interests

During development, several populations of progenitor cells in the dorsal telencephalon generate a large variety of neurons. These neurons acquire distinct morphologies and physiological properties and serve distinct functions in the mammalian cerebral cortex. We are interested in the cellular and molecular mechanisms underlying cell fate specification in the mouse cerebral cortex. We focus on the mechanisms controlling the generation of neurons of different cortical layers. We apply a combination of genetic, molecular and cell biological approaches. We have identified several genes that control cortical development. One of them, Sip1 is a transcription factor implicated in Mowat-Wilson syndrome (MWS) in humans. MWS patients suffer from intellectual disability, microcephaly and seizures. We inactivated the gene specifically in cortical precursors. This resulted in the degeneration of the entire hippocampus. We have shown that in the hippocampus Sip1 controls activity of non-canonical Wnt pathway.

Another gene we identified, Satb2 is a transcription factor of a novel type that interacts with special chromosomal regulatory elements, Matrix Attachment Regions. Satb2 is an important determinant of neurons of superficial cortical layers. In order to study its role in neural development we produced several mouse mutants where Satb2 expression is altered. There are several other genes that have been identified in the lab whose function in the cortical development remains to be revealed.

Selected Recent Publications

Miquelajauregui A, Van de Putte T, Polyakov A, Nityanandam A, Boppana S, Seuntjens E, Karabinos A, Higashi Y, Huylebroeck D, Tarabykin V (2007) Smad-interacting protein-1 (Zfhx1b) acts upstream of Wnt signaling in the mouse hippocampus and controls its formation. Proc Natl Acad Sci U S A. 31;104(31): 12919-24

Britanova O, Depew MJ, Schwark M, Thomas BL, Miletich I, Sharpe P, Tarabykin V (2006) Satb2 haploinsufficiency phenocopies 2q32-q33 deletions while loss suggests a fundamental role in the coordination of jaw development. Am J Hum Genet 79(4): 668-78

Britanova O, Alifragis P, Johnes K, Gruss P, Tarabykin V (2006) Tangential migration of cortical projection neurons: a novel mode of migration. Dev Biol 298(1): 299-311

Guillemot F, Molnar Z, Tarabykin V, Stoykova A (2006) Molecular mechanisms of cortical differentiation. Eur J Neurosci 23(4): 857-68

Molnar Z, Metin C, Stoykova A, Tarabykin V, Price D, Frances F, Meyer G, Dehay C, Kennedy K (2006) Comparative aspects of cerebral cortical development. Eur J Neurosci 23(4): 921-34

Britanova O, Akopov S, Lukyanov S, Gruss P, Tarabykin V (2005) Novel transcription factor Satb2 interacts with matrix attachment region DNA elements in a tissue-specific manner and demonstrates cell-type-dependent expression in the developing mouse CNS. Eur J Neurosci 21: 658-68

Tarabykin V, Stoykova A, Usman N, Gruss P (2001) Cortical upper layer neurons derive from the subventricular zone as indicated by Svet1 gene expression. Development 128: 1983-1993

Stefan Treue

Professor, Director of the German Primate Center

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

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.

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Selected Recent Publications

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: 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 (2001) Neural correlates of attention in primate visual cortex. Trends in Neurosciences 24 (5): 295-300

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

Treue S, Martinez Trujillo JC (1999) Feature-based attention influences motion processing gain in macaque visual cortex. Nature 399 (6736): 575-579

Treue S, Maunsell JHR (1996) Attentional modulation of visual motion processing in cortical areas MT and MST. Nature 382 (6591): 539-541

Andreas Wodarz

Professor of Stem Cell Biology

- Diploma Biology, University of Cologne, 1990
- Dr. rer. nat. Developmental Biology, University of Cologne, 1993
- Postdoc, Howard Hughes Medical Institute, Stanford University, 1994-1997
- Junior Group Leader, Heinrich Heine University Düsseldorf, 1997-2004
- Habilitation in Genetics, Heinrich Heine University Düsseldorf, 2001
- Appointed as Head of the Department of Stem Cell Biology at the University of Göttingen, 2004

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Major Research Interests

At the center of my research interests is the question of how neural stem cells divide asymmetrically to produce another stem cell and a progenitor cell that will differentiate and give rise to neurons and glia cells. One important aspect of asymmetric cell division is the establishment of an intrinsic polarity which is the prerequisite for the asymmetric localization of proteins and mRNAs that serve as cell fate determinants. Our model system for the asymmetric division of stem cells is the embryonic neuroblast of Drosophila. Here we study the function of genes that control cell polarity, asymmetric localization of cell fate determinants and orientation of the mitotic spindle. The knowledge obtained in the Drosophila system has stimulated intense research on the participation of the orthologous genes and proteins in the asymmetric division of vertebrate stem cells.

Selected Recent Publications

Wodarz A, Stewart DB, Nelson WJ, Nusse R (2006) Wingless signaling modulates cadherin-mediated cell adhesion in *Drosophila* imaginal disc cells. J Cell Sci 119: 2425-2434

Wodarz A (2005) Molecular control of cell polarity and asymmetric cell division in *Drosophila* neuroblasts. Curr Opin Cell Biol 17: 475-481

von Stein W, Ramrath A, Grimm A, Müller-Borg M, Wodarz A (2005) Direct association of Bazooka/PAR-3 with the lipid phosphatase PTEN reveals a link between the PAR/aPKC complex and phosphoinositide signaling. Development 132: 1675-1686

Wodarz A, Ramrath A, Grimm A, Knust E (2000) *Drosophila* atypical protein kinase C associates with Bazooka and controls polarity of epithelia and neuroblasts. J Cell Biol 150: 1361-1374

Wodarz A, Ramrath A, Kuchinke U, Knust E (1999) Bazooka provides an apical cue for Inscuteable localization in *Drosophila* neuroblasts. Nature 402: 544-547

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

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

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

Wolf F, Naundorf B, Volgushev M (2006) Unique features of action potential initiation in cortical neurons. Nature 440(7087)

Wolf F (2005) Symmetry, Multistability, and Long-Range Interactions in Brain Development. Phys. Rev. Lett., 95: 208701

Naundorf B, Geisel T, Wolf F (2005) Action potential onset dynamics and the response speed of neuronal populations. Journal of Computational Neuroscience, 18(3): 297-309

Wolf F (2005) Symmetry Breaking and Pattern Selection in Visual Cortical Development. Methods and Models in Neurophysics, Les Houches, Session LXXX, 2003, p. 575-639, Chow CC, Gutkin B, Hansel D, Meunier C, Dalibard J (eds.), Elsevier

Zumdieck A, Timme M, Geisel T, Wolf F (2004) Long chaotic transients in complex networks. Phys. Rev. Lett., 93: 244103

Timme M, Wolf F, Geisel T (2004) Topological speed limits to network synchronization. Phys. Rev. Lett., 92: 074101

Denker M, Timme M, Diesmann M, Wolf F, Geisel T (2004) Breaking synchrony by heterogeneity in complex networks. Phys. Rev. Lett., 92: 074103

Fred Wouters

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Professor, Laboratory for Molecular and Cellular Systems

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

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

Iliev AI, Djannatian JR, Nau R, Mitchell TJ, Wouters FS (2007) Cholestrol-dependent actin remodeling via RhoA and Rac1 activation by the *Streptococcus pneumoniae* toxin pneumolysin. Proc Natl Acad Sci USA 104: 2897-2902

Esposito A, Dohm CP, Kermer P, Bahr M, Wouters FS (2007) alpha-Synuclein and its disease-related mutants interact differentially with the microtubule protein tau and associate with the actin cytoskeleton. Neurobiol Dis 26: 521-531

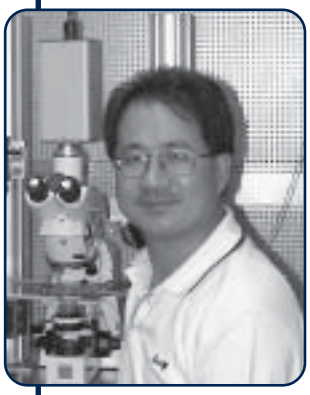
Esposito A, Dohm CP, Bahr M, Wouters FS (2007) Unsupervised fluorescence lifetime imaging microscopy for high content and high throughput screening Mol Cell Proteomics 6: 1446-1454

Hillebrand M, Verrier SE, Ohlenbusch A, Schafer A, Soling HD, Wouters FS, Gartner J (2007) Live cell FRET Microscopy: homo- and heterodimerization of two human peroxisomal ABC transporters, the adrenoleukodystrophy protein (ALDP, ABCD1) and PMP70 (ABCD3). J Biol Chem 282: 26997-27005

Pommereit D, Wouters FS. (2007) An NGF-induced Exo70-TC10 complex locally antagonises Cdc42-mediated activation of N-WASP to modulate neurite outgrowth. J Cell Sci 120: 2694-2705

Esposito A, Gerritsen HC, Wouters FS (2007) Optimizing frequency-domain fluorescence lifetime sensing for high-throughput applications: photon economy and acquisition speed. J Opt Soc Am A 24: 3261-3273

Weiqi Zhang



Privatdozent, Neurophysiology

- Dr. med. (M. D.) University of Bonn, 1987
- Internship, Department of Neurology, University of Bern, Switzerland, 1988
- Postdoctoral fellow, Department of Physiology, University of Bern, Switzerland, 1989 - 1994
- Postdoctoral fellow, Department of Physiology, University of Oxford, UK, 1993
- Postdoctoral fellow, The Nobel Institute of Neurophysiology, Karolinska Institute, Stockholm, Sweden, 1994 - 1996
- Research Group Leader, Center of Physiology and Pathophysiology, University of Göttingen, since 1997
- Habilitation, University of Göttingen, 2003

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Major Research Interests

The neuronal developmental disorders associated with Rett syndrome, the classic autism and other autistic spectrum diseases (ASD) are correlated with a disruption of functional synaptic maturation during postnatal development. Such developmental dysregulation causes cognitive, social and motor retardations. Most ASD patients achieve normal developmental milestones until 6-18 months of age when they enter a period of regression with loss of acquired cognitive, social and motor skills. The main interest of our research group is to analyze disease-related changes of the expression of receptor subunits, the properties of ion-channels and dysfunction synaptic transmission within intakt neuronal network in mutant mice models, such as MECP2, neuroligin, neurexin and neurobeachin mutants. Using an integrative approach, we aim to clarify the functional consequences of identified molecular disturbances in functional synaptic maturation and identify the changes in neuromodulation. In addition, we elucidate the potency of various strategies of protection and restoration including pharmacotherapies using the mutant mice models for ASD.

Selected Recent Publications

Ritter B, Zhang W (2000) The $GABA_A$-mediated inhibition matures during first postnatal week in brain stem of mouse. European Journal of Neuroscience 12: 2975-2984

Zhang W, Barnbrock A, Gajic S, Pfeiffer A, Ritter B (2002) Differential ontogeny of $GABA_B$ receptor-mediated pre- and postsynaptic modulation of GABA and Glycine transmission in respiratory rhythm-generating network of mouse. The Journal of Physiology 540(2): 435-446

Missler M, Zhang W, Rohlmann A, Kattenstroth G, Hammer R, Gottmann K, Südhof TC (2003) α-Neurexins are Required for Coupling Ca^{2+}-Channels to Synaptic Vesicle Exocytosis. Nature 423: 939-948

Zhang W, Rohlmann A, Sargsyan V, Aramuni G, Hammer R, Südhof TC, Missler M (2005) Extracellular domains of α-neurexin are important for regulating synaptic transmission by selectively affecting N- and P/Q-type Ca^{2+}-channels. Journal of Neuroscience. 25(17): 4330-4342

Varoqueaux F, Aramuni G, Rawson R, Mohrmann R, Gottmann K, Zhang W, Südhof TC, Brose N (2006) Neuroligins control synaptic function and network activity but not synaptogenesis. Neuron 51: 741-754

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