Yearbook 2004/05

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

International Max Planck Research School

Imprint

Publisher:	Coordination Office Neurosciences of the Georg August University Göttingen
Text:	Dr. S. Burkhardt Dr. Simone Cardoso de Oliveira
Cover Design:	Rothe Grafik
Page Layout:	VIRTUALabs (M. Nolte)
Photographics:	E. Dierßen Reprostelle MPI bpc (P. Goldmann)

Letter from the President

In 2000, the Georg August University of Göttingen, together with the Max Planck Society for the Advancement of Science established two international MSc/ PhD programs, namely *Neurosciences* and *Molecular Biology*.

Both programs met with immediate success: Some 500 students from more than 70 countries applied for the 40 study places available.

These intensive research-oriented programs are taught by internationally renowned scientists from five Göttingen University faculties, from the Max Planck Institutes for Biophysical Chemistry, Experimental Medicine and for Dynamics Selforganization as well as from the German Primate Centre. International guest lecturers also participate in the programs. The Max Planck Society contributes through its newly established International Max Planck Research Schools.

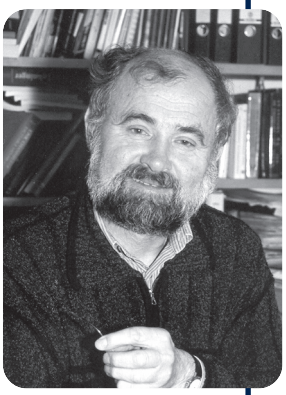
Both programs keep close contacts with the relevant industries in order to also meet market requirements, thus enhancing the chances for successful graduates to find attractive professional careers.

I would very much like to thank all scientific bodies and institutions for their committed support in establishing our new international programs and, last but not least, the German Academic Exchange Service (DAAD) and the Lower Saxony Ministry of Science and Culture.

The Georg August University of Göttingen is proud of its long international experience and very much looks forward to offering two attractive and innovative programs within the setting of a lively urban cultural and social background, a prerequisite for creative teaching and research.

Prof. Dr. Horst Kern
(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 1998 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 i n t e r nationally 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, 29 International Max Planck Research Schools have been established involving 34 Max Planck Institutes and 26 German universities. More than 1200 (mostly PhD-) students from 85 countries are presently enrolled. Eight more schools are initiated and will be established next year.

The success of the Göttingen International Max Planck Research Schools in Molecular Biology and Neurosciences is evident from the high quality of the students and from the hundreds of applications the programs receive each year. The Schools have also re-shaped the local scientific community, strengthened the ties between the participating institutions, and initiated new scientific collaborations that augment the international reputation of Göttingen as a center for scientific excellence. 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
for the Advancement
of Science

Erwin Neher
Dean of the IMPRS
Neurosciences

Overview

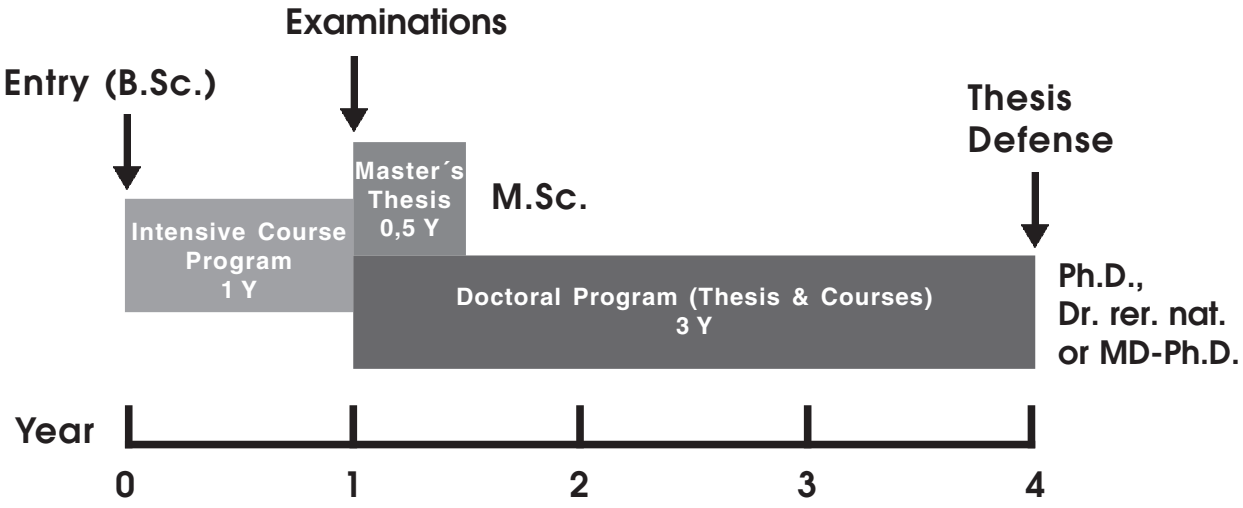
This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Neuroscience Program in Göttingen, Germany, which was established in 2000. In addition to general information on the program, the yearbook introduces the current year's students, the faculty members, the program committee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

The program is jointly conducted 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 Selforganization (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 three collaborative research centers (Sonderforschungsbereiche, SFB), and in five 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. Tuition fees are waived and scholarships are available. The academic year starts in October and is preceded by a three week orientation program. Applications may be submitted until January 31 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 3 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 that 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 following institutions and funding initiatives contributed to the success of the Molecular Biology 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

The following companies contributed stipends:

Bayer AG, Leverkusen, Germany
http://www.bayer.com/en/index.php

Carl Zeiss Lichtmikroskopie, Göttingen, Germany
http://www.zeiss.de

Degussa AG, Düsseldorf, Germany
http://www.degussa.com

DeveloGen AG, Göttingen, Germany
http://www.develogen.com

Heka Elektronik GmbH, Lambrecht / Pfalz, Germany
http://www.keka.com

Hellma GmbH & Co. KG, Müllheim / Baden, Germany
http://www.hellma-worldwide.com

KWS Saat AG, Einbeck, Germany
http://www.kws.com

Leica Microsystems GmbH, Bensheim, Germany
http://www.leica-microsystems.com

Luigs & Neumann, Ratingen, Germany
http://www.luigs-neumann.com

Roche Diagnostics GmbH, Penzberg, Germany
http://www.roche.de

Sartorius AG, Göttingen, Germany
http://www.sartorius.com

Solvay Pharmaceuticals, Hannover, Germany
http://www.solvay.com

Springer Verlag, Heidelberg, Germany
http://www.springer.de

Vossius & Partner, München, Germany
http://www.vossiusandpartner.com

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. Methods in the Neurosciences

D. Molecular Biology, Development and Neurogenetics

E. Sensory and Motor Systems

F. Clinical Neurosciences and Higher Brain Functions

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 methods courses comprise the following topics:

I Neuroanatomy

- histology and development of the brain
- cytology of the cortex (EM)
- sensory systems
- neuronal stem cells
- hippocampus
- monamine systems
- human brain
- spinal cord/cerebellum
- anatomy of leech nervous system, behaviour of leeches

II Membrane Physiology and Neurophysiology

- membrane physiology
- sensory physiology
- ca-imaging
- FCS
- motor reflexes
- FLIM
- communication of weakly electric fish
- ERG of the fly
- neuronal basis of acoustic communication
- pharmacological brain stimulation

III Methods in the Neurosciences

- neuronal modelling
- tissue slicing and cell culture
- optical Imaging
- patch clamp data analysis
- behavioral analysis

Laboratory Rotations

Starting in January, every student carries out four independent research projects (laboratory rotations) in participating laboratories. Each project is individually supervised and involves five to six 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 three different subjects.

Seminars

Seminars start in February. 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. Furthermore, topics covered by the laboratory rotations will be examined.

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 of the students. Doctoral students select three faculty members as their doctoral committee which closely monitors work progress and advises students in their research project. Laboratory work is accompanied by seminars, training of scientific writing and oral presentation skills, 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 received the PhD degree, 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 member of the Neuroscience Program.

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 *Lektorat Deutsch als Fremdsprache* to facilitate the start in Göttingen. Additional language courses and social activities accompany the program.

Application, Selection and Admission 2004

Applicants must hold a Bachelor's degree or equivalent in biology, medicine, psychology, physics, or related fields. They are required to document their proficiency in English and should not be older than 27 years.

In the year 2004, the coordination office received 227 applications from 52 countries.

Continent	Applications	Admissions
Europe (total)	**62**	**9**
Germany	16	5
other West Europe	16	2
East Europe	30	2
America (total)	**21**	**0**
North America	7	0
Central/South America	14	0
Africa (total)	**10**	**0**
North Africa	1	0
Central/South Africa	9	0
Asia (total)	**134**	**2**
Near East	9	0
Central Asia/ Far East	**125**	2

Students 2004/2005

Name		Home Country
Ioanna	Bethani	Greece
Barbara	Cokic	Serbia and Montenegro
Thorsten	Döppner	Germany
Eva	Eismann	Germany
Yunyun	Han	China
Annette	Heinrich	Germany
Anjana	Nityanandam	India
Aycan	Sentürk	Turkey
John	Tukker	Netherlands
Kristian	Wadel	Germany
Alexander	Walter	Germany

Ioanna Bethani

First Name
Ioanna

Last Name
Bethani

Date of Birth
13 April 1982

Country
Greece

EDUCATION

College / University
2000 - 2004: National and Kapodistrian University of Athens, Greece
Highest Degree
Diploma
Major Subjects
Biology
Lab Experience
Basic techniques in the field of molecular biology, transfection, tissue culture
Projects / Research
2003 - 2004: „Investigating the mechanisms of Amyloid Precursor Protein (APP) regulation by neuronal proteins Fe65, X11a and mDab1“ Dr. Spiros Efthimiopoulos, Department of Human and Animal Physiology, Faculty of Biology, University of Athens, Athens, Greece
Scholarships
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

My interests are to study the primal stages of the development of the nervous system and to understand the molecular functions of higher neuronal processes, such as learning and memory.

Barbara Cokic

First Name
Barbara

Last Name
Cokic

Date of Birth
13 July 1980

Country
Serbia and Montenegro

EDUCATION

College / University
1999 - 2004 University of Belgrade, Serbia and Montenegro
Highest Degree
Diploma
Major Subjects
Molecular Biology
Lab Experience
Cell culture, Immunological techniques, florescent microscopy, genetic engineering
Projects / Research
Diploma project: Imaging of calmodulin interaction with EAG potassium channel by FRET microscopy
Scholarships
1999 - 2004: Stipend University of Belgrade
2004: Stipend Embassy of Norway
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

My main goal is to learn a number of different techniques and to explore the nervous system by different approaches. I am particularly interested in synaptic signalling mechanisms, neuronal plasticity and regulation of ion channel function.

Thorsten Döppner

First Name
Thorsten

Last Name
Döppner

Date of Birth
20 December 1976

Country
Germany

EDUCATION

College / University
1997 - 2004: University Duisburg-Essen
Highest Degree
MD
Major Subjects
Medicine
Lab Experience
Cell culture, immunological techniques, photometric assays, different fluorimetric assays, protein and enzyme biochemistry, evaluation of different forms of cell death
Projects / Research
2000 - 2003: MD Thesis „Studies on an involvement of proteases in cold-induced apoptosis of rat liver endothelial cells“
Scholarships
2001: IFORES Stipend of the Medical Faculty of Essen
2004 - 2005: Stipend International Max Planck Research School
Publications
Doeppner T R, Grune T, de Groot H, Rauen U (2003) Cold-induced apoptosis of rat liver endothelial cells: involvement of the proteasome. Transplantation 75: 1946-53

SCIENTIFIC INTERESTS AND GOALS

As a physician who wants to become a neurologist I want to do scientific work from a clinical point of view. I am especially interested in (neuronal) cell death both as a consequence of ischemic and neurodegenerative processes. I want to understand what causes these cell deaths to happen and want to transfer this knowledge into the clinic in order to improve patients´ treatment.

Eva Eismann

First Name
Eva

Last Name
Eismann

Date of Birth
05 April 1982

Country
Germany

EDUCATION

College / University
2001 - 2004: Universität Bielefeld
Highest Degree
Vordiplom
Major Subjects
Biology
Lab experience
Basic neurophysiology, cybernetics, neuronal information processing; research assistant on behavioral and electrophysiological experiments on flies
Scholarships
since April 2004: Scholarship from „Studienstiftung des Deutschen Volkes“
2004 - 2005: Stipend International Max Planck Research School
Honors
2000: „Deutsche Schülerakademie“

SCIENTIFIC INTERESTS AND GOALS

- contributing to the understanding of how the brain generates behavior and the mind
- general principles, cellular and molecular mechanisms of information processing in the nervous system

Yunyun Han

First Name
Yunyun

Last Name
Han

Date of birth
04 January 1981

Country
P.R. China

EDUCATION

College / University
1999 - 2003: Tsinghua University, P.R. China
Highest Degree
B.Sc.
Major Subjects
Biological science
Lab Experience
07-08/2002: „Interleukin-12 Stimulates T Cells against CT-26 Cancer Cells *in vivo*“, at Chang Gung University, under the direction of Kaiping Chow.
09/2002 - 07/2003: „Cerebral ischemia-reperfusion increased the immobility in tail suspension test of mice subjected to forced swimming stress: Implications for the relationship between stoke and depression“, at Tsinghua University, under the direction of Lijun DU.
Scholarships
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

I'd like to concentrate on the cellular and molecular mechanisms of neuronal degeneration and regeneration. My main interest lies in how to help the central nervous system repair itself after damage.

Annette Heinrich

First Name
Annette

Last Name
Heinrich

Date of birth
13 May 1981

Country
Germany

EDUCATION

College / University
University of Hamburg
Highest Degree
Vordiplom equivalent
Major Subjects
Biological Anthropologies
Lab Experience
Practical training in the fields of genetics, psychobiology, psychophysiology and osteology
Scholarships
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

I'm exceedingly captivated by human biology and I would like to learn more about the human brain as a whole organ and on the molecular level. I hope to be able to contribute a part to neuroscience in general and to get a deeper understanding of the biological background for the development of psychological diseases in particular.

Anjana Nityanandam

First Name
Anjana

Last Name
Nityanandam

Date of Birth
14 May 1982

Country
India

EDUCATION

College / University
August 1999 - July 2004: Guru Gobind Singh Indraprastha University
Highest Degree
B.Tech. in Biotechnology
Major Subjects
Biotechnology, molecular biology, cell and developmental biology, biochemistry, bioseparation science and downstream processing
Lab Experience
Protein isolation, purification and characterisation, chick embryological and culture techniques, animal tissue culture
Projects / Research
06 - 07/2002: Isolation of neural crest cells from chick embryo, Univ. Pune, India
01 - 07/2003: B.Tech project on ubiquitin from goat erythrocytes
01 - 08/2004: M.Tech project on effects of ubiquitin on chick embryo development
Scholarships
1999 - 2003: AFWWA Scholarship for professional graduate studies, India
1999 - 2004: Tuition fee waiver, GGSIndraprastha University
2002: Jawaharlal Nehru Centre for Advanced Scientific Research
2003: Council for Scientific and Industrial research Junior research fellowship
08/2003 - 07/2004: All India Commitee for Technical Education fellowship
2004 - 2005: Stipend International Max Planck Research School
Honors / Awards
2000, 2001, 2002, 2003: gold medallist, B.Tech, GGSIndraprastha University.
Scientific Interests and goals:

SCIENTIFIC INTERESTS AND GOALS

My interest lies mainly in neural development. I wish to study neural stem cells, their developmental pathways and the molecular mechanisms involved in their self renewal and differentiation.

Aycan Sentürk

First Name
Aycan

Last Name
Sentürk

Date of Birth
27 May 1981

Country
Turkey

EDUCATION

College / University
1999 - 2004: Sabanci University, Istanbul, Turkey
Highest Degree
B.Sc., Biological Sciences & Bioenginnering
Minor in chemistry
Major Subjects
Molecular biology, biotechnology, chemistry
Lab Experience
Basic molecular biology, microbiology and biochemical techniques, Cell culture, Protein expression&isolation methods, Immunohistochemistry, Confocal scanning microscopy, Atomic force microscopy and bioinformatics
Projects / Research
2002: Cloning and expression of subunit beta of G protein from Arabidopsis Thaliana, Sabanci University
2002: Isolation of V_1-ATPase from Manduca Sexta, cloning, over expression and isolation of subunits, Saarland University, Germany
2003: Analysis of GFP and GFP tagged gene expression in neurons and astocytes & GFP expression differences in pituitary glands of two different mouse lines, ENI & MPI for Experimental Medicine, Göttingen, Germany
2003 - 2004: Investigation of biological systems using atomic force microscopy (Graduation Project)
Scholarships
1999 - 2004: SU Merit Scholarship, Sabanci University, Turkey
2004 - 2005: DAAD / TEV stipend

SCIENTIFIC INTERESTS AND GOALS

I want to learn about the mechanisms going on in a neuron and combine neuroscience with molecular biology and immunology to understand and elucidate the basis of neurodegenerative diseases

John Tukker

First Name
John

Last Name
Tukker

Date of Birth
24 March 1976

Country
Netherlands

EDUCATION

College / University
1996 - 2001: Utrecht University, the Netherlands
2001: Monash University, Australia
2003 - 2004: University of Pennsylvania, USA

Highest Degree
Equivalent of M.Sc. in Cognitive Artificial Intelligence

Major Subjects
Cognitive Artificial Intelligence, Neuroscience

Projects / Research
2001: Master's Thesis „Simulating motion detection: a bilocal model", Dr. M.J.M. Lankheet, Dept. of Comparative Physiology, Utrecht University
2002 - 2004: „Direction selectivity in the starburst amacrine cell", Dr. R.G. Smith, Dept. of Neuroscience, University of Pennsylvania
2004: „Vesicle recycling in hippocampal neurons", Dr. J. Klingauf, MPI for Biophysical Chemistr, Goettingen

Scholarships
2001: Trajectum scholarship
2004 - 2005: Stipend International Max Planck Research School

Publications
Tukker JJ, Taylor RW, Smith RG (in press) Direction selectivity in a model of the starburst amacrine cell

SCIENTIFIC INTERESTS AND GOALS

The question of how simple elements can be combined to produce complex behavior has fascinated me ever since I read „Goedel, Escher, Bach: an eternal golden braid". In neuroscience, this question translates into how a network of neurons is able to perform computations. The elements in this case, are often highly specialized and diverse. I am interested in understanding how this diversity helps networks to carry out their task. I would like to combine empirical results on neuronal properties with computational pproaches.

Kristian Wadel

First Name
Kristian

Last Name
Wadel

Date of Birth
20 August 1980

Country
Germany

EDUCATION

College / University
2001 - 2004: Ruprecht-Karls-University of Heidelberg

Highest Degree
B.Sc. in Molecular Biotechnology

Major Subjects
Drug research/drug development, Bioinformatics/functional genomics, Structural biology (biophysics)

Lab Experience
Basic techniques in molecular biology, microbiology, biochemistry, biophysics, biotechnology and bioinformatics

Projects / Research
2003 & 2004: Industry / internships („white biotechnology")
2004: modelling, simulation and optimization in molecular biotechnology (modelling Hodgkin-Huxley)

Scholarships
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

I take special interest in neurogenetics, neuroimmunology and neuropharmacology. I would be glad to contribute to the research carried out on neurodegenerative diseases, seeking for answers on how to delay, prevent and treat these diseases.

Alexander Walter

First Name
Alexander

Last Name
Walter

Date of Birth
08 January 1981

Country
Germany

EDUCATION

College / University
Georg August University Göttingen

Highest Degree
Vordiplom in Chemistry

Major Subjects
Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Physics, Biomolecular Chemistry

Lab Experience
Basic and advanced experience in laboratory work in the fields of Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Physics

Projects / Research
2003 - 2004: scientific assistant at the institute of Physical Chemistry, Department of Condensed Matter, Prof. Dr. G. Eckold: characterization of a Monochromator for the neutron spectroscope PUMA at the research facility in Garching, Munich

Scholarships
1999: Deutsche Schülerakademie
2002 - 2004: e-fellows.net (www.e-fellows.net)
2004 - 2005: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS

Besides high academic interest regarding basic and higher functions of the neural system I am eager to gain insight into mechanisms of neural disease. I especially wish to combine knowledge of chemical reactions with application of pharmacological drugs.

Graduate Program Committee

Prof. Dr. Nils Brose
PD Dr. Gabriele Flügge
Prof. Dr. Ralf Heinrich
Prof. Dr. Dr. Detlev Schild
PD Dr. Ralf Schneggenburger
Prof. Dr. Walter Stühmer
Dr. Fred Wouters
Dr. Swen Hülsmann
Dr. Jürgen Klingauf
PD Dr. E. Ponimaskin
Annette Heinrich
Manuela Schmidt

Program Coordination

Neuroscience Program

Dr. Simone Cardoso de Oliveira
(Program Coordinator)

Sandra Drube
(Program Assistant)

Molecular Biology Program

Dr. Steffen Burkhardt
(Program Coordinator)

Nina Mc Guinness
(Program Assistant)

Coordination Office
Neurosciences
Georg-August-Universität
Humboldtallee 32

37073 Göttingen
Germany

phone:
+49 – 551 – 39 12307 / 91244
fax:
+49 – 551 – 39 12308
e-mail:
gpneuro@gwdg.de

Further Information:

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

Faculty

(Senior Faculty, Group Leaders, Lecturers)

Mathias	Bähr	Neurology	U Göttingen
Nils	Brose	Molecular Neurobiology	MPI em
Edgar	Brunner	Medical Statistics	U Göttingen
Nicole	Dünker	Neuroanatomy	U Göttingen
Norbert	Elsner	Neurobiology	U Göttingen
Wolfgang	Engel	Human Genetics	U Göttingen
Gabriele	Flügge	Neurobiology	DPZ
Jens	Frahm	Biomedical NMR Research / Physical Chemistry	MPI bpc
Eberhard	Fuchs	Animal Physiology / Neurobiology	DPZ
Theo	Geisel	Nonlinear Dynamics, Complex Matter	MPI ds
Ralf	Heinrich	Neurobiology	U Göttingen
Michael	Hörner	Cell Biology	U Göttingen
Sven	Hülsmann	Neuro- and Sensory Physiology	U Göttingen
Herbert	Jäckle	Molecular Developmental Biology	MPI bpc
Reinhard	Jahn	Neurobiology	MPI bpc
Hubertus	Jarry	Clinical and Experimantal Endocrinology	U Göttingen
Bernhard	Keller	Neuro- and Sensory Physiology	U Göttingen
Jürgen	Klingauf	Membrane Biophysics	MPI bpc
Willhart	Knepel	Molecular Pharmacology	U Göttingen
Kerstin	Krieglstein	Neuroanatomy	U Göttingen
Gerd	Lüer	Psychology	U Göttingen
Markus	Missler	Neuro and Sensory Physiology	U Göttingen
Tobias	Moser	Otolaryngology	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Erwin	Neher	Membrane Biophysics	MPI bpc
Harald	Neumann	Neuroimmunology	ENI
Leonid	Nezlin	Molecular Neurophysiology	U Göttingen
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Evgeni	Ponimaskin	Neuro- and Sensory Physiology	U Göttingen
Thomas	Rammsayer	Psychology	U Göttingen
Diethelm W.	Richter	Neuro and Sensory Physiology	U Göttingen
Michael	Rickmann	Neuroanatomy	U Göttingen
Eleni	Roussa	Neuroanatomy	U Göttingen
Marjan	Rupnik	Neuroendocrinology	ENI
Eckart	Rüther	Psychiatry	U Göttingen
Detlev	Schild	Molecular Neurophysiology	U Göttingen
Ralf	Schneggenburger	Membrane Biophysics	MPI bpc
Friedrich-Wilhelm	Schürmann	Cell Biology	U Göttingen
Stephan	Sigrist	Neuroplasticity	ENI
Anastassia	Stoykova	Molecular Cell Biology	MPI bpc
Walter	Stühmer	Molecular Biology of Neuronal Signals	MPI em
Andreas	Stumpner	Neurobiology	U Göttingen
Heinrich	Terlau	Molecular and Cellular Neuropharmacology	MPI em
Stefan	Treue	Cognitive Neuroscience and Biological Psychology	DPZ
Michael	Waldmann	Psychology	U Göttingen
Fred	Wolf	Nonlinear Dynamics	MPI ds
Fred	Wouters	Cellular Biophysics	ENI
Wolfgang	Wuttke	Clinical and Experimental Endocrinology	U Göttingen
Weiqi	Zhang	Neuro- and Sensory Physiology	U Göttingen
Annette	Zippelius	Theoretical Physics	U Göttingen

Mathias Bähr

Professor of Neurology

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

Major Research Interests

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 adenovirus vectors that can deliver neurotrophic factors directly into neurons or into surrounding glial cells. These, and other new strategies like using 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 od neurodegenerative diseases (e.g. Alzheimer ‘s or Parkinson’s disease).

Address

Center for
Neurological Medicine
Neurology
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 6603
fax: + 49-551-39 8405
e-mail: mbaehr@gwdg.de

Further Information

http://www.mi.med.uni-goettingen.de/baehr-lab/

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

Dietz GPH, Kilic E, Bähr M (2002) Inhibition of apoptosis *in vitro* and *in vivo* using TAT-mediated protein transduction. Mol Cell Neurosci 21(1): 29-37

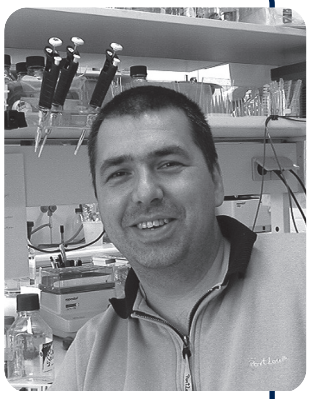
Kilic E, Dietz GPH, Herrmann DM, Bähr M (2002) Intravenous TAT-Bcl-XL is protective when delivered before and after middle cerebral artery occlusion in mice. Ann Neurol 52(5): 617-22

Kilic E, Herrmann DM, Kügler S, Kilic Ü, Holzmüller H, Schmeer C, Bähr M (2002) Adenovirus-mediated Bcl-Xl expression using a neuron-specific promoter protects against disseminated neuronal injury and brain infarction following focal cerebral ischemia in mice. Neurobiol Dis 11: 275-284

Kügler S, Kilic E, Bähr M (2003) Human synapsin 1 gene promoter confers highly neuron specific long-term transgene expression from an adenoviral vector in the adult rat brain depending on the transduced area. Gene Therapy 10(4): 337-47

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

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

Address

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

37075 Göttingen
Germany

phone: +49-551-3899 725
fax: +49-551-3899 715

Further Information

http://www.em.mpg.de/User/Brose/index.html

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

Betz A, Thakur P, Junge H J, Ashery U, Rhee J S, Scheuss V, Rosenmund C, Rettig, J Brose N (2001) Functional interaction of the active zone proteins Munc13-1 and RIM1 in synaptic vesicle priming. Neuron 30: 183-196

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

Wojcik SM, Rhee J-S, Herzog E, Sigler E, Jahn R, Takamori S, Brose N and Rosenmund C (2004) An essential role for VGLUT1 in postnatal development and control of quantal size. Proc Natl Acad Sci USA 101: 7158-7163

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

Dresbach T, Neeb A, Meyer G, Gundelfinger ED, Brose N (2004) Synaptic targeting of Neuroligin is independent of Neurexin and SAP90/PSD95 binding. Mol Cell Neurosci (in press)

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 Kolmo-gorov-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

Address

Dept. Medical Statistics
University of Göttingen
Humboldtallee 32

37073 Göttingen
Germany

phone: +49-551-39 4991
fax: +49-551-39 4995
e-mail: edgar.brunner@ams.med.uni-goettingen.de

Further Information

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

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

Selected Recent Publications

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

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, Puri M L (2002) A class of rank-score tests in factorial designs. J Statist Plann and Inf 103: 331-360

Kaufmann J, Werner C, Brunner E (2005) Nonparametric Methods for Analyzing the Accuracy of Diagnostic Tests with Multiple Readers. Statsitical Methods in Medical Research (to appear)

Nicole Dünker

Address

Center of Anatomy
Department of
Neuroanatomy
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: +49-551-39 7082 /
+49-551-39 7022
fax: +49-551-39 14016
e-mail: nduenke@gwdg.de

Further Information

http://www.neuroanatomie.uni-goettingen.de/Gruppe/Personen/Duenker/Duenker.htm

Privatdozent, Neuroanatomy

1998: Dr. rer. nat./ PhD, Department of Zoology, University of Darmstadt
1998: University of California, Department of Integrative Biology, Berkeley
1999: University of Michigan, Department of Molecular, Cellular and Developmental Biology
1999 - 2002: Department of Anatomy and Cell Biology, University of Homburg
2003: Habilitation (PD) for anatomy at the anatomical faculty of the University of Göttingen
Current position: senior postgraduate researcher at the Center for Anatomy, Department of Neuroanatomy, University of Göttingen

Major Research Interests

I Role of extracellular signaling molecules in mediating neural and non- neuronal programmed cell death

II Interaction of pro-and anti-apoptotic extracellular signaling molecules like Transforming growth factor beta (TGF-ß), tumor necrosis factor alpha (TNF(), bone morphogenetic protein (BMP) or insulin in mediating programmed cell death

III Role of extracellular signaling molecules in the establishment and maintenance of axonal projections

IV Possibilities of clinical application of extracellular signaling molecules in treatment of neurodegenerative diseases and cancer

Selected Recent Publications

Krieglstein K, Richter S, Farkas L, Schuster N, Dünker N, Oppenheim RW, Unsicker K (2000) Reduction of endogenous transforming growth factors beta prevents ontogenetic neuron death. Nat Neurosci 3: 1085-90

Dünker N, Schuster N, Krieglstein K (2001) TGF-β modulates programmed cell death in the retina of the developing chick embryo. Development 128: 1933-1942

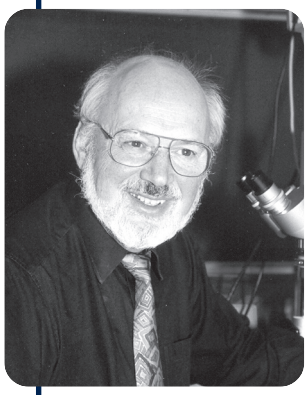
Dünker N, Schmitt K, Schuster N, Krieglstein K (2002) The role of Transforming growth factor beta 2 and 3 in mediating apoptosis in the murine intestinal mucosa. Gastroenterol 122: 1364-1375

Dünker N, Schmitt K, Krieglstein K (2002) TGF-β is required for programmed cell death in interdigital webs of the developing mouse limb. Mech Dev 113: 111-120

Farkas LM, Dünker N, Roussa E, Unsicker K, Krieglstein K (2003) TGF-βs are essential for the development of midbrain dopaminergic neurons *in vitro* and *in vivo*. J Neurosci 23: 5178-5186

Dünker N, Krieglstein K (2003) Reduced programmed cell death in the retina and defects in lens and cornea of Tgfβ2$^{-/-}$ Tgfβ3$^{-/-}$ double deficient mice. Cell Tiss Res 313: 1-10

Norbert Elsner



Professor of Zoology

Dr. rer. nat. University of Cologne 1967
PostDoc: Makerere University College, Kampala (Uganda) 1968
Department of Zoology, University of Copenhagen (Denmark) 1971
Department of Biology, University of Oregon (USA) 1972
Habilitation (Zoology) University of Cologne 1974
Professor of Zoology, University of Göttingen 1978
Head of the Department of Neurobiology

Major Research Interests

The common research topic of the department is Neuroethology of acoustic communication in singing insects. This involves as main fields of interest neuronal basis of song production and song recognition, neuropharmacology of motor actions, interdependence of singing and hearing, evolution of acoustic communication, bioacoustic and sensory ecology in the lab and in the field, and development and regeneration of components of the auditory system.
The songs of insects are produced as fixed action patterns. Single cell recordings, behaviour following lesions and electric or pharmacologic stimulation of the brain help to identify single elements and networks in the CNS producing the innate song patterns. Application of neuroactive substances to the brain aim to identify mechanisms like second messenger cascades involved in production of these motor programs (Heinrich).
A song only makes sense when it is heard by a potential partner. Song parameters and song recognition behaviour are studied with a focus on bushcrickets (Stumpner). The function of sensory cells and auditory interneurones in various insects is investigated by means of extra- and intracellular recordings, neuroanatomy and immunohistochemistry. The relevant questions are: to what degree are hearing systems specialized to species-specific needs, how is song recognition realized on the level of single interneurones, or: what are the potential predecessor structures or systems in the evolution of audition? For the latter, various sensory organs are in the focus of research - neuroanatomically, functionally and their ontogenesis (Lakes-Harlan, Stumpner).
Singing and hearing, of course, are highly interdependent, on the one hand by interference of movements with the ability to hear (studied e.g. by laser-vibrometry), on the other hand by biophysical constraints limitating the detection of parameters in the field (studied e.g. by sound analysis and behavioural tests) (Elsner).
Very helpful and sometimes surprising data are gained from developmental studies. This involves regeneration of behaviour and neuronal structures, molecular mechanisms in early development and regeneration as well as cell cultures with neurones identified as parts of the auditory system (Lakes-Harlan).

Address

Institute for Zoology and Anthropology
Dept. Neurobiology
University of Göttingen
Berliner Straße 28

37073 Göttingen
Germany

phone: +49-551-39 5401
fax: +49-551-39 2262
e-mail: nelsner@gwdg.de

Selected Recent Publications

Heinrich R, Elsner N (1997) Central nervous control of hindleg coordination in stridulating grasshoppers. J Comp Physiol A 180: 257-269

Heinrich R, Jacobs K, Lakes-Harlan R (1998) Tracing of a neuronal network in the locust by pressure injection of markers into a synaptic neuropile. J Neurosci Meth 80: 81-89

Heinrich R, Rozwod K, Elsner N (1998) Neuropharmacological evidence for inhibitory cephalic control mechanisms of stridulatory behaviour in grasshoppers. J Comp Pysiol A 183: 389-399

Lakes-Harlan R & Pfahlert C (1995) Regeneration of axotomized tympanal nerve fibres in the adult grasshopper *Chorthippus biguttulus* (L.)(Orthoptera: Acrididae) correlates with regaining the localization ability. J Comp Physiol A 176: 797-807

Jacobs K & Lakes-Harlan R (1997) Lectin histochemistry of the metathoracic ganglion of the locust, *Schistocerca gregaria*, before and after deafferentation. J Comp Neurol 387: 255-265

Lakes-Harlan R, Stölting H & Stumpner A (1999) Convergent evolution of an insect ear from a preadaptive structure. Proc R Soc Lond B 266: 1161-1167

Stölting H, Stumpner A (1998) Tonotopic organization of auditory receptorcells in the bushcricket *Pholidoptera griseoaptera* (Tettigoniidae, Decticini). Cell Tissue Res 294: 377-386

Stumpner A (1998) Picrotoxin eliminates frequency selectivity of an auditory interneuron in a bushcricket. J Neurophysiol 79: 2408-2415

Stumpner A (1999) An interneurone of unusual morphology is tuned to the female song in the bushcricket *Ancistrura nigrovittata* (Orthoptera: Phaneropteridae). J Exp Biol 202: 2071-2081

Wolfgang Engel

Professor of Human Genetics

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

Address

Institute for Human Genetics
University of Göttingen
Heinrich-Düker-Weg 12

37073 Göttingen
Germany

phone: +49-551-39 7590
fax: +49-551-39 9303
e-mail: wengel@gwdg. de

Further Information

http://www.
humangenetik.gwdg.de/

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 analysed 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 engaged 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.

Selected Recent Publications

Trappe R, Laccone F, Cobilanschi J, Meins M, Huppke P, Hanefeld F, Engel W (2001) MECP2 mutations in sporadic cases of Rett-syndrome are almost exclusively of paternal origin. American Journal of Human Genetics 68: 1093-1101

Pires-da Silva A, Nayernia K, Engel W, Torres M, Stoykova A, Chowdhury K, Gruss P (2001) Mice deficient for spermatid perinuclear RNA-binding protein show neurologic, spermatogenetic, and sperm morphological abnormalities. Developmental Biology 233: 319-328

Lee H-J, Adham IM, Schwarz G, Kneussel M, Sass JO, Engel W, Reiss J (2002) Molybdenum cofactor-deficient mice resemble the phenotype of human patients. Human Molecular Genetics 26: 3309-3317

Böhm D, Schwegler H, Kotthaus L, Nayernia K, Rickmann M, Köhler M, Rosenbusch J, Engel W, Flügge G, Burfeind P (2002) Disruption of PLC -b1-mediated signal transduction in mutant mice causes age-dependent hippocampal mossy fiber sprouting and neurodegeneration. Molecular and Cellular Neuroscience 21: 584-601

Sauter S, Miterski B, Klimpe S, Bönsch D, Schöls L, Visbeck A, Papke T, Hopf H C, Engel W, Deufel T, Epplen JT, Neesen J (2002) Mutation analysis of the Spastin gene (SPG4) in patients in Germany with autosomal dominant hereditary spastic paraplegia. Human Mutation 20: 127-132

Gabriele Flügge

Privatdozent, Experimental Neuroscience

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

Address

Clinical Neurobiology
Laboratory
German Primate Center
Dept. Neurobiology
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-38 51133
fax: +49-551-38 51137
e-mail: gfluegg@gwdg.de

Further Information

http://www.dpz.clineu/
people/fluegge/start.htm

Major Research Interests

In humans, stressful or traumatic life events such as death of a close relative often represent a chronic psychological load that can lead to psychopathologies such as depression. Because the central nervous mechanisms that lead to such diseases are still not elucidated we are investigating 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 genes in the brain that are regulated by stress. *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 neuromolecular factors that contribute to emotionality.

Selected Recent Publications

Flügge G (2000) Regulation of monoamine receptors in the brain: dynamic changes during stress. Int Rev Cytology 195: 145-213

Fuchs E, Flügge G (2001) Psychosoziale Belastung hinterläßt Spuren im Gehirn. Z Med Psychol 10: 99-105

Fuchs E, Flügge G (2002) Social stress in tree shrews: Effects on physiology, brain function, and behavior of subordinate individuals. Pharmacol Biochem & Behav 73: 247-258

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

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

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

Jens Frahm

Professor of Physical Chemistry

Director of 'Biomedizinische NMR Forschungs GmbH'
- Biomedical Nuclear Magnetic Resonance -

Address

Biomedizinische NMR
Forschungs GmbH am
Max-Planck-Institut für
Biophysikalische Chemie
Am Fassberg 11

37077 Göttingen
Germany

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

Further Information

http://www.
mpibpc.gwdg.de/
abteilungen/NMR/index.html

Major Research Interests

Methodology

- development and application of spatially resolved NMR
- magnetic resonance functional neuroimaging
- localized magnetic resonance neurospectroscopy

Brain Research

- noninvasive neurobiology, human neuroscience
- structural, metabolic, and functional studies of the central nervous system
- functional mapping of neuronal activation, cognitive information processing in humans
- brain disorders in childhood
- animal models, transgenic mice

Selected Recent Publications

Natt O, Watanabe T, Boretius S, Radulovic J, Frahm J, Michaelis T (2002) High-Resolution 3D MRI of Mouse Brain Reveals Small Cerebral Structures *In Vivo*. J Neurosci Methods 120: 203-209

Watanabe T, Natt O, Boretius S, Frahm J, Michaelis T (2002) *In Vivo* 3D MRI Staining of Mouse Brain After Subcutaneous Application of $MnCl_2$. Magn Reson Med 48: 852-859

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

Wilken B, Dechent P, Brockmann K, Finsterbusch J, Baumann M, Ebell W, Korenke GC, Pouwels PJW, Hanefeld FA, Frahm J (2003) Quantitative Proton Magnetic Resonance Spectroscopy of Children with Adrenoleukodystrophy Before and After Hematopoietic Stem Cell Transplantation. Neuropediatrics 34: 1-10

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

Eberhard Fuchs

Professor of Animal Physiology

1977: Dr. rer. nat., University of Munich
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

Address

German Primate Center
Clinical Neurobiology
Laboratory
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-38 51130
fax: +49-551-38 51307
e-mail: efuchs@gwdg.de

Further Information

http://www.dpz.gwdg.de/neuro/agf/start.htm

Major Research Interests

The Clinical Neurobiology Laboratory at the German Primate Center is an interdisciplinary research laboratory using functional neuroanatomical, neuropharmacological, molecular and behavioral 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 disorders.
The laboratory specializes in the development, validation and investigation of animal models to detect abnormal cognitive and behavioral expressions of brain pathology. Currently, we are engaged in the investigation of central nervous and behavioral phenomena associated with stress and depression. In addition, there are several studies in the areas of Parkinson's disease and Multiple Sclerosis.

Selected Recent Publications

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

van der Hart MGC, Czéh B, de Biurrun G, Michaelis T, Watanabe T, Natt O, Frahm J, Fuchs E (2002) Substance P receptor antagonist and clomipramine prevent stress-induced alterations in cerebral metabolites, cytogenesis in the dentate gyrus and hippocampal volume. Mol Psychiat 7: 933-941

Czéh B, Welt T, Fischer AK, Erhardt A, Schmitt W, Müller MB, Toschi N, Fuchs E, Keck ME (2002) Chronic psychosocial stress and concomitant repetitive transcranial magnetic stimulation: effects on stress hormone levels and adult hippocampal neurogenesis. Biol Psychiat 52: 1057-1065

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

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

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

Fuchs E, Flügge G (2004) Cellular consequences of stress and depression. Dialogues Clin Neurosci 6: 171-183

Theo Geisel

Address

Nonlinear Dynamics Group
MPI for Dynamics and Selforganization
(formerly MPI für Strömungsforschung)
Bunsenstr. 10

37077 Göttingen
Germany

phone: +49-551-5176 401
fax: +49-551-5176 402
e-mail: geisel@chaos.gwdg.de

Further Information

http://www.chaos.gwdg.de

Professor of Theoretical Physics and Director at the Max Planck Institute for Dynamics and Self-Organization

Dr. rer.nat., University of Regensburg (1975)
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

Complex dynamics is everywhere. In the electrical activity of hearts, the firing patterns of neuronal networks, the motion of electrons in semiconductor nanostructures, the spreading of epidemics, turbulent motion of fluids, and even in simple economic models to name a few. The complexity is caused by nonlinearities in the equations of motion as well as (in many cases) interactions among many individual units, cells, oscillators, or degrees of freedom. The science of nonlinear dynamics has made considerable progress in recent years in providing concepts and methods, which now can be applied to gain a mathematical understanding of complex dynamical phenomena occurring in nature. In our group we focus on the study of dynamical problems in neuroscience, electron transport in semiconductor nanostructures, and quantum chaos.

Coordinated activity, and in particular synchronization of cortical neurons are believed to play functional roles, e.g. for the so-called binding problem. We address questions such as the stability and the speed of synchronization and study the effect of delayed interactions, network topology, and network heterogeneity on the resulting firing patterns. We have found e.g. that the delayed interactions between neurons typically lead to unstable attractors, which allow rapid switching and provide the network with a high degree of flexibility in fulfilling successive tasks.

On a much slower time scale nonlinear mechanisms also govern the activity dependent formation of cortical representations and neuronal maps. Nonlinear models of pattern formation allow us to understand details of ocular dominance, orientation preference, and other neuronal maps.

Selected Recent Publications

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

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

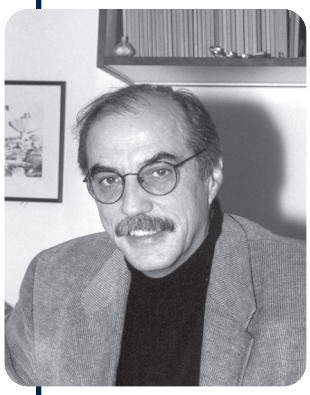
Wolf F, Geisel T (2003) Universality in visual cortical pattern formation. Journal of Physiology - Paris 97: 253-264

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

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

Herbert Jäckle



Professor, Director at the Max Planck Institute for Biophysical Chemistry

Faculty member at the EMBL, Heidelberg (1980 - 1982)
Head of the group (associate professor), Max Planck Institute for Developmental Biology, Tübingen (1982 - 1988)
Professor and Chairman, Dept. of Genetics and Microbiology, Univ. of Munich (1988 - 1991)

Address

Dept. of Molecular Developmental Biology,
Max-Planck-Institute for Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1482
fax: +49-551-201 1755
e-mail: hjaeckl@gwdg.de

Further Information

http://www.mpibpc.gwdg.de/abteilungen/170/

Major Research Interests

How is the embryo generated from a single cell, the egg? We address this question by using the *Drosophila* embryo as an experimental system, applying the combined tools of classical embryology, genetics, molecular biology and biochemistry. We have focussed our efforts to isolate and characterize the factors underlying early pattern formation along the anterior-posterior axis of the embryo. We sought to unravel their mode of action und the molecular mechanism in which they function.
Many of the factors required to establish the basic body plan are also necesssary for organ formation, a process which involves local inductive interactions between groups of cells and/or epithelial cell layers. We have started to identify the genetic components and regulatory circuitries involved in organogenesis as well as in neural conductivity and function. We also use the fly to identify the components of novel biochemical pathways and cellular key components that control and maintain homeostasis and energy balance, and we initiated a gene discovery program to systematically characterize the function of genes on the *Drosophila* X-chromosome.

Selected Recent Publications

Schöck F, Reischl J, Wimmer E, Taubert H, Purnell BA, Jäckle H (2000) Phenotypic supression of *empty spiracles* is prevented by buttonhead. Nature 405: 351-354

Piepenburg O, Vorbrüggen G, Jäckle H (2000) *Drosophila* segment borders result from unilateral repression of hedgehog activity by Wingless signaling. Molecular Cell 6: 203-209

Niessing D, Sprenger F, Driever W, Taubert H, Jäckle H, Rivera-Pomar R (2000) Homeodomain position 54 specifies transcriptional versus translational control by Bicoid. Mol Cell 5: 595-401

Linder B, Gerlach N, Jäckle H (2001) The *Drosophila* homolog of the human AF10 is a HP1-interacting suppressor of position effect variegation. EMBO reports 2: 211-216

Benos P V *et al*. (2001) From first base: The sequence of the tip of the *X*-chromosome of *Drosophila melanogaster*, a comparison of two sequencing strategies. Genome Research 11: 710-730

Ralf Heinrich

Address

Institute for Zoology and Anthropology
Dept. Neurobiology
Berliner Strasse 28

37073 Göttingen
Germany

phone: +49-551-39 91183
or 39 91186
fax: +49-551-39 5438
e-mail: rheinri1@gwdg.de

Juniorprofessor, Molecular Neuropharmacology of Behavior

Dr. rer. nat., University of Göttingen, 1995
Postdoctoral fellow, Harvard Medical School, Boston, USA, 1997 - 1999

Major Research Interests

Invertebrate preparations can offer unique advantages over more complex nervous systems of vertebrates and especially mammals, such as a smaller total number of neurons in the CNS, the concept of individually identifiable neurons and rather limited repertoires of behaviors composed of genetically determined and stereotype components.
Behavior is the product of complex interactions between various types of neurons. We are especially interested in the central nervous mechanisms underlying the selection and adaptation of actions that are most appropriate for a particular behavioral situation an animal encounters. Our neuroethological studies focus on two systems:

1) *The acoustic communication behavior of insects*: Pharmacological interference with transmitter- and second messenger-systems in identified brain areas aims to characterize the signaling pathways that contribute to general motivation, initiation of communication behaviors and the selection/ composition of behaviorally meaningful song patterns. Our studies on intact and behaving preparations allow to link natural sensory stimuli to physiological changes in the brain (on transmitters, modulators, second messengers) and to analize their modulatory effects on the subsequent behavior of the animal.
2) *Aggressive behavior of arthropods*: In essentially all species of animals, including man, 5HT is important in aggression, which is a quantifiable behavior in various arthropods. In lobsters and crayfish, enhanced serotonergic function is linked to increased aggression and dominance, while octopamine (the invertebrate analogue of norepinephrine) antagonizes these effects. Pharmacological and physiological studies aim to find out where and how these amine-releasing neurosecretory systems change during a fight to establish stable hierarchies and allow experience to alter the subsequent fighting behavior. Agonistic behavior of *Drosophila melanogaster* is displayed, when access to food or mates is limited. Males and females fight with different genetically programmed strategies, but only males seem to establish stable hierarchies. Whith genetic tools and various already available mutants at hand, *D. melanogaster* offers new methodological approaches to understand the central nervous mechanisms that drive aggressive behaviors.

Selected Recent Publications

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 cellls. Proc Nat Acad Sci USA 96: 2473-2478

Heinrich R, Bräunig P, Walter I, Schneider H, Kravitz EA (2000) Aminergic neuron systems of lobsters: Morphology and electrophysiology of octopamine-containing neurosecretory cells. J Comp Physiol A 186: 617-629

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

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 (2002) Impact of descending brain neurons on the control of stridulation, walking and flight in orthoptera. Microscopy Research and Technique 56: 292-301

Swen Hülsmann

Group leader at the Department of Neurophysiology

Dr. med., University of Münster
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

Address

Center for Physiology and Pathophysiology
Dept. Neuro- and Sensory Physiology
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 9592
fax: +49-551-39 9676
e-mail: sh@zmpg.de

Further Information

http://www.neuro-physiol.med.uni-goettingen.de/~agh/

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.

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

Professor, Director at the Max Planck Institute for Biophysical Chemistry

Dr. rer. nat. (Ph.D.) 1981, University of Göttingen
Professor (since 1997 Adjunct Professor) of Pharmacology, Yale University School of Medicine
Appointed as Director at the Max Planck Institute for Biophysical Chemistry 1997

Address

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

37077 Göttingen
Germany

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

Further Information

http://www.mpibpc.gwdg.de/abteilungen/190/

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, Rhee JS, Rosenmund C, Jahn R (2000) Identification of a vesicular glutamate transporter that defines a glutamatergic phenotype in neurons. Nature 407: 189-194

Lang T, Bruns D, Wenzel D, Riedel D, Holroyd P, Thiele C, Jahn R (2001) SNAREs are concentrated in cholesterol-dependent clusters that define docking and fusion sites for exocytosis. EMBO J 20: 2202-2213

Antonin W, Fasshauer D, Becker S, Jahn R, Schneider TR (2002) Crystal structure of the endosomal SNARE complex reveals common structural principles of all SNAREs. Nature Struct Biol 9: 107-111

Fasshauer D, Antonin W, Subramaniam V, Jahn R (2002) SNARE assembly and disassembly exhibit a pronounced hysteresis (2002) Nature Struct Biol 9: 144-151

Jahn R, Grubmüller H (2002) Membrane fusion. Curr Opinion in Cell Biology 14: 488-495

Lang T, Margittai M, Hölzler, H, Jahn R (2002) SNAREs in native plasma membranes are active and readily form core complexes with endogenous and exogenous SNAREs. J Cell Biol 158: 751-760

Bernhard U. Keller

Professor of Neurophysiology

Dr. rer. nat., University of California, San Diego / University of Göttingen, 1986
Postdoctoral fellow, Max-Planck-Institute for biophysical Chemistry, Göttingen, 1987
Staff Scientist, Max-Planck-Institute for biophysical Chemistry, Göttingen, 1989
Heisenberg - Stipend, 1995
Extraordinary Professor (apl.), Neurophysiology, University of Göttingen, 2001

Major Research Interests

Calcium signals represent a key information processing system in the central nervous system, and defined changes in cytosolic calcium levels have been associated with multiple neuronal processes including learning, memory, synaptic plasticity and neurodegenerative disease. While the last years have provided significant information about the molecular elements that control calcium signals in identified cells, little is known about how Ca-dependent signal cascades are processed, superimposed and integrated in a functionally intact neuronal net.

Based on a functionally intact neuronal network that controls rhythmic-respiratory activity in the brain stem of mice, we have addressed three questions:

i) which molecular elements control Ca-dependent signal cascades underlying rhythmic-respiratory activity in identified brain stem neurones ?

ii) how does the spatio-temporal profile of cytosolic Ca signaling modulate neuronal activity in this interconnected neuronal net ?

iii) how are cytosolic Ca signals affected in transgenic mouse models of human neurodegenerative disease (e.g. SOD1 G93A mouse model of human amyotrophic lateral sclerosis) that specifically affect brain stem neurones ?

In our present research, we address these questions by a combined research approach. For example, we employ techniques from molecular biology and classical electrophysiology like patch clamp recordings from slice preparations and combine these recordings with up-to date imaging techniques including fast CCD imaging and IR-laser based multiphoton measurements. Accordingly, the central focus of our research is to increase our understanding of Ca signaling in a functionally intact neuronal system, and achieve a better understanding of the disruptions of Ca-dependent signal cascades characteristic for human neurodegenerative disease.

Address

Center for Physiology
and Pathophysiology
Dept. Neuro- and Sensory
Physiology
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 9677
fax: +49-551-39 5923
e-mail: bkeller@neuro-physiol.med.uni-goettingen.de

Further Information

http://www.neuro-physiol.med.uni-goettingen.de/~agk/

Selected Recent Publications

Lips MB, Keller BU (1998) Endogenous calcium buffering in motoneurones of the nucleus hypoglossus from mouse. J Physiol 511(1): 105-117

Palecek J, Lips MB, Keller BU (1999) Calcium dynamics and buffering in motoneurones of the mouse spinal cord. J Physiol 520(2): 485-502

Lips M, Keller BU (1999) Activity-related calcium dynamics in motoneurones of the nucleus hypoglossus from mouse. J Neurophysiol 82(6): 2936-2946

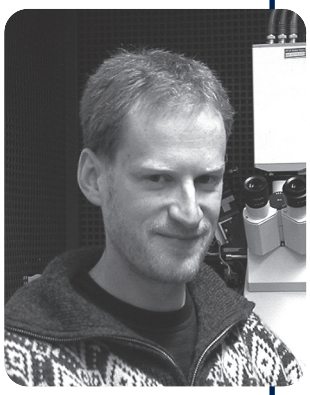
Paarmann I, Frermann D, Keller BU, Hollmann M (2000) Expression of fifteen glutamate receptor subunits and various splice variants in tissue slices and single neurones of brainstem nuclei, and potential functional implications. Journal of Neurochemistry 74(4): 1335-45

Ladewig T, Keller BU (2000) Simultaneous patch clamp recording and calcium imaging in a rhythmically active neuronal network in the brain stem slice preparation from mouse. Pflügers Arch 440: 322-332

Vanselow B, Keller BU (2000) Calcium dynamics and buffering in oculomotor neurones from mouse, that are particularly resistant during amyotrophic lateral sclerosis (ALS)-related motoneuron disease. J Physiol 525: 433-445

Ladewig T, Kloppenburg P, Lalley P, Zipfel W, Webb W, Keller BU (2003) Spatial profiles of store-dependent calcium release in motoneurones of the nucleaus hypoglossus from newborn mouse. J Physiol 547: 775-787

Jürgen Klingauf



Research Group Leader at the Max Planck Institute for Biophysical Chemistry

Research fellow, Dept. of Molecular & Cellular Physiology, Stanford University, Ca, 1996 - 1998.
Dr. rer. nat. (Ph.D.) 1999, University of Göttingen.
Since 2000 junior group leader at the Max Planck Institute for Biophysical Chemistry.

Address

AG Microscopy of
Synaptic Transmission
Dept. Membrane Biophysics
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1629
fax: +49-551-201 1688
e-mail: jklinga@gwdg.de

Further Information

http://www.mpibpc.gwdg.de/abteilungen/140/ groups/index.html

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

Klingauf J, Kavalali ET, Tsien RW (1998) Kinetics and regulation of fast endocytosis at hippocampal synapses. Nature 394: 581-585

Kavalali ET, Klingauf J, Tsien RW (1999) Properties of fast endocytosis at hippocampal synapses. Phil Trans R Soc Lond B 354: 337-346

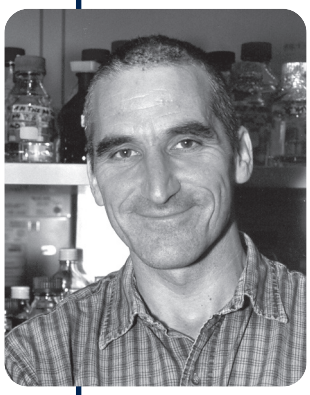
Kavalali ET, Klingauf J, Tsien RW (1999) Activity-dependent regulation of synaptic clustering in a hippocampal culture system. Proc Natl Acad Sci USA 96: 12893-12900

Choi S, Klingauf J, Tsien RW (2000). Postfusional regulation of cleft glutamate concentration during LTP at 'silent synapses'. Nature Neurosci 3: 330-336

Bruns D, Riedel D, Klingauf J, Jahn R (2000) Quantal release of serotonin. Neuron 28(1): 205-220

Professor of Molecular Pharmacology

Dr. rer. nat., University of Freiburg i. Br., Germany, 1980
Habilitation, University of Freiburg i. Br., Germany, 1985
Research Fellow, Laboratory of Molecular Endocrinology, Harvard Medical School, Boston, MA, USA, 1987 - 1990
Joined Medical Faculty of the University of Göttingen 1991



Address

Dept. Molecular Pharmacology
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: +49-551-39 5787
fax: +49-551-39 9652
e-mail: wknepel@med.uni-goettingen.de

Further Information

http://regulus.PharBP.med.Uni-Goettingen.DE/internet.htm

Major Research Interests

The main interest of the laboratory is in the molecular mechanisms of gene transcription. Transient transfections of reporter fusion genes, transgenic mice, and other molecular biology techniques are used to study the mechanisms of cell-specific and signal-induced gene transcription, and how drugs interfere with these mechanisms to produce pharmacological effects. 1. The pancreatic islet hormone glucagon is a biological antagonist of insulin and regulates blood glucose levels. Enhanced synthesis and secretion of glucagon contributes to increased hepatic glucose output and hyperglycemia in diabetes mellitus. We study the mechanisms which activate the glucagon gene in pancreatic islet a cells as well as signaling pathways to the glucagon gene induced by cAMP, membrane depolarization, and insulin. 2. We study the regulation of glucagon gene transcription by the new group of oral antidiabetic drugs, the thiazolidinediones. These so-called 'insulin sensitizers' may improve insulin action in part through an effect on glucagon. 3. The ubiquitously expressed, cAMP- and calcium-regulated transcription factor CREB is affected by several classes of drugs. We study how the immunosuppressive drugs cyclosporin A and FK506 (tacrolimus) inhibit CREB-mediated transcription. This effect may underlie their pharmacological effects, both desired and undesired. Using transgenic mice and an animal model of depression, we also study whether treatment with antidepressants alters CREB-mediated transcription in order to better understand the molecular mechansims of action of antidepressant drugs.

Selected Recent Publications

Beimesche S, Neubauer A, Herzig S, Grzeskowiak R, Diedrich T, Cierny I, Scholz D, Alejel T, Knepel W (1999) Tissue-specific transcriptional activity of a pancreatic islet cell-specific enhancer sequence/Pax6-binding site determined in normal adult tissues *in vivo* using transgenic mice. Mol Endocrinol 13: 718-728

Siemann G, Blume R, Grapentin D, Oetjen E, Schwaninger M, Knepel W (1999) Inhibition of cyclic AMP response element-binding protein/cyclic AMP response element-mediated transcription by the immunosuppressive drugs cyclosporin A and FK506 depends on the promoter context. Mol Pharmacol 55: 1094-1100

Herzig S, Füzesi L, Knepel W (2000) Heterodimeric Pbx-Prep1 homeodomain protein binding to the glucagon gene restricting transcription in a cell type-dependent manner. J Biol Chem 275: 27989-27999

Grzeskowiak R, Amin J, Oetjen E, Knepel W (2000) Insulin responsiveness of the glucagon gene conferred by interactions between proximal promoter and more distal enhancer-like elements involving the paired-domain transcription factor Pax6. J Biol Chem 275: 30037-30045

Schinner S, Dellas C, Schröder M, Heinlein C, Chang C, Fischer J, Knepel W (2002) Repression of glucagon gene transcription by peroxisome proliferator-activated receptor γ through inhibition of Pax6 transcriptional activity. J Biol Chem 277: 1941-1948

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

Address

Center for Anatomy
Dept. Anatomy with main focus on Neuroanatomy
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: +49-551-39 7051/
39 7052
fax: +49-551-39 14016
email: kkriegl@gwdg.de

Further Information

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

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

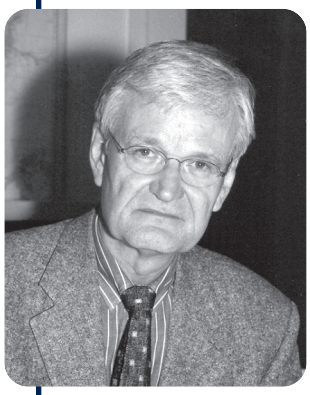
Schober A, Hertel R, Arumäe U, Farkas L, Jaszai J, Krieglstein K, Saarma M, Unsicker K (1999) GDNF rescues target-deprived spinal cord neurons but requires TGF-ß as co-factor *in vivo*. J Neurosci 19: 2008-2015

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 doparninergic 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



Professor of Psychology

Diploma in Psychology at the University of Hamburg, Germany (1963)
Dr.rer.nat. (1966) and Habilitation (1971) at the Christian Albrechts University at Kiel, Germany
Professor of Psychology at the Universities Kiel (1973),
Düsseldorf (1974 - 1978) (chairman),
Aachen (1979 - 1982) (chairman),
and Göttingen (since 1982) (chairman)

Address

Georg Elias Müller Institute
of Psychology
University of Göttingen
Gosslerstr. 14

37073 Göttingen
Germany

phone: +49-551-39 3619
fax: +49-551-39 3662
e-mail: gluer@uni-goettingen.de

Further Information

http://www.psych.uni-goettingen.de/abt/2

Major Research Interests

Experimental psychology; Cognitive psychology: Problem solving; Memory: Working memory; Iconic memory. Language and language disturbance (aphasia); Eye movement research, visual perception and mental imagery; Word recognition in different writing systems (cross-cultural approach): Language and memory; Spatial cognition.

Selected Recent Publications

Lüer G, Becker D, Lass U, Fang Y, Chen G & Wang Z (1998) Memory span in German and Chinese: Evidence for the phonological loop. European Psychologist 3: 102-112

Werner S, Saade Chr, Lüer G (1998) Relations between the mental representation of extrapersonal space and spatial behavior. In Chr. Freksa, Chr. Habel & K. F. Wender (Eds.), Spatial Cognition (Pp. 107-127). Berlin: Springer

Lass U, Fang Y, Chen G, Becker D, Lüer G (1999) Is memory for shapes subject to language-specific effects? An experimental study of memory span in German and Chinese subjects. - Zeitschrift für Sprache & Kognition 18: 136-145

Lass U, Lüer G, Becker D, Fang Y, Chen G, Wang Z (2000) Kurzzeitgedächtnisleistungen deutscher und chinesischer Probanden mit verbalen und figuralen Items: Zur Funktion von phonologischer Schleife und visuell-räumlichen Notizblock. Zeitschrift für Experimentelle Psychologie 47: 77-88

Elsner N, Lüer G (Eds) (2000) Das Gehirn und sein Geist. Göttingen: Wallstein

Kluwe R, Lüer G, Rösler F (Eds.) (2003) Principles of Human Learning and Memory. Basel: Birkhaeuser

Markus Missler

Research Group Leader at the Center for Physiology

Dr.med. (M.D.), University of Göttingen, 1992
Graduate College (DFG), Göttingen, 1992 - 1994
Postdoctoral fellow, UTSW & HHMI, Dallas, 1994 - 1999
Research Group Leader (SFB 406), 1999 - 2004
Univ. Professor for Genetics and Molecular Neurobiology (Otto-von-Guericke-University Magdeburg), 2004

Address

Center for Physiology
University of Göttingen
Humboldtallee 23

37073 Göttingen Germany

phone: +49-551-39 12807
fax: +49-551-39 12809
e-mail: mmissle1@gwdg.de

Major Research Interests

Synapses of the nervous system combine two different aspects: From a structural point of view, they represent a specialized form of cell-cell adhesion/recognition sites, and functionally they maintain neurotransmission, thereby sustaining the flow of information from one neuron to the next. Our group is particularly interested in studying the question of whether these two aspects of synapses are related to each other. To address this question we have studied the role of candidate molecules. In a recent major finding, we demonstrated that a family of cell adhesion molecules (neurexins) is indeed essential for efficient regulated exocytosis and is therefore required for a successful communication between neurons. We were able to show that (i) neurexins are presynaptically localized, and (ii) they regulate the activity of presynaptic as well as postsynaptic high-voltage activated calcium channels - the latter via a hitherto unknown transsynaptic signalling pathway.
Further activities in the laboratory include functional analysis of neurexophilins, a secreted ligand of α-neurexins. Expression patterns of neurexophilins show an extremely localised distribution pattern in specific subpopulations of neurons, which may utilize neurexophilins to modulate the α-neurexin function. In addtion, we have started a screening test to identify novel genes involved in synaptogenesis using a so-called differential display approach to examine differentially expressed mRNAs at chracteristic stages of development. Our investigations rely on molecular biological, neurogenetic, morphological and (in our collaborations) electrophysiological methods.

Selected Recent Publications

Verhage M, Maia AS, Plomp JJ, Brussard AB, Heeroma JH, Vermeer H, Toonen RF, Hammer RE, van den Berg TK, Missler M, Geuze HJ, Südhof TC (2000) Synaptic assembly of the brain in the absence of neurotransmitter secretion. Science 287: 864-869

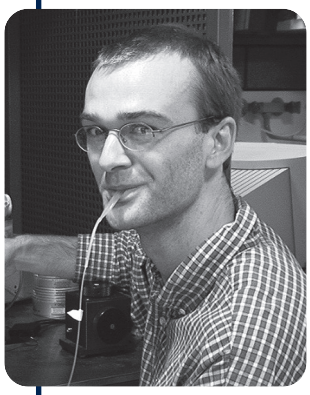
Safavi-Abbasi S, Wolff JR, Missler M (2001) Rapid morphological changes in astrocytes are accompanied by re-distribution but not quantitative changes of cytoskeletal proteins. Glia 36: 102-115

Missler M (2003) Synaptic cell adhesion goes functional. Trends Neurosci 26: 176-178

Missler M, Zhang W, Rohlmann A, Kattenstroth G, Hammer RE, Gottmann K, Südhof TC (2003) a-Neurexins couple Ca^{2+}-channels to synaptic vesicle exocytosis. Nature 423: 939-948

Kattenstroth G, Tantalaki E, Südhof TC, Gottmann K, Missler M (2004) Postsynaptic N-methyl-D-aspartate receptor function requires a-neurexins. PNAS 101: 2607-2612

Tobias Moser



Group Leader at the Department of Otolaryngology

Dr. med. (M.D.) 1995, University of Jena, Habilitation for Otolaryngology 2003
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

Address

InnerEarLab
Department of
Otolaryngology
University of Göttingen
Robert-Koch-Strasse 40

37075 Göttingen
Germany

phone: +49-551-39 8968
fax: +49-551-39 12950
e-mail: tmoser@gwdg.de

Further Information

http://www.innerearlab.org

Major Research Interests

The main focus of our group is the synaptic function and dysfunction of cochlear inner hair cells (IHCs), which transform sound-induced mechanical signals into auditory nerve activity by Ca^{2+} triggered exocytosis of neurotransmitter. We use cell-physiological techniques: patch-clamp, uncaging of caged signal molecules and fluorimetric imaging to study hair cell ion channels, synaptic exocytosis and endocytosis in inner hair cells. Our current and future research aims on an improved understanding of normal presynaptic hair cell function, including the characterization of the molecular players e.g. by investigation of IHCs from mouse mutants for synaptic proteins. In addition, we try to identify pathomechanisms of deafness by investigating different aspects of hair cell function in mouse models of human deafness. Here, we focus on mouse models of human auditory neuropathy, which is caused by defects central to the mechanically amplifying outer hair cells.

Selected Recent Publications

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

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

Beutner D, Moser T (2001) The Presynaptic Function of Mouse Cochlear Inner Hair Cells during Development of Hearing. J Neurosci 2001 21: 4593-4599

Fuchs P, Glowatzki E, Moser T (2003) The afferent synapse of cochlear hair cells. Curr Opin Neurobiol 13(4): 452-8

Brandt A, Striessnig J, Moser T (2003) CaV1.3 Channels are essential for Development and Presynaptic Activity of Cochlear Inner Hair Cells J Neurosci 23: 10832-40

Klaus-Armin Nave

Professor of Molecular Biology, Director at the Max Planck Institute of 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 of Experimental Medicine, Göttingen and Adj. Professor of Molecular Biology, Heidelberg

Address

Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-38 99757
fax: +49-551-38 99758
email: nave@sun0.urz.
uni-heidelberg.de

Further Information

http://efil.org/efil.php?
DB=neurogene&RESET=1

Major Research Interests

Transgenic and natural mouse mutants are useful tools to study human genetic diseases. Focussing on the nervous system, we are interested in diseases involving myelin-forming glial cells. These highly specialized cells enwrap neuronal axons with multiple layers of membranes and provide the electrical insulation that is necessary for rapid impulse propagation. We are studying the principles of these neuron-glia interactions and the genes that are required for normal myelin assembly and maintenance. One gene of interest encodes PMP22 (a myelin membrane protein of Schwann cells) and is frequently duplicated in patients with Charcot-Marie-Tooth disease. Mutations of another myelin protein gene, termed PLP, underlie Pelizaeus-Merzbacher disease, a lethal white matter disease. A third neurological disorder under study is adrenoleukodystrophy, caused by a dysfunction of peroxisomes. We have generated mouse mutants that accurately model these human diseases to study disease mechanism at the cellular levele and to explore possible treatment strategies.

Future Projects and Goals

Identification of disease modifier genes; epigenetic factors of disease expression; novel transgenic strategies to obtain conditional mouse mutants;
Mechanisms of neuron-glia signalling; transcriptional control genes of neuronal differentiation.

Selected Recent Publications

Griffiths I, Klugmann M, Anderson T, Yool D, Thomson C, Schwab M H, Schneider A, Zimmermann F, McCulloch M, Nadon N, Nave K-A (1998) Axonal swellings and degeneration in mice lacking the major proteolipid of myelin. Science 280: 1610-1613

Schwab M H, Bartholomä A, Heimrich B, Feldmeyer D, Druffel-Augustin S, Goebbels S, Naya F J, Frotscher M, Tsai M-J, Nave K-A (2000) Neuronal bHLH proteins (NEX and BETA2/NeuroD) regulate terminal granule cell differentiation in the hippocampus. J Neuroscience 20: 3714-3724

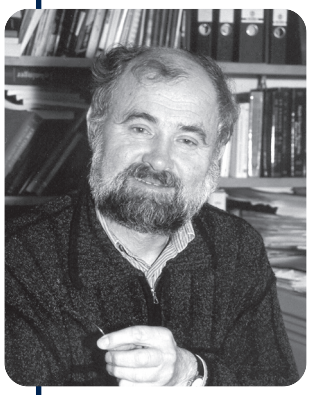
Niemann S, Sereda MW, Suter U, Griffiths IR, Nave K-A (2000) Uncoupling of myelin assembly and Schwann cell differentiation by transgenic overexpression of PMP22. J Neuroscience 20: 4120-4128

Werner H, Dimou L, Klugmann M, Pfeiffer St, Nave K-A (2001) Multiple splice isoforms of proteolipid M6B in neurons and oligodendrocytes. Mol Cell Neurosci. 18: 593-605

Lappe-Siefke C, Göbbels S, Gravel M, Nicksch E, Lee J, Braun P E, Griffiths I, Nave K-A (2003) Disruption of Cnp1 uncouples oligodendroglial functions in axonal support and myelination. Nature Genetics 33: 366-374

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 (in print)

Michailov GV, Sereda MW, Brinkmann BG, Fischer TM, Haug B, Birchmeier C, Role L, Lai C, Schwab MH, Nave K-A (2004) Axonal neuregulin-1 regulates myelin sheath thickness. Science. Apr 30; 304(5671): 700-3



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

Address

Dept. Membrane Biophysics
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1675
fax: +49-551-201 1688
e-mail: eneher@gwdg.de

Further Information

http://www.mpibpc.gwdg.de/abteilungen/140/

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

Voets T, Moser T, Lund P-E, Chow RH, Geppert M, Suedhof TC, Neher E (2001) Intracellular calcium dependence of large dense-core vesicle exocytosis in the absence of synaptotagmin I. PNAS 98: 11680-11680

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 GABAB 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

Harald Neumann

Address

Neuroimmunology
European Neuroscience
Institute Göttingen
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 12341
fax: +49-551-39 12346
e-mail: hneuman1@gwdg.de

Further Information

http://www.eni.gwdg.de/

Group Leader at the European Neuroscience Institute Göttingen

1990 'Approbation' in Medicine, University Würzburg and University (LMU) Munich
1991 M.D., University of Würzburg
1998 'Habilitation' in Neuroimmunology, Technical University, Munich
Positions held
1990 - 1992 Internship, Department of Neurology, University Ulm (Germany)
1992 - 1994 DFG Scholarship (postdoctoral fellow), Max-Planck-Institute of Psychiatry, Martinsried (Germany)
1994 - 2001 Research associate and group leader, Department of Neuroimmunology, Max Planck-Institute of Neurobiology, Martinsried (Germany)
since 2001 Group leader, Neuroimmunology, European Neuroscience Institute Göttingen

Major Research Interests

The immunoprivileged status of the central nervous system (CNS) is conditional. In the healthy organism, immune responsiveness of the brain tissue is kept to a minimum. However, under pathological conditions, genes are turned on which change non-reactive CNS tissue to a pro-inflammatory milieu supporting bi-directional interactions between CNS and immune cells. Striking examples are disorders as diverse as CNS autoimmune diseases, injury and neurodegenerative diseases.

Our group has demonstrated that neuronal lesions recruit inflammatory cells to the pathologically changed tissue. Furthermore, neurons are stimulated by inflammatory cytokines to express MHC (major histocompatibility complex) class I molecules and are susceptible to cytotoxic attack by T lymphocytes. In particular, neurites are highly susceptible to T lymphocyte cytotoxicity.

Our group is currently interested in the role of the innate immune response in neurodegenerative and neuroinflammatory diseases such as multiple sclerosis. We are analyzing the cytotoxic and growth inhibitory effects of activated murine microglia and macrophages on neurites. In particular, we are studying the immune-mediated modulation of the axonal transport of synaptic molecules by time-lapse confocal microscopy.

Furthermore, we are assessing the use of the genetically modified hematopoietic precursor and stem cells as a new therapy in animal models of neuroinflammatory diseases. Bone marrow derived hematopoietic stem cells and mesenchymal cells will be modified by retroviral vectors to express chemokine receptors for attraction to lesioned brain tissue and release of growth factors after differentation into resident brain cells.

Selected Recent Publications

Medana I, Martinic MMA, Wekerle H, Neumann H (2001) Transection of major histocompatibiltiy class I-induced neurites by cytotoxic T lymphocytes. Am J Pathol 159: 809-815

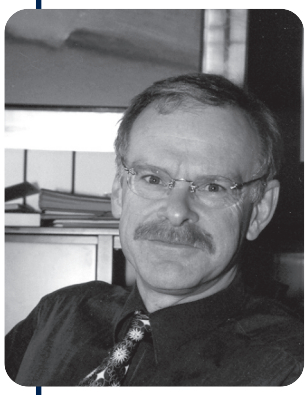
Neumann H, Medana I, Bauer J, Lassmann H (2002) Cytotoxic T lymphocytes in autoimmune and degenerative CNS diseases. Trends in Neurosci 25 (6): 313-319

Neumann H, Schweigreiter R, Yamashita T, Rosenkranz K, Wekerle H, Barde Y-A (2002) Tumor necrosis factor inhibits neurite outgrowth and branching of hippocampal neurons by a Rho-dependent mechanism. J Neurosci 22: 854-862

Neumann H (2003) Molecular mechanisms of axonal damage in inflammatory central nervous system diseases. Curr Opin Neurology 16: 267-273

Iliev A, Stringaris AK, Nau R, Neumann H (2004) Neuronal injury mediated via stimulation of microglial toll-like receptor-9 (TLR9). FASEB J 18: 412-414

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

Address

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

37075 Göttingen Germany

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

Further Information

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

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

Nitsche MA, Jaussi W, Liebetanz D, Lang N, Tergau F, Paulus W (2004) Consolidation of human motor cortical neuroplasticity by D-cycloserine. Neuropsychopharmacology: 1573-8

Antal A, Nitsche MA, Kruse W, Kincses TZ, Hoffmann KP, Paulus W (2004) Direct current stimulation over V5 enhances visuomotor coordination by improving motion perception in humans. J Cogn Neurosci 16(4): 521-7

Antal A, Nitsche MA, Kincses TZ, Kruse W, Hoffmann KP, Paulus W (2004) Facilitation of visuo-motor learning by transcranial direct current stimulation of the motor and extrastriate visual areas in humans. Eur J Neurosci 19(10): 2888-92

Nitsche MA, Liebetanz D, Schlitterlau A, Henschke U, Fricke K, Frommann K, Lang N, Henning S, Paulus W, Tergau F (2004) GABAergic modulation of DC stimulation-induced motor cortex excitability shifts in humans. Eur J Neurosci 19(10): 2720-6

Nitsche MA, Grundey J, Liebetanz D, Lang N, Tergau F, Paulus W (2004) Catecholaminergic Consolidation of Motor Cortical Neuroplasticity in Humans. Cereb Cortex (Epub ahead of print)

Siebner HR, Lang N, Rizzo V, Nitsche MA, Paulus W, Lemon RN, Rothwell JC (2004) Preconditioning of low-frequency repetitive transcranial magnetic stimulation with transcranial direct current stimulation: evidence for homeostatic plasticity in the human motor cortex. J Neurosci 24(13): 3379-85

Lang N, Nitsche MA, Paulus W, Rothwell JC, Lemon RN (2004) Effects of transcranial direct current stimulation over the human motor cortex on corticospinal and transcallosal excitability. Exp Brain Res 156(4): 439-43. Epub 2004 Jan 24

Antal A, Kincses TZ, Nitsche MA, Bartfai O, Paulus W (2004) Excitability changes induced in the human primary visual cortex by transcranial direct current stimulation: direct electrophysiological evidence. Invest Ophthalmol Vis Sci 45(2): 702-7

Evgeni Ponimaskin

Address

Dept. Neuro- and Sensory Physiology
University of Göttingen
Humboldtallee 23

37073 Göttingen, Germany

phone: +49-551-39 5939
fax: +49-551-39 6031
e-mail: evgeni@ukps.gwdg.de

Further Information

http://www.GWDG.DE/~clneuphy/gframe.htm

Group Leader at the Centre for Molecular Physiology of thr 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.

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

Professor of Psychology

1988 - 1989 Postdoctoral Fellow, Department of Pharmacology, Thomas Jefferson University, Philadelphia, Pa.
1989 - 1995 Assistant Professor, Department of Psychology, University of Giessen
1995 - 1997 Associate Professor, Institute for Psychology, University of Jena
since 1997 Professor of Psychology, Georg Elias Müller Institute for Psychology, University of Göttingen

Address

Georg Elias Müller Institute
for Psychology
University of Göttingen
Goßlerstr. 14

37073 Göttingen
Germany

phone: +49-551-39 3611
fax: +49-551-39 3662
e-mail: trammsa@uni-goettingen.de

Further Information

http://www.psych.uni-goettingen.de/home/rammsayer/

Major Research Interests

Biological and experimental personality research:

Biological basis of extraversion
Neuropharmacology of individual differences
Pharmacopsychological approaches to personality
Elementary cognitive tasks and mental ability
Behavioral sex differences

Temporal information processing in humans:

Neurobiological approaches to timing systems in humans
Perceptual and cognitive mechanisms in human timing and time perception
Time psychophysics

Cognitive neuroscience:

Neurochemistry of declarative and procedural memory functions
Cognitive inhibition in humans

Selected Recent Publications

Rammsayer TH (1998) Extraversion and dopamine: Individual differences in responsiveness to changes in dopaminergic activity as a possible biological basis of extraversion. European Psychologist 3: 37-50

Rammsayer T (1999) Neuropharmacological evidence for different timing mechanisms in humans. Quarterly Journal of Experimental Psychology, Section B: Comparative and Physiological Psychology 52: 273-286

Rammsayer TH (2001) Effects of pharmacologically induced changes in NMDA-receptor activity on long-term memory in humans. Learning and Memory 8: 20-25

Rammsayer T, Ulrich R (2001) Counting models of temporal discrimination. Psychonomic Bulletin & Review 8: 270-277

Rammsayer TH, Rodewald S, Groh D (2000) Dopamine-antagonistic, anticholinergic, and GABAergic effects on declarative and procedural memory functions. Cognitive Brain Research 9: 61-71

Diethelm Richter

Address

Center for Physiology and Pathophysiology
University of Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 59112
fax: +49-551-39 6031
e-mail: d.richter@gwdg.de

Further Information

http://www.neuro-physiol.med.uni-goettingen.de/groups/richter/index.phtml

Professor of Physiology
Chairman of the II. Department of Physiology, University of Göttingen
Deputy Speaker of the European Neuroscience Institute Göttingen

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

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. Europ J Neurosci 12: 239-246

Mironov SL, Richter DW (2001) Oscillations and hypoxic changes of mitochondrial variables in neurons of the brainstem respiratory center. J Physiol 533: 227-236

Ponimaskin EG, Schmidt MFG, Heine M, Bickmeyer U, Richter DW (2001) 5-Hydroxytryptamine 4(a) receptor expressed in Sf9 cells is palmitoylated in an agonist-dependent manner. Biochem J 353: 627-634

Heine M, Ponimaskin E, Bickmeyer U, Richter DW (2001) 5-HT-receptor-induced changes of the intracellular cAMP level monitored by a hyperpolarization-activated cation channel. Europ J Physiol DOI 10: 1007

Manzke T, Günther U, Ponimaskin EG, Haller M, Dütschmann M, Schwarzacher S, Richter DW (2003) 5-HT_{4ca1} Receptors avert opioid-induced breathing depression without loss of analgesia. Science 301: 226-229

Christian Rosenmund

Group Leader at the Max Planck Institute for Biophysical Chemistry

PhD Neurosciences, Vollum Institute, Portland, OR, USA 1993
Postdoctoral fellow Salk Institute, La Jolla, CA, USA 1993 - 1995
Helmholtz fellow, MPI biophysikalische Chemie 1995 - 1997
Heisenberg fellow and independent group leader, Dept. Membranbiophysik at the Max Planck Institute for Biophysical Chemistry, since 1998

Address

Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37070 Göttingen
Germany

phone: +49-551-201 1672
fax: +49-551-201 1688
e-mail: crosenm@gwdg.de

Further Information

http://www. mpibpc.gwdg.de/abteilungen/140/groups/index.html

Major Research Interests

Neurotransmission at the central synapse involves a series of functional highly coordinated steps. On the presynaptic site, synaptic vesicles tether, prime to fusion competence, and fuse Ca^{2+} triggered with the plasma membrane to release the neurotransmitter in the synaptic cleft. Postsynaptically, ionotropic receptors respond to binding of the neurotransmitter with distinct conformational steps that shape the postsynaptic response. We characterize synaptic properties with standard patch-clamp electrophysiology and optical techniques from cultured primary hippocampal neurons of transgenic mice that bear deletions or mutations of pre- or postsynaptic proteins. We have identified and/or characterized the vesicular neurotransmitter transporters VGLUT and VGAT, the vesicle priming factor Munc13, and the core complex associated proteins synaptotagmin 1 and complexin. Furthermore, knock-out mice are used to examine protein-domain and -residue function by gain of function rescue experiments by viral overexpression of wildtype and mutant proteins. Postsynaptically, we examine structural principles that control the gating properties of AMPA-type glutamate receptors.

Selected Recent Publications

Takamori S, Rhee JS, Rosenmund C, Jahn R (2000) Identification of a vesicular glutamate transporter that defines a glutamatergic phenotype in neurons. Nature 407: 189-94

Mansour M, Nagarajan N, Nehring R, Clements J, Rosenmund C (2001) Heteromeric AMPA receptors assemble with a preferred subunit stoichiometry and spatial arrangement. Neuron 32: 841-853

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

Rosenmund C, Sigler A, Augustin I, Reim K, Brose N, Rhee JS (2002) Differential control of vesicle priming and short term plasticity by Munc13 isoforms. Neuron 33: 411-424

Varoqueaux F, Sigler A, Rhee SJ, Brose N, Enk C, Reim K, Rosenmund C (2002) Total arrest of spontaneous and evoked synaptic transmission but normal synaptogenesis in the absence of Munc13 mediated vesicle priming. PNAS 99: 9037-9042

Marjan Rupnik

Research Group Leader at the European Neuroscience Institute Göttingen

Ph.D. 1996, University of Ljubljana
Assistant Professor of Pathophysiology and Physiology, 1997
Junior group leader since 2000, European Neuroscience Institute Goettingen
Since 2004 Professor of Physiology at the University of Ljubljana

Address

Neuroendocrinology group,
European Neuroscience
Institute Göttingen
Waldweg 33

37073 Göttingen, Germany

phone: +49-551 39 12348
fax: +49-551-39 2694
e-mail: mrupnik@gwdg.de

Further Information

http://www.eni.gwdg.de/endooverview.htm

Major Research Interests

During embryonic stages there is not much need for a functional endocrine secretion due to domination and hyperactivity of maternal endocrine glands. However, after birth a body of a newborn mammal has to activate various endocrine systems and later establish neuronal control over them. The main focus of our group is to characterize the Ca^{2+}-dependent secretory activity in cells composing a pancreatic neuroendocrine system during early postnatal life.

We developed a tissue slice preparation of rodent pancreas, a novel approach to *in situ* characterization of secretory activity from pancreatic cells, both endocrine and exocrine, as well as neurons. The slice preparation is particularly advantageous due to its short preparation time, lack of chemical disturbance, preserved paracrine inputs and relative longevity in organotypic culture.

The techniques we apply are whole-cell patch-clamp for channel and membrane capacitance measurements, Ca^{2+} photometry and imaging, confocal and multi-photon microscopy, immunocytochemistry and a series of cell biology techniques.

Our studies aim to provide important information about innervation of different cell types found in pancreas and their physiology. In addition we want to establish how the malfunction of the interplay between the cells in this neuroendocrine system contributes to the pathophysiology of Diabetes mellitus.

Selected Recent Publications

Rupnik M, Kreft M, Sikdar SK, Grilc S, Romih R, Zupancic G, Martin TF, Zorec R (2000) Rapid regulated dense-core vesicle exocytosis requires the CAPS protein. Proc Natl Acad Sci U S A 97(10): 5627-32

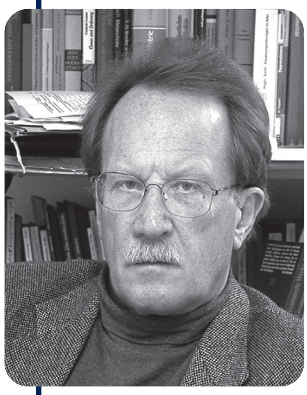
Speier S, Rupnik M (2003) A novel approach to *in situ* characterization of pancreatic beta-cells. Pflugers Arch 446(5): 553-8

Sedej S, Tsujimoto T, Zorec R, Rupnik M (2004) Voltage-activated Ca^{2+} channels and their role in the endocrine function of the pituitary gland in newborn and adult mice. J Physiol 555(Pt 3): 769-82

Meneghel-Rozzo T, Rozzo A, Poppi L, Rupnik M (2004) *In vivo* and *in vitro* development of mouse pancreatic beta-cells in organotypic slices. Cell Tissue Res 316(3): 295-303

Kreft M, Stenovec M, Rupnik M, Grilc S, Krzan M, Potokar M, Pangrsic T, Haydon PG, Zorec R (2004) Properties of Ca^{2+}-dependent exocytosis in cultured astrocytes. Glia 46(4): 437-45

Eckart Rüther



Professor of Psychiatry

Dr. med. LMU Munich
Prof. of Psychiatry LMU Munich
Dept. of Psychiatry Univ. Munich

Address

Dept. of Psychiatry and Psychotherapy
University of Göttingen
von-Siebold-Str. 5

37075 Goettingen
Germany

phone: +49-551-39 6600/01
fax: +49-551-39 2798
email: eruethe@gwdg.de

Further Information

http://www.gwdg.de/~eruethe/

Major Research Interests

Psychopharmacology
Sleep Medicine
Dementia
PTSD
Schizophrenia
Biological Psychiatry

Selected Recent Publications

Wiltfang J, Otto M, Baxter H C, Bodemer M, Steinacker P, Bahn E, Zerr I, Kornhuber J, Kretzschmar H A, Poser S, Rüther E, Aitken A (1999) Isoform pattern of 14-3-3 proteins in the cerebrospinal fluid of patients with Creutzfeldt-Jakob disease. J Neurochem 73,6: 2485-2490

Bandelow B, Wedekind D, Pauls J, Brooks A, Hajak G, Rüther E (2000) Salivary cortisol in panic attacks. Am J Psych 157 (3): 454-456

Moll G H, Mehnert C, Wicker M, Bock N, Rothenberger A, Rüther E, Huether G (2000) Age-associated changes in the densities of presynaptic monoamine transporters in different regions of the rat brain from early juvenile life to late adulthood. Dev Brain Res 119: 251-257

Rüther E and Glaser A (2000) A prospective PMS study to validate the sensitivity for change of the C-Scale in advanced stages of dementia using the NMDA-antagonist memantine. Pharmacopsychiatry 33: 1-6

Rüther E, Ritter R, Apecechea M, Freytag S, Gmeinbauer R, Windisch M (2000) Sustained improvements in patients with dementia of Alzheimer´s type (DAT) 6 months after termination of Cerebrolysin therapy. J Neural Trans 1-15

Eleni Roussa

Address

Center for Anatomy,
Dept. Neuroanatomy
University of Göttingen
Kreuzbergring 40

37075 Göttingen
Germany

phone: +49-551-39 7068
fax: +49-551-39 14016
e-mail: eroussa@gwdg.de

Privatdozentin; Neuroanatomy

1988 Dr. med. dent. University of Saarland, Germany
Training in Periodontology, Dental School, University of Saarland
Postdoctoral fellow, Department of Anatomy, Medical School, University of Saarland
Temporary Lecturer for Anatomy, School of Biological Sciences, University of Manchester, UK
since 2001 Senior scientist, Center for Anatomy, Department of Neuroanatomy, University of Göttingen, Germany
2002: Habilitation, University of Göttingen

Major Research Interests

Dopaminergic and serotonergic neurons play important roles in the regulation of motor performances, behavior and cognition. Neuron loss or functional impairment of dopaminergic or serotonergic neurons are associated with a wide range of human disease states, including Parkinson's disease, depression and anxiety.
We are interested in the understanding of the early determination and differentiation of mesencephalic dopaminergic neurons and hindbrain serotonergic neurons. We specifically focus on the identification of intrinsic and extrinsic regional determinants that dictate differentiation of progenitor cells towards particular types of neurons, as well as on new genes representing the intracellular mediators of development towards dopaminergic and serotonergic neurons.

Selected Recent Publications

Farkas LM, Dünker N, Roussa E, Unsicker K, Krieglstein K (2003) TGF-βs are essential for the development of midbrain dopaminergic neurons *in vitro* and *in vivo*. The Journal of Neuroscience 23: 5178-5186

Roussa E, Nastainczyk W, Thévenod F (2004) Differential expression of electrogenic NBC1 (SLC4A4) variants in rat kidney and pancreas. Biochemical Biophysical Research Communications 314: 382-389

Roussa E, Krieglstein K (2004) GDNF promotes neuronal differentiation and dopaminergic development of mouse mesencephalic neurospheres. Neuroscience Letters 361: 52-55

Roussa E, Farkas L, Krieglstein K (2004) TGF-beta promotes survival on mesencephalic dopaminergic neurons in cooperation with Shh and FGF-8. Neurobiology of Disease 16: 300-310

Roussa E, Krieglstein K, (2004) Induction and specification of dopaminergic cells development: focus on TGF-β, Shh and FGF8. Cell and Tissue Research (in press)

Detlev Schild

Professor of Physiology

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

Address

Center for Physiology and Pathophysiology
University of Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 5915
fax: +49-551-39 8399
e-mail: dschild@gwdg.de

Further Information

http://www.ukmn.gwdg.de

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

Selected Recent Publications

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

Manzini I, Rössler W, Schild D (2002) cAMP-independent responses of olfactory neurons in *Xenopus laevis* tadpoles and their projection onto olfactory bulb neurons. J Physiol 545: 475-484

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

Nezlin LP, Heerman S, Schild D, Rössler W (2003) Organisation of glomeruli in the olfactory bulb of *Xenopus laevis* tadpoles. J Comp Neurol 464: 257-268

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

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

Schild D & Manzini I (2004) Cascades of response vectors of olfactory receptor neurons in *Xenopus laevis* tadpoles Eur J Neurosci (in press)

Ralf Schneggenburger

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

Dr. rer. nat. (PhD) 1993, University of Göttingen
1994 - 1996 Postdoctoral fellow at the Neurobiology Laboratory, Ecole Normale Supérieure, Paris
1996 - 2000 Research Assistant at the Max Planck Institute for Biophysical Chemistry, Göttingen
since 2001 Heisenberg fellow and leader of the Research Group "Synaptic Dynamics and Modulation" at the Max Planck Institute for Biophysical Chemistry

Address

AG Synaptic Dynamics
and Modulation
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49 551 201 1770
fax: +49 551 201 1688
e-mail: rschneg@gwdg.de

Further Information

http://www.mpibpc.gwdg.de/abteilungen/140/groups/sdm/

Major Research Interests

Fast communication between nerve cells in the brain is mediated by chemical synaptic transmission. During this process, a presynaptic action potential is translated via Calcium dependent membrane fusion of small synaptic vesicles into the release of neurotransmitter substances. Interestingly, upon repeated presynaptic activity, the responses in most postsynaptic cells show a pronounced dynamic behavior. The strength of synaptic responses either grows, or declines with time, and this short term synaptic plasticity is expected to modulate the information flow in neural networks.

We study a synapse in the auditory pathway which has an unusually large presynaptic terminal with hundreds of active zones. This synapse is unique because patch-clamp recordings can be made directly from the presynaptic terminal. This allows us to apply Calcium imaging and Calcium uncaging methods directly to the presynaptic nerve terminal. We have shown that the sensitivity of the vesicle fusion reaction for intracellular Calcium ions is significantly higher than previously assumed. This has direct consequences for our understanding of different forms of synaptic plasticity, such as facilitation and depression. In collaborative studies, we also use gene knock-out approaches to analyze the precise role of proteins in presynaptic Calcium signalling and plasticity of transmitter release.

Selected Recent Publications

Schneggenburger R, Sakaba T & Neher E (2002) Vesicle pools and short-term synaptic depression: lessons from a large synapse. Trends in Neurosci 25: 206-212

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

Wölfel M, Schneggenburger R (2003) Presynaptic capacitance measurements and Ca^{2+} uncaging reveal sub-millisecond exocytosis kinetics and characterize the Ca^{2+} sensitivity of vesicle pool depletion at a fast CNS synapse. J Neuroscience 23: 7059-7068

Felmy F, Neher E, Schneggenburger R (2003) Probing the intracellular Calcium sensitivity of transmitter release during synaptic facilitation. Neuron 37: 801-811

Professor of Zoology

1967 Doctor rer.nat., University of Münster)
1967 - 1970 Research Fellow (Assistent) at the Max Planck Institute of Brain Research, Department of General Neurology/ Köln
1970 - 1977 Research Assistant at the Institute of Zoology, Department of Experimental Morphology, University of Köln
1975 - 1976 Visiting Fellow at the Research School of Biological Sciences, Department of Neurobiology, Australian National University, Canberra, Australia)
1977 Professor and Head of the Department of Cell Biology at the Zoological Institute, University of Göttingen

Address

Institute for Zoology
and Anthropology,
Department of Cell Biology
University of Göttingen
Berliner Str.28

37073 Göttingen
Germany

phone: +49-551-39 5406
fax: +49-551-39 9320
e-mail: fschuer@gwdg.de

Further Information

http://www.gwdg.de/~zellbio

Major Research Interests

Neurobiology of invertebrate nervous systems, mainly central nervous system of insects; work on insects, crayfish, earthworms and onychophora. Cellular neurobiology: Structure and function of interneurons, giant fibre systems, synaptic networks, neuroactive compounds with emphasis on biogenic amines in crickets and bees; olfactory brain systems in *Drosophila* wild type and mutants; electrophysiological and behavioural studies: walking and escape behaviour of crickets and cockroaches.
Currently used techniques in the department:Neurocytology, Neuroanatomy, Immunocytology, Electron microscopy, Electrophysiology, Tissue culture of identified neurons, Setups for quantitative registration of behaviours.

Selected Recent Publications

Watson A H D, Schürmann F-W (2002) Synaptic structure, distribution, and circuitry in the central nervous system of the locust and related insects. Microsc Res Technique 56: 210-226

Yasuyama K, Meinertzhagen J A, Schürmann F-W (2002) Synaptic organisation of the mushroom body calyx in *Drosophila melongaster*. J comp Neurol 445: 211-226

Yasuyama K, Meinertzhagen J A, Schürmann F-W (2003) Synaptic connections of cholinergic antennal lobe relay neurons innervating the lateral horn neuropile in the brain of *Drosophila melanogaster*. J comp Neurol 466: 299-315

Frambach I, Rössler W, Winkler M, Schürmann F-W (2004) F-actin at identified synapses in the mushroom body neuropil of the insect brain. J comp Neuro 475: 303-314

Stephan J. Sigrist

Address

European Neuroscience
Institute Göttingen
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 12350
fax: +49-551-39 12346
e-mail: ssigris@gwdg.de

further information

http://www.eni.gwdg.de/~marjan/

Research Group Leader at the European Neuroscience Institute Göttingen

Dr. rer. nat (PhD) 1997, University of Tübingen
Since 2001 Independent group leader position group located at the European Neuroscience Institute Göttingen (ENI-G), Max Planck Society
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 and 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 and Schuster CM (2000) Postsynaptic translation affects the morphology and efficacy of neuromuscular junctions. Nature 405 (6790): 1062-1065

Anastassia Stoykova

Privatdozent, Developmental Biology

1972 Medical Doctor (M.D.), Bulgarian Medical Academy
1973 - 1988 Research Associate in Neurochemistry; Regeneration Research Laboratory, Bulgarian Academy of Sciences, Sofia
1985 PhD; Bulgarian Academy of Sciences, Sofia
1989 Habilitation (Neurobiology) and Assistant Research Professor at the Institute of Molecular Biology, Bulgarian Academy of Sciences
1980 -1981 and 1988-1989: Guest investigator as Alexander von Humboldt grant holder at the Max Planck Institute of Experimental Medicine and Max-Planck Institute for Biophysical Chemistry, Göttingen
1991 -2002 Staff Research Scientist at the Max Planck Institute for Biophysical Chemistry; Department Molecular Cell Biology, Göttingen
2002 Habilitation (Developmental Biology); Faculty of Human Medicine, University of Göttingen
2002 -present Research Group Leader at the Max Planck Institute for Biophysical Chemsitry; Department Molecular Cell Biology, Göttingen Lecturer at the International Max Planck Research School, Program Neurosciences

Address

Max Planck Institute for Biophysical Chemistry
Am Faßberg 11

37077 Göttingen
Germany

phone: +49-551-201 1710
fax: +49-551-201 1504
e-mail: astoyko@gwdg.de

Major Research Interests

In the mammalian cortex billions of neurons are organized in six layers and numerous functional domains that process different kinds of sensory information. Our recent efforts are focused on the identification and functional analysis of genes involved in the arealization and layer formation of the developing cortex, using the mouse as a model system. As a result of microarray assays performed through the Affymetrix chip technology, we obtained a collection of genes and ESTs that are differentially expressed in distinct domains of the embryonic cortex. Currently we are in a process of creating and analyzing knockout mouse mutants for selected genes. The morphological, expression and behavioural phenotypic analysis of the generated loss-of-function mutants will be supplemented by gain-of-function assays through somatic electroporation *in vitro* (whole embryo cultures or isolated brains) and *in vivo* (*in utero*) in the brain of developing embryos. Some of these mutants may represent models for human neurological diseases thus providing in the long term some basis to understand the relationship between the genetic regulation of cortical development and cortical dysfunctions in man.
Furthermore, we are analyzing the role of the transcription factor Pax6 in mammalian corticogenesis, which function is abolished in the human disease *Aniridia*. Evidences from our and other laboratories show that Pax6 is intrinsic determinant of the cortical multipotent progenitors (the radial glial cells) and is also involved in the cortical arealization. By using the Cre-LoxP recombination system for *in vivo* conditional inactivation and overexpression, we are studying the function of Pax6 on progenitor proliferation, regionalization, cell fate specification, functional arealization and layer formation. We will also attempt to identify downstream gene targets for the two Pax6 isoforms that are active in vertebrates and possibly involved in a specific cell fate pathway.

Selected Recent Publications

Götz M, Stoykova A, Gruss P (1998) *Pax6* controls radial glia differentiation in the cerebral cortex. Neuron 21: 1031-1044

Stoykova A, Treichel D, Hallonet M, Gruss P (2000) *Pax6* modulates the patterning of the mammalian telencephalon. J Neuroscience 20 (21): 8042-8050

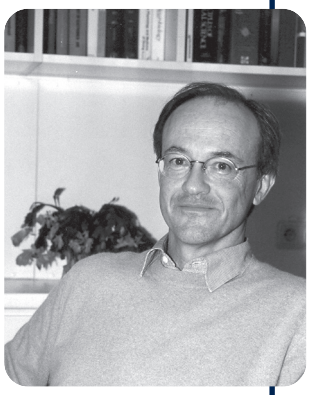
Tarabykin V, Stoykova A, Usman N, Gruss P (2001) Cortical upper layer neurons derive from the subventricular zone as indicated by *Svet1* gene expression. Development 128(1): 1983-1993

Muzio L, DiBenedetto B, Stoykova A, Boncinelli E, Gruss P, Mallamaci A (2002) Conversion of cerebral cortex into basal ganglia in *Emx2-/- Pax6*$^{sey/sey}$ double-mutant mice. Nature Neuroscience 5: 737-745

Muzio L, DiBenedetto B, Stoykova A, Boncinelli E, Gruss P, Mallamaci A (2002) *Emx2* and *Pax6* control regionalization of the pre-neuronogenic cortical primordium. Cerebral Cortex 12(2): 129-139

Stoykova A, Hatano O, Gruss P, Götz M (2003) Increase in reelin-positive cells in the marginal zone of *Pax6* mutant mouse cortex. Cerebral Cortex 13(6): 560-571

Walter Stühmer



Address

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

37075 Göttingen
Germany

phone: +49-551-38 99646
fax: +49-551-38 99644
e-mail: wstuehm@gwdg.de

Further Information

http://www.
mpiem.gwdg.de/index.html

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

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

Pardo L A, Brüggemann A, Camacho J, Stühmer W (1998) Cell-cycle related changes in the conducting properties of r-eag K^+ channels. J Cell Biol 143: 767-775

Pardo L A, del Camino D, Sánchez A, Alves F, Brüggemann A, Beckh S, Stühmer W (1999) Oncogenic potential of EAG K^+ channels. EMBO J 18: 5540-5547

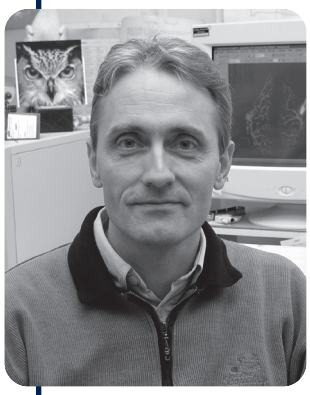
Niemeyer BA, Mery L, Zawar C, Suckow A, Monje F, Pardo LA, Stühmer W, Flockerzi V, Hoth M (2001) Ion channels in health and disease. EMBO Rep 2: 568-573

Loerke D, Stühmer W, Oheim M (2002) Quantifying axial secretory-granule motion with variable-angle evanescent-field excitation. J Neurosci Methods 119: 65-73

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

Andreas Stumpner



Assistant 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
Guestprofessor, University of Zürich, Switzerland, 2002 - 2003

Address

Institute for Zoology and Anthropology
Dept. Neurobiology
University of Göttingen
Berliner Str. 28

37073 Göttingen
Germany

phone: +49-551-39 5574
fax: +49-551-39 5438
e-mail: astumpn@gwdg.de

Further Information

http://www.mpiem.gwdg.de/index_en.html

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 (1998) Picrotoxin eliminates frequency selectivity of an auditory interneuron in a bushcricket. J Neurophysiol 79: 2408-2415

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

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

Stumpner A, von Helversen D (2001) Evolution and function of auditory systems in insects. Naturwiss 88: 159-170

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

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

Heinrich Terlau

Research Group Leader at the Max Planck Institute for Experimental Medicine

Dr. rer. nat. (Ph.D.) 1990, University of Tübingen
Group leader at the Max Planck Institute for Experimental Medicine since 1999

Address

Molecular and Cellular
Neuropharmacology Group
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-38 99474
fax: +49-551-38 99475
e-mail: hterlau@gwdg.de

Further information:

http://www.
mpiem.gwdg.de/User/
Terlau/index.html

Major Research Interests

The research of our group focuses on the identification and characterization of pharmacological active substances interacting with ion channels. A biophysical description and the investigation of the potential physiological implications of this interaction is performed by using mainly electrophysiological techniques and expression systems. Due to the key role of ion channels in different physiological processes, substances interacting with these proteins may have a great variety of possible pharmacological or even clinical implications. The main focus of our research is the analysis of the interaction of conotoxins with certain ion channels. Conotoxins are neurotoxic peptides from the venoms of the predatory cone snails. These cysteine rich peptides are usually between 10 to 30 amino acids long. Conotoxins are heavily used in neuroscience research and are known to be highly selective and specific for their target molecules. Due to these properties conotoxins are also used for trying to understand the structure and function of ion channels.

Selected Recent Publications

Ferber M, Sporning A, Jeserich G, DeLaCruz R, Watkins M, Olivera BM, Terlau H (2003) A novel conus peptide ligand for K^+ channels. J Biological Chemistry 278: 2177-2183

Ferber M, Al-Sabi A, Stocker M, Olivera BM, Terlau H (2004) Identification of a mammalian target of êM-conotoxin RIIIK. Toxicon 43(8): 915-21

Boccaccio A, Conti F, Olivera BM, Terlau H (2004) Binding of kappa-conotoxin PVIIA to Shaker K^+ channels reveals different K^+ and Rb^+ occupancies within the ion channel pore. J Gen Physiol 124(1): 71-81

Al-Sabi A, Lennartz D, Ferber M, Gulyas J, Rivier JE, Olivera BM, Carlomagno T, Terlau H (2004) êM-conotoxin RIIIK, Structural and Functional Novelty in a K^+ channel antagonist. Biochemistry 43(27): 8625-35

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, Univ. of Tübingen, 1995 - 2001
Professor of Animal Physiology, Univ. of Tübingen, 2000 - 2001
Professor of Cognitive Neuroscience and Biological Psychology, Univ. of Göttingen, 2001

Address

German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-38 51115
fax: +49-551-38 51183
e-mail: treue@gwdg.de

Further Information

http://www.dpz.gwdg.de/akn/cnl.html

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 emphasize is on electrophysiology, i.e. the recording of the activity of neurons in the visual cortex of macaque monkeys and measuring human perceptual abilities with psychophysical methods we also use theoretical approaches and functional brain imaging.
Using these techniques, we have been able to elucidate how motion information is represented in primate cortical area MT and how attention changes that representation and correspondingly the percept of the visual environment.

Selected Recent Publications

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

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

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

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

Hol K, Treue S (2001) Different populations of neurons contribute to the detection and discrimination of visual motion. Vision Research 41(6): 685-689

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

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

Michael R. Waldmann

Professor of Psychology

1988 Ph.D. at the University of Munich
1987 - 94 Teaching and research positions at the Universities of Frankfurt and Tübingen
1988 - 90 Postdoctoral research at the University of California, Los Angeles(UCLA); collaboration with Keith Holyoak
1995 Habilitation at the University of Tübingen
1994 - 98 Senior research scientist at the Max Planck Institute for Psychological Research
since 1998 Professor of Psychology (C3) at the University of Göttingen

Address

Department of Psychology
University of Göttingen
Gosslerstr. 14

37073 Göttingen
Germany

phone: +49-551-39 3784
fax: +49-551-39 3656
e-mail: michael.waldmann@bio.uni-goettingen.de

Further Information

http://www.psych.uni-goettingen.de/abt/1/waldmann/index.shtml

Major Research Interests

Causal learning

Our general approach is to study the interaction of top-down knowledge about abstract characteristics of causality and bottom-up contingency learning. The majority of current learning theories view learning as a purely data-driven, associative process ("bottom up"). In contrast, our theory ("causal-model theory") assumes that the processing of the learning input is partly determined by domain knowledge. We are particularly interested in the role of abstract knowledge about causality, such as knowledge about causal directionality, causal relevance, causal structures, and causal interventions. In a number of studies we have shown that this kind of knowledge may dramatically affect learning despite the fact that the learning input was kept constant. Currently we are planning to explore the neural basis of associative as opposed to causal learning processes.

Categorization and Induction

In this project we are interested in the interplay between alternative categorial frameworks and induction. The traditional approach to categorization claims that categories mirror the correlational structure of the environment. By contrast, we argue that in many domains there are alternative ways of categorizing the world. For example, human behavior may either be explained by functional, cognitive or by neuropsychological theories. We are interested in factors determining the way domains are categorized, and in the influence of alternative categorial schemes on subsequent induction processes.

Selected Recent Publications

Waldmann MR, Holyoak KJ (1992) Predictive and diagnostic learning within causal models: Asymmetries in cue competition. Journal of Experimental Psychology: General 121: 222-236

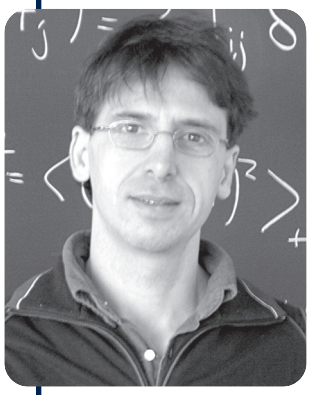
Waldmann MR, Holyoak KJ, Fratianne A (1995) Causal models and the acquisition of category structure. Journal of Experimental Psychology: General 124: 181-206

Waldmann MR (1996) Knowledge-based causal induction. In D. R. Shanks, K. J. Holyoak, & D. L. Medin (Eds.), The psychology of learning and motivation, Vol. 34: Causal learning (pp. 47-88). San Diego: Academic Press

Waldmann MR, Hagmayer Y (1999) How categories shape causality. In M. Hahn & S. C. Stoness (Eds), Proceedings of the Twenty-first Annual Conference of the Cognitive Science Society (pp. 761-766). Mahwah, NJ: Erlbaum

Waldmann MR (2000) Competition among causes but not effects in predictive and diagnostic learning. Journal of Experimental Psychology: Learning, Memory, and Cognition 26: 53-76

Fred Wolf



Research Group Leader at the Max Planck Institute for Dynamics and Selforganisation

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

Address

Department of Nonlinear Dynamics,
Max-Planck-Institut für Strömungsforschung
Bunsenstr. 10

37073 Göttingen
Germany

phone: +49-551-5176 423
fax: +49-551-5176 409
e-mail: fred@chaos.gwdg.de

Further Information

http://www.chaos.gwdg.de

Major Research Interests

Theoretical Neuroscience and Nonlinear Dynamics, Sensory Processing in the Auditory System, Dynamics and Synchronization in Neuronal Networks, Function and Development of the Visual Cortex.

Selected Recent Publications

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

Löwel S, Schmidt KE, Kim D-S, Wolf F, Hoffsümmer F, Singer W, Bonhoeffer T (1998) The layout of orientation and ocular dominance domains in area 17 of strabismic cats. European Journal of Neuroscience 10: 2629-2643

Kaschube M, Wolf F, Geisel T, Löwel S (2002) Genetic influence on quantitative features of neocortical architecture. J Neuroscience 22: 7206-7217

Timme M, Wolf F, Geisel T (2002) Coexistence of regular and irregular dynamics in complex networks of pulse-coupled oscillators. Phys Rev Lett 89: 258701-4

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

Kaschube M, Wolf F, Puhlmann M, Rathjen S, Schmidt KF, Geisel T, Lowel S (2003) The pattern of ocular dominance columns in cat primary visual cortex: intra- and interindividual variability of column spacing and its dependence on genetic background. Eur J Neurosci 18: 3251-3266

Timme M, Wolf F, Geisel T (2004) Topological speed limits to network synchronization. Phys Rev Lett 92: 074101-4

Denker M, Timme M, Diesmann M, Wolf F, Geisel T (2004) Breaking synchrony by heterogeneity in complex networks. Phys Rev Lett 92: 074103-6

Fred Wouters

Address

Cell Biophysics Group
European Neuroscience Institute
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 12368
fax: +49-551-39 12346
e-mail: fred.wouters@gwdg.de

Further Information

http://www.eni.gwdg.de/~marjan/

Group Leader Cell Biophysics Group at the European Neuroscience Institute

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.

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

Wouters FS, Bastiaens PIH, Wirtz KWA, Jovin TM (1998) FRET microscopy demonstrates molecular association of non-specific lipid transfer protein (nsL-TP) with fatty acid oxidation enzymes in peroxisomes. EMBO J 17: 7179-7189

Wouters FS, Bastiaens PIH (1999) Fluorescence lifetime imaging of receptor tyrosine kinase activity in cells. Curr Biol 9: 1127-1130

Wouters FS, Verveer PJ, Reynolds AR, Bastiaens PIH (2000) Quantitative imaging of lateral ErbB1 receptor signal propagation in the plasma membrane. Science 290: 1567-70

Harpur A, Wouters FS, Bastiaens PIH (2001) Imaging FRET between spectrally similar GFP molecules in single cells. Nat Biotechnol 19: 167-9

Wouters FS, Verveer PJ, Bastiaens PIH (2001) Imaging biochemistry inside cells. Trends Cell Biol 11: 203-11

Wolfgang Wuttke

Professor of Clinical and Experimental Endocrinology

Dr. med. 1967
Post-doc, Michigan State University and UCLA, 1969 - 1971
Habilitation (Physiology) 1972
Apl. Professor 1976
Professor of Clinical and Experimental Endocrinology 1985

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.

Address

Clinical and Experimental Endocrinology
Gynecological University Hospital
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: +49-551-39 6714
fax: +49-551-39 6518
e-mail: ufkendo@med.uni-goettingen.de

Further Information:

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

Selected Recent Publications:

Roth C, Jung H, Kim K, Arias P, Moguilevsky J, Jarry H, Leonhardt S, Wuttke W (1997) Involvement of gamma amino butyric acid (GABA) in the postnatal function of the GnRH pulse generator as determined on the basis of GnRH and GnRH-receptor gene expression in the hypothalamus and the pituitary. Exp Clin Endocrinol Diab 105: 353-358

Cho S, Han J, Sun W, Choi D, Kwon H B, Jarry H, Wuttke W, Kim K (1997) Evidence for autocrine inhibition of gonadotropin-releasing hormone (GnRH) gene transcription by GnRH in hypothalamic GT1-1 neuronal cells. Mol Brain Res 50: 51-58

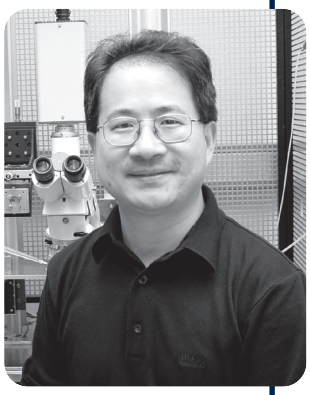
Roth Ch, Leonhardt S, Theiling K, Lakomek M, Jarry H, Wuttke W (1998) Ontogeny of the GNRH-, glutaminase- and glutamate decarboxylase-gene expression in the hypothalamus of female rats. Developmental Brain Research 110: 105-114

Leonhardt S, Shahab M, Luft H, Wuttke W, Jarry H (1999) Reduction of luteinizing hormone secretion induced by long-term feed restriction in male rats is associated with increased expression of GABA-synthesizing enzymes without alterations of GnRH gene expression. Journal of Neuroendocrinology 11: 613-619

Kang S S, Kim S R, Leonhardt S, Jarry H, Wuttke W, Kim K (2000) Effect of Interleukin-1ß on Gonadotropin-Releasing Hormone (GnRH) and GnRH Receptor Gene Expression in Castrated Male Rats. J. Neuroendocrinol. 12: 421-429

Leonhardt S, Böning B, Luft, H, Wuttke W, Jarry H (2000) Activation of Gene Expression of the -Aminobutyric Acid Rather than the Glutamatergic System in the Preoptic Area during the Preovulatory Gonadotropin Surge of the Rat. Neuroendocrinology 71: 8-15

Weiqi Zhang



Address

Center for Physiology
and Pathophysiology
University of Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 3767
fax: +49-551-39 4178
e-mail: zhang@ukps.gwdg.de

Further Information

http://www.neuro-physiol.med.uni-goettingen.de/~zhang/

Privatdozent, Neurophysiology

Dr. med. (M.D.), University of Bonn, Germany, 1987
Training in Neurology at University Hospital in Bern, Switzerland, 1988
Postdoctoral fellow, Department of Physiology, University of Bern, Switzerland, 1989 - 1992
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 for Physiology, University of Göttingen, Germany, since 1997
Habilitation, University of Göttingen, Germany, 2003

Major Research Interests

The modulation of synaptic activity represents one of the essential feature of neuronal network, which empowers the networks to keep their plasticity. The modulatory processes change the dynamic range of synaptic activity from milliseconds to hours and days depending the requirements and the developmental stage of the network. Such modulatory processes involve ligand- and G-protein-mediated regulation of ion channel activity, regulation of neurotransmitter release machinery, regulation of receptor targeting, internalisation and intracellular RNA- and protein-synthesis. Currently, we use a combination of electrophysiological, immunocytochemical, biochemical and molecular biological methods to investigate the molecular mechanisms responsible for GABAB-, adrenergic-, serotoninergic and opioid receptor-mediated modulation of ion channels and neurotransmitter release as well as for intracellular regulation of receptor targeting and internalisation in developing respiratory network of mice. Furthermore, collaboration with other research groups allows us to analyze change of properties of network, receptor, channels and synapses in mutant mice, such as in MECP2, neuroligin, neurexin and 5-HT KO mice as well as in stress animal models, which are thought to be relevant for various development-related disorders causing failures in respiratory network.

Selected Recent Publications

Zhang W, Pombal MA, Manira AEl, Grillner S (1996) Rostrocaudal Distribution of 5-HT Innervation in The Lamprey Spinal Cord and Differential Effects of 5-HT on Fictive Locomotion. Journal of Comparative Neurology 374 (2): 278-290

Zhang W, Elsen F, Barnbrock A, Richter DW (1998) Postnatal development of GABA-B receptor-mediated modulation of voltage-activated Ca^{2+} currents in mouse brain stem neurones. European Journal of Neuroscience 11 (7): 2332-2342

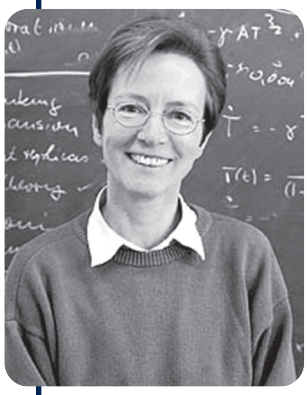
Ritter B, Zhang W (2000) The GABA-A-mediated inhibition matures during first postnatal week in brain stem of mouse. European Journal of Neuroscience 12: 2975-2984

Zhang W, S Grillner (2000) The Spinal 5-HT System contributes to the generation of Fictive Locomotion in Lamprey. Brain Research 879 (1-2): 188-192

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

Annette Zippelius



Professor of Theoretical Physics

Dr. rer. nat., Technical University of Munich, 1977
Postdoctoral Fellow, Universities of Harvard and Cornell, 1978 - 1981
Habilitation at the Technical University of Munich, 1982
Research Associate, Forschungszentrum Jülich, 1983 - 1988
Professor at the Institute of Theoretical Physics, University of Göttingen, since 1988

Address

Institute for Theoretical Physics
University of Göttingen
Bunsenstraße 11

37073 Göttingen
Germany

phone: +49-551-39 7678
fax: +49-551-39 9631
e-mail: annette@theorie.physik.uni-goettingen.de

Further Information

http://www.theorie.physik.uni-goettingen.de/~annette/

Major Research Interests

A semi-microscopic model of synaptic transmission and plasticity

A stochastic model of synaptic transmission has been designed on the basis of electrophysiological experiments and is currently analysed with help of Monte Carlo simulations. The transmission process is decomposed into three steps: 1) release of neurotransmitter from presynaptic vesicles, 2) diffusion of transmitter molecules in the cleft, and 3) kinetics of postsynaptic receptors.

The model of presynaptic vesicle dynamics has been designed on the basis of experimentally observed patterns of synaptic depression (and facilitation) at the Calyx of Held in the mammalian auditory pathway and comprises recruitment and calcium related release of vesicles. Transmitter dynamics within the cleft can be effectively modeled by a two-dimensional diffusion process, where absorbing boundary conditions reflect the effect of transmitter uptake by transporters and diffusion into extra-synaptic space. On the postsynaptic membrane the neurotransmitter interacts with individual spatially distributed receptors, which are included in the model on the basis of kinetic Markov models. The modeling steps of presynaptic vesicle dynamics, transmitter motion in the cleft and its interaction with postsynaptic receptors are combined to create a model of a single synaptic connection between two neurons. Postsynaptic responses are studied as function of input-frequency and possible physiological determinants. It is shown that the specific combination of release-probability, receptor desensitization and presynaptic release-machinery determines whether synaptic connections facilitate or depress and sets the range of input-rates, i.e. frequencies, that can be transmitted towards the postsynaptic side.

Selected Recent Publications

Marienhagen J, Keller BU, Zippelius A (1997) Kinetic model of excitatory synaptic transmission to cerebellar Purkinje cells. J Theor Biology 188: 227

Broderix K, Goldbart PM, Zippelius A (1997) Dynamical signatures of the vulcanisation transition. Phys Rev Lett 79: 3688

Trommershäuser J, Marienhagen J, Zippelius A (1999) Stochastic model of central synapses: slow diffusion of transmitter interacting with spatially distributed receptors and transporters. J Theor Biol 198: 101

Broderix K, Löwe H, Müller P, Zippelius A (1999) Shear viscosity of a crosslinked ploymer melt. Europhys Lett 48: 421

Trommershäuser J, Titz S, Keller B, Zippelius A (2001) Variability of excitatory currents due to single channel noise, receptor number and morphological heterogeneity. J Theor Biol 208

Index

Notes

Notes