



R. Dengler

Reinhard Dengler

- 1974** Medical examination, Medical School, Technical University Munich (TUM), Germany
- 1973** Medical Doctor, TUM
- 1974** Postdoctoral work at the Department of Physiology, TUM
- 1983** Habilitation (Ph.D.) with a neurological thesis at TUM
- 1986** Sabbatical at the Department of Physiology, University of Alberta, Edmonton, Canada
- 1989** Professor of Neurology, Medical School, University of Bonn, Germany
- 1992** Professor and Chair of Neurology, Medical School Hannover, Germany

Current Research

The research of my group focuses on the pathogenesis, pathophysiology and therapy of neurodegenerative diseases, especially basal ganglia disorder (central movement disorders) and motor neuron diseases (amyotrophic lateral sclerosis).

1. Central movement disorders

Parkinsonism:

Differential diagnosis: We are member of the "Kompetenz-Netzwerk M. Parkinson" which is supported by the German Ministry of Education and Science. A major goal of our project is to improve the differentiation between the various Parkinson syndromes such as idiopathic Morbus Parkinson, Multi-System-Atrophy (MSA), progressive supranuclear paralysis (PSP) and others. Clinical instruments and modern imaging techniques such as PET, SPECT and functional magnetic resonance imaging (fMRI) are used.

Emotional changes: Another project, part of a DFG-supported research group together with departments of the School of Veterinary Medicine, studies emotional behavior in patients with idiopathic parkinsonism. We focus on changes of expressive and receptive communication of emotions. These studies use neuropsychological testing, recording of event related brain potentials and functional MRI.

Treatment: The impact of the new treatment method "deep brain stimulation" (DBS) in the subthalamic nucleus (STN) is intensively studied clinically and by means of transcranial magnetic stimulation. We could very recently demonstrate that cortical inhibitory mechanisms are improved by DBS to the same extent as by Levodopa.

We participate regularly in clinical studies testing the efficacy of newly developed drugs in idiopathic parkinsonism, particularly in late stages of the disease.

We are interested in long-term side effects of Levodopa therapy such as fluctuations (on-off) and hyper/dyskinesia. The latter are also investigated in animal models of the disease. These experiments include strategies of prevention of the degeneration of dopaminergic neurons by nerve growth factors and by neurotransplantation.

Dystonia: We regularly see a large number of patients with dystonic syndromes in our botulinum toxin clinic. These activities have led to several publications with a focus on optimal dosis and on antibody development. Concerning pathophysiology, we study changes of cortical activation in dystonia using proprioceptive stimulation (vibration), transcranial magnetic stimulation and fMRI.

2. Motoneuron diseases, amyotrophic lateral sclerosis (ALS)

Improvement of early diagnosis: The diagnosis ALS requires the demonstration of upper motor neuron involvement (UMNI). In early ALS, however, there are frequently no clinical signs of UMNI and patients cannot be enrolled in treatment studies. Therefore we are testing whether modifications of transcranial magnetic stimulation such as bilateral recording or triple stimulation can improve early diagnosis. In addition, we use fMRI to study the time course of cortical hyperexcitability in early stages of the disease. fMRI also provides clues to the pathomechanisms of ALS (excitotoxicity)

Immunology and proteomics: Inflammatory mechanisms and microglia activation seem to play a role in neuronal death in neurodegenerative diseases. Therefore we look for changes of cytokines and other proteins (proteomics in cooperation with department of cell and molecular pathology) in the cerebrospinal fluid of patients with ALS.

Excitotoxicity: The pathomechanism of excitotoxicity is studied by the patch clamp technique applied to natural variants of (recombinant) AMPA type glutamate receptors looking for channel opening times, relaxation behavior etc. These studies are mainly carried out in the labs of J. Bufler and will be described there in more detail.

Treatment studies: We participate regularly in international multicenter trials with the newest compounds and are in the planning phase of investigator driven trials with substances beyond actual commercial interest. We have established a specific study outpatient unit for this purpose.

Selected Publications

[1] Rollnik J.D., Hierner,R., Schubert,M., Shen,Z.L., Johannes,S., Troeger,M., Wohlfarth,K., Berger,A.C., Dengler,R.: Botulinum toxin treatment of co-contractions after birth-related brachial plexus lesions. **Neurology** 55:112-114,2000

[2] Rosenkranz,K., Altenmüller,E., Siggelkow,S., Dengler,R.: Alteration of sensorimotor integration in musician's cramp: impaired focusing of proprioception. **Clin.Neurophysiol.** 111:2040-2045,2000

[3] Bigalke,H., Wohlfarth,K., Irmer,A., Dengler,R.: Botulinum Toxin A: Dysport improvement of biological availability. **Exp.Neurol.** 168:162-170,2001

[4] Däuper,J., Peschel,T., Schrader,C., Kohlmetz,C., Joppich,G., Nager,W., Dengler,R., Rollnik, J.: Effects of subthalamic nucleus (STN) stimulation on motor cortex excitability. **Neurology** 59:700-706,2002

[5] Grosskreutz,J., Zoerner,A., Schlesinger,F., Krampfl,K., Dengler,R., Bufler,J.: Kinetic properties of human AMPA-type glutamate receptors expressed in HEK293 cells. **Eur.J. Neurosci.** 17:1173-1178,2003

Group Structure

Group leader:

Senior scientists:

Postdoctoral fellows:

Graduate students:

Technicians:

Reinhard Dengler

Christian Winkler

Thomas Peschel, Christoph Schrader,
Kristine Schröder, Wido Nager, Jan Stewen

Friedemann Szymanski,

Andreas Niesel, Ursula Jensen

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