



Department of Neurology

Molecular Mechanisms in Neurodegenerative Diseases

Head: [Albert C. Ludolph](#)

The Department of Neurology at Ulm University focuses its clinical and experimental work mainly on understanding the molecular mechanisms underlying such neurodegenerative diseases as Alzheimer's, Parkinson's and Huntington's disease, frontotemporal dementias and amyotrophic lateral sclerosis/motor neuron disease (ALS/MND). Structurally, the department consists of a number of large outpatient clinics, each serving their respective patient populations, in addition to a clinical trial center, which specializes in clinical studies of selected groups of patients. There is also a gene and biobank, an inpatient clinic for acutely neurologically ill patients, and an experimental section in which more than 50 scientists work in 10 basic neuroscience groups. These groups perform experimental research on the basic mechanisms of the diseases mentioned above.

The group of Prof. Dr. von Arnim conducts in vitro and in vivo experimental studies on Alzheimer's disease (AD) and is interested in the processing, sorting and signaling of the β -amyloid precursor protein (APP) and associated proteins (including motor proteins), and their subcellular compartmentalization. The work focuses on aspects of trafficking in AD and employs novel molecular

The Team:

Head of Department: [A.C. Ludolph](#)

Professors: [C. von Arnim](#), [M. Otto](#), [H. Braak](#)

Group Leaders/Postdocs: [C. Schnack](#), [A. Witting](#)

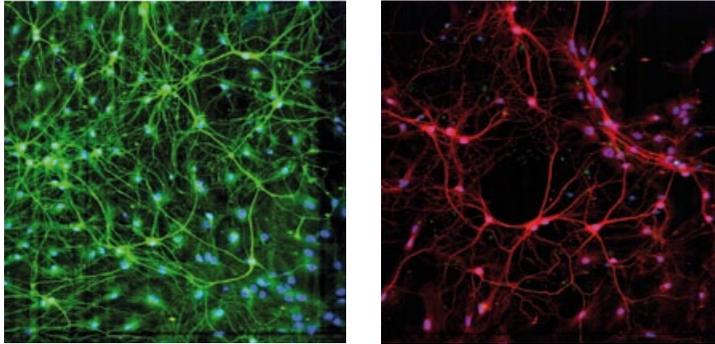
PhD Students: [A. Hellrung](#), [M. Leibinger](#), [T. Hering](#)

Study Programme Experimental Medicine Students:

[S. Kirschmer](#), [L. Campanelli](#), [W. Ruf](#), [H. Tritschler](#),
[M. Büchsel](#)

Additional Members of Thesis Advisory Committees:

[P. Gierschik](#) (Ulm), [N. Weidner](#) (Heidelberg)



In green primary hippocampal neurons are stained with the neuronal marker beta-tubulin III and in red microtubule associated protein 2 is stained to visualize dendrites. Nuclei are stained in blue with DAPI. Images were taken with IN Cell Analyzer 3000, which allows high throughput screening with microscopic approach.

imaging techniques (FLIM, TIRF). The ultimate goal of these studies is the translation of the findings into clinical therapeutic approaches, which can be supported by imaging techniques in small animals and humans.

The group of Dr. Witting investigates the role of inflammation and its regulation by metabolic processes in neurodegenerative diseases, with a special focus on amyotrophic lateral sclerosis and Huntington's disease. The metabolic aspects of neurodegenerative diseases are further investigated in other tissues and cells in collaboration with the groups of Dr. Dupuis, Dr. Weydt and Dr. Lindenberg. This integrated research may open new avenues of therapeutic intervention for these devastating diseases.

Studies on the etiology and pathogenesis of ALS/MND are the focal point of Prof. Dr. Ludolph's group. Experimental studies on etiology and pathogenesis center on resistance to hypoxia, neuritic transport and their associated proteins, and neuroinflammation, both in vitro and in vivo. The final goal of these experimental studies is the development of clinical interventions. This includes both preclinical intervention for the prevention of the disease and the development of therapies in the clinical phase to influence the human disease therapeutically. Although interventions for treatment are classically limited to pharmacological approaches, nutritional and psychosocial approaches to treatment are also the subject of intensive investigation. In the near future Prof. Dr. Danzer will join the department as junior professor. She works on oligomer (alpha-synuclein) secretion from living neurons and transmission of oligomers in Parkinson's disease which complements the immunohistopathological studies of Prof. Dr. Braak in this field of research.

Ulm University
Department of Neurology
Prof. Dr. Albert C. Ludolph
Oberer Eselsberg 45
89081 Ulm, Germany
Tel. +49 (0)731 177 1201
Fax +49 (0)731 177 1202
albert.ludolph@rku.de
www.uniklinik-ulm.de/struktur/kliniken/neurologie.html

Selected Publications:

- Lebedeva E, Stingl JC, Thal DR, Ghebremedhin E, Strauss J, Özer E, Bertram L, von Einem B, Tumani H, Otto M, Riepe MW, Ludolph AC, von Arnim C.A.F. (2010) Genetic variants in presenilin genes and correlation to cerebrospinal β -amyloid 42 concentrations and diagnosis of Alzheimer's disease, *Neurobiol Aging*, in press.
- Beyer AS, von Einem B, Schwanzar D, Thal DR, Ingelsson M, Makarova A, Deng M, Chhabra ES, Pröpfer C, Böckers TM, Hyman BT, von Arnim CAF (2010) Engulfment adaptor PTB domain containing 1 interacts with and affects processing of the amyloid-beta precursor protein, *Neurobiol Aging*, in press.
- von Einem B, Rehn F, Schwanzar D, Beyer AS, Weber P, Wagner M, Schneckenburger H, von Arnim CAF (2010) Competition of the low density lipoprotein receptor related protein (LRP) with Amyloid precursor protein (APP) for beta-secretase, *Exp Neurol* 225, 85-93.
- Ferger AI, Campanelli L, Reimer V, Muth KN, Merdian I, Ludolph AC and Witting A (2010) The effect of mitochondrial dysfunction on the immunological properties of microglia, *J Neuroinflammation* 7, 45.
- Röna-Vörös K, Weydt P (2010) The Role of PGC-1alpha in the Pathogenesis of Neurodegenerative Disorders, *Curr Drug Targets* 11, 1262-9, in review.
- Weydt P, Soyak SM, Gellera C, Didonato S, Weidinger C, Oberkofler H, Landwehrmeyer GB, Patsch W (2009) The gene coding for PGC-1alpha modifies age at onset in Huntington's Disease, *Mol Neurodegener* 4, 3.