Karin Weissenborn

1983 Dr. med. Medical School of Hannover
Department of Pharmacology
Thesis: “Metabolism of spirolactones in rat adrenal gland tissue”

1990 Habilitation, Department of Neurology, Medical School of Hannover
“P300 in early grades of hepatic encephalopathy”

since 1996 Associate Professor of Neurology, Hannover Medical School

Current research

The research of our group is focussed on metabolic encephalopathies, Hepatitis-C – virus (HCV)-infection associated cognitive dysfunction and stroke.

1.) Metabolic encephalopathies

Metabolic alterations of brain function are one of the main causes of altered consciousness in clinical practice. The improvement of their diagnosis and therapy is thus a major goal of a large number of clinicians worldwide. Besides these clinical aspects metabolic brain disease also offers the opportunity to detect general mechanisms of brain dysfunction and brain destruction.
An impressive example is hepatic encephalopathy (HE). HE presents with characteristic extrapyramidal and cerebellar symptoms which may resolve after a few days of plasma ammonia-lowering therapies. In some patients chronic progressive Parkinsonism is to be observed. Concerted action of clinicians, neuropathologists, neurochemists and biochemists showed that these symptoms are caused by basic astrocytic dysfunction due to hyperammonemia, inflammation and manganese deposition with preference in the basal ganglia and cerebellum. Neurophysiological and neuro-imaging studies revealed dysfunction of subcortical (thalamic) pulse generators in HE patients with motor dysfunction.

Our group focussed on the neuropsychological characterization of hepatic encephalopathy, uremic encephalopathy and hypoglycaemia related brain dysfunction and an improvement of their assessment using psychometry, neurophysiological methods and neuro-imaging. Presently, we are investigating cerebral ammonia metabolism in patients with liver cirrhosis and fibrosis and different grades of hepatic encephalopathy in cooperation with Prof. Berding, Clinic of Nuclear Medicine, Hannover Medical School and Dr. Buchert, Dept. of Nuclear Medicine, University Clinic Hamburg Eppendorf. Our studies aim to answer the question whether the blood brain barrier permeability for ammonia is increased in patients with liver fibrosis and/or cirrhosis.

2.) Hepatitis-C –virus (HCV)-infection associated cognitive dysfunction
In the past the hepatitis C virus-infection has been considered a hepatological disease. Today, there is increasing evidence that HCV-infection causes mild to severe cerebral dysfunction in about half of the afflicted patients. We were able to show that part of the HCV-afflicted patients develop distinct attention and memory deficits in addition to disabling chronic fatigue. Using MRI, MRS, SPECT and PET we found microstructural alterations especially in the dorsolateral prefrontal cortex, the insula, the cerebellum, and the striatum, alterations of dopaminergic and serotonergic neurotransmission and also a decreased glucose utilisation within part of the limbic association cortex under resting conditions.
Future studies will relate to microglia activation, genetic predisposition for the development of cognitive dysfunction after HCV-infection and proteom analysis of the cerebrospinal fluid in HCV-afflicted patients with encephalopathy.

3.) Stroke
Our projects in stroke medicine are related to clinical problems, predominantly. We take part in several multi-centre studies aimed at stroke therapy and stroke prevention, such as the “Erythropoietin in acute stroke multi-centre study” (Principal investigator: Prof. Dr. Dr. H. Ehrenreich, MPI for Experimental Medicine, Göttingen). We just finished a study aimed to detect gender differences in stroke outcome. In addition we address themes such as the complications of thrombolysis therapy, improvement of the diagnosis of dissections of the brain supplying arteries, and further problems accruing from clinical stroke management.

Selected publications:

1.) Giewekemeyer K, Berding G, Ahl B, Ennen JC, Weissenborn K. Bradykinesia in cirrhotic patients with early hepatic encephalopathy is related to a decreased glucose uptake of frontomesial cortical areas relevant for movement initiation. **J Hepatology** 2007; 46 (6): 1034 - 1039

2.) Weissenborn K, Ahl B, Fischer- Wasels D, van den Hoff J, Hecker H, Burchert W, Köstler H. Correlations between MRS alterations and cerebral ammonia and glucose metabolism in cirrhotic patients with and without hepatic encephalopathy. **GUT** 2007; e-pub ahead July 2007

3.) Weissenborn K, Ennen JC, Bokemeyer M, Ahl B, Wurster U, Tillmann HL, Trebst C, Hecker H, Berding G. Monoaminergic neurotransmission is altered in hepatitis C virus infected patients with only mild liver disease but severe chronic fatigue and cognitive impairment.
GUT 2006; 55 (11):1624-1630

4.) Weissenborn K**,** Krause J, Schüler A, Ennen JC, Ahl B, Hecker H, Manns MP, Boeker KW. Hepatitis C Virus Infection Affects the Brain – Evidence by Psychometric Studies and Magnetic Resonance Spectroscopy. **J. Hepatology** 2004; 41 (5): 845-851

5.) Ahl B, Weissenborn K, van den Hoff J, Fischer-Wasels D, Köstler H, Hecker H, Burchert W. Regional differences in cerebral blood flow and cerebral ammonia metabolism in cirrhotics with and without hepatic encephalopathy (HE). **Hepatology** 2004; 40: 73-79

Group Structure

Group leader:	Karin Weissenborn
Postdoctoral fellow:	Anita B. Tryc, Argyro Tountopoulou, Hans Worthmann
Graduate students:	Naema AbuAbbod, Güldan Akdag, Dimitrios Arvanitis, Stefan Gehrdes, Annemarie Goldbecker, Semra Sivri, Thorsten Süß
Undergraduate students:	Meike Heeren, Diana Noll, Henning Pflugrad, Ramona Schuppner, Lea Wagner, Jessica Weigand

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