Abstract zum Seminarvortrag am 4/6/2016

Univ.-Prof. Dr. med. Ferdinand Binkofski
Uniklinik RWTH Aachen, Klinik für Neurologie,
Sektion und Lehrstuhl für Klinische Kognitionsforschung,
Aachen, **Germany**

Insights into the brain energy regulation from Phosphorus spectroscopy and electric brain stimulation.

Using MRI phosphorus spectroscopy and tDCS measurements we could demonstrate that brain energy consumption induced by electrical stimulation increases systemic glucose tolerance in normal-weight men. In obesity, fundamental reductions in brain energy levels, gray matter density, and cortical metabolism, as well as chronically impaired glucose tolerance, suggest that disturbed neuroenergetic regulation may be involved in the development of overweight and obesity. In a group of obese participants we induced neuronal excitation by anodal transcranial direct current stimulation and examined cerebral energy consumption as well as determined systemic glucose uptake by euglycemic-hyperinsulinemic glucose clamp. So we could also demonstrate that brain energy consumption and systemic glucose uptake are blunted in obese compared with normal-weight volunteers, indicating neuroenergetic dysregulation in obese humans. Broadening our understanding of reduced multifocal gray matter volumes in obesity, our findings show that reduced appetite- and taste-processing area morphometry is associated with decreased brain energy levels. Specifically, gray matter volumes of the insula relate to brain energy content in obese participants. Thus, diminished cerebral energy supply may underlie the decline in brain areas assigned to food intake regulation and therefore the development of obesity.