**Magnetic resonance spectroscopy in tinnitus -**

**Neurochemistry of the human auditory cortex in patients with chronic tinnitus**

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Tinnitus is a condition where affected patients experience a persistent sound in one or both ears or in the head. Apart from an objective Tinnitus in which an underlying physiological condition can be found, in a subjective tinnitus no source can be detected. The formation and the way how and why this disabling experience sustains remain unclear. We aim to add new findings to the current knowledge about the pathogenesis of tinnitus. While tinnitus often originates in the periphery, mechanisms of the central auditory pathway and of the auditory cortex have also been shown to be important in its generation, maintenance, and persistence. Changes in the homeostatic plasticity increasing the central gain are suspect to be part of the pathogenesis.

We focused on these mechanisms by researching the role of inhibition modulated by neurotransmitters in the auditory cortex in tinnitus patients. Earlier studies showed promising results in GABA concentration deficits in the auditory cortex of tinnitus patients.

With our research we extended those observations in that we analysed the concentration and role of several different neurotransmitters (GABA, glutamate, choline) in the auditory cortex and adjacent regions and how they differ in tinnitus vs. healthy subjects. Additionally, we further explored neuroanatomical features and their influence on tinnitus. We used magnetic resonance spectroscopy (MRS) to analyse metabolites in the auditory cortex of our subjects. MRS is an innovative and promising approach that is based on the well-established magnetic resonance imaging (MRI) technology. MRS allows to inspect different tissues for the presence and concentration of numerous metabolites. Furthermore, we analysed the neuroanatomic features (cortical thickness, surface and area) in our subjects using MRI-FreeSurfer-technique. To assess the hearing abilities of our subjects several hearing-tests were applied.

This all-embracing approach is new to the research of the role of metabolic changes in tinnitus. Results of ongoing analyses will be demonstrated. The new insights gained will help to further understand the pathophysiology of tinnitus. If an inhibitory deficiency turns out to be responsible for causing or maintaining tinnitus a pharmacological or similar neuromodulatory intervention could be developed for a treatment.