Recent findings from neuroimaging studies in humans indicate that synchronicity of brain activity across different regional brain structures is affected in Alzheimer patients, leading to the consideration of AD as a disconnection syndrome. Due to disconnection of brain areas, Alzheimer’s disease (AD) was proposed to induce neuronal network breakdown which likely represents an entry point for AD-related cognitive decline. Of note, the basal unit for information processing within the mammalian cortex is the cortical column. The microcircuit of a cortical column is a complex processing unit that links a number of inputs to a number of outputs via overlapping internal processing chains. We assumed that AD pathology may also impair the connections of micrcircuits within and between cortical columns and, therefore, basal cortical information processing.

Utilizing the 5xFAD mouse model, we characterized electrophysiological properties of the AD afflicted murine cortex. We further investigated patterns of neuronal activity with thallium autometallography. In order to correlate these functional data with AD mediated structural alterations, we additionally analyzed Aβ Plaque load and neuronal dysmorfomy. Our findings suggest that altered connectivity impairs function of columnar microcircuits in AD afflicted mouse brain.