Cortical neural network alteration in neurodegenerative disease and development of therapeutical intervention

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**Abstract**

Neurodegenerative diseases such as Alzheimer’s and Parkinson’s are the most devastating diseases harming neuronal cells in central nerve system. Accumulation of decades of research has elucidated molecular and cellular mechanisms as disease progresses, however, the exact causal relationship remains elusive. Previously. the cortex neuron activities in disease model are recorded in low quantity by patch calmping or 64 channel multielectrode array (MEA) in which case the high resolution of neural circuit is hard to obtain. Here we applied a high density MEA system to record the propagation of neuronal activity in cortex layers and hippocampus of Alzheimer’s and Parkinson model animals. In addition, patch clamp recordings indicate suppression of long term potentiation (LTP) in the circuits. Current source density and entropy analysis from MEA recordings reveal decorrelation in neural network hampering propagation of activity transmission within circuits. Molecular markers for synaptic interaction suggest evidence for the impedance. With this novel technique we are suggesting a potential therapeutic possibility to improve the symptom of Neurodegenerative diseases.

**Keywords**: Neurodegenerative diseases, neural circuit, MEA, decorrelation