CAMD セミナー

(Center for Development of Advanced Medicine for Dementia)

Mathematical Modeling for the cortical excitability in Alzheimer's Disease based on MEG data

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東棟 2 階会議室

During my talk I will first give a brief introduction to Magnetoencephalography (MEG) as a method to measure brain function. Then I will sketch current modeling approaches which go beyond the localization of centers of brain activity. Dynamic modeling rests on the identification of a few essential brain locations, but it furthermore includes a mathematical model which combines the activation time courses of those locations explaining the measured data. The model itself is constructed in a biologically plausible fashion meaning that the estimated parameters can be related to physiology. Such a model was developed to explain data from the MULNIAD project at NCGG that demonstrates the cortical hyper excitability in prodromal and early Alzheimer diseases associated with local amyloid-β deposition using somatosensory evoked magnetic fields recovery function (SEF-R). The mathematical model explains the MEG data using one optimized set of in total 59 parameters for each participant. Two out of the 59 parameters were significantly related to the age and disease status of participants, namely the parameters describing the connection between the excitatory interneurons in layer IV and the deeper pyramidal cells in layer V/VI. Connection strength and time constant show a) a general effect of aging and b) a specific effect of the disease.