

Thesis Defense

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ANALYSIS AND PROCESSING OF FUNCTIONAL MRI IMAGES TO INVESTIGATE THE EFFECT OF NORMAL AGING ON HUMAN BRAIN FUNCTIONAL CONNECTIVITY IN THE PRIMARY MOTOR CORTEX

Abstract

The Program of Functional Neuroimaging (PFNI) at the University of Connecticut Health Center (UHC) has undertaken a project aimed at applying a suite of non-invasive, and quantitative functional MRI (fMRI) techniques to investigate the effects of normal aging on neurovascular coupling and functional connectivity in the human brain in order to improve the understanding of the basic mechanisms of the neurophysiological correlates of aging. The focus of this thesis was on applying fMRI techniques and image processing tools to investigating the effects of aging on functional connectivity.

Task activation and resting state fMRI time series images of young and elderly subjects were collected, and then activation and connectivity maps were constructed for the two age groups by applying statistical and image processing tools. Images used for connectivity maps were collected using low frequency spontaneous oscillations of regional cerebral blood flow and oxygenation MRI signals. This technique has been found to have temporal correlation between spatially separated but functionally connected brain regions.

From aging research, it was hypothesized that that low frequency resting state physiological fluctuation and response-to-task have a common neuronal basis, and via a common neurovascular coupling the low-frequency resting state physiological fluctuation reflects the basal neural activity fluctuations. The validity of this hypothesis was reflected in differences in the functional connectivity maps between age groups, namely less functional connectivity indices in the older age group.

Time & Venue: Friday, May 10, 2002
2:00 PM
University of Connecticut, Storrs Campus
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260 Glenbrook Road, Bronwell Building
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