

An investigation of Optic Neuritis using Correlation Transfer Functions Determined from Resting State Functional Connections

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Abstract—To date, functional magnetic resonance imaging studies of optic neuritis have not been able to determine if the restoration of visual cortex activity over repeated sessions is the result of cortical plasticity associated with recovery or is merely the response to the restoration of visual input to the cortex from the recovering optic nerve. An alternative approach that is potentially independent of visual input is to investigate the synchrony of brain activity between spatially distinct regions of the visual areas of the brain while the subject is at rest, as a means to determine functional connectivity. This requires an investigation of changes in the inter-regional communication between visual areas over repeated sessions associated with recovery from optic neuritis. We propose the use of correlation transfer functions as a novel means to determine the relationship in between fMRI signals in terms of the direction of flow of visual information throughout the network of brain regions associated with vision. Preliminary results using LGN, V1, and LOC signals suggest that: a) the transfer function between these areas is not a constant, b) the transfer function is different between the “eyes open” and “eyes closed” states; and c) the presence of ON changes the frequency characteristics of the transfer function.