



Research Project Proposal
Academic year 2015-2016

Project Nº 5
Title: In vivo evaluation of resting state neural networks in Parkinson's disease using Magnetic Resonance Imaging
Department/ Laboratory Neuroscience Department, Neuroimaging Laboratory, CIMA
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Summary <p>The human brain is organized into parallel, interacting systems of anatomically and functionally connected areas. Recently developed methods to measure connectivity have the potential to improve our understanding of the functions of these systems in the healthy brain and provide a tool to assess differences associated with neurodegenerative diseases. Resting state functional connectivity magnetic resonance imaging (MRI) is becoming a widely used tool to investigate brain networks that exhibit correlated fluctuations. Functional connectivity MRI (fcMRI) is based on the observation that distant brain regions show correlated, slow, spontaneous fluctuations in the time-series signal measured using functional MRI techniques (fMRI). These low frequency coherences are hypothesized to reflect underlying fluctuations in neural activity that trigger a hemodynamic response. Arterial Spin Labeling perfusion MRI offers the unique possibility of measuring both cerebral blood flow (CBF) and functional connectivity using data acquired in a single scan. The capability of ASL to provide absolute quantification of baseline CBF is very useful for clinical applications. In studies comparing patients to controls, the assessment of baseline perfusion abnormalities in the diseased brain will yield crucial information that can be used to guide the functional connectivity analysis. Simultaneous assessment of perfusion and functional connectivity abnormalities will yield complementary information.</p> <p>The goal of this project is to explore the use of ASL data in the assessment of functional connectivity abnormalities in Parkinson's disease.</p>
References <p>Auer DP. Spontaneous low-frequency blood oxygenation level-dependent fluctuations and functional connectivity analysis of the 'resting' brain. Magn Reson Imaging 26:</p>



1055-64 (2008).

Fernández-Seara MA, Mengual E, Vidorreta M, Castellanos G, Irigoyen J, Erro E, Pastor MA. Resting state functional connectivity of the subthalamic nucleus in Parkinson's disease assessed using arterial spin-labeled perfusion fMRI. *Hum Brain Mapp.* (2015) Jan 30. doi: 10.1002/hbm.22747. [Epub ahead of print]

POSSIBILITY OF PhD

YES*

* (PhD grant required)