



Application number/Title: 33278 - Statistical Analysis of UK Biobank Imaging Database

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Keywords provided by the Applicant PI to describe the research project: connectivity, fmri, individual differences, mediation, pain, priors

Application Lay Summary:

In this project we seek to address four different aims.

First, we seek to develop Bayesian statistical models for use on data from small-sampled studies, with priors (related to resting-state brain networks and brain parcellations) derived using the UK Biobank imaging data. We hypothesize that this will aid in the analysis of smaller more targeted research studies, which are more specifically targeted towards a specific disease/illness.

Second, we seek to study brain-based mediators of various behavioral variables using a newly developed approach for high-dimensional mediation analysis. This will allow us to identify distributed brain networks that mediate the relationship between two different target variables. We hypothesize that this will increase our understanding of the brain mechanisms necessary for explaining the relationship between different variables, and that this can help target intervention.

Third, we seek to study individual differences in time varying brain connectivity using resting-state fMRI data. This is currently an area of intense research in the field of neuroimaging, and we hypothesize that understanding individual differences in the amount of time individuals spend in various brain states can help better understand health-related outcomes.

Fourth, we seek to use machine learning and related pattern-recognition algorithms to develop brain models of the functional representations underlying chronic pain. We will assess their relationship to previously identified brain networks, pain-related biomarker patterns, and neurochemical binding profiles derived from other studies, and seek to determine whether pain-related predictions are secondary to other co-occurring conditions, including depression, anxiety, and drug/medication use. We hypothesize that better understanding of the functional representations underlying chronic pain can help aid in developing intervention.