Abstract

TITLE:
Multi-Center fMRI Methods And Design: Function BIRN

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ABSTRACT BODY:
Background. Many fMRI studies of schizophrenia involve small and restricted samples. The combination of data across institutions allows for rapid data collection, access to unique populations, and assessment of validity and generalizability of findings. Differences in imaging methods, analysis methods, and the methods for storing and retrieving data, all present challenges to sharing large imaging and clinical datasets. Previous multi-site imaging studies have not assessed intersite variability or reliability of the imaging data prior to data combination; or have avoided data combination in favor meta-analysis methods. Methods. The Function BIRN is a multi-site project funded by NCRR/NIH (www.nbirn.net) for the following goals: 1) Standardized calibration of equipment using geometric and human phantoms; 2) Developing a multi-site, standardized protocol for fMRI data collection on populations of persons with schizophrenia, including site-specific cognitive paradigms; 3) Creating a federated database to integrate multi-site data, for a deeper understanding of the functional neuroanatomy of schizophrenia than would be possible through meta-analysis. The eleven sites involved in the project are dedicated to collecting calibration fMRI data, developing experimental paradigms and analysis methods, populating a virtual data grid, and designing a searchable multi-site database of MRI and clinical data. Results. Using a set of geometric phantoms to measure spatial distortions and temporal drift across sites, the FBIRN has collected a unique dataset of machine characteristics in fMRI data, which have served to assess initial inter-site differences. Using a set of traveling human subjects repeatedly scanned at each site, the FBIRN has determined that inter-site variability in the BOLD signals can exceed inter-subject variability, thus limiting the usefulness of combining raw imaging data across sites. Initial assessements indicate that intersite variability can be decreased through use of a variety of calibration methods. Conclusions. The collaborative efforts of multiple researchers have resulted in novel approaches to human subject data sharing, experimental design, fMRI data standardization, and clinical and imaging database design. Correction algorithms can decrease the inter-site effects to allow the combination of multi-site data to identify

differences between patient groups and treatments.
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