

## **BIOMEDICAL INFORMATICS RESEARCH NETWORK: FUNCTIONAL IMAGING RESEARCH IN SCHIZOPHRENIA TESTBED**

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**Purpose.** An emerging paradigm in neuroscience is the multi-investigator, multi-site collaboratory (e.g., [www.scienceofcollaboratories.org/](http://www.scienceofcollaboratories.org/)). These collaboratories allow otherwise rare data to be amassed, which a single site might not be able to collect on its own, for example for financial or patient recruitment reasons. The collation and combination of data collected at various sites brings with it several thorny problems, beginning with the need for standardized or equilibrated data collection techniques, and continuing through to institutional policies regarding the sharing of intellectual property and the credit given for collaborative efforts. With the growth of these collaboratories in physics, astronomy, and now neuroscience, these issues are becoming more pressing. One critically important outcome of these efforts will be to enable multi-site clinical trials to use neuroimaging data as a biomarker for clinical outcome measures.

**Methods.** The Functional Imaging Research in Schizophrenia Testbed for the Biomedical Informatics Research Network (FIRST BIRN, [www.nbirn.net](http://www.nbirn.net)) is an 11-site consortium whose goal is the development of methods to combine functional MRI data from different scanners, magnet strengths and imaging techniques, in the study of cognitive disorders in schizophrenia. The collection of fMRI data requires careful calibration of the scanner and equipment used, as well as constant quality assurance checking. Different scanner models and makes have different quality assurance methods; thus, unless these methods and the equipment used are identified and compensated for in each machine, quality assurance measures are not comparable across sites. Even when the static images are equated and corrected for scanner-specific spatial distortions, however, functional MRI images, given their dynamic nature, are still not directly comparable either in their distortions or signal sensitivity. The ability to calibrate functional MRI images under different conditions is the key to making multi-site fMRI collaborations possible.

The FBIRN has chosen to develop a common calibration method. The project is funded by NCRN and NIH for the following goals: 1) Standardized calibration of equipment and imaging activation paradigms using geometric and human phantoms; 2) Collection of fMRI data using a standardized protocol on populations of persons with schizophrenia at different sites, while including the added value of each site's own methods; 3) Combining fMRI data into a federated database, leading to a deeper understanding of the functional neuroanatomy of schizophrenia than would be possible with any individual site's data.

**Conclusions.** The unified efforts of researchers across universities have resulted in novel approaches to human subject data sharing, experimental design, fMRI data standardization, and clinical and imaging database design. Issues related to multi-site integration of fMRI images will be demonstrated for data obtained on a small number of subjects, extensively studied at all collaborating sites.

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