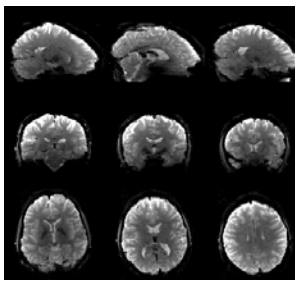
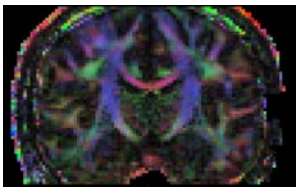
HUMAN Connectome PROJECT

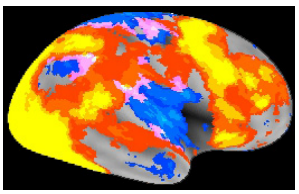
Mapping structural and functional connections in the human brain

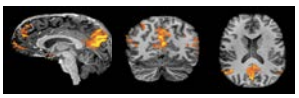
The **HUMAN CONNECTOME PROJECT** (HCP) is a comprehensive effort to map brain connectivity and its variability in over a thousand healthy adult subjects, producing a large amount of currently missing, but absolutely vital, data about the human brain. The 5 year project will yield fundamental information about how individual brain circuitry is related to behavior, environmental and genetic factors. This information will pave the way for future studies that reveal how brain circuitry changes during development and aging and how it differs in neurological and psychiatric disorders.

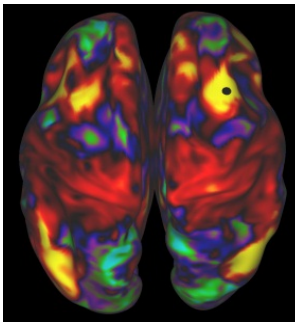
The HCP is pushing the limits of the current state of the art in neuroimaging to determine structural and functional whole brain connectivity. Project highlights include:

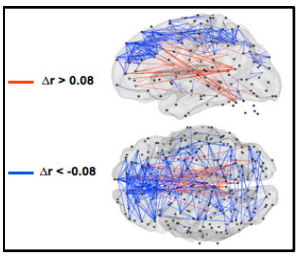












- Customized Skyra 3T and 7T MR scanners will provide rapid, high-resolution functional MRI (fMRI) and diffusion imaging
- 1200 healthy, adult subjects ages 22-35 will be scanned by multiple imaging modalities:
  - Resting-state fMRI (R-fMRI)
  - Task-evoked fMRI (T-fMRI)
  - Diffusion MRI (dMRI) with tractography analysis
- Subjects include 300 twin pairs and their siblings, allowing robust analysis of the heritability of brain connectivity and associated behavior traits
- All 1200 subjects scanned on a single Skyra 3T scanner, beginning in Summer 2012
- 200 of these subjects will also have R-fMRI, T-fMRI and dMRI imaging on a single 7T scanner
- Collecting extensive demographic and behavioral data on each subject, as well as blood samples to be used for genotyping in Year 5 of the project
- T-fMRI protocols will maximize coverage of different areas of the brain
- Overlap of tasks with those in other large studies will facilitate cross-study comparison
- Standardized imaging protocols and processing pipelines for maximal comparability
- MEG/EEG imaging on a subset of 100 subjects, including both resting-state MEG/EEG and task-evoked MEG/EEG, using some of the same tasks and timing as will be used in T-fMRI
- All HCP-generated methods will made available as they are finalized
- HCP data will be freely available through quarterly releases of our ConnectomeDB database, beginning Fall 2012
- Freely-available Connectome Workbench analysis and visualization platform. Connectome Workbench will provide a variety of unique features in a single software package. Notable features include:
  - View and compare all imaging modalities as surfaces and volumes
  - User-friendly interface (windows, tabs, etc.)
  - Connectivity maps and fMRI time series animations
- Send your comments and suggestions on the project and its analysis tools to: **feedback@humanconnectome.org**