www.humanconnectome.org

HUMAN Connectome PROJECT

Mapping structural and functional connections in the human brain

NIH **Blueprint** for Neuroscience Research

NATIONAL INSTITUTES OF HEALTH

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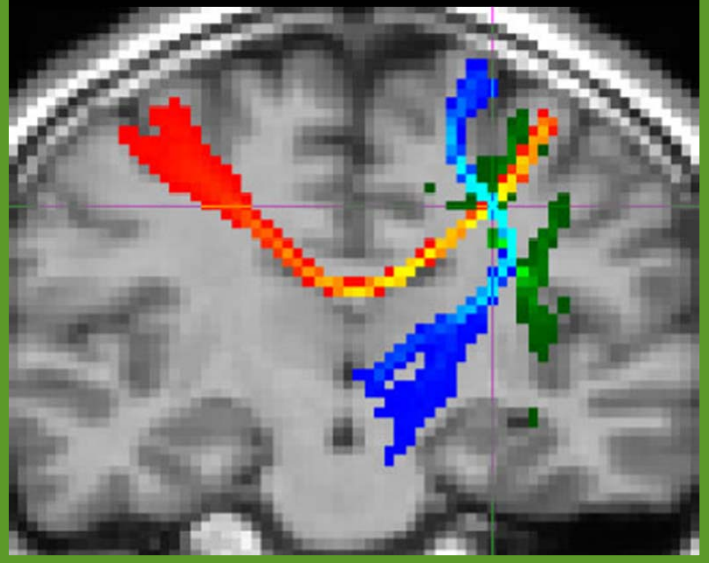
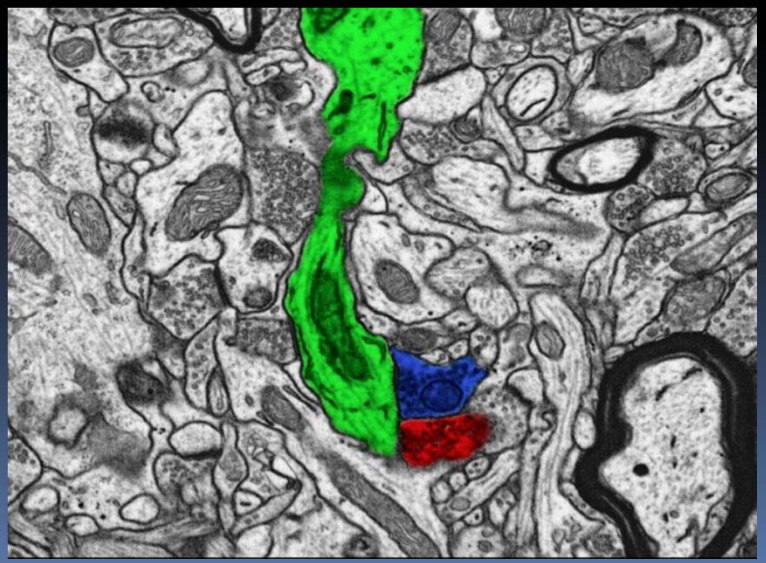
The Human Connectome Project:

- An NIH-funded effort to chart a comprehensive map of neuronal connections and its variability in healthy adults (on the macro-scale)

Macro-connectome
(whole-brain, long-distance)



Micro-connectome
(synapses, neurons)



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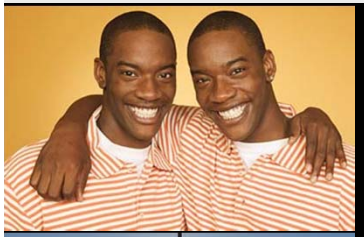

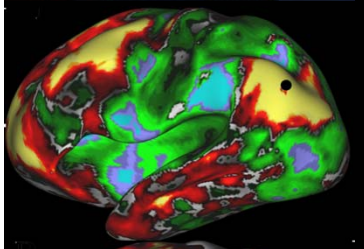

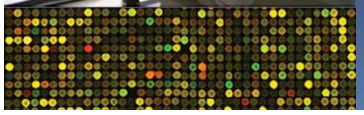

Project Goals I

- Study a large population:
  - 1,200 healthy adults
  - 300 twin pairs and their non-twin siblings
- Cutting-edge neuroimaging methods
  - 3T Skyra MRI, customized gradient (UMinn -> Wash U)
  - 7T MRI (UMinn, 200 subjects); perhaps also 10.5T
  - dMRI/tractography; R-fMRI; Task-fMRI
  - MEG/EEG (100 subjects)
- Extensive behavioral testing
- Blood samples for genotyping

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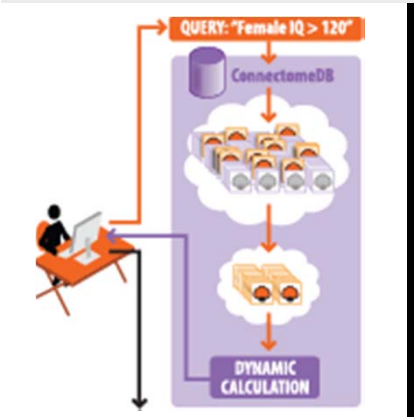

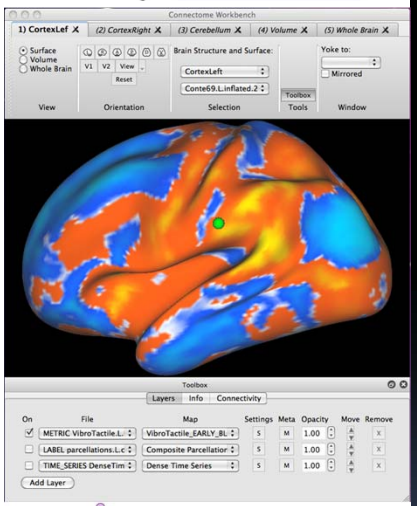

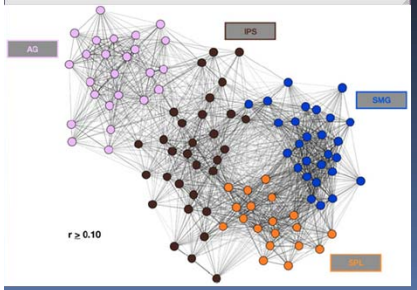

Project Goals II

- Make the data freely available
- Provide a user-friendly informatics platform
  - Data mining, discovery science
- Relate brain connectivity to individual capabilities
  - Link to heritability, genetics
- A baseline for future studies of brain disorders
  - Autism, schizophrenia, ADHD, etc.
  - Neurosurgical planning and interpretation

Nelson et al. (Neuron, 2010)

Project Timeline

Five years, two phases

Phase I (2010 - mid-2012): Refinement and optimization

- Hardware, pulse sequences
- Analysis methods (within, across modalities)
- Informatics platform

Phase II (mid-2012 - 2015): Production

- 400 subjects/year
- Data freely available (quarterly releases)
- Genotyping (complete sequencing?) in year 5

Post-project: Data available through 2020

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The “WU-Minn” HCP consortium

10 institutions:

Washington University

University of Minnesota

University of Oxford (UK), Indiana University,
Saint Louis University, Warwick University (UK)
University d’Annunzio (Chieti, IT)
Ernst Strungmann Institute (Frankfurt, DE)
Radboud University (Nijmegen, NL)
Advanced MRI Technologies (Sebastopol, CA)

82 on HCP team (September 2011)