



NA-MIC

National Alliance for Medical Image Computing

<http://na-mic.org>

NA-MIC MGH Core 1

Bruce Fischl

**MGH ATHINOULA A. MARTINOS CENTER
Harvard Medical School**

MIT CSAIL/HST



**MASSACHUSETTS
GENERAL HOSPITAL**



Who are we?

Note that MGH is the lead site in the morphometry testbed of the Biomedical Informatics Research Network (BIRN) and also a site in the functional BIRN (fBIN).

Faculty

Bruce Fischl (BIRN/NA-MIC)
Randy Gollub (BIRN/NA-MIC)
Dave Kennedy (BIRN/NA-MIC)
Karl Helmer (mBIRN)
Doug Greve (BIRN)

Engineering

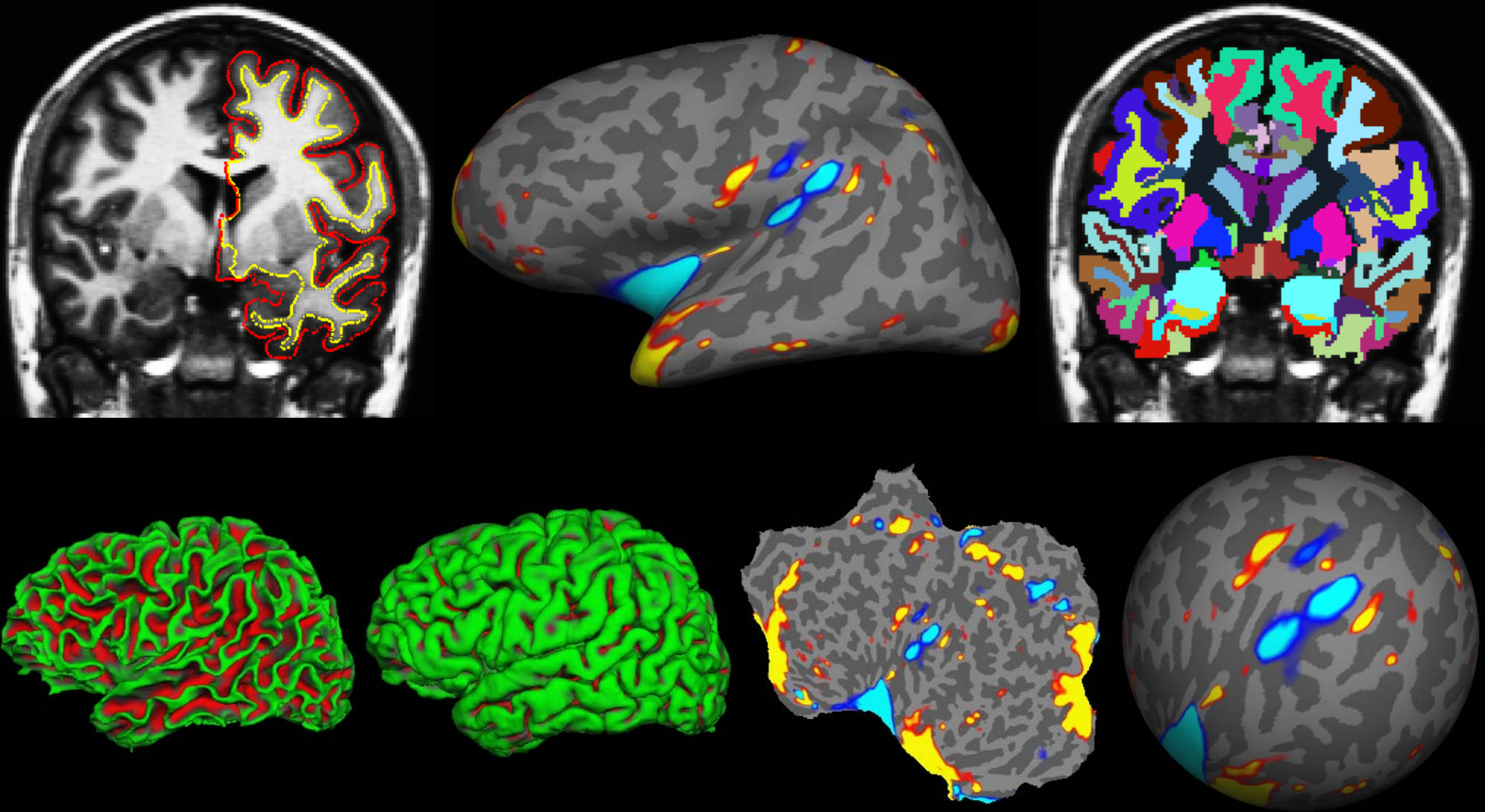
Dennis Jen (NA-MIC)
Kevin Teich (BIRN)
Nick Schmansky (BIRN)

Postdocs

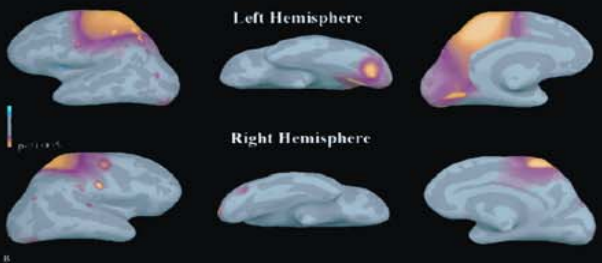
Lilla Zollei
Gheorghe Postelnicu
Anastasia Yendiki



FreeSurfer

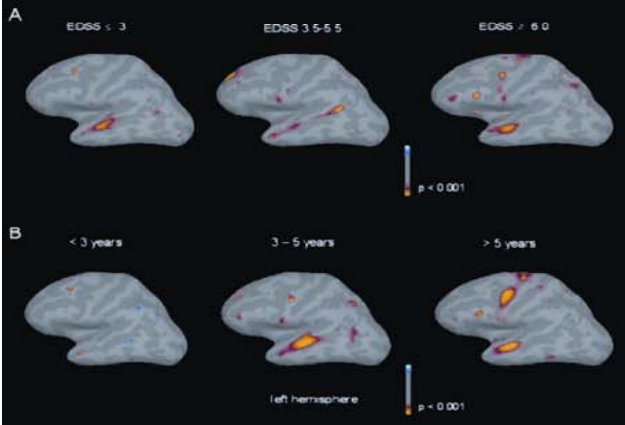


Huntington's Disease



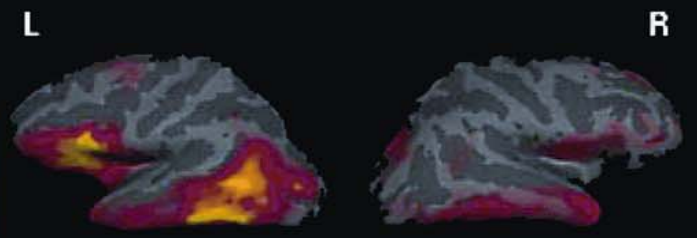
Rosas et al., 2002

Multiple Sclerosis



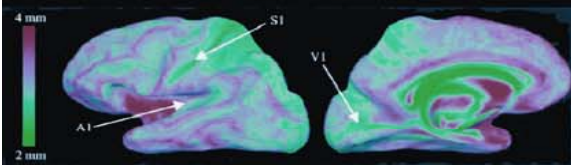
Sailer et al., 2003

Schizophrenia

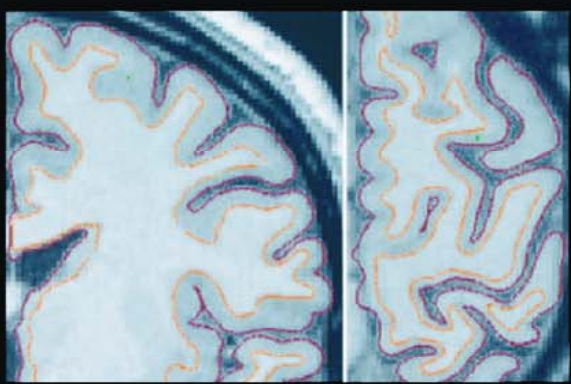


Kuperberg et al., 2003

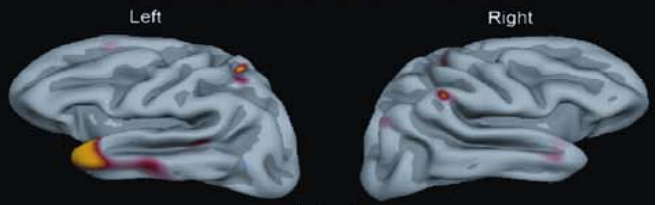
Normal Variation



Fischl et al., 2000

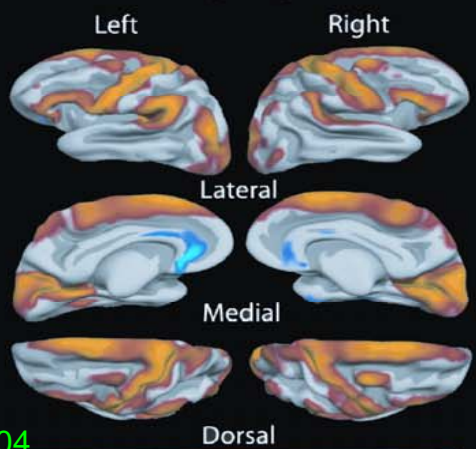


Semantic Dementia



Gold et al., 2005

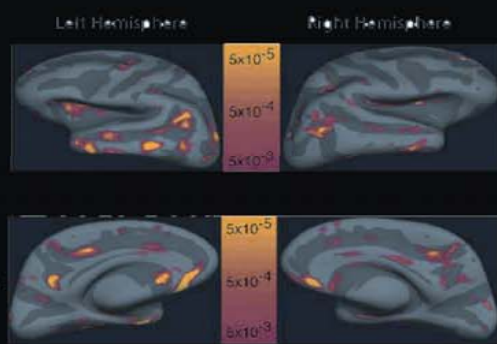
Aging



Salat et al., 2004



Animal Phobia



Rauch et al., 2004



What NA-MIC gets from MGH

1. Integration of FreeSurfer and Slicer.

ability to render any of the models/measures generated in FreeSurfer (>2500 licenses distributed)

2. Training courses.

4 courses run (22, 21, 24 and 50 attendees) in collaboration with Randy Gollub, Steve Pieper, Sonia Pujol, Katie Hayes, Jenni Pacheco and Doug Greve.

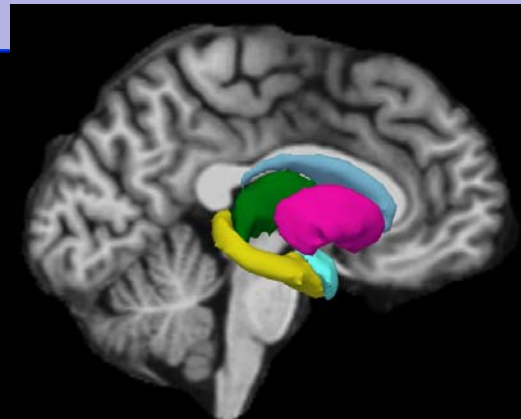
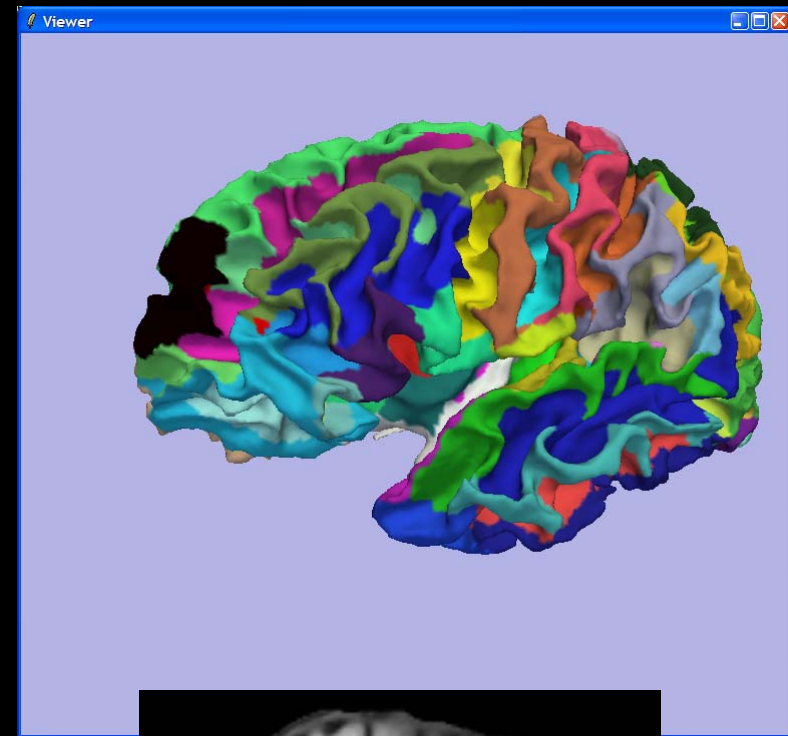
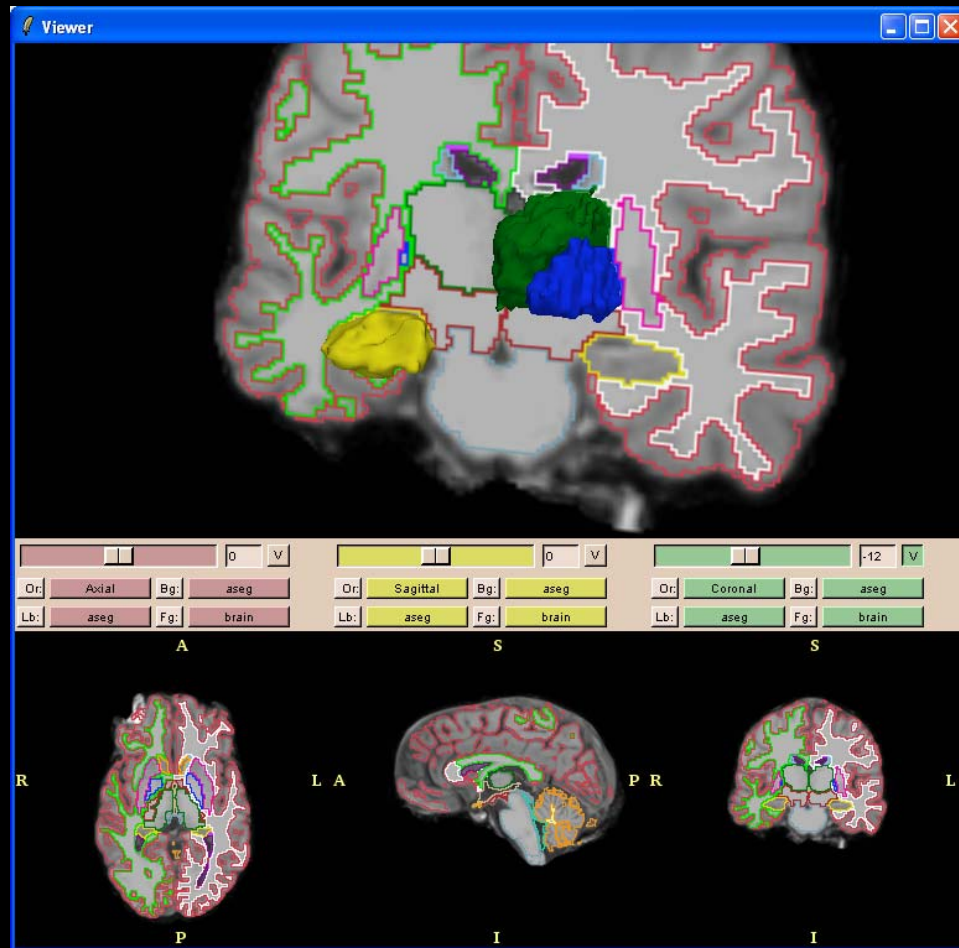
3. POIstats tool for constrained tractography.

An MCMC algorithm with replica exchange for computing the most probable path between two ROIs.

4. Tools for aligning histological images with MR ones.



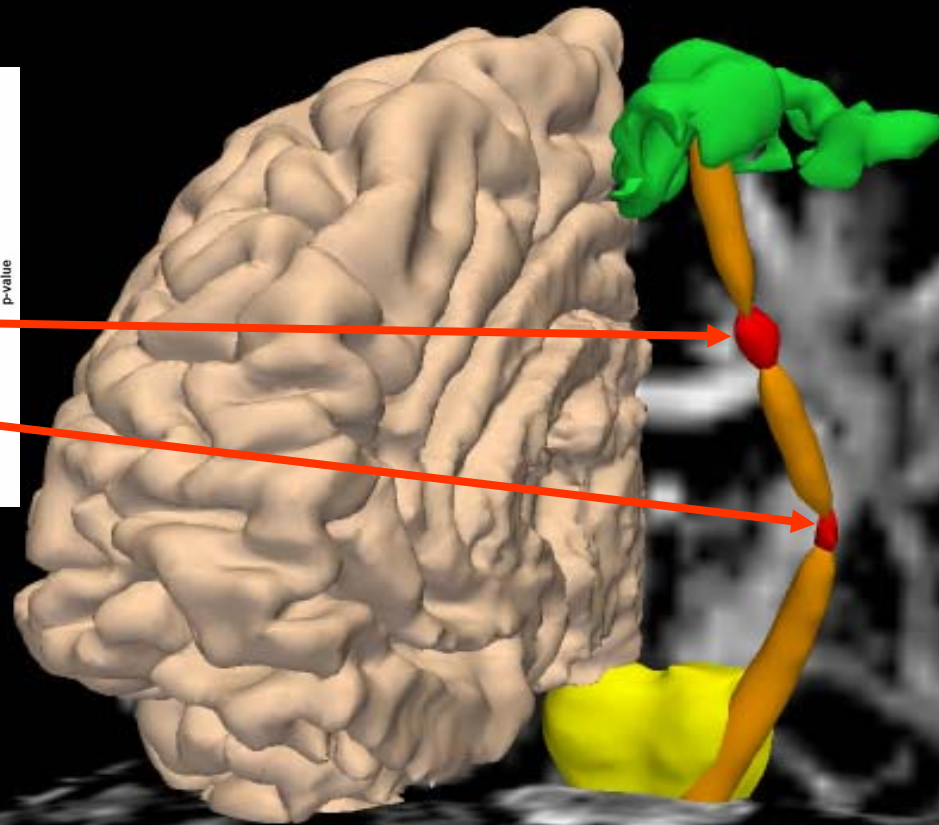
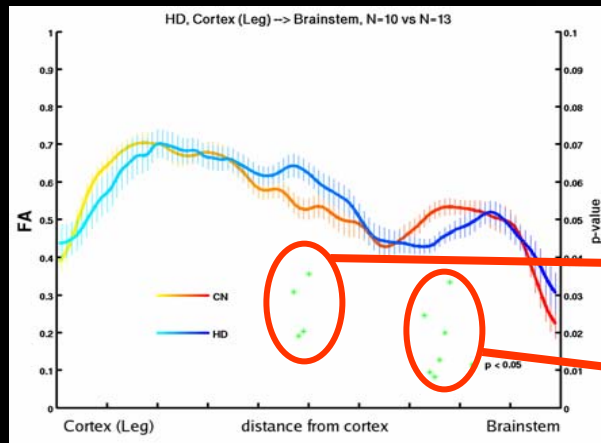
FreeSurfer/Slicer Integration



In collaboration with Randy Gollub, Kevin Teich, Wendy Plesniak, Nicole Aucoin and Steve Pieper



POIstats*



*Manuscript in preparation – will be contributed to iTK in first quarter '07. Joint work with Dave Tuch, Karl Helmer, David Salat, Vasanth Pappu, H. Diana Rosas and Dennis Jen



What MGH gets from NA-MIC

1. Integration of FreeSurfer and Slicer.
2. Open sourcing of FreeSurfer!
3. Industrial strength engineering expertise.
 - 407 unit tests
 - 64 system tests
 - nightly builds/tests on an array of platforms
 - integration of the Doxygen documentation system.
4. ITK support.



Publications

Salat DH, Smith EE, Tuch DS, Benner T, Pappu V, Schwab KM, Gurol ME, Rosas HD, Rosand J, Greenberg SM. White matter alterations in cerebral amyloid angiopathy measured by diffusion tensor imaging. *Stroke*. 2006 Jul;37(7):1759-64.

Blood AJ, Tuch DS, Makris N, Makhlof ML, Sudarsky LR, Sharma N. White matter abnormalities in dystonia normalize after botulinum toxin treatment. *NeuroReport* 2006; 17(12): 1251-5.

Tuch DS, Salat DH, Wisco JJ, Zaleta AK, Hevelone ND, Rosas HD. Choice reaction time performance correlates with diffusion anisotropy in white matter pathways supporting visuospatial attention. *Proc Natl Acad Sci U S A*. 2005 Aug 23;102(34):12212-7.

Peng Yu, P. Ellen Grant, Yuan Qi, Xiao Han, Florent Segonne, Rudolph Pienaar, Evelina Busa, Jenni Pacheco, Nikos Makris, Randy L. Buckner, Polina Golland, Bruce Fischl, Cortical Surface Shape Analysis Based on Spherical Wavelets, *IEEE Transaction on Medical Imaging* (to be published in the special issue on computational neuroanatomy).

Florent Segonne, Jenni Pacheco, Bruce Fischl, Geometrically Accurate Topology Correction of Cortical Surfaces using Non-Separating Loops, *IEEE Transaction on Medical Imaging* (to be published in the special issue on computational neuroanatomy).

Submitted

Xiao Han, Bruce Fischl, Intensity Renormalization for Improved Brain MR Image Segmentation across Scanner Platforms , *IEEE Transaction on Medical Imaging* (submitted).

Hinds, O., Polimeni, J., Rajendran, N., Balasubramanian, M., Wald, L., Rosas, D., Frosch, M., Augustinack, J., Wiggins, G., Potthast, A., Fischl, B., and Schwartz, E. 2007. Intersubject regularity in the intrinsic shape of human V1. *Journal of Neuroscience*. Submitted.