RECONSTRUCTION AND ANALYSIS OF HUMAN V1 BY IMAGING THE STRIA OF GENNARI USING MRI AT 7T*

Oliver P. Hinds[1], Jonathan R. Polimeni[2], Megan L. Blackwell[3], Christopher J. Wiggins[3], Graham Wiggins[3], André J.W. van der Kouwe[3], Lawrence L. Wald[3], Eric L. Schwartz[1,2,4], and Bruce Fischl[3,5]

[1]Department of Cognitive and Neural Systems, Boston University, Boston, MA 02215, USA
[2]Department of Electrical and Computer Engineering, Boston University, Boston, MA 02215, USA
[3]Department of Radiology, MGH, Athinoula A. Martinos Center, Harvard Medical School, Charlestown, MA 02129, USA
[4]Department of Anatomy and Neurobiology, Boston University School of Medicine, Boston, MA 02118, USA
[5]Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

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Abstract

The *stria of Gennari*—a definitive landmark for anatomical identification of primary visual cortex—has been imaged both *ex vivo* and *in vivo* and visualized in planar sections, but no surface reconstructions were performed. To image the stria, we used a high-bandwidth, multiecho FLASH pulse sequence with an isotropic voxel size of 200 µm and scanned *ex vivo* human occipital cortex at 7T for 12 hours. This provided enhanced contrast between gray and white matter and reduced MR image distortion, thus enabling reliable identification of the full extent of the stria. We developed software for reconstructing surfaces from slice images obtained either from MRI or serial tissue section data. This software was used to identify vertices representing points of the stria as input to a surface tiling algorithm, which outputs a two-dimensional, manifold triangular mesh representing the striate surface. A flattened surface was obtained using an accurate quasi-isometric flattening algorithm (see Balasubramanian *et al.*, this meeting), using a global error measure based on geodesic distances for a minimal error brain flattening. Surface-based representations of V1 are necessary for quantifying the "shape", surface area, and inter-subject variability of V1, supplying ground-truth for probabilistic atlases used for cross-subject registration, and may provide a method for same-subject comparison to functionally determined V1 *in vivo*. A software toolkit is available supporting the surface reconstruction methods described in this work.

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