

# Superior Temporal Gyrus: Anterior & Posterior Portions

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## **Tool and Images:**

- The manual tracing features of ITK-SNAP are used to label the Superior Temporal Gyrus (STG). The mamillary bodies define the boundary between anterior and posterior STG (AntSTG, PostSTG), which are labeled separately. The majority of tracing is done in the coronal view.
- The images used in the following methods are T1 gray level images, aligned to standard ACPC space and resliced to isotropic voxels using the BRAINS2 software package (University of Iowa). For coronal images from BRAINS2, the SNAP file orientation is **RIP**. Images aligned using other tools may have different orientations.
- Use the existing **STG.label** label description file, which ensures that saved volumes are always properly labeled. A new label file may be generated if working on a data set other than the pediatric Autism or Fragile X Longitudinal data sets.

## I. Boundary between AntSTG and PostSTG:

- A) The superior temporal gyrus (STG) is bordered superiorly by the Sylvian Fissure and inferiorly by the Superior Temporal Sulcus.
- 1) Load the T1 gray level image.
  - 2) Load the STG label descriptions file. Select the AntSTG label.
- B) The boundary between the posterior and anterior STG is defined at the level of the mamillary bodies, with the posterior boundary of the AntSTG defined as one slice anterior the mamillary bodies.
- 1) Locate the mamillary bodes in the axial view.
  - 2) Place the crosshair just anterior to, but not touching, the mamillary bodies.
  - 3) Check the coronal and sagittal view to ensure the crosshair is anterior to the mamillary bodies.
  - 4) Without moving the crosshairs, switch the coronal view.
  - 5) This coronal slice is the posterior boundary of the AntSTG. Begin tracing the AntSTG on this slice, and work anteriorly.

Note: The manual trace may be combined with the GM/WM brain mask when complete. Therefore, tracing at the outer edge of the brain does not need to be too precise, as long as the trace fully encompasses the gyrus. However, tracing along all other boundaries does need carefully follow boundaries.

## II. Tracing the Anterior STG

- A) Trace the AntSTG in the coronal view, beginning at the slice defined above.
- 1) The Sylvian Fissure is the superior boundary of the AntSTG. The superior temporal sulcus is the inferior boundary of the AntSTG.
  - 2) Trace around the AntSTG, from the depth of the Sylvian Fissure to the depth of the superior temporal sulcus. Surround all of the gray matter (GM) of the gyrus at the outer edge of the brain.
  - 3) Trace a straight line across the white matter (WM) that connects the AntSTG to the rest of the temporal lobe.
  - 4) Page one slice anterior and continue tracing the AntSTG as described above.
  - 5) Stop tracing the AntSTG in the coronal view when the WM tract connecting the temporal lobe to the rest of the brain is no longer visible.

B) Switch to the sagittal view.

- 1) Trace any remaining AntSTG, working lateral to medial.
- 2) The medial border of the AntSTG is the last slice on which the superior temporal sulcus separates the STG from the middle temporal gyrus.
  - a. In most slices there will STG label which as been traced in the coronal view. This can serve as a guide as to when to stop tracing. If there is no label from the coronal view present, be wary of tracing any more in the sagittal view. Check the boundary in the coronal and axial views.

### III. Tracing the Posterior STG

A) Switch to the coronal view. Select the PostSTG label.

B) Begin tracing at the posterior extent of the PostSTG, which is defined as the most posterior slice on which the corpus callosum connects across the midline.

Note: To help identify the STG, page posteriorly from the already labeled AntSTG.

- 1) Trace around the PostSTG, from the depth of the sulcus at its superior surface to the depth the superior temporal sulcus (at its inferior surface).
- 2) Trace a straight line across the WM that connects the PostSTG to the rest of the temporal lobe.
- 3) Stop tracing the PostSTG on the slice immediately posterior to the AntSTG label.

**IV. Trace** the STG in the other hemisphere, following the above guidelines. Select the appropriate labels for the hemisphere.

**V. Review** the STG labels in all views.

### VI. Save Segmentation & Volumes

A) Save the segmentation file as <ID>\_SupTempGyrus.gipl

B) Save the voxel counts (volumes) as <ID>\_SupTempGyrus.vxct

### Summary Information

Tool used: ITK-SNAP segmentation tool.

Reliability has not yet been established.

### Reference

Yushkevich, P.A., Piven, J., Hazlett, H.C., Smith, R.G., Ho, S., Gee, J.C., & Gerig, G. (2006). User-guided 3D active contour segmentation of anatomical structures: Significantly improved efficiency and reliability. *Neuroimage*, 31 (3), 1116-1128.  
[ITK-SNAP software: <http://www.itksnap.org>]