

## Exercise 50 : Mayo 3D Brain Atlas

The Analyze Mayo 3D Brain Atlas add-on provides a unique 3D implementation of the Talairach anatomical atlas of the human brain. The Mayo 3D Brain Atlas add-on allows for 3D navigation of the atlas and interactive query and reporting of atlas-based coordinates in many common volumetric and neuroanatomical and neurofunctional frames of reference, including TT, MNI, SPM, FSL and ICBM coordinates. In addition, atlas-derived neuroanatomical regions can be output from the module and then utilized directly in many other Analyze modules. This exercise will demonstrate how to use the Mayo 3D Brain Atlas add-on.

1. Load the **MRI\_3D\_Head.avw** data set from the **\$(BIR)\images\TutorialData** directory.
2. Select the **MRI\_3D\_Head.avw** data set then open the **Mayo 3-D Brain Atlas** module (**Apps > Mayo 3D Brain Atlas**).
3. The PowerBar buttons in the main **Mayo 3D Brain Atlas** window are set up in the sequence of operations performed. The first step to using the atlas is AC-PC based alignment of the loaded image data to the Talairach-Tournoux coordinate and proportional grid system.



4. Open the **Align AC-PC** window (**Tools > Align AC-PC**).
5. Use your cursor to move the **AC** and **PC** points to the appropriate location on the sagittal image. Enlarging the image may help to identify the AC and PC; right-click on the display and select **Size > Double**. Note that the left and right arrows and rotation buttons can be used to adjust the data set to correct for symmetry.
6. Select the AC point and move it to the appropriate location. The magnify window will automatically display helping you to determine the precise location of the AC (figure 1).



7. Select the PC point and move it to the appropriate location.
8. Select **Align AC-PC**. The image volume will realign to the AC-PC.
9. Select **Next** to open the **Extract Brain Tool**. A seed point and threshold range are automatically set by the **Extract Brain Tool**. These can be adjusted if necessary.
10. Check the **Fill Holes after Extraction** option and then select **Extract Brain**.
11. The extracted brain can be reviewed using the **Slice** slider bar (figure 2).

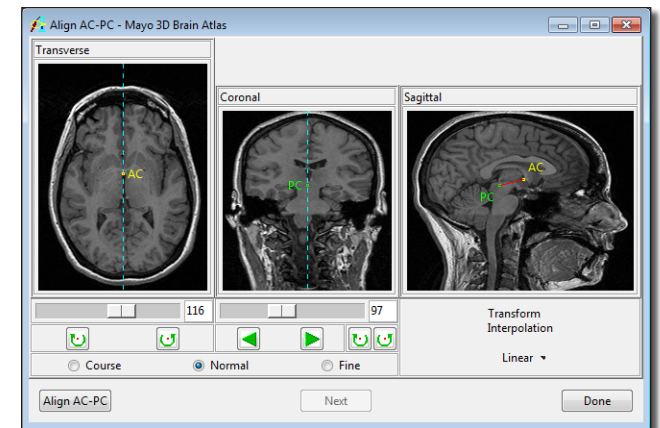


Figure 1

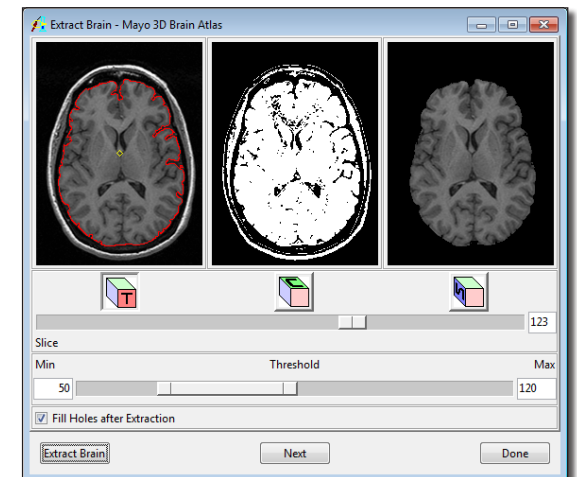


Figure 2

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12. Select **Next** to open the **Adjust Registration** tool (figure 3). If needed the atlas can be adjusted. Right-click in any of the orthogonal display panes and select **Restrict > None**. Note the right-click menu also provides options to display the loaded or extracted volume and increase the display size.
13. The grid can now be manipulated. Move the grid lines in any of the orthogonal displays to adjust the atlas. When you are finished making adjustments, right-click in any of the orthogonal displays and set **Restrict** back to "All."
14. Move the yellow square marker in any of the orthogonal displays to move through the loaded volume. Note that when the marker is moved the name of the atlas region and the coordinates of the current marker point will appear in the lower left-hand corner of the window.
15. To query specific structures by coordinates, navigate back to the main module window and select the **Query Atlas** button from the PowerBar.
16. The **Adjust Registration** window and the **Query Atlas** window work together. The **Query Atlas** window will return the atlas structure and coordinates for the current location set in the **Adjust Registration** window.
17. In the Adjust Registration window, move the Yellow marker to a location you wish to query.
18. In the Query Atlas window click the **Query** button, the structure and location of the Yellow marker will be returned.
19. Check the Query Range option and set the Range to 5. Click the Query button again. All structures with in a 5 voxel range will be reported in the query window (figure 4). Please note: The information returned can be saved as a text file by right-clicking in the Query window and selecting the **Save As** option.
20. Close the **Query Atlas** and **Adjust Registration** windows.
21. To save the atlas as an object map open the **Generate Output** window by clicking on the **Output** button in the PowerBar.

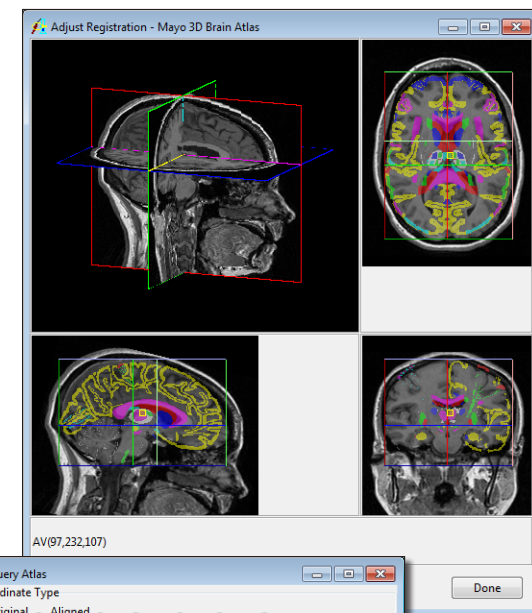


Figure 3

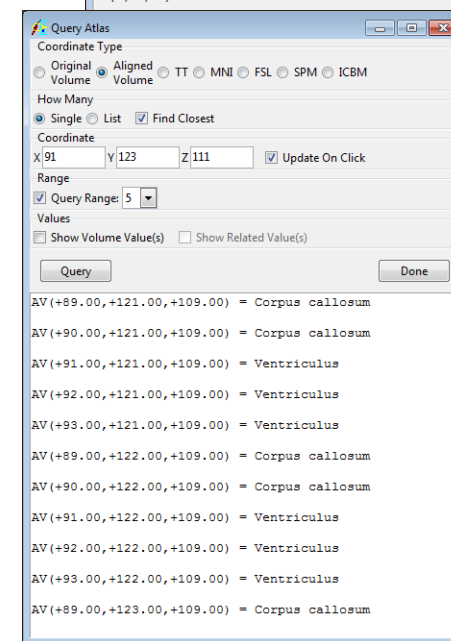


Figure 4

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22. In the **Generate Output** window returned (figure 5), make sure the following options are set:
  - i. Set **Output What** to **Specified Atlas**
  - ii. Set **Space** to **Original Volume**
  - iii. Set **Which Atlas** to **Transverse**
  - iv. Set **Output As** to **Object Map**
23. Next change **Object(s)** to **Specified** and then click on the List button. The **Object List** window returned allows you to select only the objects you wish to output to the object map, click **Done** to close the window and then set **Object(s)** back to **All**.
24. Select **Generate Output**. The object map will be saved as '**AtlasOutput\_MRI\_3D\_Head.obj**' in the specified directory.
25. Select **Done** in the **Generate Output** window and close the **Mayo 3D Brain Atlas**.
26. To review the Atlas object map created, select the **MRI\_3D\_Head** data set from the Analyze workplace and then open the Multiplanar sections module. Select **File > Load Object Map** and load the object map saved in step 23. Select the Traffic Signal icon to begin the sequence display of the data.
27. Close all windows before proceeding to the next exercise.

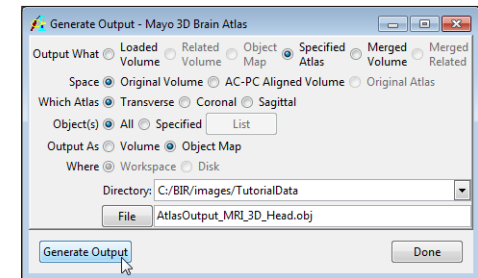


Figure 5