



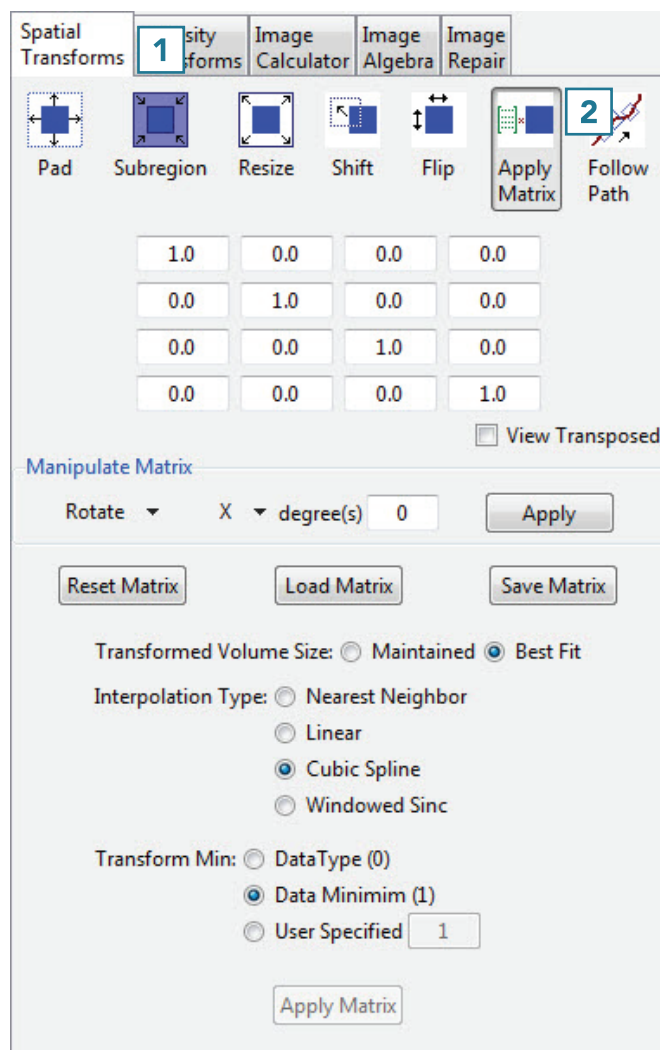
## Using the Apply Matrix Tool

### AC-PC Alignment of Brain Data

In this exercise we will use the tools available in the Transform module to align an MRI scan of the brain along the AC-PC axis.

To follow along, download the data set MRI\_Head from [analyzedirect.com/data](http://analyzedirect.com/data) and load into Analyze using Input/Output.

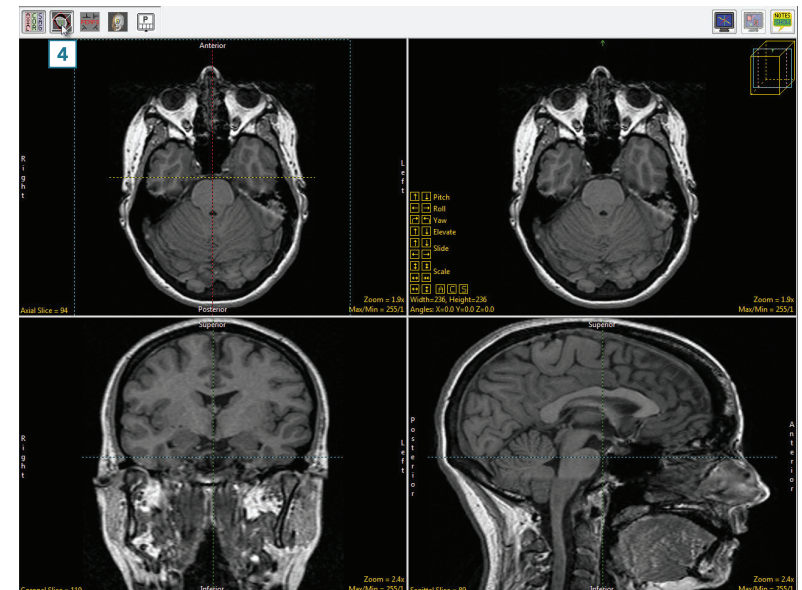
- Select the data set to align along the and open Transform.
- Navigate to Spatial Transforms [1]
- Select the Apply Matrix tool [2].



## Using the Apply Matrix Tool (continued)

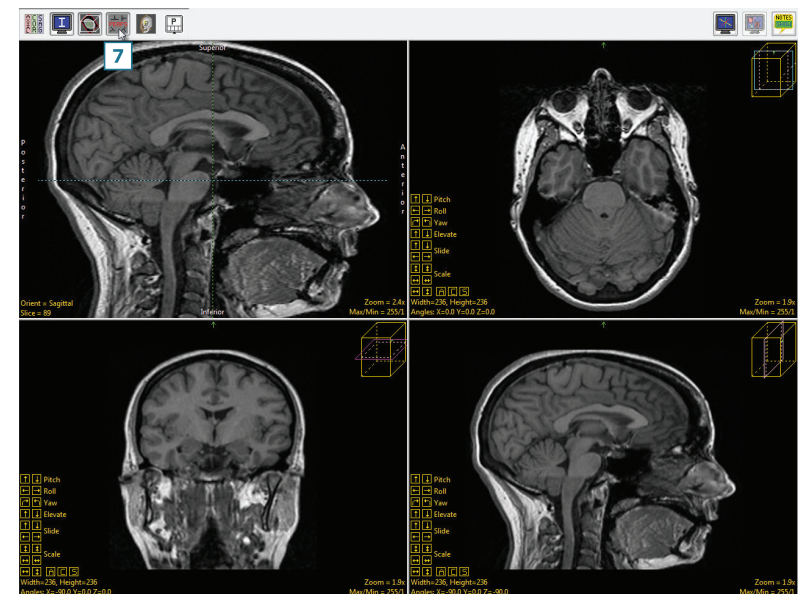
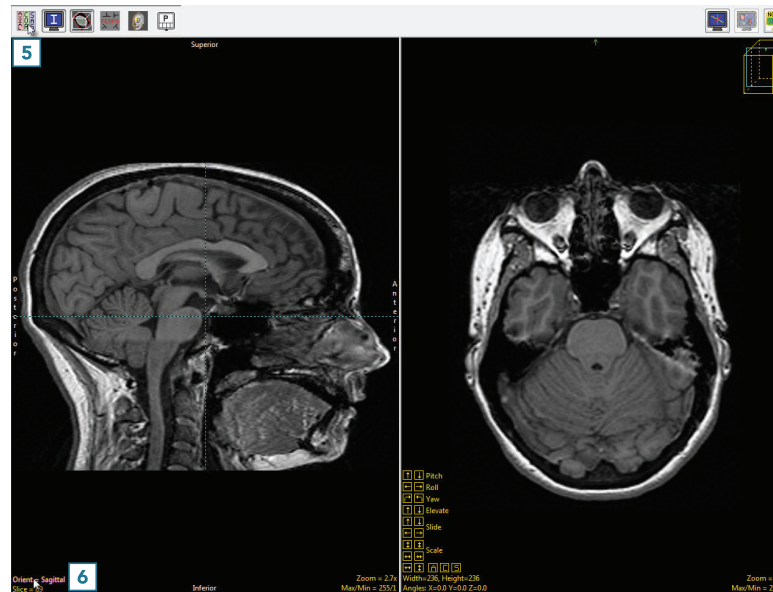
The optimal display settings for AC-PC alignment or any other manipulation of an oblique plane are as follows:

- Switch off the rendering [3] (unless an object map is loaded, which might help visualize the oblique). Now the three orthogonal views are shown.
- Switch on the oblique [4]. Now, the oblique and the three orthogonal views are shown.



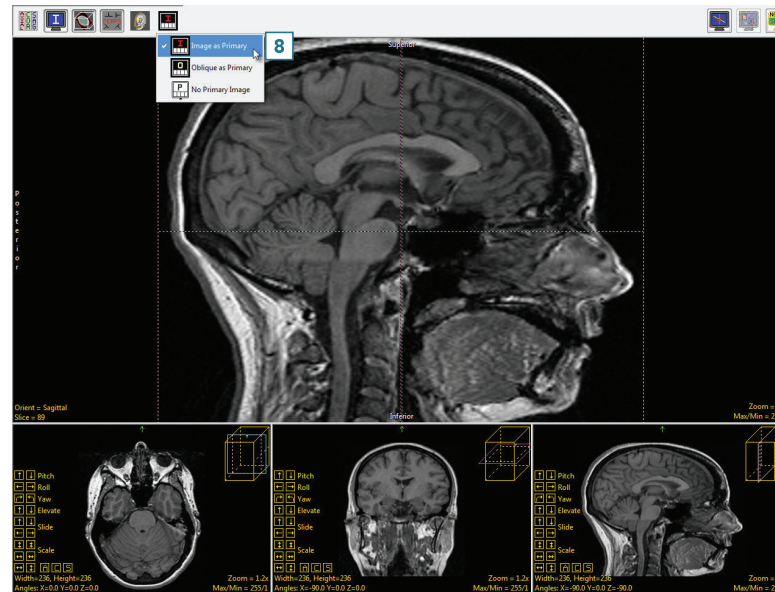
## Using the Apply Matrix Tool (continued)

- Toggle the orthogonal orientations to a single image [5].
  - Set this image to the sagittal view by clicking twice on the Orient parameter [6].
  - Now the sagittal orientation and the oblique image are shown.
- 
- Switch on the perpendicular images [7].

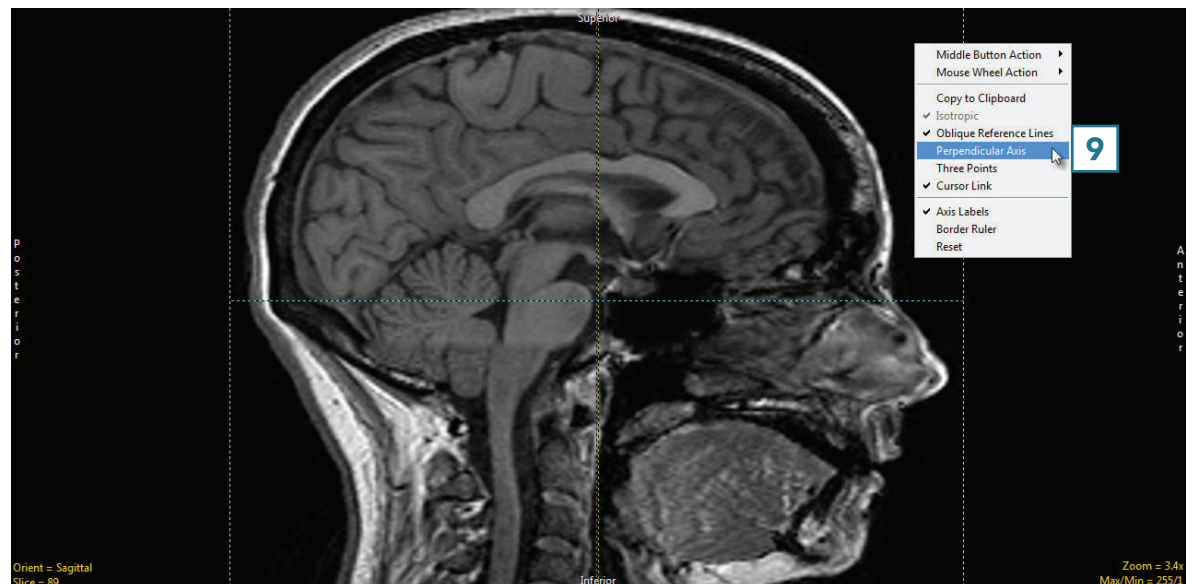


## Using the Apply Matrix Tool (continued)

- The AC-PC line will be defined on the sagittal view, so double-click the sagittal image or select Image as Primary in the drop-down menu [8].



- Right-click on the sagittal image and select Perpendicular Axis [9] to turn on the perpendicular axis tool.







## Using the Apply Matrix Tool (continued)

- Navigate to the mid-sagittal slice, which for this data set is slice 90 [10].
- Drag the left endpoint of the perpendicular axis to the posterior commissure [11].
- Drag the right endpoint of the perpendicular axis to the anterior commissure [12].

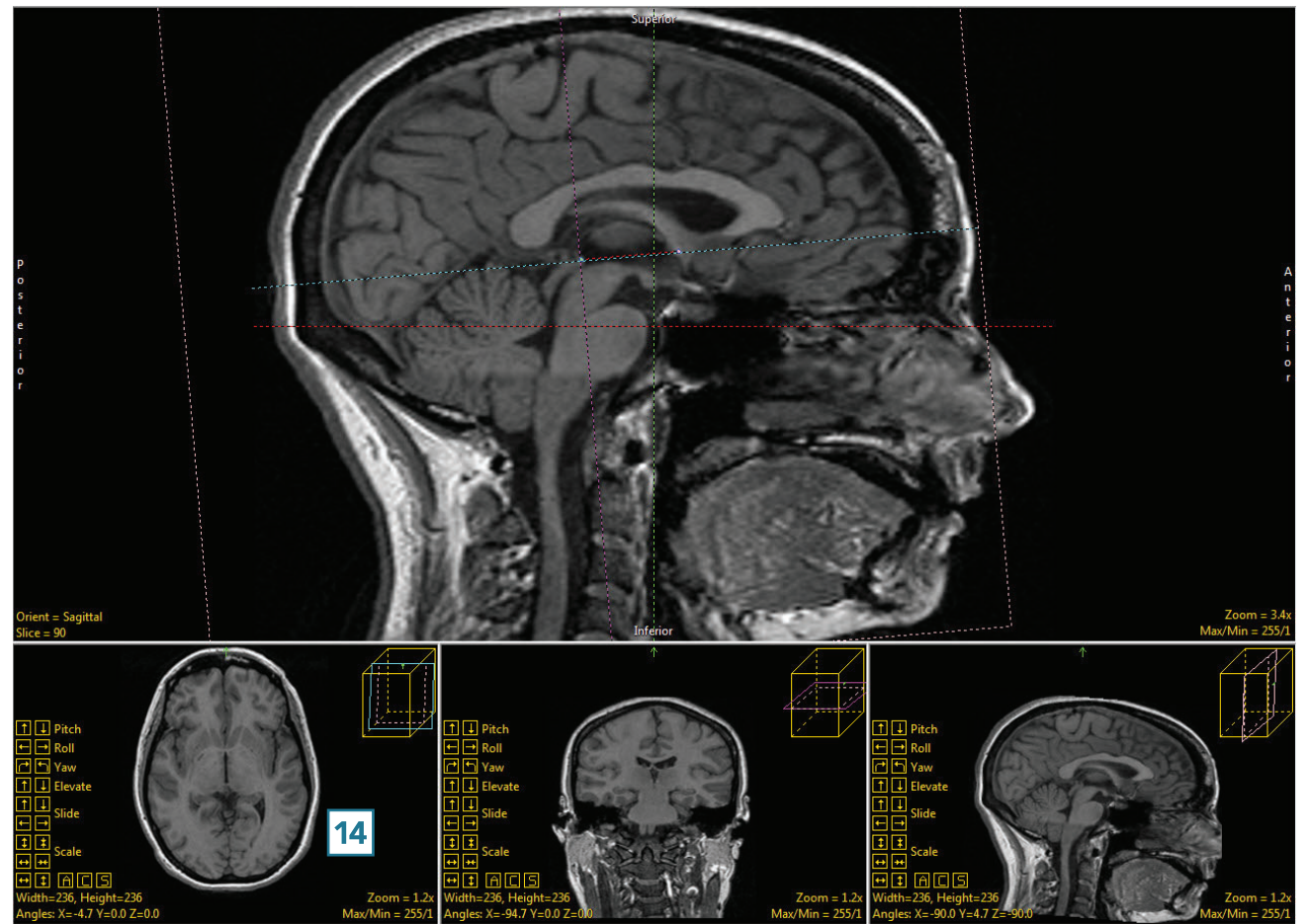


- To set the oblique plane to be parallel, rather than perpendicular, to the AC-PC plane, right-click on one of the perpendicular axis endpoints and set the Matrix to Create to Parallel [13].



## Using the Apply Matrix Tool (continued)

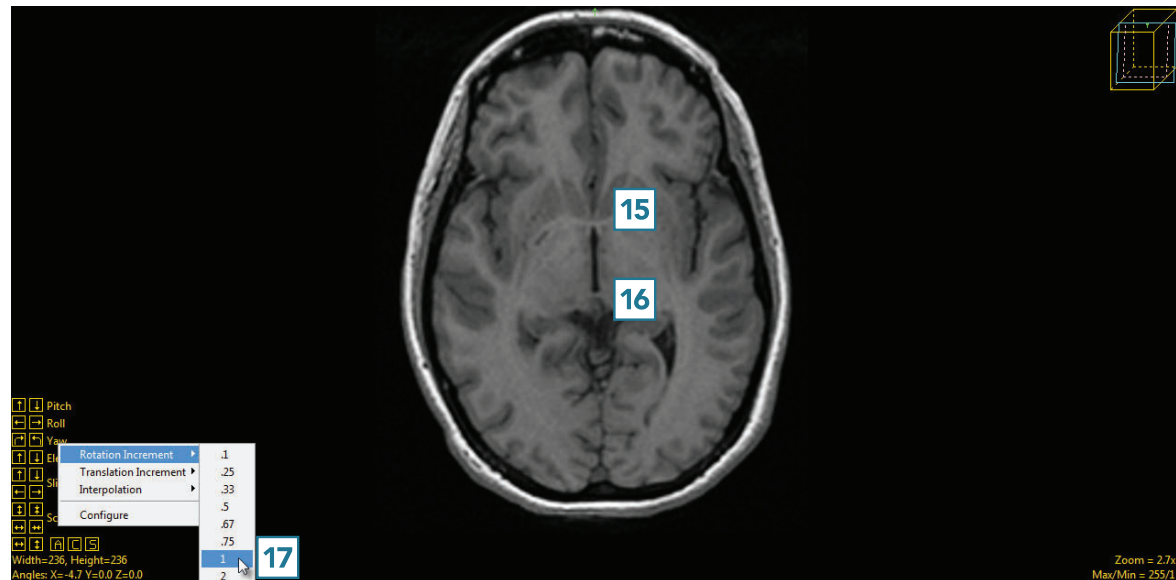
- Now the main oblique image (the leftmost of the three) is an AC-PC aligned axial image [14].
- Double-click this image to make it the primary image.



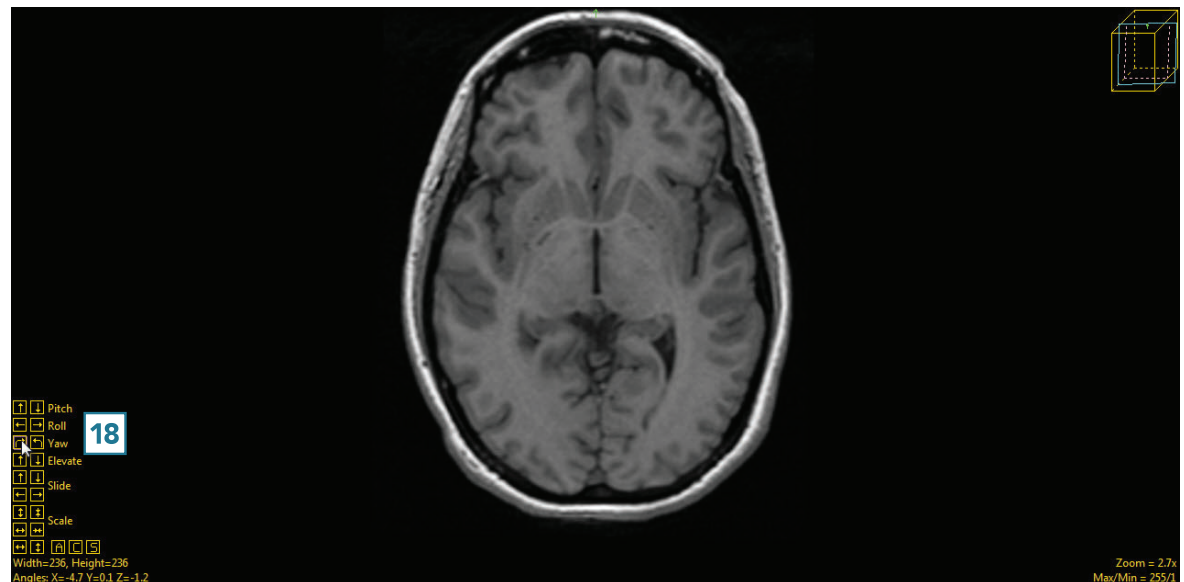


## Using the Apply Matrix Tool (continued)

- The AC [15] and PC [16] can both be seen on the same oblique slice, indicating good AC-PC alignment.
- To adjust vertical alignment of the data set, right-click Yaw and set the Rotation Increment to 1 [17].



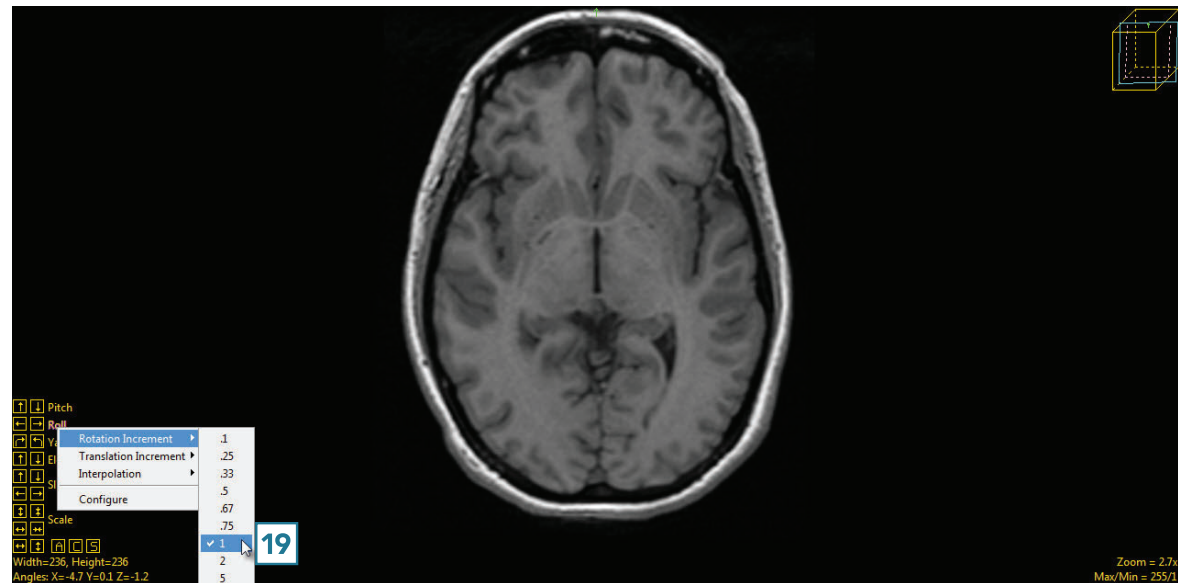
- Use the left and right Yaw buttons to align the data set vertically [18]. The increment can be made even smaller to make smaller adjustments as needed.



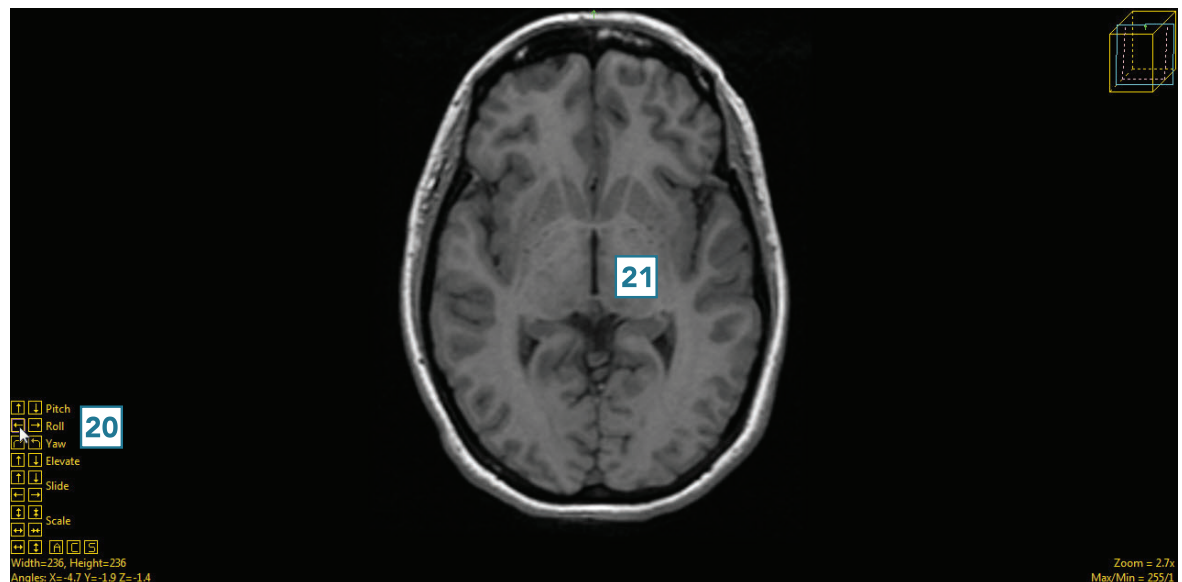


## Using the Apply Matrix Tool (continued)

- The last adjustment to be made to the oblique plane will be done using the Roll function. Right-click on Roll and change the Rotation Increment to 1 [19].



- Click on the left and right roll buttons [20] to adjust the data set until the anatomical structures appear symmetrical [21].







## Using the Apply Matrix Tool (continued)

- Click Apply Matrix [22] to apply the transformation.

The screenshot shows the 'Apply Matrix' tool interface. At the top, there are icons for 'Pad', 'Subregion', 'Resize', 'Shift', 'Flip', 'Apply Matrix', and 'Follow Path'. Below these icons is a 4x4 matrix of input fields containing the following values:

0.999238	0.020560	-0.03315	0.106856
-0.01745	0.995657	0.091437	19.57691
0.034894	-0.09078	0.995258	-21.9265
0.0	0.0	0.0	1.0

Below the matrix is a checkbox labeled 'View Transposed' which is currently unchecked. Under the heading 'Manipulate Matrix', there is a 'Rotate' dropdown menu, a 'X' dropdown menu, a 'degree(s)' input field with the value '0', and an 'Apply' button. Below this are three buttons: 'Reset Matrix', 'Load Matrix', and 'Save Matrix'. Further down are three sections of options:

- 'Transformed Volume Size:' with radio buttons for 'Maintained' and 'Best Fit' (selected).
- 'Interpolation Type:' with radio buttons for 'Nearest Neighbor', 'Linear', 'Cubic Spline' (selected), and 'Windowed Sinc'.
- 'Transform Min:' with radio buttons for 'DataType (0)', 'Data Minimum (1)' (selected), and 'User Specified' (with an input field containing '1').

At the bottom, there is a blue 'Apply Matrix' button with a small icon of a hand pointing at it, and a blue box containing the number '22'.

## Using the Apply Matrix Tool (continued)

- Click Save Volume [23] to save the transformed data set.



- In the Save Transformed window, choose to create a new workspace volume [24].
- Rename [25] and click Save Volume [26].
- Close Transform.

