BioImage Suite Activity

BioImage Suite is a collection of applications that allow you to view and analyze brain images. In this activity, you will use the MNI2TAL application, which provides an online brain atlas and is useful for converting between two common brain coordinate systems: Montreal Neurological Institute (MNI) space and Talairach space. You will use BioImage Suite to gain practice with these brain coordinate systems, Brodmann areas, and neuroanatomy. You are welcome to work on this activity with your classmate(s).

Part 1: MNI to TAL

1. Go to BioImage Suite.
2. Click on Applications -> MNI2TAL.
3. One at a time, enter the following sets of MNI coordinates in the MNI boxes. You should enter them in X, Y, Z order. Hit "Go" to find the corresponding Talairach coordinates, Brodmann's area and anatomical terms for each set of MNI coordinates. For example, if you looked up the MNI coordinates (X = -38, Y = 6, Z = -2), you'll see that the corresponding Talairach coordinates are (X = -36, Y = 2, Z = 1) and that this is in an area called the left insula, which is (Brodmann's area) BA 13.
4. Complete the table below by filling in the Talairach (TAL) coordinates, Brodmann area, and anatomical term for each set of MNI coordinates.

Table 1. MNI to Talairach coordinate conversion.

MNI coordinates			**Talairach coordinates**				
X	**Y**	**Z**	**X**	**Y**	**Z**	**Brodmann Area**	**Anatomical term**
-38	6	-2	-36	2	1	BA 13	Left insula
9	27	57					
-6	27	33					
-21	-18	-18					
57	33	3					

Part 2: TAL to MNI

1. Repeat Part 1, but this time enter the following sets of Talairach coordinates in the TAL boxes. You should enter them in X, Y, Z order. Hit "Go" to find the corresponding MNI coordinates, Brodmann's area and anatomical terms for each set of Talairach coordinates.
2. Complete the table below by filling in the MNI coordinates, Brodmann area, and anatomical term for each set of Talairach coordinates.

Table 2. Talairach to MNI coordinate conversion.

MNI coordinates			**Talairach coordinates**				
X	**Y**	**Z**	**X**	**Y**	**Z**	**Brodmann Area**	**Anatomical term**
3	24	-9	2	20	-6	BA 32	Right dorsal anterior cingulate cortex
			-40	-54	25		
			45	0	24		
			-58	-4	-20		
			14	9	13		

Part 3: Observations

1. Using the terms **left-right**, **ventral-dorsal**, and **posterior-anterior**, indicate below the dimension that is represented by the X, Y, and Z coordinates when describing a location in the human brain.

   X _____

   Y _____

   Z _____

2. What did you notice when converting MNI coordinates to Talairach coordinates and vice versa?

3. Why is there sometimes an anatomical name but no Brodmann area (e.g., Left-Hippocampus)?

4. Look up the MNI coordinates (X = 19, Y = -13, Z = 25). What do you think "Outside defined BAs" means?