03 - Hemispheric lateralisation

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1. General anatomy of the brain A. Cortical structures The cerebrum has four major lobes (frontal, temporal, parietal and occipital lobes). The lobar surface is heavily folded forming sulci (valleys) and gyri (ridges). Primary (major) sulci are more invariant in their appearance than the secondary (minor) sulci. The central sulcus divides frontal lobe from the parietal lobe. Precentral gyrus (part of the frontal lobe) is the primary motor cortex. The representation of different body parts in this region is often termed as a homunculus. Postcentral gyrus (part of the parietal lobe) is the primary somatosensory cortex with a similar homunculus representation. The lateral sulcus (Sylvian fissure) divides frontal lobe from the temporal lobe. The insula, a structure that is sometimes regarded as the fifth lobe of the cerebrum, is located deep in the Sylvian fissure. Insula is the seat of the primary gustatory cortex. Other major primary sulci include
2. Superior and inferior frontal sulci: In between these sulci is the middle frontal gyrus constituting the dorsolateral prefrontal cortex, often considered to be responsible for executive functions of the human brain.
3. Cingulate sulcus on the medial side of the frontal lobe. The anterior portion of the adjoining cingulate gyrus is considered to be the seat of motivation.
4. Olfactory and orbital sulci on the inferior surface of the frontal lobe. The orbitofrontal cortex is often considered to be the seat of associative learning and decision-making.
5. The Superior temporal sulcus is forming superior temporal gyrus, the seat of primary auditory cortex.
6. The interparietal sulcus separates superior and inferior parietal lobes. The inferior parietal lobe is made of the angular gyrus and supramarginal gyrus and is considered to be important for visuospatial attention.
7. Calcarine sulcus in the medial occipital cortex, the seat of primary visual (striate) cortex Hemispheric lateralisation Most fundamental brain functions are represented bilaterally. Higher levels of associative functions usually lateralize to one or other hemisphere. For example, language comprehension is localized to the left temporal cortex while prosody (tonal modulation of speech) seems limited to the right hemisphere. The hemisphere contralateral to the dominant hand is the dominant hemisphere, and it mediates language and speech functions. Dominance can be tested using Annette’s

handedness scale or Edinburgh handedness inventory. But handedness is not always same as dominance.

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