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GENDERED BRAIN ANATOMY

Ao. Univ. Prof. Dr. Michael Pretterklieber, Division of Anatomy

It was as late as during the 19th century that researchers have tried to answer the question if there is a typical “female” or “male” brain in humans. According to the limited technical equipment, during that time as well as within the first decades of the 20th century, characterization of brains was mainly based on macroscopic accountable features such as size, weight or the individual pattern of gyri and sulci. Furthermore, the all-male researchers used these patterns to “prove” that a female brain is inferior to a male one in structure and function. However, in 1913 Maria Montessori [1] used the same facts to evidence the superiority of the female brain. Today’s knowledge on morphological differences between female and male brains reveals that the brain of a woman is in general more symmetrically arranged and presents a more dense network connecting both hemispheres. And although it is accepted that a bigger brain is able to make one smarter or wiser, the question still remains unanswered if there is any simple connection between the actual size of the brain and the intellectual powers of its owner [2].

As a first step, a “male” brain is established already during the fetal period by one of the physiological effects of testosterone, i.e. lack of this hormone will lead to the development of a “female” brain. That has been called the “organizing” effect of testosterone and distinguished from its life-long lasting “activating” function [3]. Thus, sexual hormones seem to be able to interact with brain morphology during the whole life [4]. Until today, several sexual dimorphic areas have been recognized within the human brain, especially in the preoptic region of the hypothalamus, within the limbic system (the vomeronasal organ, the bed nucleus of the stria terminalis and the amygdaloid body), in the temporal plane as well as in the regions closely adjacent to the central sulcus. Moreover, it has been shown that female and male brains differ in the relation between cortex and medulla of the telencephalon. Nevertheless, also phenomenons of lateralization as well as individually or age dependent alterations in brain structure and function have to be taken into consideration and may sometimes hamper an unambiguous assignment of a human brain. Finally, in fact also a “third gender” exists in which brain structure shows a tendency towards the experienced sex [5].

References

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