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Structure and Development of Mid Brain

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Short Communication

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DESCRIPTION

The forward-most part of the brainstem, known as the midbrain or mesencephalon, is involved in regulating temperature as well as vision, hearing, motor control, sleep and wakefulness, and arousal (awareness).The tectum, cerebral aqueduct, tegmentum, and cerebral peduncles are the main areas of the midbrain. The midbrain connects to the diencephalon rostrally (thalamus, hypothalamus, etc.) and the hindbrain caudally (pons, medulla, and cerebellum). The midbrain displays a distinct rostral lateral splay. The midbrain is often sectioned axially, either at the level of the superior colliculi or the inferior colliculi. One popular method for remembering the midbrain's structures is to imagine these cross-sections (especially at the level of the superior colliculi) as the bear's upside-down face, with the cerebral peduncles serving as the bear's ears, the cerebral aqueduct as its mouth, and the tectum as its chin. Prominent features of the tegmentum serve as the bear's eyes, and certain regions of the pons serve as the bear [1,2].

Cerebral aqueduct

The cerebral aqueduct, a component of the ventricular system that connects the third and fourth ventricles (rostrally and caudally, respectively), is in charge of maintaining the flow of cerebrospinal fluid. The periaqueductal grey, which plays a part in analgesia, quiescence, and bonding, surrounds the cerebral aqueduct, a small channel that runs between the tectum and the tegmentum. The inferior colliculus is the level of the dorsal raphe nucleus, which is situated on the ventral side of the periaqueductal grey and releases serotonin in response to specific neuronal activity [3].

Tegmentum

The midbrain tegmentum, which is significantly bigger than the tectum, is the part of the midbrain ventral to the cerebral aqueduct. The superior cerebellar peduncles, which enter at the caudal end, medially, on the ventral side and exit more rostrally, connect it to the cerebellum. The median raphe nucleus, which aids in memory consolidation, is located between these peduncles on the ventral side of the brain. A sophisticated synaptic network of neurons that are largely involved in homeostasis and reflex activities is found in the main bulk of the tegmentum. It is crossed by a variety of unique neural pathways that connect various brain regions. At the level of the inferior colliculus, the medial lemniscus, a thin ribbon of fibres, is close to the lateral edge on the ventral side and maintains a similar position rostrally (the position can appear more medial due to the tegmentum widening towards the rostral end) [4].

Cerebral peduncles

On either side of the midline, the cerebral peduncles each form a lobe ventrally of the tegmentum. The interpeduncular fossa, which is a cistern filled with cerebrospinal fluid, is located between the lobes and beyond the midbrain. The cerebral crus is the preponderance of each lobe. The corticobulbar and corticospinal tracts are located in the central and medial ventral areas of each cerebral crus, respectively. The remaining portions of each cerebral crus are mostly made up of tracts that connect the cortex to the pons. Older writings refer to the crus cerebri as the cerebral peduncle, although this word actually refers to all nerve fibres connecting to the cerebrum (often via the diencephalon), which would also contain a large portion of the tegmentum. Tracts from the internal capsule are found in the crus pedunculi, which are tiny areas surrounding the major cortical tracts [5,6].

Development of mid brain

The midbrain, also known as the mesencephalon, develops from the second vesicle of the neural tube during embryonic development, and the interior of this region of the tube becomes the cerebral aqueduct. The midbrain does not continue to subdivide for the duration of neural development, in contrast to the other two vesicles, the forebrain and the hindbrain. It does not divide into further brain regions while the telencephalon and diencephalon split the forebrain, for instance. The midbrain's cells continue to divide throughout embryonic development; ventrally, this occurs more frequently than dorsally. Congenital hydrocephalus can develop as a result of partial or complete occlusion of the cerebral aqueduct caused by the outward expansion's compression of the still-forming structure. During embryonic development, the alar plate of the neural tube gives rise to the tectum.

REFERENCES

1. Gregg N, et al. Neurobehavioural changes in patients following brain tumour: Patients and relatives perspective. Neurosci Res.2021;3: 11-27.
2. Arber A. Dual-process morality and the personal/impersonal distinction: A reply to McGuire, Langdon, Coltheart, and Mackenzie. J Exp Soc Psychol.2019; 45: 511-584.
3. Ashkan K, et al. Reflexion and reflection: A social cognitive neuroscience approach to attributional inference. Adv Exp Soc Psychol. 2009.
4. Bhangoo R, et al. Moral rigidity in obsessive-compulsive disorder: Do abnormalities in inhibitory control, cognitive flexibility and disgust play a role. J Behav Ther Exp Psychiatry. 2017;45:158-169.
5. Beaney R, et al. Response inhibition, cognitive flexibility and working memory in obsessive-compulsive disorder, generalized anxiety disorder and social anxiety disorder. Int J Environ Res. 2022;18: 3642.
6. Benzina N, et al. A cross-species assessment of cognitive flexibility in compulsive disorders. bioRxiv. 2018.