Press release Workshop WS-A H. Schröder* & R. A. I. De Vos**

Gross anatomy and sectional anatomy of the normal and dysfunctional human brain stem

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Objective

The declared aim of this conference is to provide *a solid foundation for a credible consensus on the structural/functional organization of the normal and abnormal human brain* which *will set the stage for the emergence of concepts regarding the functional interaction of brain structures and structural alterations associated with diseases of the brain.*

Point of departure

The human brain stem - located between the spinal cord and the diencephalon (cf. Fig. 1) – is an important relay station which contains the nerve cell aggregations (nuclei) that are the site of origin as well as the targets of the so-called cranial nerves. The latter provide outgoing (efferent) innervation for all muscles of the head including e.g. the mimic musculature. Incoming (afferent) information is conveyed to the brain stem from cranial sensory structures. Among those are e.g. the skin of the face and the mucous membranes of nose, mouth and throat (touch, pain), the tongue (taste) and the inner ear (hearing). Incoming information is integrated locally in simple (reflexes) or more complex answers or conveyed to higher centers of integration. This task is subserved by ascending fiber tracts which e.g. transfer information about touch and pain. Outgoing signals from the higher centers reach the brain stem via large fibre bundles, e.g. the pyramidal tract (cf. Figs. 1, 2) that subserves voluntary movements.

Multidisciplinary and innovative aspects

It would be a little bit exaggerated to say that the human brain stem is still one of the white spots of the map of the human brain. A lot of data have been accumulated about the structure and function of the human brain stem in recent years in addition to a plethora of knowledge from animal studies.
Nevertheless, the brain stem plays a particular role in that despite the progress made in imaging of the brain over the last decade we are still far from being able to visualize the minute, densely packed structures of the living human brain stem with sufficient resolution (cf. Fig. 2). Furthermore, pathological aspects of brain stem structure and function at the time being do not get the attention they deserve which is probably related to the rather complex nature of this brain compartment.

Our workshop would like to draw the attention of the participants to two important features:

1. Understanding the human brain stem requires a profound knowledge about its internal structure and the connections with other parts of the brain since unlike with other parts of the brain a direct visualization of brain stem components is not possible.
2. Based on this it becomes possible to study the numerous pathological manifestations of brain diseases infesting the human brain stem

Along these lines we have structured our workshop in an interdisciplinary approach (neuroanatomy / neurpathology) which in direct interaction with the participants at the microscope will provide:

1. A basic anatomical understanding of the different parts of the human brain stem followed
2. by selected pathoanatomical examples of neurodegenerative disorders like e.g. Alzheimer's and Parkinson's disease pathology in the brain stem.

The introduction into the field will be eased for beginners by the use of special tissue sections which by their increased thickness help to easily identify the numerous structures of the human brain stem.
We hope that in this way we will be able to contribute as defined in the conference goals *to cooperate in defining the structural bases of this complex organ and will unite their knowledge in a multidisciplinary way, so that the synergy of the various skills strengthens what we know*.

Contact

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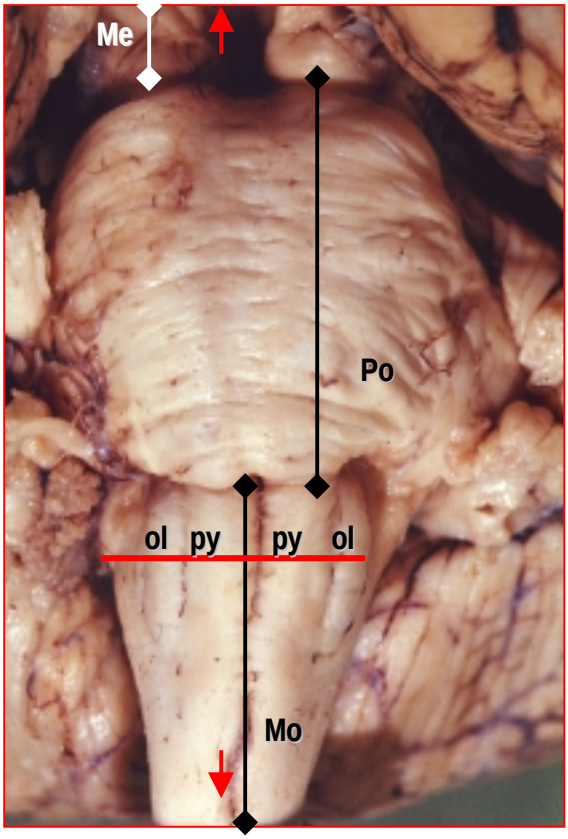

Fig. 1 Ventral view of the human brain stem

The brain stem consists of three parts (bottom to top):

- **A.** The Medulla oblongata (Mo) directly connected with the spinal cord or spinal medulla (direction of the arrow).
- **B.** The Pons (bridge, Po)
- **C.** The Mesencephalon (Me; midbrain) connected to the diencephalon (direction of the arrow)

The red line indicates the approximate level of the section shown in Fig. 2

Fig. 2 Horizontal section through the human brain stem (cf. Fig.1)

Fig. 2A Participants of the workshop will work with this kind of stained sections which allow the identification of nerve cell aggregations (nuclei, red color) (e.g. the inferior olivary nucleus, IO) and fiber tracts (greenish color) (e.g. the pyramidal tract; cst, cf. text). Both, the pyramidal tract and the inferior olivary nucleus are bulging towards the ventral surface of the brain stem and can easily be identified in Fig. 1 as the so-called pyramids (py) and the olives (ol).

Fig. 2B Atlas overlay shwoing the plethora of structures present in this small area as it will be presented to the participants of the workshop (transversal diameter in the millimater range)

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DRAWING I

MEDULLA OBLONGATA
MIDDLE PART

IV	**Fourth ventricle**
IO	**Inferior olive**
	d, m IO subnuclei
Namb	**Ncl. ambiguus**
Narc	**Arcuate ncl.**
Nct	**Ncl. conterminalis**
Nip	**Ncl. interpositus**
Nprp	**Ncl. praepositus hypoglossi**
NTS	**Ncl. tractus solitarii**
Nvermcr	**Vermiform ncl. of the restiform body**
NVIIId	**Dors. cochlear ncl.**
NVIIIm	**Med. vestibular ncl.**
NVIIIve	**Ventral cochlear ncl.**
RF	**Reticular formation**
RFgi	Gigantocellular ncl.
RFl	Lateral nucleus
cst	**corticospinal tract**
ml	**medial lemniscus**
icp	**inferior cerebellar peduncle**

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PLATE I