

Locus K: cuneate subnuclear regions in human dorsal column nuclei with neurochemical, cyto- and myeloarchitectural features of protopathic sensory nuclei

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This study is aimed to further characterize on a neurochemical, histological and morphometric ground the human Locus K, a newly identified region in the human nucleus cuneatus that shares neurochemical features with protopathic second order sensory nuclei (Del Fiacco et al., 2013; Serra et al., 2013).

Human brainstem sections were observed by means of ABC immunohistochemistry for calcitonin gene-related peptide (CGRP), substance P (SP) and transient receptor potential vanilloid type-1 receptor (TRPV1), Kluver-Barrera, Black Gold kit II and Nissl staining followed by computerized analysis of cell size and density.

As for CGRP and SP, at both pre- and postnatal age, immunoreactivity to TRPV1 occurs in Locus K with a distribution alike that present in the spinal trigeminal nucleus, caudal part. Morphometric analysis shows that, in adult tissue, the mean diameter and density of Nissl stained neurons in the Locus K are consistent with those of the caudal spinal trigeminal and solitary nuclei, and different from those in the gracile, cuneate and external cuneate nuclei. Kluver-Barrera and Black Gold kit II staining shows that myelinated fibres, abundant in the main cuneate, gracile and trigeminal magnocellular nuclei, are scarce in both the Locus K and trigeminal substantia gelatinosa.

Immunohistochemical and cyto- and myeloarchitectural analysis uphold the parallel neurochemical and structural arrangement for Locus K and protopathic nuclei in the human medulla oblongata, and support the concept that Locus K represents a special component of the human dorsal column nuclei.

Work funded by Fondazione Banco di Sardegna.

References

- [1] Del Fiacco et al., The human cuneate nucleus contains discrete subregions whose neurochemical features match those of the relay nuclei for nociceptive information, *Brain Struct. Funct.* 2013 DOI 10.1007/s00429-013-0625-4.
- [2] Serra et al., Locus K: a novel territory of the human dorsal column nuclei. *Eur. J. Histochem.* 57S3, 13, 2013.

Keywords

Dorsal column nuclei, Sensory systems, Human, 3D rendering, Morphometry, Neurochemistry.