

Cytoarchitecture and stereotaxic location of a preoccipital area in the region of V5/MT

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Area V5/MT is well known from functional imaging studies as a cortical area where motion of visual stimuli is represented. Its cytoarchitectonic correlate, however, is still unknown. The classical cytoarchitectonic maps of Brodmann, von Economo and Koskinas and Sarkissov did not distinguish this area among preoccipital areas. The aim of this study was to find a putative anatomical correlate of the functionally defined V5/MT in the human preoccipital cortex of post mortem brains, and to analyze its cytoarchitecture.

Regions of interest for the cytoarchitectonic analysis were defined by using the published stereotaxic coordinates from functional imaging studies of area V5/MT, and macroscopic landmarks as a first rough estimate (1). In these regions, cytoarchitectonic analysis was performed. Cell body stained coronal sections of 10 human brains were investigated. 3D-reconstructions of the brains were calculated and transferred to the standard format of the reference brain as previously described and validated (2). Borders between preoccipital visual areas were delineated in each 60th section of both hemispheres by applying an observer-independent cytoarchitectonic technique (3).

Putative area V5/MT was characterized by the following criteria: a clear border between layers II and III, a high cell packing density of layers II and III, a thick layer III with a clear radial arrangement and large pyramidal cells (in particular in IIIc), smaller pyramidal cells in layer V than in layer III, and a low cell packing density of layer V. The area was located near to the intersection of the anterior occipital and the lateral occipital sulci in the temporo-occipital region, mainly in the depths of the sulci (70% of the cases).

Mean centers of gravity were $x=-39$ $y=-77$, $z=5$ in the left, and $x=46$, $y=-72$, $z=6$ in the right hemisphere. The mean total volume of this area was 0.524 cm³ (SD=0.72). Intersubject variability in size and location of putative V5/MT was quantified by population maps. The correspondence in spatial location as well as previous architectonic descriptions (4) suggest that this area may be the cytoarchitectonic correlate of functionally defined V5/MT.

Reference List

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