

Poster presentation

Morphological relation of the lingual sulcus to the Posterior parahippocampal region in the human brain

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Background

The ventromedial temporo-occipital region of the human brain includes the caudal part of the parahippocampal gyrus that plays a critical role in memory formation [1] and the immediately adjoining ventral occipital region subserving secondary visual processing [2]. The morphology of this region in the human brain is not well understood, although it is crucial for interpreting the precise location of cortical activation peaks resulting from functional neuroimaging studies of memory and visual processing. The present research examined the morphological patterns of the lingual sulcus (LiS) and its relation to the caudal parahippocampal region that includes the Posterior extension of the collateral sulcus (CSp) and the isthmus, the narrow passage that links the parahippocampal gyrus to the Posterior cingulate gyrus [3].

Materials and methods

We studied high resolution T1-weighted magnetic resonance images of 40 healthy volunteers. We employed 3D-imaging software for an in-depth inspection of the sulci within all three planes. All sulci were identified by marking and color-coding the space between their banks. Images were registered into the Montreal Neurological Institute standardized stereotaxic space [4] which is based on the Talairach space and is internationally used in functional neuroimaging studies.

Results

The LiS was consistently identified as an independent sulcus running underneath and more or less parallel to the

calcarine sulcus. It was found to blend in many cases with the adjacent medial branch of the CSp. The CSp defines the Posterior part of the parahippocampal region and originates around the mid-level of the hippocampus and bifurcates around the level of the isthmus. The anterior part of the LiS originates just Posterior to the isthmus and runs caudally towards the occipital pole without ever reaching it.

Conclusions

These findings provided a definition of the morphological limits of the Posterior parahippocampal region that is now thought to constitute a functional unit for memory processing and distinguished this region from the lingual gyrus bounded by the LiS that forms the ventral part of the parastriate visual areas. These results provide the possibility of a clear and unambiguous localization of activation peaks obtained in functional neuroimaging studies and thus may unravel the anatomo-functional organization of the caudal temporo-occipital region.

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