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Sulcal pattern, extension, and morphology of the precuneus in adult humans

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Abstract: The precuneus represents a relevant cortical component of the parietal lobes. It is involved in visuospatial integration, imagery and simulation, self-awareness, and it is a main node of the Default Mode Network. Its morphology is extremely variable among adult humans, and it has been hypothesized to have undergone major morphological changes in the evolution of *Homo sapiens*. Recent studies have evidenced a marked variation also associated with its sulcal patterns. The present survey contributes to add further information on this topic, investigating the extension of its main folds, their geometrical influence on the lateral parietal areas, and the relationships with the sulcal schemes. The subparietal sulcus, on average, extends 14 mm in its anterior and middle regions and 11 mm in its posterior area. The precuneal area extends 36 mm above this sulcus. The subparietal sulcus is generally wider on the right hemisphere. Males always have larger values than females, but differences are not significant. Sulcal pattern is not correlated with the size of the subparietal sulcus extension. There is a lack of consistent correspondence between hemispheres in the sulcal patterns, pointing further toward a notable individual variability and random asymmetries. The vertical extension of the precuneus influences the height and proportions of the upper parietal profile, but the lateral parietal outline is not sensitive to precuneal variation. There is no correlation between external cortical shape and the size of the subparietal sulcus. Morphological analyses of the precuneus must be integrated with studies on histological factors involved in its variability and, ultimately, with analyses on possible relationships with functional factors.

Keywords: brain anatomy, parietal lobes, subparietal sulcus, cortical folding, shape analysis;