

Age effects on the marginal division of the neostriatum in health adults revealed by a resting functional connectivity

Zhiye Chen¹, Lin Ma¹, Xin Lou¹, and Jinfeng Li¹

¹Department of Radiology, Chinese PLA General Hospital, Beijing, Beijing, China

The marginal division(MrD) of neostriatum was discovered as a flat, pan-shaped zone at the caudomedial margin of the neostriatum and surrounding the rostrolateral border of the globus pallidus in the rat brain using histochemical techniques in 1988, which was proved to be composed of spindle-shaped neurons with special connections(1). The MrD was identified to be involved in learning and memory function of the rat and human brains by behavior and functional MR imaging(2-3). The aim of this study was to explore the age effects on the marginal division (MrD) of the neostriatum in health adults using resting-state functional MRI (rs-fMRI).

Methods:

Conventional MRI, 3D structure images and rs-fMRI were performed in 64 health adults, which were classified into young group and senior group. MrD was defined using manual drawing on structure images(Fig.1), and was applied to the computation of functional connectivity maps. Simple group data was performed with simple t test, and two groups data were performed with analysis of covariance with gender as the covariance.

Results:

The brain regions of functional connectivity related with MrD were located in bilateral middle cingulate gyrus, putamen, thalamus and amygdala in young group, and in bilateral putamen, thalamus, amygdala, insula cortex, rolandic operculum and right supramarginal gyrus in senior group. The brain regions with decreased functional connectivity related with MrD were demonstrated in bilateral middle cingulate gyri, parahippocampal gyri and left hippocampus in senior group compared with young group.

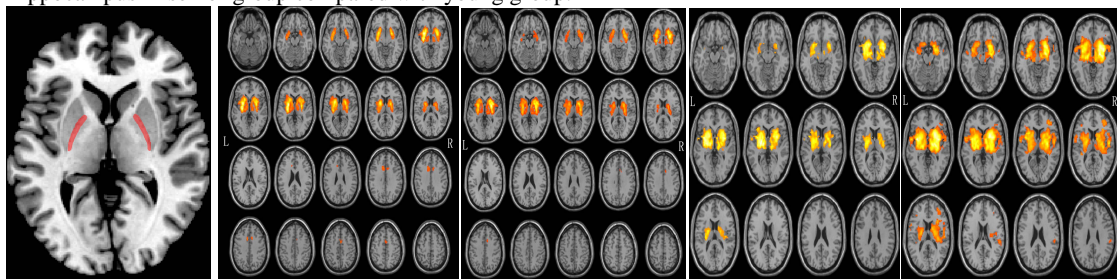


Fig.1

Fig.2

Fig.3

Fig.4

Fig.5

Fig.1 The Marginal division of the neostriatum was manually drew using MRIcron (version 1).

Fig.2 The functional connectivity of the left marginal division were mainly located in bilateral middle cingulate gyrus, putamen, thalamus and amygdala in young group.

Fig.3 The functional connectivity of the right marginal division were mainly located in right middle cingulate gyrus, bilateral putamen, thalamus and amygdala in young group.

Fig.4 The functional connectivity of the left marginal division were mainly located in bilateral putamen and thalamus in senior group.

Fig.5 The functional connectivity of the right marginal division were mainly located in right supramarginal gyrus, bilateral insula cortex, rolandic operculum, putamen, thalamus and amygdala in senior group.

Discussion:

The changes of functional connectivity related with MrD was demonstrated in the aging in health adults, and the functional connectivity of MrD was mainly located in bilateral putamen, thalamus, amygdala.

Reference:

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