NEURAL CONNECTIVITY OF THE AMYGDALA IN THE HUMAN BRAIN: A DIFFUSION TENSOR IMAGING STUDY

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Abstract: Several diffusion tensor imaging (DTI) studies have reported on the anatomical neural tracts between the amygdala and specific brain regions. However, no study on the neural connectivity of the amygdala has been reported. In the current study, using probabilistic DTI tractography, we attempted to investigate the neural connectivity of the amygdala in normal subjects. Forty eight healthy subjects were recruited for this study. A seed region of interest was drawn at the amygdala using the FMRIB Software Library based on probabilistic DTI tractography. Connectivity was defined as the incidence of connection between the amygdala and each brain region at the threshold of 1 and 5 streamlines. The amygdala showed 100% connectivity to the hippocampus, thalamus, hypothalamus, and medial temporal cortex regardless of the thresholds. In contrast, regarding the thresholds of 1 and 5 streamlines, the amygdala showed high conncetivity (over 60%) to the globus pallidus (100% and 92.7%), brainstem (83.3% and 78.1%), putamen (72.9% and 63.5%), occipito-temporal cortex (72.9% and 67.7%), orbitofrontal cortex (70.8 and 43.8%), caudate nucleus (63.5% and 45.8%), and ventromedial prefrontal cortex (63.5% and 31.3%), respectively. The amygdala showed high connectivity to the hippocampus, thalamus, hypothalamus, medial temporal cortex, basal ganglia, brainstem, occipito-temporal cortex, orbitofrontal cortex, and ventromedial prefrontal cortex. We believe that the methods and results of this study provide useful information to clinicians and researchers studying the amygdala.

Key words: *Amygdala, neural connectivity, diffusion tensor imaging, emotion, memory*

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1. Introduction

Amygdala, a large mass of deep nuclei located in the medial temporal lobe, is a part of the limbic system [2, 37]. The amygdala has widespread connectivity with various

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