CONNECTIVITY OF INFERIOR CEREBELLAR PEDUNCLE IN THE HUMAN BRAIN: A DIFFUSION TENSOR IMAGING STUDY

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Abstract: The inferior cerebellar peduncle (ICP) is an important role in motor control, such as coordination of movement control of balance, posture, and gait. In the current study, using diffusion tensor tractography (DTT), we attempted to investigate the connectivity of the ICP in normal subjects. Forty healthy subjects were recruited for this study. DTTs were acquired using a sensitivity-encoding head coil at 1.5 Tesla. A seed region of interest was drawn at the ICP using the FMRIB Software Library. Connectivity was defined as the incidence of connection between the ICP and target brain regions at the threshold of 5, 25, and 50 streamlines. The ICP showed 100 % connectivity to the vestibular nucleus, reticular formation, pontine tegmentum, and posterior lobe of the cerebellum, irrespective of thresholds. In contrast, the ICP showed more than 70 % connectivity with the target brain regions at the threshold of 5 streamlines that is to the thalamus (100 %), anterior lobe of the cerebellum (100 %), pedunculopontine nucleus (95.0 %), red nucleus (92.5 %), primary somatosensory cortex (86.3 %), and primary motor cortex (75.0 %). According to our findings, the ICP had high connectivity, mainly with the sensory-motor related areas. We believe that the methodology and results of this study would be useful in investigation of the neural network associated with the sensory-motor system and brain plasticity following brain injury and other diseases.

Key words: *inferior cerebellar peduncle, restiform body, connectivity, cerebellum, diffusion tensor imaging*

Received: February 4, 2015 **DOI:** 10.14311/NNW.2016.26.025
Revised and accepted: September 19, 2016

1. Introduction

The cerebellum as a key role of motor coordination and cognitive function communicates cerebrum via cerebellar peduncles [34, 36]. The inferior cerebellar peduncle (ICP, also called the restiform body) is located in the dorsolateral border

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