Somatotopic Map and Inter- and Intra-Digit Distance in Brodmann Area 2 by Pressure Stimulation

Mi-Hyun Choi

Department of Biomedical Engineering, Research Institute of Biomedical Engineering, College of Biomedical & Health Science, Konkuk University, Chungju, South Korea

Abstract

The somatotopic representation of the tactile stimulation on the finger in the brain is an essential part of understanding the human somatosensory system as well as rehabilitation and other clinical therapies. Many studies have used vibrotactile stimulations and reported finger somatotopic representations in the Brodmann area 3 (BA 3). On the contrary, few studies investigated finger somatotopic representation using pressure stimulations. Therefore, the present study aimed to find a comprehensive somatotopic representation (somatotopic map and inter- and intra-digit distance) within BA 2 of humans that could describe tactile stimulations on different joints across the fingers by applying pressure stimulation to three joints - the first (p1), second (p2), and third (p3) joints - of four fingers (index, middle, ring, and little finger). Significant differences were observed in the inter-digit distance between the first joints (p1) of the index and little fingers, and between the third joints (p3) of the index and little fingers. In addition, a significant difference was observed in the intra-digit distance between p1 and p3 of the little finger. This study suggests that a somatotopic map and inter- and intra-digit distance could be found in BA 2 in response to pressure stimulation on finger joints.