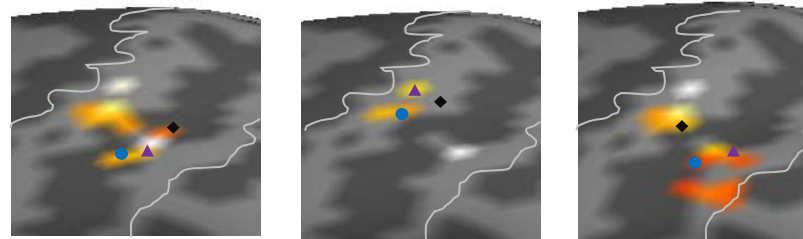


## Somatotopic Map and Inter- and Intra-Digit Distance in Brodmann Area by Vibration and Pressure Stimulation



Mi-Hyun Choi

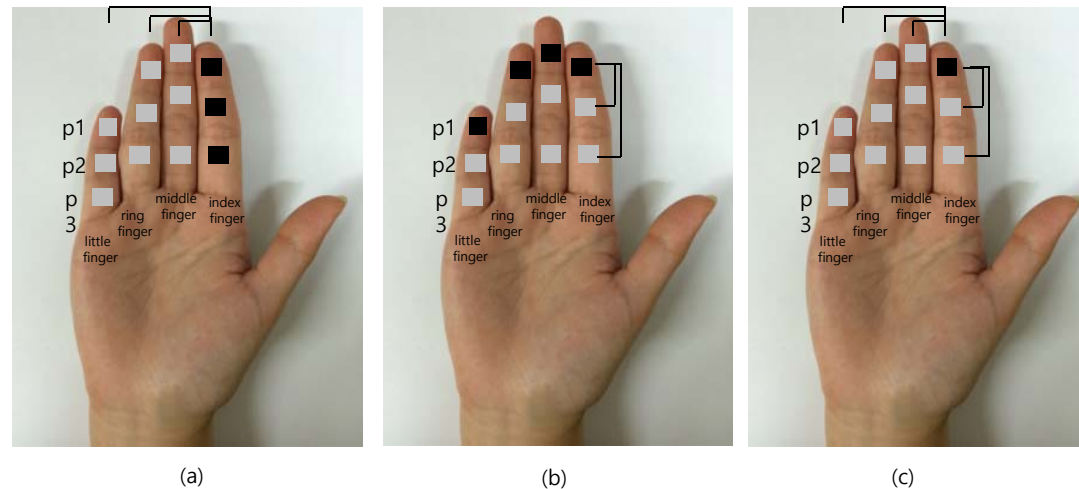
Biomedical Engineering, Research Institute of Biomedical  
Engineering, School of ICT Convergence Engineering, College of  
Science & Technology, Konkuk University, South Korea

# 1. Introduction and purpose

- 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.
- Therefore, the present study aimed to find a comprehensive somatotopic representation (somatotopic map and inter- and intra-digit distance) within BA 3 and 2 of humans that could describe tactile stimulations on different joints across the fingers by applying vibration and pressure stimulation to three joints - the first (p1), second (p2), and third (p3) joints - of four fingers (index, middle, ring, and little finger).



## 2. Methods

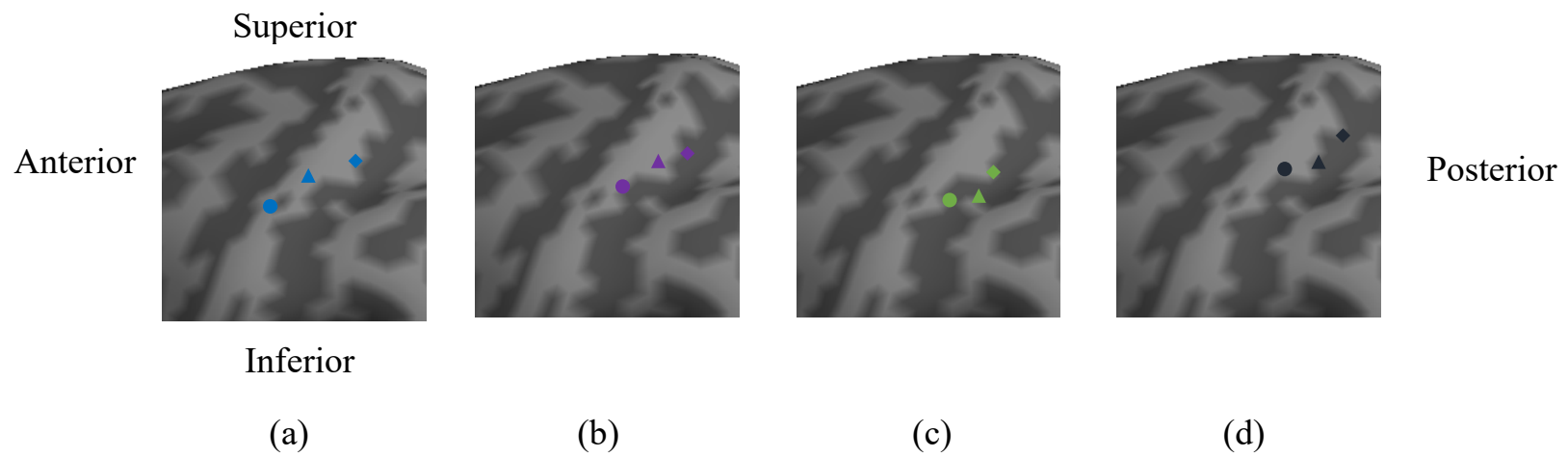


p1: Distal phalanx, p2: Intermediate phalanx, p3: Proximal phalanx  
■ Standard phalanx

Fig. 2. Definition of the stimulated locations.

- (a) The inter-digit distance was calculated as the distance between peak coordinates in BA 3 of each phalanx of the index finger (p1, p2, or p3 in black square) and the corresponding phalanx of other fingers (middle, ring, and little).
- (b) The intra-digit distance was calculated as the distance between p1 (black square) and others (p2, and p3) within each finger.
- (c) The inter-/intra-digit distance was calculated as the distance from p1 of the index finger (black square) to other finger-phalanx combinations.

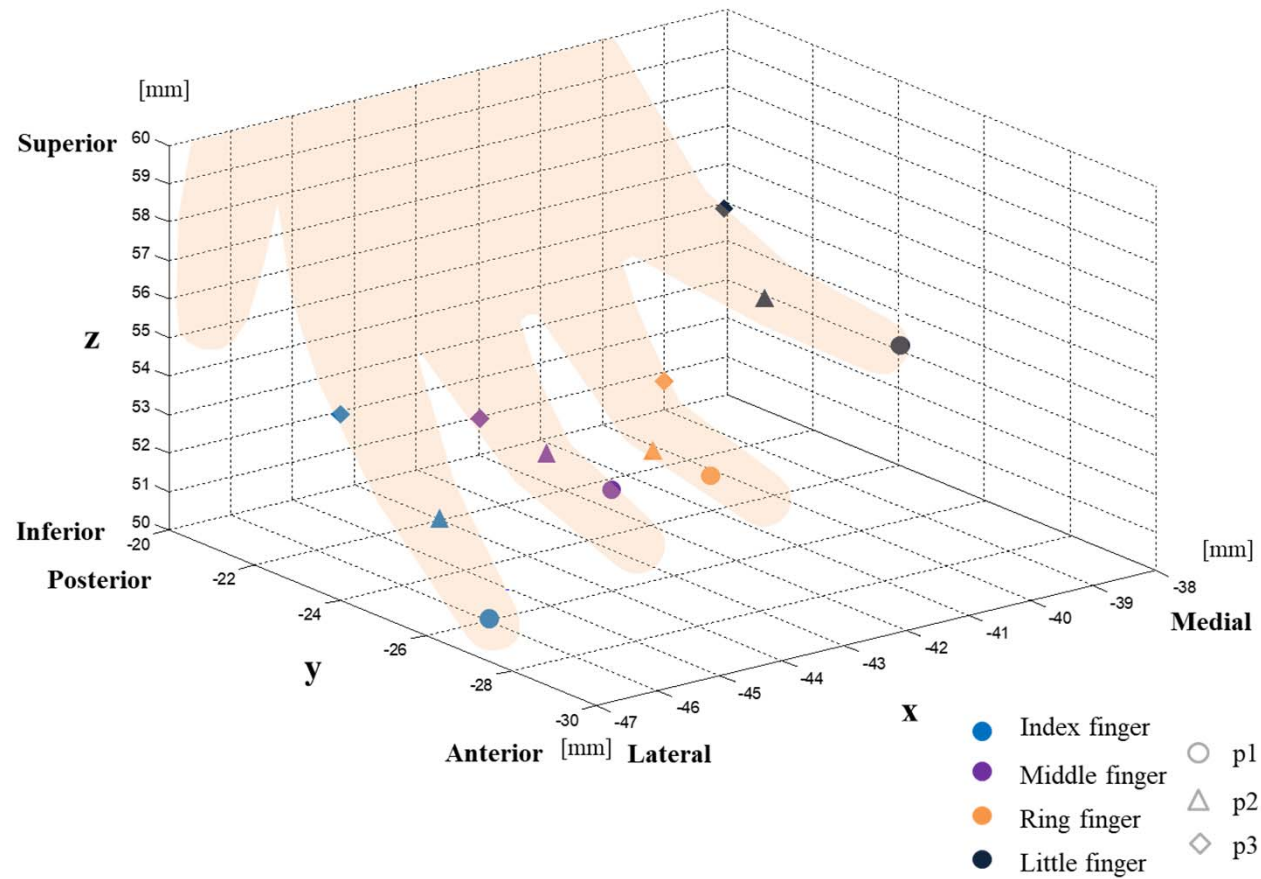
### 3. Results



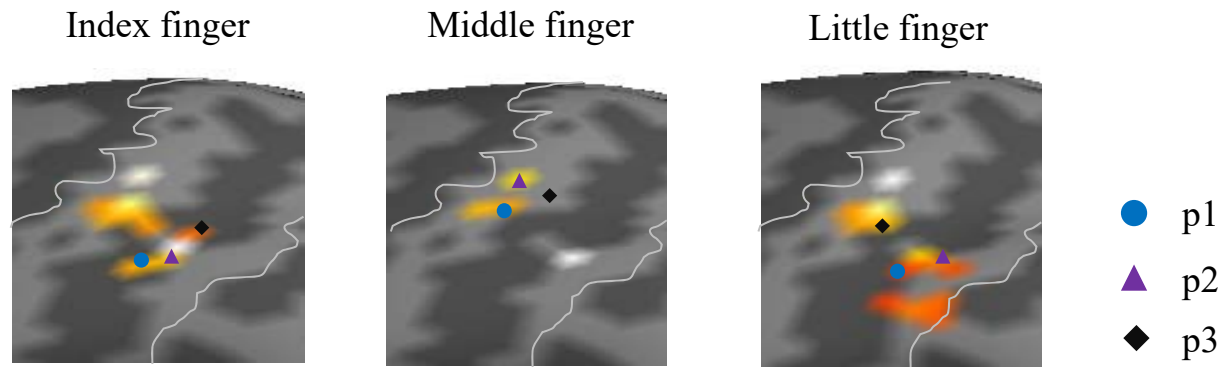
- Index finger
  - Middle finger
  - Ring finger
  - Little finger
- p1
  - △ p2
  - ◇ p3



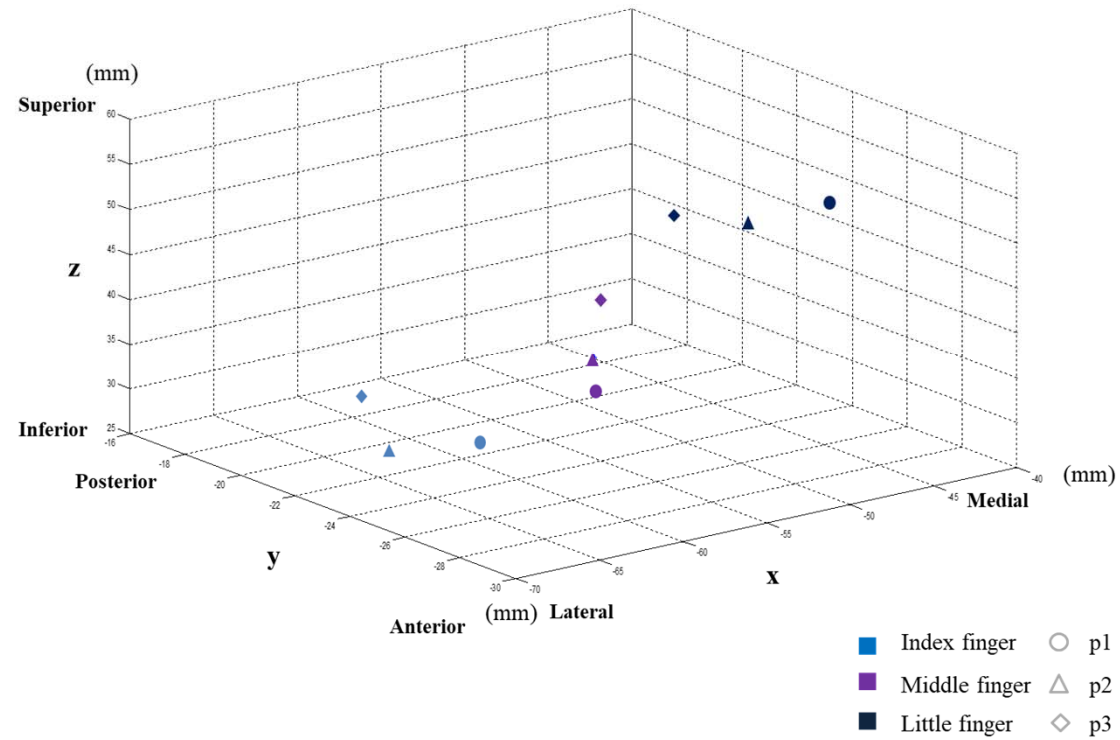
# 3. Results



### 3. Results



# 3. Results



## 4. Conclusion

- We will investigate somatotopic representations of pressure stimulations on the fingers in the bilateral primary and secondary somatosensory cortices to increase our understanding of tactile information processing in the brain.
- The comprehensive inter-/intra-digit somatotopic mapping obtained in this study is expected to contribute towards generating an integrated model for comprehensive and precise somatotopic mapping of fingers and their components.

