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7 Tesla Magnetic Resonance Imaging of Caudal Anterior Cingulate and Posterior Cingulate Cortex Atrophy in Patients with Trigeminal Neuralgia

Young Seok Park, Soon Tae You, Byeong Ho Oh, Hyeong Cheol Moon, Youn Joo Lee
Chungbuk National University, Cheongju,South Korea
Chungbuk National University Hospital, Cheongju, South Korea

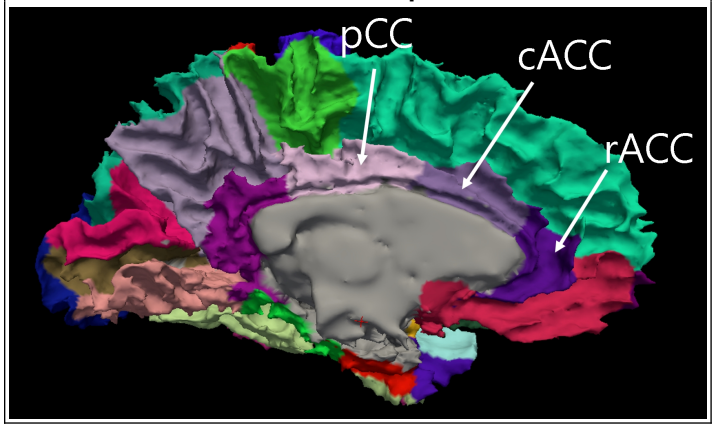
Introduction

The cingulate cortex (CC) is a brain region that plays a key role in pain processing, but CC abnormalities are not unclear in patients with trigeminal neuralgia (TN). The purpose of this study was to determine the central causal mechanisms of TN and the surrounding brain structure in healthy controls and patients with TN using 7?Tesla (T) magnetic resonance imaging (MRI).

Methods

Whole-brain parcellation in gray matter volume and thickness was assessed in 15 patients with TN and 16 healthy controls matched for sex, age, and regional variability using T1-weighted imaging. Regions of interest (ROIs) were measured in rostral anterior CC (rACC), caudal anterior CC (cACC) and posterior CC (PCC). We also investigated associations between gray matter volume or thickness and clinical symptoms, such as pain duration, Barrow Neurologic Institute (BNI) scores, offender vessel, and medications, in patients with TN.

rACC cACC pCC



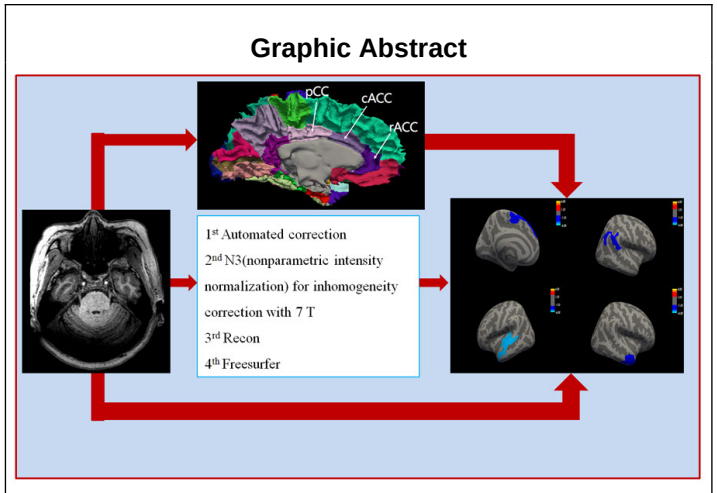
Results

The cACC and PCC exhibited gray matter atrophy and reduced thickness between the TN and control groups. However, the rACC did not. Cortical volumes were negatively correlated with pain duration in transverse and inferior temporal areas, and thickness was also negatively correlated with pain duration in superior frontal and parietal areas

Learning Objectives

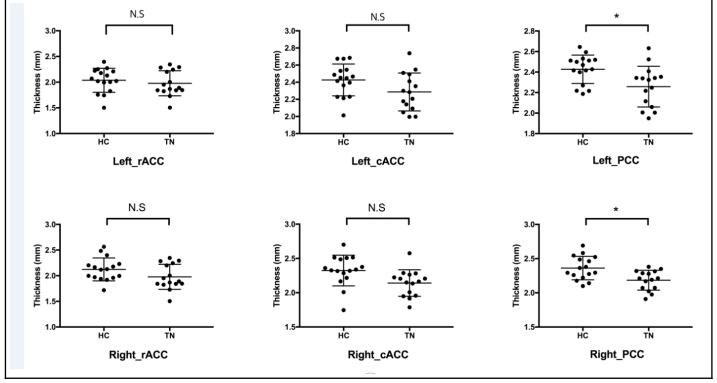
The role of Anteriro cingulate cortex in Trigeminal neuralgic pain using high teslar MRI

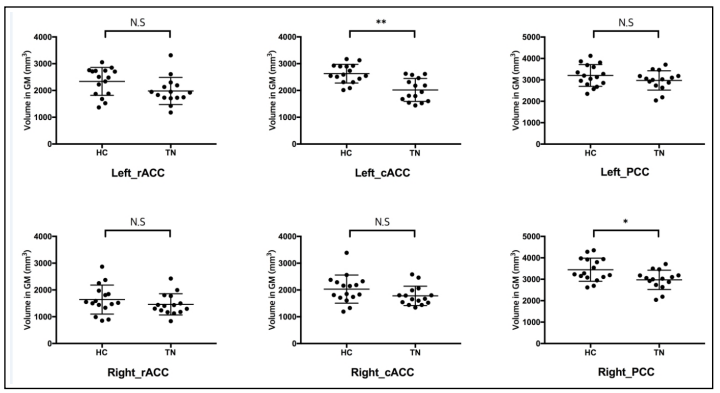
Graphic Abstract



ACC volume analysis using 7T MRI

Gray matter Thickness





Conclusions

The cACC and PCC gray matter atrophy occurred in the patients with TN, and pain duration was associated with frontal, parietal, and temporal cortical regions. These results suggest that the cACC, PCC but not the rACC are associated with central pain mechanisms in TN.

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