Sex-related cortical alterations in patients with Cervical Spondylosis

Talia Oughourlian1,2, Chencai Wang2,3, Noriko Salamon3, Langston T. Holly4, Benjamin M. Ellingson2,3,4,5

1. Neuroscience Interdisciplinary Graduate Program, David Geffen School of Medicine, UCLA
2. UCLA Brain Tumor Imaging Laboratory (BTIL), Center for Computer Vision and Imaging Biomarkers, UCLA
3. Dept. of Radiological Sciences, David Geffen School of Medicine, UCLA
4. Dept. of Neurosurgery, David Geffen School of Medicine, UCLA
5. Dept. of Psychiatry and Biobehavioral Sciences, David Geffen School of Medicine, UCLA

Introduction
Cervical spondylosis (CS) is a progressive degenerative condition in which the cervical spinal cord becomes compressed leading to chronic neck pain. Studies have demonstrated that CS patients undergo cerebral alterations, yet sex-related cortical differences remain unknown. Sex-related morphological alterations have been observed in other chronic pain disorders including IBS and migraine.

Methods
T1-weighted structural MRIs were acquired on a 3T scanner using a MP-RAGE sequence, a TR=2300-2500ms, TE=2-3ms, TI=900-945ms, flip angle=9º, and 1mm3 isotropic voxel size. The Neck Disability Index (NDI) questionnaire was used to measure the severity of disability due to neck pain (0-4=no disability, 5-14=mild, 15-24=moderate, 25-34=severe, 35-50=complete disability). FreeSurfer was used to perform morphometric analyses. Significance was set at p<0.05 with a FDR of 0.05.

We hypothesize patients with cervical spondylosis will exhibit sex differences in cortical thickness and volume in sensorimotor and pain related regions.

Compared to female patients, male patients exhibited significantly thicker cortex in the left precuneus and larger cortical volume in the (left) lingual gyrus, superior frontal gyrus, superior temporal gyrus, rostral middle frontal gyrus, and the (right) lateral occipital cortex, parahippocampal gyrus, insular cortex, and precentral gyrus.

Male patients exhibited a greater positive correlation between cortical volume and NDI in the pars opercularis and the pars orbitalis compared to female patients.

Conclusion
In patients with cervical spondylosis, with or without myelopathy, we observed sex-dependent cortical alterations in regions known to be involved in pain processing. Furthermore, males displayed a greater positive correlation between cortical volume and NDI in the pars opercularis and pars orbitalis suggesting that sex-dependent morphometric changes may be related to symptom severity.

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Figure 1: Patient with cervical stenosis

Figure 2: Sex-related differences within patients

Figure 3: Interaction between sex and NDI score

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