Introduction: Whiplash associated disorders (WAD) are a major cause of disability after motor vehicle accidents and are often without objective clinical findings. Recent clinical and biomechanical studies implicate the cervical facet joints as a major source of neck pain after whiplash. Lord et al (1996) reported an overall 60% prevalence of cervical zygapophysial joint pain in a study conducted on 68 patients referred for chronic neck pain after whiplash. For a portion of cervical spine to be a source of pain that area must be innervated. Currently, information on cervical facet joint innervation is lacking. This study is the first to investigate the innervation of human cervical facet capsules for pain fibers using immunohistochemistry.

Materials and Methods: Seven cervical facet capsules (C2 to C7) were harvested from three unembalmed cadavers donated as part of the Willed Body Program to this institution. Facet capsules were excised en-block with sharp scalpel. They were fixed in 4% paraformaldehyde and frozen till further processing. 40 - 50 micron thick floating sections were taken using a cryostat (Leica CM 3050) and were collected in multi-well plates. Floating sections were processed by avidin biotin peroxidase (ABC) method for protein gene product 9.5, substance P (SP) and calcitonin gene related peptide (CGRP) immunoreactivity at different dilutions. Control sections were treated in the absence of primary antibody. A digital camera attached to the microscope was used to capture stained nerve fiber images to PC.

Results: This study demonstrated the presence of nerve fibers in human cervical facet capsules as evidenced by short segments of nerve fibers immunoreactive to PGP 9.5 (Fig 1), a general neuronal marker. The presence of substance P immunoreactivity (Fig 2) was demonstrated by the presence of nerve fibers in different locations of the sections. The stained nerve fibers were observed as single short fibers or present in groups. Numerous short segments of thick nerve fibers immunoreactive to CGRP were also observed.

Discussion: Bogduk (1982) reported that cervical facet joints are innervated by branches of cervical dorsal rami. Each divides into a medial and a lateral branch. The facet joint capsule receives innervation from the medial branch. McLain (1994) reported mechanoreceptor endings in human cervical facet joint capsules and free nerve endings in the subsynovial loose areolar and dense capsular tissue. However, nociceptive innervation of the cervical facet capsules has still not been demonstrated using immunohistochemistry. Our study appears to be the first to show evidence of nociceptive innervation of the cervical facet capsules by demonstrating SP and CGRP immunoreactive nerve fibers. Cervical zygapophysial joint pain is common among patients with chronic neck pain after whiplash (Lord et al 1996). Presence of nerve fibers immunoreactive to nociceptive proteins in human cadaver facet capsules provides added credence to their role in the etiology of neck pain after whiplash injury.

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References: