IMAGING THE DETAIL OF NERVE ENDINGS IN INTERVERTEBRAL DISC USING AN ADVANCE IMMUNO-FLUORESCENCE MICROSCOPY

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BACKGROUND AND OBJECTIVE: The normal intervertebral disc lacks nerve endings except in the outermost circumferential lamellae of the annulus fibrosus [1]. The aims of the current study were to investigate neural invasion of the disc following an induced anterolateral lesion using an advance immunofluorescence technique.

METHODS: Thick frozen sections of normal and lesion lumbar discs were immunostained according to our previous method [2] using antisera to protein gene product 9.5 (PGP-9.5) as a general neural marker, calcitonin gene-related peptide (CGRP), as a marker for nociceptive nerve endings and tyrosine hydroxylase (TH) as a marker for noradrenergic nerve fibres. The healing process and nerve growths into the lesioned disc were investigated at 4, 8, and 12 weeks post-lesion.

RESULTS: At 4 weeks post-lesion PGP-9.5 immunoreactive (IR) nerve fibres were sparse but become more pronounced at 8 and 12 weeks in the area of the lesion containing blood vessels. Numerous PGP-9.5-IR nerve fibres were detected in the anterior and posterior longitudinal ligaments as well as superior and inferior cartilaginous endplates. The terminals of these nerve fibres frequently penetrated the endplates. Occasional receptor nerve endings were noted within the disc. At 12 weeks post-lesion numerous CGRP-positive nerve endings were seen in the peripheral part of the lesion but no immunoreactivity for TH was seen at any time interval. Normal control disc without lesion showed scattered nerves endings and blood vessels only in the outer most layer of the annulus fibrosus.

CONCLUSIONS: The current results are consistent with some previous reports. They conflict with others with reference to innervation of the nucleus pulposus and the depth of nerve growth in degenerated discs. Rich nerve growth into the site of the lesion and the presence of nociceptor nerve endings in cartilage endplates emphasise the complex innervation of the lesion lumbar intervertebral disc.

REFERENCES: