Cytokine Profile in Intervertebral Disc Tissues from Patients with Discogenic Axial Back Pain Confirmed by Discography

Abstract

Background Context: Back pain affects millions of people worldwide and is thought to be most commonly related to symptomatic degeneration of the intervertebral disc. Unfortunately, imaging studies showing degeneration have a poor correlation with patient symptoms, leaving the clinician without a good tool to determine the location and source of the pain. It is known that degenerating discs produce a wide variety of cytokines which may play a role in the pathophysiology of discogenic pain. Our study sought to quantify the cytokines produced by the intervertebral discs of human patients with severe discogenic pain as compared to those with non-painful discs.

Study Design: Cytokine, chemokine and growth factor expression levels were measured and compared for intervertebral discs from patients with severe discogenic pain and controls.

Patient Sample: Disc tissue was collected from patients undergoing ALIF for severe discogenic low back pain and patients undergoing ALIF for adult scoliosis (controls).

Outcome Measures: Cytokine, chemokine and growth factor expression levels.

Methods: We collected surgically-removed intervertebral disc tissues from patients undergoing ALIF for severe back pain with well-documented preoperative provocative discography and patients undergoing for adult scoliosis (controls). The discs were matched for degree of degeneration according to the Pfirrmann grading scheme and then subjected to protein extraction. The extracted proteins were analyzed using a human cytokine array which detects the presence and levels of 42 cytokines, chemokines and growth factors. The quantitative data was then compared between the discogram positive discs and controls.

Results: Multiple specific cytokines were elevated in the painful discs, compared with control discs of the same grade of degeneration. Cytokines found at significantly higher levels in the painful discs were: Growth-Regulated Oncogene (GRO), Interleukin (IL)-8, Monocyte Chemoattractant Protein (MCP)-1, and Regulated upon Activation, Normal T-cell Expressed and Secreted (RANTES).

Conclusion: Because certain cytokines are elevated in painful discs, these factors deserve further study to determine if these peptides play a causative role in the pain process within the intervertebral disc. Causative cytokines may serve targets for pharmacologic or biologic manipulation in the future as a treatment mechanism for discogenic pain.