Proteoglycan

Proteoglycans are proteins that are heavily glycosylated. The basic proteoglycan unit consists of a “core protein” with one or more covalently attached glycosaminoglycan (GAG) chain(s).

The point of attachment is a serine (Ser) residue to which the glycosaminoglycan is joined through a tetrasaccharide bridge (e.g. chondroitin sulfate-GlcA-Gal-Gal-Xyl-PROTEIN). The Ser residue is generally in the sequence -Ser-Gly-X-Gly- (where X can be any amino acid residue but Proline), although not every protein with this sequence has an attached glycosaminoglycan. The chains are long, linear carbohydrate polymers that are negatively charged under physiological conditions due to the occurrence of sulfate and uronic acid groups. Proteoglycans occur in the connective tissue.

Discs from patients with spondylolisthesis had a reduced proteoglycan content in all section sampled and less collagen in the outer annular layers. In contrast discs containing tears in the posterior annulus were unaltered biochemically, although extended studies on 2 patients indicated that there may be localised biochemical changes in the region of the tear itself. Collagen types I, II, and III and proteoglycan distributions were studies qualitatively by immunofluorescence. Collagen types I and III appeared to be reduced in discs from patients with spondylolisthesis, but again little change was found in patients with tears in the posterior annulus fibrosus [1)].

1)
Roberts S, Beard HK, O'Brien JP. Biochemical changes of intervertebral discs in patients with spondylolisthesis or with tears of the posterior annulus fibrosus. Ann Rheum Dis. 1982 Feb;41(1):78-85. PubMed PMID: 7065733; PubMed Central PMCID: PMC1000869.