Protein synthesis and gene expression in loaded intervertebral disc

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Abstract:

The study that was undertaken used a rat-tail model of scoliosis by applying an apparatus which imposed an angulated deformity and compressive load to the tails of growing rats. The proposed work tested the hypothesis that altered levels of mRNA correlate with alteration in the amount of synthesis of collagen and aggrecan dependant on deformity and load. Using radioactive labeled 'tracers' to measure the incorporation of sulfate and tritium into intervertebral discs, we measured the synthesis of sulfated glycoaminoglycans and collagen. We then made comparisons with the gene expression data from a different set of animals that were subjected to the same experimental interventions. The project utilized RT-PCR measurements of mRNA levels of these proteins and enzymes in loaded and 'control' discs. It was found that are slight trends in the correlation of the altered levels of mRNA and protein synthesis, but not in all cases. We found that there is no significant difference between the concave and convex sides of the intervertebral disc when being angulated to 15 degrees, and also while being angulated and compressed. Also, it was found that compression alone does not have any significant effect on the protein synthesis or gene expression of the disc. This was unexpected data, as it was thought that by altering the stresses on the disc would correlate with the amount of collagen and aggrecan synthesis.