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A hypothetical biomechanical model to explain the degenerative sequence of a lumbar motion segment

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Abstract

In back-treating circles, little is understood of the genesis and pathology of simple backpain. This paper proposes a new model to explain the degenerative sequence, from early pre-pathological disc dehydration towards increasingly complex and intractable spinal disorders. It also provides therapists with an evidence-informed rationale on which to base intervention. Sustained spinal loading from stooped working postures and sedentary lifestyles causes dehydration and reduced metabolic vigour of the lumbar intervertebral discs. Their declining health causes transfer of load from nucleus to annulus, which makes the outer 'ligamentous' layers of the annulus less compliant and more susceptible to incidental trauma. The poor extensibility and scarring of the outer annulus cause the discomfort of common or simple backpain. A 'stiff spinal segment' that can be palpated by human hands. It is Stage 1 of Sarah Key's hypothetical model which she proposes, accounts for between 80-90% of cases of lower back pain.

As the disc loses stretch and the ability to imbibe fluid, impaired function results from loss of disc pressure and loss of disc height. The painful, though benign dysfunction of a stiff spinal segment may become more intractable as it spreads through the motion segment, manifesting first as facet joint arthropathy (Stage 2), and possibly other spinal conditions such as acute locked back (Stage 3), prolapsed intervertebral disc (Stage 4) and ultimately segmental instability (Stage 5). Manual spinal mobilization and spinal decompression techniques improve the nutritional exchange through the disc and restore compliance of the outer annulus which alleviates simple backpain, while also interrupting the catabolic decline of the segment through subsequent more complex stages. [Word count: 234]

Key Words: backpain, intervertebral disc, dehydration, ligamentous, extensibility, arthropathy, instability

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