

## Lumbar Backward Bending and Its Effect on Discs

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A very useful procedure for helping evaluate lower back and extremity pain is McKenzie's "centralization" phenomenon.<sup>1</sup> I have often found that when a patient is put into repeated end-range motions, mostly in extension and sometimes in lateral bending, the distal peripheral pain will retreat toward the originating spinal location.

Donelson et al.<sup>2</sup> evaluated chronic low back patients with backward bending, performed diagnostic disc injection (discogram) to provoke pain, and followed up with MRI. They concluded that patients whose pain centralized had discogenic pain with a functionally competent annulus; patients whose pain remained peripheral had discogenic pain with a much higher incidence of outer annular disruption and a possible "breached annular wall and an incompetent hydrostatic mechanism."

The exact reason why backward extension may reduce pain is still not definitely known. Sometimes lumbar flexion will reduce peripheral pain. It is known that the outer third of the annulus fibrosus is innervated. Coppes et al.<sup>3</sup> found more extensive disc innervation in severely degenerated lumbar discs compared with normal discs. It is well accepted that discs can be the source of back pain without nerve root involvement. Both an inflammatory or chemical disturbance has been implicated, along with excessive mechanical deformation of damaged or sensitized disc tissue.<sup>4</sup>

Reasons given for the reduction and centralization of pain during backward bending include the anterior migration of nuclear tissue and the reduction of forces acting on pain-sensitive tissues, since extension may transfer compressive forces from the disc's vertebral body unit to the apophyseal joints so that nuclear pressure is reduced. Repeated extension movements in vivo have been shown to increase the height of the spine possibly by unloading the disc and permitting rehydration.<sup>5</sup> During extension, the vertebrae may pivot around the apophyseal joints and unload the disc.

A question arises about lumbar extension, since extension also causes a transfer of load from the anterior annulus and nucleus to the posterior annulus, which is a major source of disc pain. The answer may be that patients with degenerated discs have reduced disc height and a damaged annulus or endplate. In extension, the zygapophyseal joints resist compressive forces on the spine, especially when the disc is narrowed. With increased disc degeneration, the posterior annulus would be stress shielded by the neural arch so that the posterior annulus became relatively unloaded in the extended posture.

Adams et al.<sup>4</sup> concluded that pain relief would be anticipated only in those patients whose painful discs can be stress shielded by the neural arch in extension, which also relates to factors such as disc height and the "precise shape of the neural arch." If stress to the posterior annulus is not protected by the neural arch, this may explain why backward bending would increase pain.

Despite these observations, why lumbar extension may or may not relieve pain remains a mystery.

*References:*

1. McKenzie RA. *The Lumbar Spine: Mechanical Diagnosis and Therapy*. Waikanae, New Zealand; Spinal Publications, 1981.
2. Donelson R, Aprill C, Medcalf R, Grant W. A prospective study of centralization of lumbar and referred pain. A predictor of symptomatic discs and annular competence. *Spine* 1997;22(10).
3. Coppes MH, Marani E, Raph T, et al. Innervation of "painful" lumbar discs. *Spine* 1997;22(20).
4. Adams MA, May S, Brian JC, et al. Effects of backward bending on lumbar intervertebral discs: relevance to physical therapy treatments for low back pain. *Spine* 2000;25(4).
5. Magnusson ML, Aleksiev AR, Spratt KF, et al. Hyperextension and spine height changes. *Spine* 1996;21.

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