

Anatomy of The Spine

The Intervertebral Disc

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The intervertebral disc serves as a cushion between adjacent vertebrae. The covering of (annulus) surrounds the stuffing (â€œdisc materialâ€? or nucleus pulposisâ€?).

The intervertebral disc is comprised of three regions referred to as annulus fibrosis, the nucleus pulposus, and the vertebral cartilage endplate.

The intervertebral disc (IVD) is comprised of water, cells (chondrocyte-like cells and fibroblasts), proteoglycans aggregates, and collagen fibers. The outer layer is called the annulus fibrosis it is made up of several layers of interwoven supportive fibers. The vertebral cartilage endplate is comprised of a thin layer of porous cartilage which lies over the bone of the vertebral body. Nutrition to the inner annulus fibrosis and nucleus pulposus depends on the diffusion of water and small molecular substances across the vertebral endplates. The gel-like center (nucleus pulposus) of the intervertebral disc helps provide stability as well as mobility to the vertebral motion segment. The adaptable gel-like center of the inter vertebral disc also allows deformity of the disc under the weight of the body above.

The outer fibers of the disc referred to as the annular fibers are anchored to the adjacent margin of the cartilage and bone. The annular fibers lie in a crisscross relationship to one another. This interwoven ring of fibers increases the strength of the disc. In an axial section, they are configured somewhat like the slices of an onion. Under normal circumstances the annular fibers are able to stretch to a small degree without tearing. The annular fibers are made up of collagen, which is a form of connective tissue. When collagen fibers are looked at under a microscope they have an appearance similar to a spring.

The nucleus (disc material), which forms the center of the disc, is also composed of primarily of water. It is gel like and is contained by inner concentric layers of annular fibers. When pressure is applied to the intervertebral disc, its nucleus deforms not unlike a water balloon with h pressure placed upon it. When the pressure is released the normal nucleus returns to its original shape because it is contained by the strong annular fibers. The healthy intervertebral disc is actually much stronger than the adjacent bone of the vertebrae. The healthy intervertebral disc has high percentage water. Until the third decade of life, the gel of the inner nucleus pulposus is composed of approximately 90% water; however, the water content gradually diminishes over the next 4 decades to approximately 65%. In the babies the intervertebral disc is comprised of approximately 90% water whereas in a 70-year-old individual the disc is approximately 70% or less water. Repetitive movement of vertebrae relative to one another facilitates the movement of fluid into and out of the intervertebral disc.

The intervertebral disc functions like a hydraulic system. It acts as a spacer and shock absorber between the vertebrae. These flexible cushions are located between vertebrae and subsequently allows for the spine to bend or twist. Its presence promotes each functional unit of the spine to move in flexion, extension, lateral bending and rotation.