

The intervertebral discs lie between the vertebral bodies and are fused with them. The intervertebral discs consist of an outer fibrous ring (annulus fibrosus) and a spongy center (nucleus pulposus).

The outer part of the fibrous ring consists of crisscrossed, tight collagen fibers solidly fused with, and thus connecting, the annular epiphysis of each of the adjacent vertebrae. Collagen fibers radiate into the plates of the vertebral bodies from the inner part of the fibrous ring.

The intervertebral disc completely covers the base and upper plate respectively of each adjacent vertebral body. In the bony epiphysis area, the outer part of the fibrous ring extends slightly beyond the circumference of the vertebral body. The spongy center (nucleus pulposus) in the middle of the intervertebral disc is comprised of 80% water, which is stored in its gelatinous interior tissue. Together with the fibrous ring, the spongy center absorbs pressures exerted upon the spinal column and distributes them to the base and upper plates of the neighboring vertebral bodies. On the whole, the intervertebral discs function like a shock absorber, whereby the spongy center performs most of the work by deforming like a “water cushion” that cannot be compressed entirely.

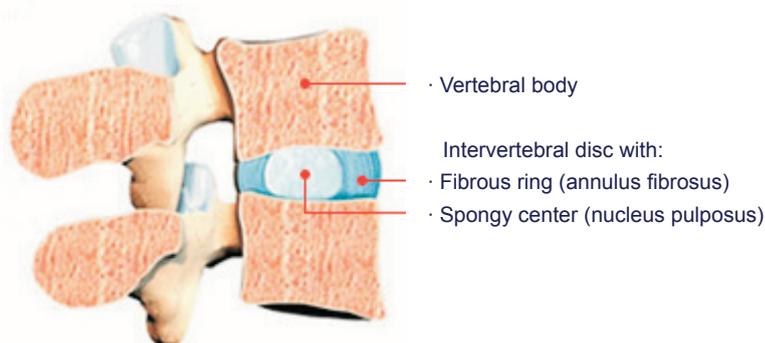
High levels of compression, shearing and tensile forces develop in the spinal column during rotation and flexion movements, forces that have to be absorbed and distributed by the intervertebral discs. Such load applications force fluid out of the intervertebral disc, making it thinner. When the pressure is relieved, for example during sleep, the disc takes up fluid again and becomes thicker. This mechanism explains why a person’s height may vary by 1-2 cm in the course of a day depending on load and strain on the spine.

The intervertebral discs no longer contain blood vessels as of the fourth year of life, and must be supplied with nutrients via diffusion. The intervertebral discs are in direct contact with the bony plates of the adjacent vertebral bodies, which have a porous structure.

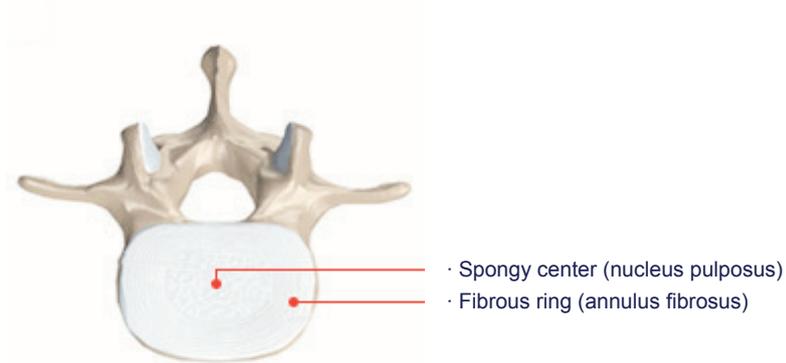
Metabolic exchange takes place through these porous bony structures by way of diffusion contact with the marrow spaces of the vertebrae.

Due to the natural aging process, intervertebral discs lose their capacity to take up water, resulting in a drop in the swelling pressure of the spongy center. This means that pressures to which the vertebrae are exposed are increasingly distributed via the fibrous ring. As the intervertebral disc becomes less elastic and thinner, the base and upper plates of adjacent vertebrae move closer together. This results in the first bone-on-bone reactions involving formation of osteophytes (new bony substance) at the epiphyses of the vertebral bodies – a sign of the degeneration (wearing down) of the intervertebral disc (osteocondrosis, spondylosis).

- Intervertebral disc of a lumbar spine segment



- View of intervertebral disc from above



- View of intervertebral disc from above showing its location in relation to spinal cord and spinal nerves.

