

## How does the spine work?

The spine, which connects the skull to the pelvis, is also called the vertebral column. It consists of 24 segments of block-shaped bone called vertebrae and an additional 9 fused vertebrae that make up the lowest part of the spine, the sacrum and tailbone.

Each vertebrae of the vertebral column has protruding bony areas for the attachment of muscles that are essential for the movement of the spine and the rest of the body.

Between each vertebra are spongy but tough cushions called discs that act as shock absorbers and give the spine its flexibility.

The vertebral column protects the spinal cord and its emerging nerves that run down most of the length of the spine. The spinal cord is the mass of nerve that connect the brain to the rest of the body.

The vertebrae have two major functions: to bear the weight of the body, and to house the spinal cord or spinal nerve roots (cauda equina) within the spinal column.

The spine is arranged in three natural curves:

- 1) The neck region, or cervical spine, made up of 7 vertebrae - where the vertebrae curve forward.
- 2) The trunk region, or thoracic spine, made up of 12 vertebrae - where the vertebral column curves backward, and to which the ribs attach.
- 3) The low back region, or lumbar spine, made up of 5 vertebrae - which curves forward in the same direction as the cervical spine.

When these curves are in their normal alignment, the body is in a balanced position. This distributes weight evenly throughout the vertebrae so they are in a less vulnerable position for strain and injury.

There are two major parts to each vertebra, the vertebral body and the vertebral arch. The vertebral body is the front portion of the vertebrae. It is shaped like a cylinder and is greater in height than the back portion. The vertebral arch is the back portion of the vertebrae. It is an irregularly shaped structure.

At the center of each vertebra is a hole, protected by the surrounding strong bone. Placed together, the central opening of each vertebra makes up the spinal canal through which the spinal cord, cauda equina, or spinal nerve roots pass. Each vertebra has important bony projections called processes that provide sites for the attachment of ligaments and muscles

that are important for the stability and movement of the spine.

On the back part of the vertebrae are two upper and two lower processes that form the joints connecting the back part of each vertebra. These are the facet joints. They are important for movement between each vertebra and for movements of the entire vertebral column as a unit.

### **The Discs of the Back**

Between each vertebra are spongy pads, like soft cushions, called intervertebral discs. Each disc has a soft jelly-like center which is surrounded by a fibrous outer envelope. Together, a disc with the attached part of the vertebra above and below is considered an intervertebral joint. These joints allow for the movement of the back. Healthy discs are elastic and springy. They make up 20% to 25% of the total length of the vertebral column. Initially, the disc contains about 85% to 90% water, which is why it is so elastic. However, this amount decreases to 65% with age, resulting in disc degeneration.

### **The Spinal Cord and the Lower Back**

The nerves that come off the spinal cord are called nerve roots. These nerve roots pass through small openings on either side of the connecting vertebrae and enervate the whole body. Various nerve roots combine to form spinal nerves.

There are five pairs of lumbar (lower back) spinal nerves. The nerve roots that arise from the end of the spinal cord and continue down the spinal canal through the lower part of the spine look like a "horse's tail".