

THE STRUCTURE AND FUNCTION OF A HEALTHY SPINE

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The Structure And Function Of A Healthy Spine

The spine (or backbone) runs from the base of the skull to the pelvis. It serves as a pillar to support the body's weight and to protect the spinal cord. There are three natural curves in the spine that give it an "S" shape when viewed from the side. These curves help the spine withstand great amounts of stress by providing a more even distribution of body weight.

The spine is made up of a series of bones that are stacked like blocks on top of each other with cushions called discs in between to help absorb shock/load.

The spine is divided into three regions:

- **Cervical Spine** - The cervical spine (or neck) is the uppermost part of the spine. There are seven vertebrae within the cervical spine, numbered C1 to C7 from top to bottom. The first two vertebrae of the cervical spine are specialized to allow for neck movement. C1 (also called the atlas like atlas holding the world) sits between the skull and the rest of the spine. C2 (also called the axis) has a bony projection (odontoid process) that fits within a hole in the atlas to allow rotation of the neck. The first spinal curve is located at the cervical spine. It bends slightly inward, resembling a "C." This inward curve is called a lordotic curve.
- **Thoracic spine** - There are 12 vertebrae (T1 to T12) in the chest section, called the thoracic spine. The ribs attach to the spine on the thoracic vertebrae. The curve of the thoracic spine bends outward like a backward "C" and is called a kyphotic curve.
- **Lumbar spine** - The lumbar spine (or lower back) usually consists of five vertebrae numbered L1 to L5. (Some people have six lumbar vertebrae.) The lumbar spine, which connects the thoracic spine and the pelvis, bears the bulk of the body's weight and are the largest vertebrae. The curve of the lumbar spine also bends inward (lordotic curve).

Below the lumbar spine is a large bone called the sacrum. The sacrum actually consists of several vertebrae that fuse together during a baby's development in the womb. The sacrum forms the base of the spine and the back of the pelvis. Below the sacrum is a small bone called the coccyx (or tailbone), which is another specialized bone created by the fusion of several smaller bones during development.

The spine is sometimes discussed by parts: bones (and joints), discs, nerves, and soft tissues (ligaments, tendons, muscles).

Vertebrae (bone)/joints

- **Body** - The body is the front portion and the main weight-bearing structure of the vertebra.
- **Spinous process** - The spinous process is the posterior, or rear, portion of the vertebra. It is the bony ridge you can feel down your back.
- **Laminae** - These are two small plates of bone that join in the back of the vertebra.
- **Pedicles** - Pedicles are short, thick bumps that project backward from the upper part of the vertebral body.
- **Transverse processes** - These are the bony projections on either side of the vertebra where the laminae join the pedicles. Muscles and ligaments attach to the spine on the transverse processes.
- **Facet joints** - These are the spinal joints, the areas on the spine where one vertebra comes into contact with another.

Joints allow for movement, since bones themselves are too hard to bend without being damaged. Facet joints are the specialized joints that connect the vertebrae. The facet joints allow the vertebrae to move against each other, providing stability and flexibility. These joints allow us to twist, to bend forward and backward, and from side to side. Each vertebra has two sets of facet joints. One pair faces upward to connect with the vertebra above and the other pair faces downward to join with the vertebra below.

In the center of each vertebra is a large opening, called the spinal canal, through which the spinal cord and nerves pass. The vertebrae are held together by groups of ligaments, fibrous tissues that connect bone to bone.

Intervertebral discs

Intervertebral discs are flat, round cushioning pads that sit between the vertebrae (inter means “between” or “within”) and act as shock absorbers. Each intervertebral disc is made of very strong tissue, with a soft, gel-like center — called the nucleus pulposus — surrounded by a tough outer layer called the annulus. When a disc breaks or herniates (bulges), some of the soft nucleus pulposus seeps out through a tear in the annulus. This can result in pain when the nucleus pulposus puts pressure on nerves.

Nerves

The spinal cord, the column of nerve fibers responsible for sending and receiving messages from the brain, runs through the spinal canal. It is through the spinal cord and its branching nerves that the brain influences the rest of the body, controlling movement and organ function.

As the spinal cord runs through the spinal canal, it branches off into 31 pairs of nerve roots, which then branch out into nerves that travel to the rest of the body. The nerve roots leave the spinal cord through openings called neural foramen, which are found between the vertebrae on both sides of the spine. The nerves of the cervical spine control the upper chest and arms. The nerves of the thoracic spine control the chest and abdomen, and the nerves of the lumbar spine control the legs, bowel, and bladder.

Soft tissues

Tendons connect muscles to bone and assist in concentrating the pull of muscle on bones. Ligaments link bones together, adding strength to

joints. They also limit movements in certain directions. Muscles provide movements of the body and help maintain position of the body against forces such as gravity.

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