

Anatomy of The Spine

An Overview of the Basics

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The spine or backbone is referred in the health care field as the vertebral column. The vertebral column functions to support the body, to protect neurological structures and to afford flexibility. The vertebral column also provides sensory input to the central nervous system via all of the specialized nerve ending in structures of the spine. This sensory input helps control movement and also alerts the brain about injury or inflammation involving the structures of the spine. The spine has to last a lifetime and therefore should be taken care of. No current engineering structure comes anywhere near meeting the dynamic specification and integration of the human spine.

The spine is a complex area of the body comprised of bones, inter vertebral discs, muscles, joints and ligaments.

The spine has four primary purposes:

- 1) to maintain the structure of the trunk,
- 2) to allow for bodily movement,
- 3) to protect the nervous system and
- 4) to act as a shock absorber with a sensory system to provide feedback to the brain through countless specialized nerve endings in spinal tissues.

The spinal column is a series of bones each referred to as a vertebra. With the exception of the top two vertebrae, each pair of vertebrae are separated by an intervertebral disc which serves as a spacer and provides for movement and shock-absorption. The discs provide the spine with flexibility and serve as shock absorbers. The center of the disc is jelly-like and it is contained by tough circular fibers that are anchored to the adjacent bones (vertebrae). The spinal canal is formed by the pedicles and lamina creating a bony ring to protect the spinal cord and roots.

The spine is a column of functional units stacked upon one another. The functional spinal unit is composed of two vertebral bodies separated by a "cushion" (the disc). Each functional unit moves independent of one another as well as collectively as part of the vertebral column. Each functional unit contains tissues which have a nerve supply and, therefore, are pain sensitive.

The spine is held in place by supportive muscles, tendons and ligaments. The ligaments are tough, non-elastic bands that hold adjacent bones together and provide stability to the spine. The spine is capable of bearing a significant amount of weight as well as bending and twisting. Spinal movement occurs due to the flexibility of the intervertebral disc, the presence of the spinal facet joints and as the result of muscular contractions.

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There is a numbering system used to identify the vertebra of the spine. Counting down from above, there are seven cervical vertebrae (neck), 12 thoracic vertebrae (mid-back) and five lumbar vertebrae (low back). The base of the spine is comprised of the sacrum and at the end of the sacrum; the coccyx (â€œtail boneâ€?) is attached. The vertebral level capable of the greatest amount of rotation is the upper neck between the base of the skull and the second cervical vertebra. The low back is comprised of the L1 through L5 vertebrae which are typically the largest and strongest vertebrae within the spine. The low back or lumbar region supports the greatest amount of weight of any area of the spine. Extending from the neck to the coccyx, there are 31 pairs of nerve roots which exit the spinal canal, on the right or left side through openings in bone (foramina).

The back is complex, an intertwined network of muscles and ligaments which traverse up and down the spine and in between spinal segments. The spine provides stability during the upright posture and during walking, as well as other movements. The spine acts as a natural shock absorber via its curves and the mechanical relationship between each vertebra.