

The spinal column, our central axial organ, looks like a as a double-S-shaped column when viewed from the side (in the sagittal plane). It has to perform both static and dynamic tasks. It provides the body with a stable, yet mobile, supporting structure that carries the weight of the head, trunk and upper extremities while protecting the spinal cord (medulla spinalis) and the roots of the emerging spinal cord nerves (nervi spinales).

Various bony processes on the vertebrae serve as spinal column insertions for back musculature.

Spinal column segments

The spinal column comprises

7 cervical vertebrae (vertebrae cervicales)

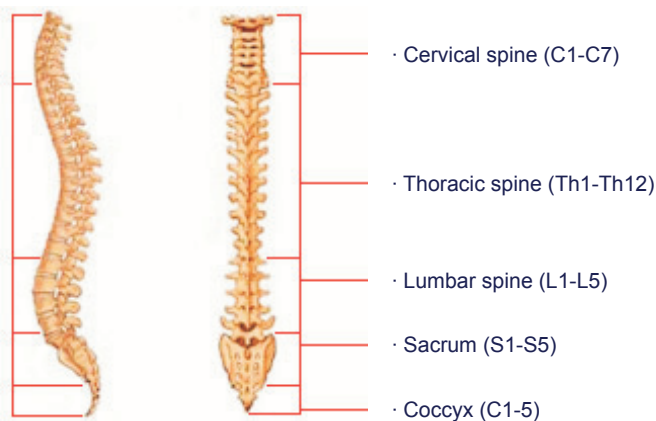
12 thoracic vertebrae (vertebrae thoracicae)

5 lumbar vertebrae (vertebrae lumbales)

5 sacral vertebrae (vertebrae sacrales), fused to the sacrum (os sacrum)

4-5 coccygeal vertebrae (vertebrae coccygeae), fused to the coccyx (os coccygeum)

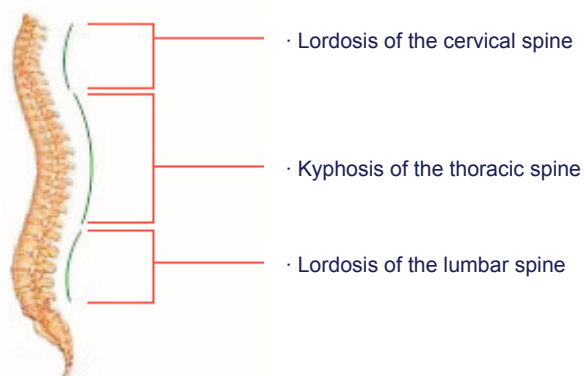
- Side view of the spinal column (sagittal) and rear view (dorsal)



Seen from the side, the spinal column shows typical curves.

The curve toward the front in the cervical and lumbar segments is called lordosis, and the corresponding backward curve in the thoracic spine segment is called kyphosis.

- Side view of the spinal column (sagittal profile)



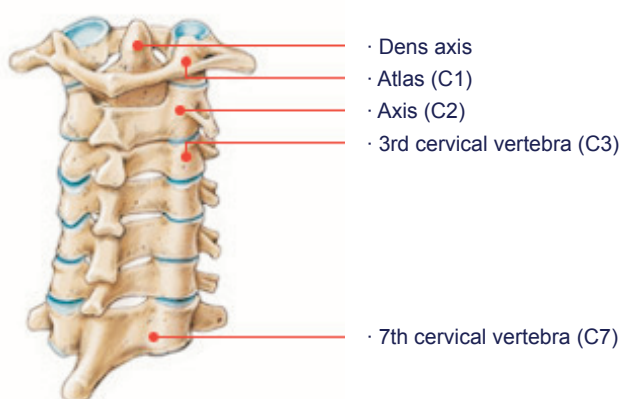
Cervical spine

The cervical spine has 7 vertebrae (C1-C7). It is the segment of the spinal column with the greatest mobility, and has special features that facilitate rapid movement along its whole length.

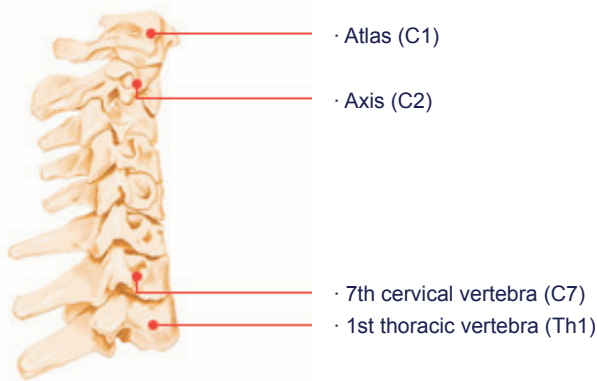
- Cervical spine, location



- Cervical spine, rear view



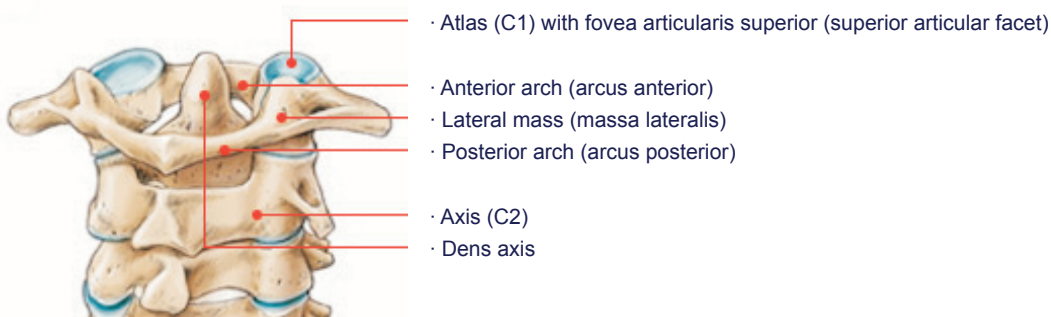
• Cervical spine, side view



The first and second cervical vertebrae, the atlas (C1) and axis (C2), have forms that differ from those of all the other vertebrae, enabling them to support and secure the head and ensure its mobility.

The ring-shaped atlas (C1) is the vertebra that directly bears the weight of the head. It consists of two lateral elements, the massae laterales or lateral masses, connected by the anterior and posterior arches. The atlas is connected to the occipital bone of the skull via articular processes (fovea articularis superior), forming the atlantooccipital joint that allows the head to move forward and backward and incline to the side to a slight degree as well.

• Atlas (C1) and axis (C2), rear view



• Atlas (C1), from above



- Axis (C2), from above



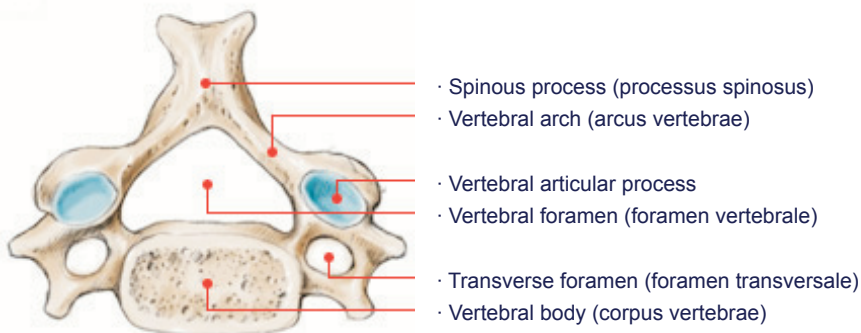
The special structure of the vertebral body of the 2nd cervical vertebra (axis), along with its peg-shaped process, the dens axis, which extends into a gap in the 1st cervical vertebra, facilitates the transition between the atlas and the rest of the cervical spine.

The dens axis is held in position by a tight ligament to prevent it from damaging the spinal cord. the 4 atlantoaxial joints between atlas and axis make it possible for the head to rotate, whereby the atlas rotates eccentrically about the pivot of the axis.

The atlas, axis and occipital bone of the skull are connected by a complex ligamentous apparatus that, in combination with the atlantooccipital joint, the atlantoaxial joints and the attached muscles, gives the head its impressive mobility.

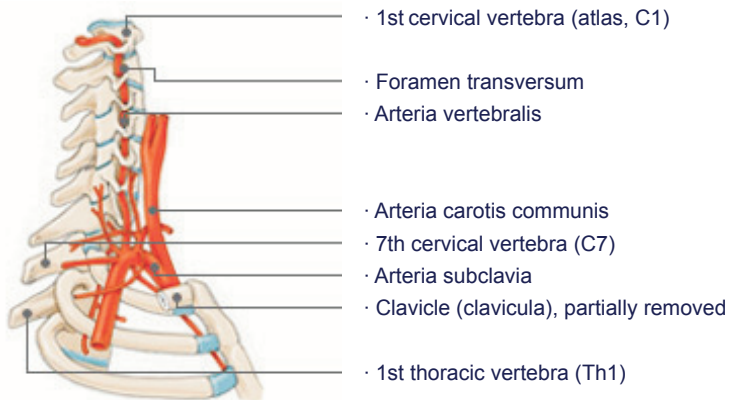
The cervical vertebrae feature large vertebral foramina to accommodate the spinal cord and are smaller than the thoracic and lumbar vertebrae.

- Cervical vertebra, from above



Additional special features of the cervical vertebrae are openings in the transverse processes (transverse foramina, foramina transversaria), through which the vertebral arteries (arteriae vertebrales) that branch off from the subclavian artery (arteria subclavia), run along both sides of the cervical spine to supply blood to the brain.

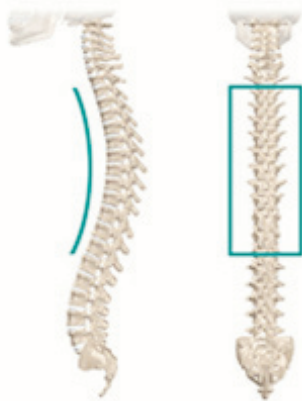
- Course of the arteria vertebralis along the cervical spine, from the side



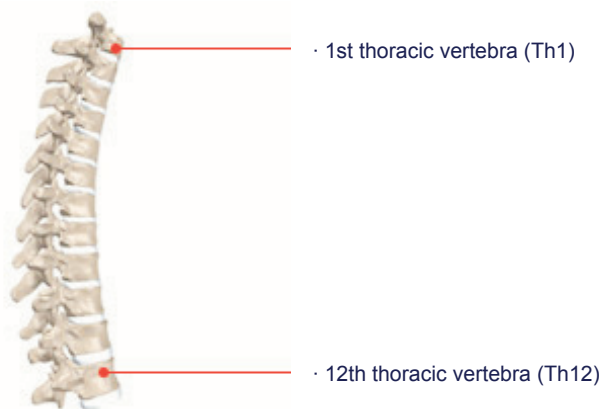
Thoracic spine

The thoracic spine has 12 vertebrae (Th1-Th12) and exhibits a characteristic backward curve or thoracic kyphosis.

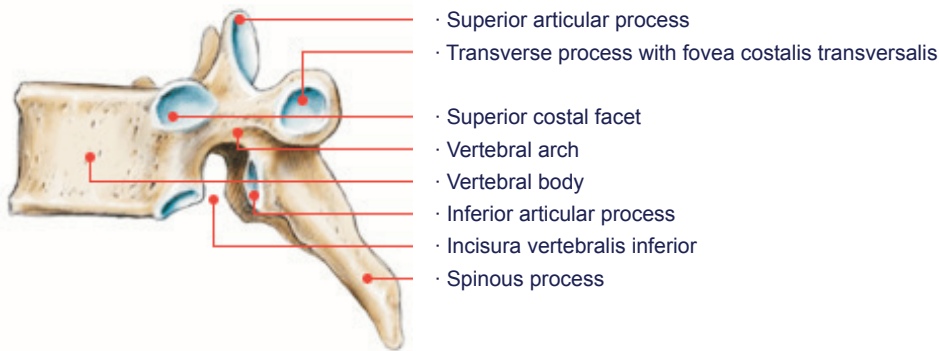
- Thoracic spine, location



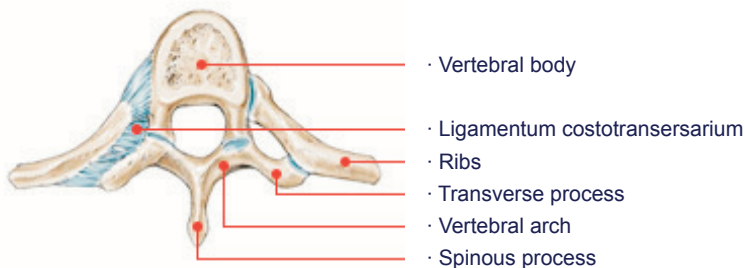
- Thoracic spine, side view



• Thoracic vertebra, side view



• Thoracic vertebra with ribs, from above



The thoracic vertebrae are larger than the cervical vertebrae. They have a comparatively heavy body, with a flat wedge shape somewhat lower at the front than at the back when seen from the side. The thick, three-sided spinous processes point downward and backward. The vertebral foramen is round and smaller than in the cervical vertebrae. A characteristic special feature of the thoracic vertebrae is the presence of the connection points to the ribs of the ribcage. Each transverse process features three articular connections (fovea costalis superior and inferior, and the fovea costalis transversalis), at which points each rib is connected to the thoracic spine via the rib tubercle and head. These joints are protected and secured in position by a tight articular capsule and ligaments.

The 12 thoracic vertebrae, the 12 rib pairs and the sternum form the ribcage (or thorax), which protects the internal organs.

• Ribcage (thorax), rear view

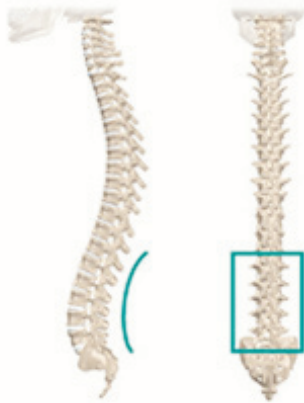


Lumbar spine

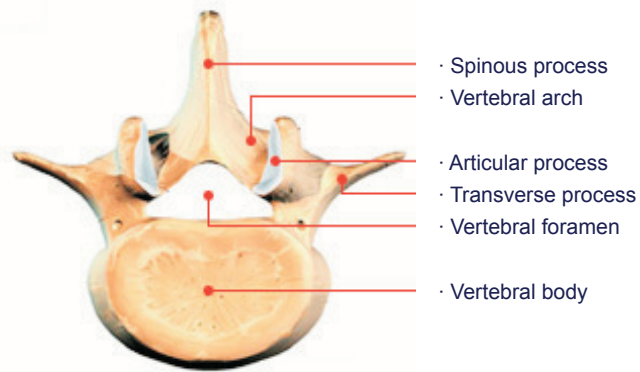
The lumbar spine has 5 vertebrae (L1-L5). The lumbar vertebral bodies are the largest vertebrae of all, since the lumbar spine carries a large proportion of the body's weight. The side view shows their slightly wedge-like shape, similar to the thoracic vertebrae, although in this case the front or ventral side is thicker.

The transverse processes are much smaller than those of the thoracic vertebrae. The spinous processes are thick and horizontally oriented. The vertebral foramina are triangular and smaller than in the thoracic vertebrae. The special structure of the lumbar vertebrae facilitates a high degree of mobility for extension and overextension of the trunk in this spinal segment.

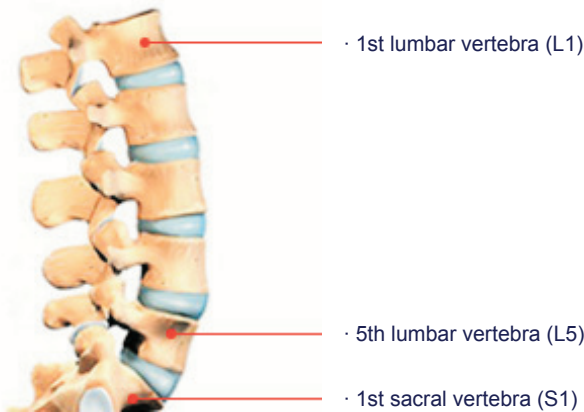
• Lumbar spine, location



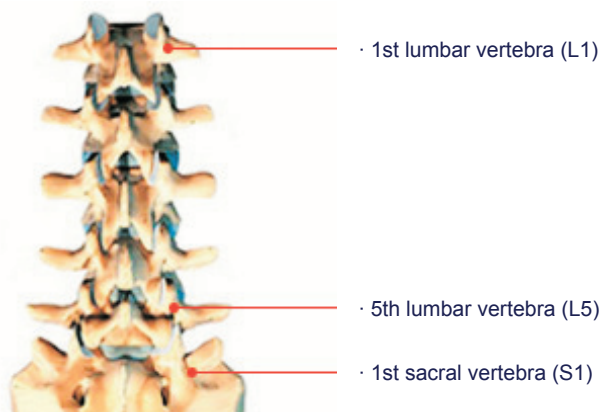
• Lumbar vertebra, from above



• Lumbar spine, side view



• Lumbar spine, rear view



Sacrum/coccyx

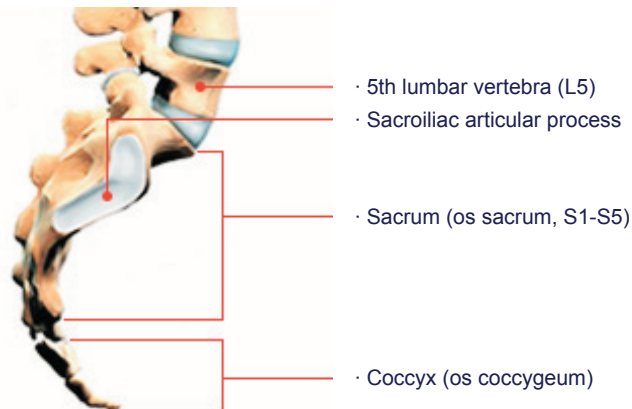
The sacrum (os sacrum) consists of 5 vertebrae (S1-S5) fused together to form a triangular plate, providing a broad upper base upon which the 5th lumbar vertebra rests, then narrowing toward the bottom. The sacrum has 4 openings (foramina sacralia) for nerves and vessels.

Articular processes are located on the sides of the sacrum (articulationes sacroiliacae) connecting it to the iliac bones of the pelvis. This connection (the sacroiliac joint), is secured by a strong ligamentous apparatus and allows only limited mobility.

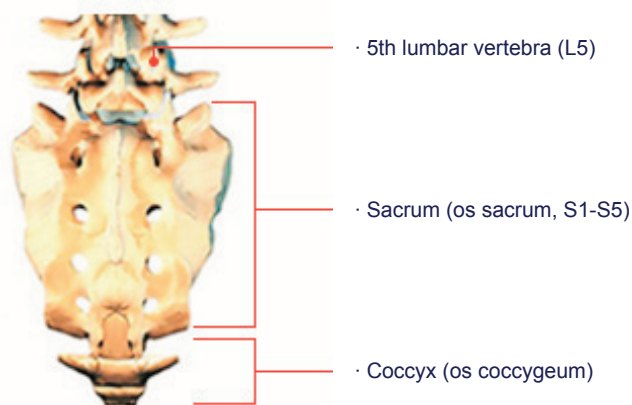
The coccyx (os coccygeum) consists of 4-5 fused vertebrae and provides insertions for the ligaments and muscles of the pelvis.

The pelvis, lower lumbar vertebrae and sacrum are subjected to considerable static loads, which is why the various bony structures in this region are connected by a complex system of thick ligaments.

• Sacrococcyx, side view



• Sacrococcyx, rear view



- Pelvis, lower lumbar spine, sacrococcyx, front view

