**Spine Anatomy and Spine General**

The purpose of the spine is to help us stand and sit straight, move, and provide protection to the spinal cord.

The human spine has 7 Cervical vertebra (C), 12 Thoracic vertebra (T), 5 Lumbar vertebra (L), and 5 Sacral vertebra (S). Generally, these are numbered in the following manner: the first cervical vertebra is C1 and the last cervical vertebra is C7. The first thoracic vertebra is T1 and the last thoracic vertebra is T12. Similarly, the first lumbar vertebra is L1 and the last lumbar vertebra is L5. After the L5 vertebra is the sacrum and although there are 5 sacral vertebra, there typically are no discs intervening here. Between the second cervical vertebra and the first sacral vertebra are intervening discs. The discs are structures made out of cartilage and they provide cushion between each vertebral segment. The discs are then referred to by the vertebra which borders them: the disc between the fifth lumbar vertebra and the first sacral vertebra is the L5,S1 disc, the disc between the fifth and sixth cervical vertebra is the C5,6 disc. Please note, that there are individuals born with either one extra or one less vertebra and this may alter the numbering system at times.

Further, each vertebra joins the above and below vertebra with many different types of joints. Typically each vertebra has 4 facet joints: a right and left superior and inferior facet. The cervical vertebra also have 2 joints which are called uncovertebral joints. Between the first and second cervical vertebra, there is a special joint which allows rotation of the head. The first and second vertebra are thus extremely unique and do not follow most of the typical anatomical rules.

Since the spine helps us to stand straight, its shape is designed to carry the weight of the body and distribute it straight down through the pelvis. Each individual segment of the spine also has its unique curvature. The cervical curvature is called the cervical lordosis (backward bend), the thoracic curvature is called the thoracic kyphosis (forward bend), and the lumbar curvature is called the lumbar lordosis (backward bend).
Cervical Spine (Neck)
Spine image 1 is a front view of the spine and the spinal elements. Spine image 2 is a left sided side view and Spine image 3 is a view of the spine from the back.
Spine Image 1 - Cervical Spine Front View

Vertebral art.
Facet joint
Nerve root
Disc
Vertebra (Body)
Spine Image 2 - Cervical Spine Side View

- Occiput
- Vertebral art.
- Nerve root
- Facet joint
- Vertebra (Body)
- Disc
- Spinuous process
Spine Image 3 – Cervical Spine Back View

- Occiput
- Spinal Cord
- Nerve root
- Lamina
- Facet
- Spinuous Process
Transverse Process
Disc
Vertebral Body
Nerve root

Spine Image 4 – Thoracic Spine Front View
Spine Image 5 – Thoracic Spine Side View

- Transverse Process
- Facet
- Disc
- Nerve root
- Spinal Cord
- Pedicle
- Spinuous process
- Vertebral Body
Facet
Nerve root
Spinal Cord
Transverse Process
Spinous process
Lamina

Spine Image 6 – Thoracic Spine Back View
Spine Image 7 – Lumbar Spine Front View

- Transverse process
- Nerve root
- Vertebral body
- Disc
- Sacrum
Spine Image 8 – Lumbar Spine Side View

- Transverse process
- Spinous process
- Disc
- Pedicle
- Nerve root
- Vertebral body
- Sacrum
The occiput is the base of the skull and the top of the spine. The sacrum is base of the spine and connects the spine to the pelvis. The major bones (white) include the vertebral body and the unco-vertebral joints in the front, the facet joints and the pedicles on the side, the lamina and spinuous process in the back. The bones of the spine protect the nervous elements. The thicker yellow structure (seen on Spine Image 3) is the spinal cord and the thinner yellow structures coursing between each vertebra are the spinal nerves. Additionally, between each vertebra is a disc (grey) and there are two continuous coursing vertebral artery (red) which supply blood to the base of the brain or brainstem. The transverse processes are smaller bones which attach muscles which allow for spinal motion.
Spine General
The spine is surrounded by many ligaments and muscles which help to maintain its stability. The spinal cord is the part of the body through which the brain sends it signal to the remainder of the body. The spinal cord is further protected in a thin sac called the dura and this sac contains water in which the spinal cord may move somewhat. The spinal cord typically ends between the first and second lumbar vertebra and then only exists as nerve roots. The remainder of the spinal nerve roots then in the lumbar spine are collectively referred to as the cauda equine. Between each vertebra on either side, the right and the left, at each disc level, a nerve exits the spinal cord. Each nerve is responsible for either the movement of a specific muscle(s) (myotome) or the sensation from the skin for a specific region (dermatome).

Thus, disease or injury can effect any or every part mentioned above. There may be disease or injury to the discs. Overgrowth, osteophytes (bone spurs), stenosis or pinching, may effect the vertebra or the facets. The ligaments may be effected, etc. The net result of any of these disease processes may result in pressure on the nerves, spinal cord, strain on the muscle, ligament, or joints, and manifest as pain, sensory disturbance, weakness, trouble walking, and/or bladder or bowel difficulties. The latter sections will provide more specific relationships of these diseases.

The following is a normal MRI of the upper spinal cord and spinal elements. MRI techniques may be designed in such a manner as to highlight the spinal cord, the nerves, the water, the disc, etc. Below are a side ways (sagittal) image of the spine and spinal cord with its structures labeled and a slice image of the cervical spine and spinal cord. Notice the fluid space which is white circumferentially around the spinal cord.