

# Back pain management programme

## Back care principles

To understand how to care for your back, it is important to have a basic understanding of its anatomy and function. To look after your back it is very important to make sure that you put the least amount of stress and strains on your back.

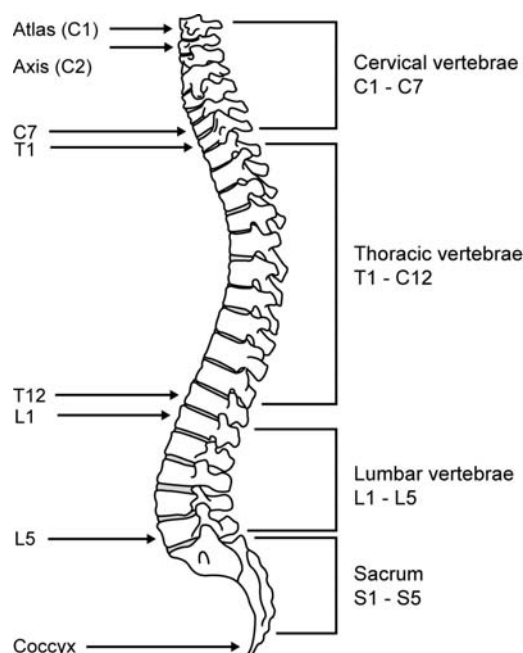
### Anatomy and function of the spine

The spinal column starts at the base of the head and ends at the coccyx. There are 33 bones in the spinal column of which nine are fused vertebrae and 24 are mobile vertebrae. It is subdivided into five distinct areas:

1. The cervical region – the neck – seven vertebrae.
2. The thoracic region – the chest region – 12 vertebrae.
3. The lumbar region – the low back – five vertebrae.
4. The sacrum – a group of five vertebrae that fuse to form a large flattish bone.
5. The coccyx – a group of four vertebrae that fuse during puberty – the tailbone.

The spinal column is straight when viewed from the back, but has four curvatures when viewed from the side, which are the:

1. Cervical curvature – a concave curve which forms several months after birth.
2. Thoracic curvature – a convex curve which appears late in the development of the foetus.
3. Lumbar curvature – a concave curve again appearing after birth.
4. Sacral-Coccygeal curvature – a convex which forms in the foetus.



There is a considerable variation between **vertebrae** or each region, such as shape, size and unique characteristics. However, they all have a few basic similarities. There are two main parts to vertebrae, the **body** and the **arch**.

## The vertebrae

The body is cylindrical in shape, with rough surfaces on either side to attach to discs. It is a very dense bony structure as it acts as the main weight bearing structure of the spine. To facilitate function the size of the vertebrae increases as the column descends.

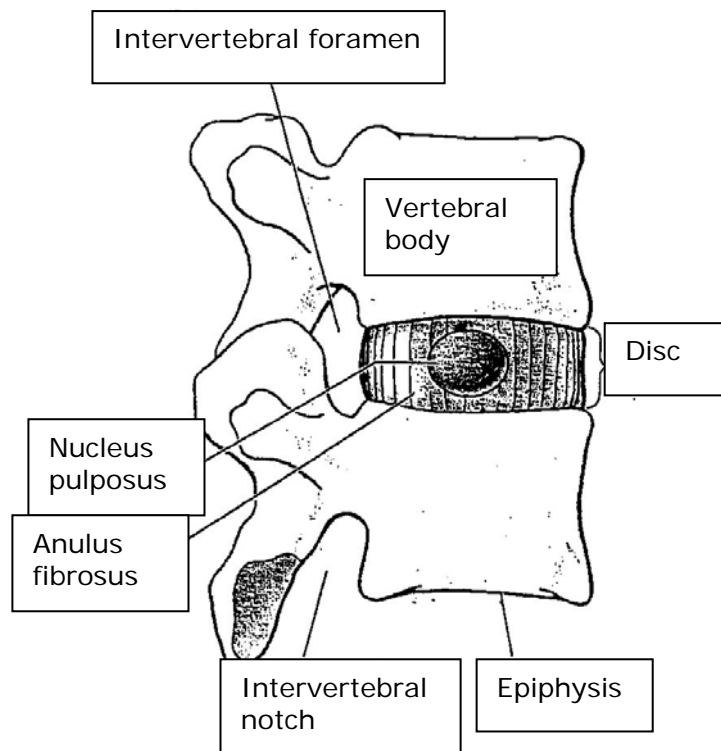
The arch forms around the spinal canal, and has five processes arising from it. At the back is the spinous process (which can be felt or seen on thin people, in the centre of your back). At either side are the transverse process (which are very difficult to feel as they are deep below the muscles). The spinous processes and the transverse process provide attachments for the muscles and the ligaments of the back. The other two processes are again on either side and form joints between the vertebrae above and below. These are called the articular process and act to limit the amount of movement at each joint, especially twisting.

## The discs

Separating each of the vertebral bodies are the intervertebral discs of which there are 23. The discs have an outer fibrous ring, the annulus fibrosis, which is made up of concentric layers of elastic fibres arranged in a cross-ply formation. The inner substance is called the nucleus pulposus, which is a jelly like substance that when young has a water content, but tends to dehydrate as one gets older.

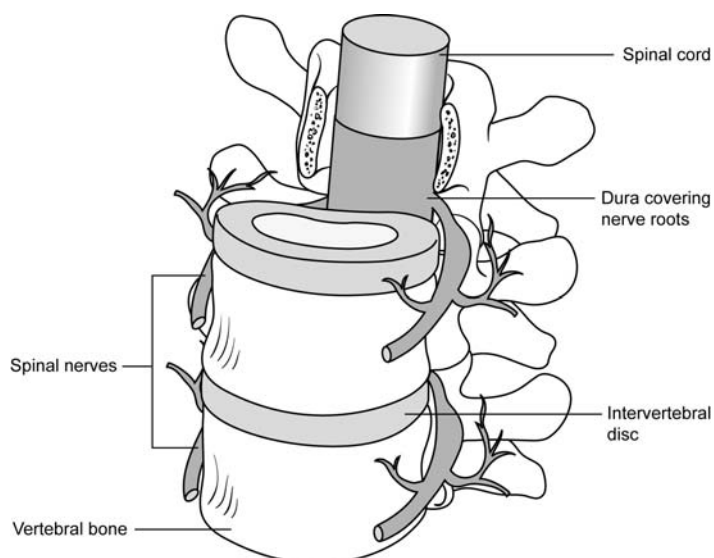
The discs form the joints between two adjacent vertebral bodies, thus permitting movement, they also act as shock absorbers by virtue of their elasticity.

Unlike other spinal soft tissue structures the disc themselves have a poor nerve supply. Consequently considerable damage has to occur to the disc, or for them to impinge upon another structure before pain is felt in the region. Conversely due to the poor blood and nerve supply the healing process in the disc is considerably slower than other structures.



## The nerves

As mentioned earlier each vertebrae has an arch which contains the spinal cord – a group of nerves that descend from and ascend to the brain. There is a gap called the intervertebral foramen formed between each vertebrae where the nerves exit the spinal column and supply the body. The main function of these nerves is to connect the brain to the body, therefore controlling movement and feeling. If the spinal cord is severed as in the case of some severe breaks of the spine, paralysis can occur from that level down.



## The ligaments

Ligaments attach bone to bone. They act to stabilise joints by attaching to bones on either side of the joint. They are elastic in structure which allows for them to change length and therefore for a joint to move. They have their resting length which can be altered by either being continuously stretched or shortened. Both of these will lead to the joint resting in a different position to which it was designed and consequently poor posture.

## The muscles

Muscles can attach to bone as well as other structures. The muscles of the trunk serve both to support and provide the force for movement of the spine. Some of the muscle notably of the stomach and very close to the back work together all the time, as a very low subconscious level to keep the low back in its correct natural curvature. If these muscles do not work, poor posture will occur. There are also relatively strong muscles in the back that are used to doing movement and lifting. It should be noted however that these are still much weaker than the leg muscles.

## The function of the spine

The function of the entire spine has been touched on briefly while discussing the structures that make up the spine. It should be noted how many functions the spine has.

- Firstly it has to support the head
- Then it provides attachments for the thoracic cage (the ribs), which in turn protects all the inter-thoracic organs, and provides struts for the upper limb.
- At the base it provides attachment to the pelvis, where it transmits the weight from the trunk to the lower limbs.
- It also safeguards the spinal cord, allowing exit of the nerves where necessary, therefore supplying movement and feeling to other parts of the body.
- The discs provide effective shock absorbency during walking, running and cycling etc.
- The curves also act as shock absorbers and help maintain balance
- The muscles provide stability for the spine and provide power for movement.
- The ligaments again provide stability to the spine and limit the movement.