

# DISC DEGENERATION, CORE STABILITY AND AEROBIC CONDITIONING



**Top 7  
Cervical**

**Next 12  
behind  
the ribs  
Thoracic**

**Next 5  
Lumbar in  
low back**

**Tail end  
Sacrum**

## THE PARTS OF YOUR SPINE AND HOW THEY WORK

The spine is made up of 25 small bones (vertebrae) that are stacked on top of each other to create the spinal column. Between two vertebra is a soft, gel-like cushion called a disc that helps absorb pressure. In addition to the discs the spine also has small joints at the back called facet joints. The spine itself has four main segments: the cervical (neck), thoracic (behind the rib cage), lumbar spine (low back) and sacrum (behind the pelvis). The normal spine has an "S"-like curve when looking at it from the side. This allows for an even distribution of weight. Each vertebra has a hole in the center, so when they stack on top of each other they form a hollow tube (spinal canal) that holds and protects the spinal cord and its nerve roots.

## SPINAL CORD AND NERVE ROOTS

The spinal cord is a column of millions of nerve fibers that run through the spinal canal. The spinal cord extends from the brain to just below the chest. After this it continues as a collection of nerves called the cauda equina. The spinal cord branches off into thirty-one pairs of nerve roots. These roots exit the spine on both sides through spaces (neural foramina) between each vertebra. The nerves in each area of the spinal cord connect to specific parts of your body. **The spinal cord is thus like a motorway that goes through a bony tunnel and branches off into 31 A roads on either side.**

Fig 1 View of spine from the side

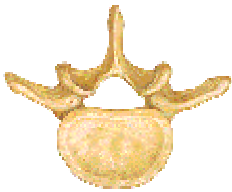
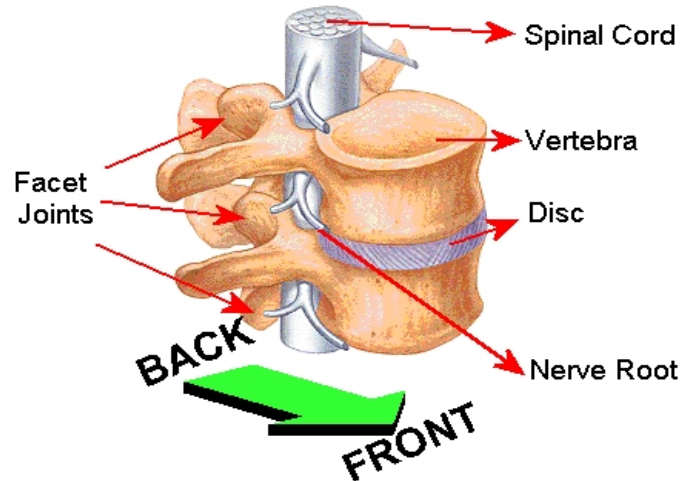


Fig 2 A vertebra viewed from top

## WHAT ARE DISCS?

The discs are the cushions that act as shock absorbers between each of the vertebra in your spine. They are made of cartilage. Each disc has a strong outer ring of fibres called the Annulus Fibrosus, and a soft jelly-like centre called the nucleus pulposus. They are like a jam doughnut. The bread of the doughnut being the annulus fibrosus and the jam in the centre being the nucleus pulposus. The disc contains a lot of water and acts as a soft cushion.



When the disc contains a lot of water we call it hydrated.

## WHAT IS AN MRI SCAN

An MRI scan is one of the ways we can scan and see your spine and nerve roots. This involves going into a tube like machine. You may have to lie still in the machine for about 30 minutes. The machine contains a magnet and sensors which revolve around your body and pick up details. The computer then analyses the details and provides different images. These images are usually cut slices. The lengthwise cuts are called sagittal images. Cross sectional cuts are called axial images. There are also different types of images the MRI scan provides. Some of the types are called T1 and T2 images. There are like negative and positive images that we can produce from a black and white camera. Each type of image provides a different detail. A well hydrated (normal) disc is white in colour on the T2 weighted MRI scan pictures.

## DISC DEGENERATION

Sometimes over a period of time the disc loses its water content and becomes dehydrated. This condition is called disc degeneration. This is a natural ageing process but can occur even in younger age in some individuals. A degenerated disc is black on the T2 weighted MRI scan picture. Disc degeneration causes back pain and only some leg pain. Disc degeneration is not serious and all of us get it with age. Unfortunately some get it a bit earlier. Please also note that disc degeneration symptomatically gets better in 99.9% of the cases and nothing needs to be done. Sometimes the degenerate disc may show a white spot at the back. This is called a High Intensity Zone (HIZ) and may indicate a small tear in the annulus. This is like a small puncture. Sometimes the height of the disc is reduced and becomes like a flat tyre. In some cases the bones on either side of the disc may show some changes on the scan. These are called Modic end plate changes.

## TREATMENT

As stated before disc degeneration symptomatically improves in 99.9% of the cases and nothing needs to be done. In other words the pain decreases with time. It is important to remain active and try to carry on with your job. In very rare

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occasions some surgical intervention may be required for disc degeneration. This document does not discuss the details of that surgical intervention.

1. **Rest and Mobilisation:** If the pain is severe, you may need to take a few days off from work. Please note that rest from work does not mean bed rest. The few days off work is for you to concentrate on your health and your body. It is important that you start an exercise regime as soon as possible. There are two main exercises you need to do. The first is core stability exercise and the other is any Aerobic exercise like walking, swimming, or static cycling.

### a. Core stability exercise.

As mentioned before the spine consists of a series of bones placed on top of each other with the discs in between. This structure is not very stable on its own. It becomes unstable if weight is put on it or when it is moved about. The ligaments hold the bones together and give the spine a certain amount of stability. However, much of the stability of the back is provided by the muscles. This muscular system is often disrupted in people with low back pain and it is useful to attempt to correct this. There are two main muscles that are affected in back pain.

1. The multifidus muscle, at the back, which runs from one back bone to another along the spine.
2. The transversus abdominis muscle. This is a muscle deep in the tummy and encircles the tummy like a jacket.

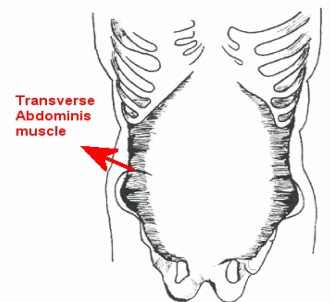
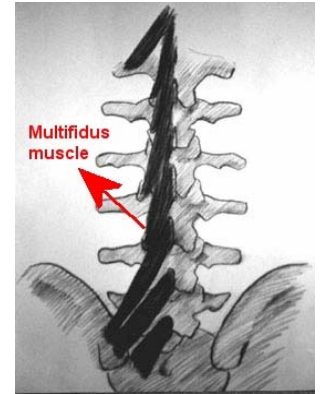
It is only necessary to tense the muscles up to about 25-30% of their maximum capacity to get the best effect. So trying very hard when doing these exercises is not helpful. All the exercises are held for 10 seconds and done 10 times. Three times a day is enough initially. Try however to increase the number done. Remember "**LITTLE BUT OFTEN**". You should over time progress to doing a set of these exercises every hour you are awake. On average one sleeps for about 8 hours a day. If done every hour one should be able to do it 16 times a day. The main two exercises for core stability are

#### 1. Exercise One (Pull belly button to spine)

This exercise can be done whilst sitting, standing or lying down. There are two parts to the exercise. The first is to tighten the pelvic floor and the second is to tighten the muscles that wrap your abdomen. The pelvic floor contains of a sheet of muscle that runs at the base of the pelvis to hold the organs inside. This sheet of muscle is like a hammock. Try to pull up that hammock. This may be the same action you do to stop passing water. Once the pelvic floor is tightened pull your belly button towards your spine. Hold for ten seconds or a count of 10 and then relax. Do not tense up the chest. Remember to keep breathing normally. Give yourself a short time to recover then repeat the process until you have done it ten times. This is an exercise that can be done constantly even while standing, sitting, talking, watching TV etc. You cannot overdo this exercise.

#### 2. Exercise Two (Lift bum off floor)

Lie on your back. Bend your hips and knees. Tighten up the "pelvic floor" as mentioned above. Push down with your feet and lift your bum off the floor and try to keep your trunk and thighs in a straight line, Hold for 10 seconds and then relax. Repeat 10 times.



### b. AEROBIC EXERCISE

Begin a gentle walking program and increase the number of times you walk each day. These exercises again have to be done '**LITTLE BUT OFTEN**'. Some people get pain if they walk for 150 yards. It is important then that one should not walk more than 100 yards on a single occasion. Walking a great distance and fighting the pain barrier only increases the pain and you will then not be able to do any exercise for a few days. This defeats the purpose. Walking 100 yards each time is sufficient. However you should try to walk 100 yards every half an hour that you are awake. This may allow one to walk about 3200 yards or 2 miles in a day if one sleeps for 8 hours and is awake for 16 hours in a day.

2. **Pain medications:** In normal circumstances over the counter Paracetamol, Codeine and or Neurofen can be taken if you have taken them before without problems. If your pain is not controlled talk to your own doctor.
3. **Facet Joint Injections:** This is usually reserved for more severe pain. This involves injecting a steroid and local anaesthetic around the spinal nerves to take away the inflammation.
4. **Surgical Treatment – Fusion, Disc replacement.** Surgery for back pain alone is required very rarely. Spinal Fusion involves attaching two vertebrae together. Disc replacement involves removing the disc and placing an artificial disc in that space.

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