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## Low back (Lumbar spine)

The lumbar spine is comprised of 5 bones (L1- L5 vertebrae) that are separated by intervertebral discs (cartilage with a gel like center). The discs act as a “shock absorber” and allow the spine to move freely during activity.

- Starts below the rib cage
- Larger and thicker, dense bone structures
- Your spinal cord actually ends at the top of the lumbar spine, however a bundle of nerve roots called the cauda equina descend down the lumbar region of the spinal column.
- Each discs functions to hold the upper and lower vertebrae (bones) together and create spaces (nerve passageways called foramen)
  - Spinal nerve roots branch off of your spinal cord, in pairs, and leave the spinal column through the foramen (spaces/holes in the bone).
    - Your nerves are your communication channels from your brain to your muscles, glands, and organs.
- The lumbar spine includes a network of muscles and ligaments that provide the spine with stability and movement.

### Functions

- Provides support and stability of the upper body weight
- Movement: bending (front, back, side to side) and twisting
  - L4-L5 are the primary vertebrae responsible for movement.
- Control movement and sensation to your legs



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## Low Back Pain

Due to the complex make up of the low back it is susceptible to injury and pain.

- Acute pain: sudden onset and last a few days to a few weeks after an injury or tissue damage. Pain subsides as the body heals.
- Subacute pain: Last 6 weeks to 3 months. May need a medical workup to determine the source.
- Chronic pain: Last longer than 3 months and requires medical workup to determine the source of the pain. Generally severe, affecting normal daily activities.

\*\*If low back pain interferes with sleep, mobility, or daily activities, seek medical attention.

## Symptoms

- Pain that is dull or achy
- Stinging, burning pain that moves into the back of the thigh and down towards your feet.
- Muscle spasms

Symptoms may worsen with prolonged sitting or standing.

## Common Causes

- Acute:
  - Lifting a heavy object
  - Twisting while lifting a heavy object
  - Poor posture over time
  - Sudden movements, overstressing the lumbar region (example: a fall)
  - Sports related injury – twisting or large force of impact
- Chronic:
  - Disc herniation
  - Degenerative Disc Disease
  - Sacroiliac joint dysfunction
  - Facet joint dysfunction
  - Spinal Stenosis
  - Spondylolisthesis
  - Osteoarthritis
  - Deformity – Scoliosis or Kyphosis



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- Trauma
- Compression Fracture

### **Treatment**

- Once diagnosed by your doctor, they will discuss possible treatment plans.
  - Rest
  - anti-inflammatory medication (corticosteroids or non-steroidal anti-inflammatory medicines)
  - Steroid injection
  - Surgical intervention
  - Physical Therapy

### **Physical Therapy**

The PT will perform an initial evaluation to test your range of motion, strength, and pain level.

The physical therapist will develop a plan of care and establish goals to assist you in:

- Improving range of motion and flexibility
- Mobilization
- Manual therapy (soft tissue massage)
- Increasing strength
- Decreasing pain through modalities
- Learning proper body mechanics, lifting/carrying techniques, and posture to prevent further injury.



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## Spinal Stenosis

- A narrowing of the spaces within your spine
  - Can cause pressure/compression of the spinal cord and nerves that travel through the spinal column.

## Common Causes

- Aging
- Wear and tear damages of bones which may lead to bone spur
- Thickened ligaments - The spinal cord (nerve) which holds the bones of the spine together, becomes thick with aging and this can bulge into spinal canal
- Spinal injuries - accidents or injuries to the spine
- Herniated or bulging discs
- In some cases it is congenital (present by birth) - it is known as Congenital Spinal stenosis
- Tumor in the spine
- Bone overgrowth

## Symptoms

- Tingling or numbness in legs or arms
- Stiffness and severe back pain
- Difficulty in walking and standing for long time
- Might experience balancing problems
- Resting may provide temporary relief, but the symptoms reoccur

## Treatment

- Once diagnosed by your doctor, they will discuss possible treatment plans.
  - Rest
  - anti-inflammatory medication (corticosteroids or non-steroidal anti-inflammatory medicines)
  - Steroid injection
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## Possible Surgical Interventions

The goal is to permanently decompress the spinal canal.

- Laminectomy: removal of a portion of the vertebrae (lamina) to increase space for the nerves. \*Most Common\*
- Foraminotomy: expanding the foramen (a “hole” or opening in the vertebrae that allows the nerve roots to pass through the spinal column) to allow more space for the nerve roots to pass.
- Spinal Fusion: The joining of two bones together to decrease instability.
  - Bone is used to create a “bridge” of the two vertebrae, allowing them to join and stimulating new bone growth -or-
  - Metal implants (rod, screws, etc) are secured to the vertebrae to hold them together.



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## **Spondylosis**

- Erosion and degeneration of the soft tissue of the spine.
  - This soft tissue serves to protect the vertebrae (back bone) and nerves of the spine from damage.
  - The loss of tissue makes the bones and nerves more vulnerable to damage, leading to pain.
- Typical painful conditions that develop as a result of Spondylosis:
  - Herniated discs
  - Degenerative disc disease
  - Spinal stenosis
- May develop in any part of the spine – Cervical, Thoracic, or Lumbar region
- Main contributor: Age (primarily > 50 y/o)

## **Spondylitis**

- Inflammation of the spinal joints (facet joints).
  - These joints allow the spine to bend and move
- Symptoms are stiffness and pain.
- As the disease progresses, the inflammation may spread to other parts of the body including:
  - Joints between the ribs and spine
  - Hips
  - Shoulders
  - Knees
- Advanced stages, the bones may fuse, making movement very difficult and painful.

## **Spondylolisthesis**

- Forward slippage of one vertebra with respect to the one beneath it.
- Most commonly occurs at L5, slipping over S1.



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## **Spondylolysis**

- Instable slip, crack, or stress fracture of a vertebrae (back bone).
- Most commonly occurs in children and adolescents who participate in sports that involve repeated stress on the low back (gymnastics, football, and weightlifting)

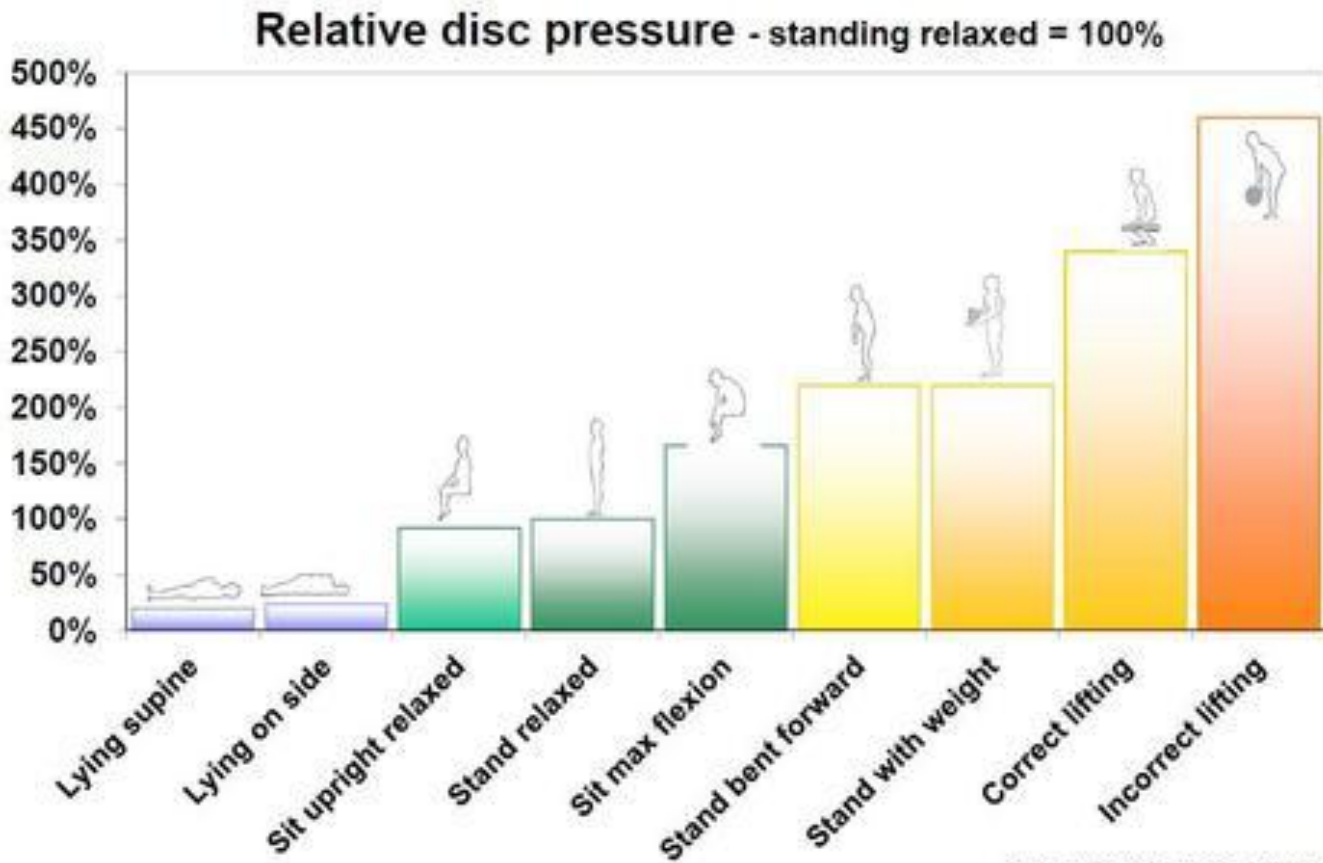


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## Disc Pressure in various positions

- The following illustration depicts compressive forces on the disc in various positions.
- When lying supine (on your back), the spine is at rest in a neutral position, allowing the spine to unweight and the disc to imbibe fluid and expand
  - Example: a sponge taking in water when put in the sink
- Understanding these positions and the stress they place on your back can assist you in assuming appropriate positions during daily life to protect your back.



Source: Wilke et al, Spine 24, #8, P755, 1999