

## Objectives:

1. Define Spondylolisthesis
2. Describe how X-ray and MRI are used to diagnose Spondylolisthesis

### What is Spondylolisthesis?

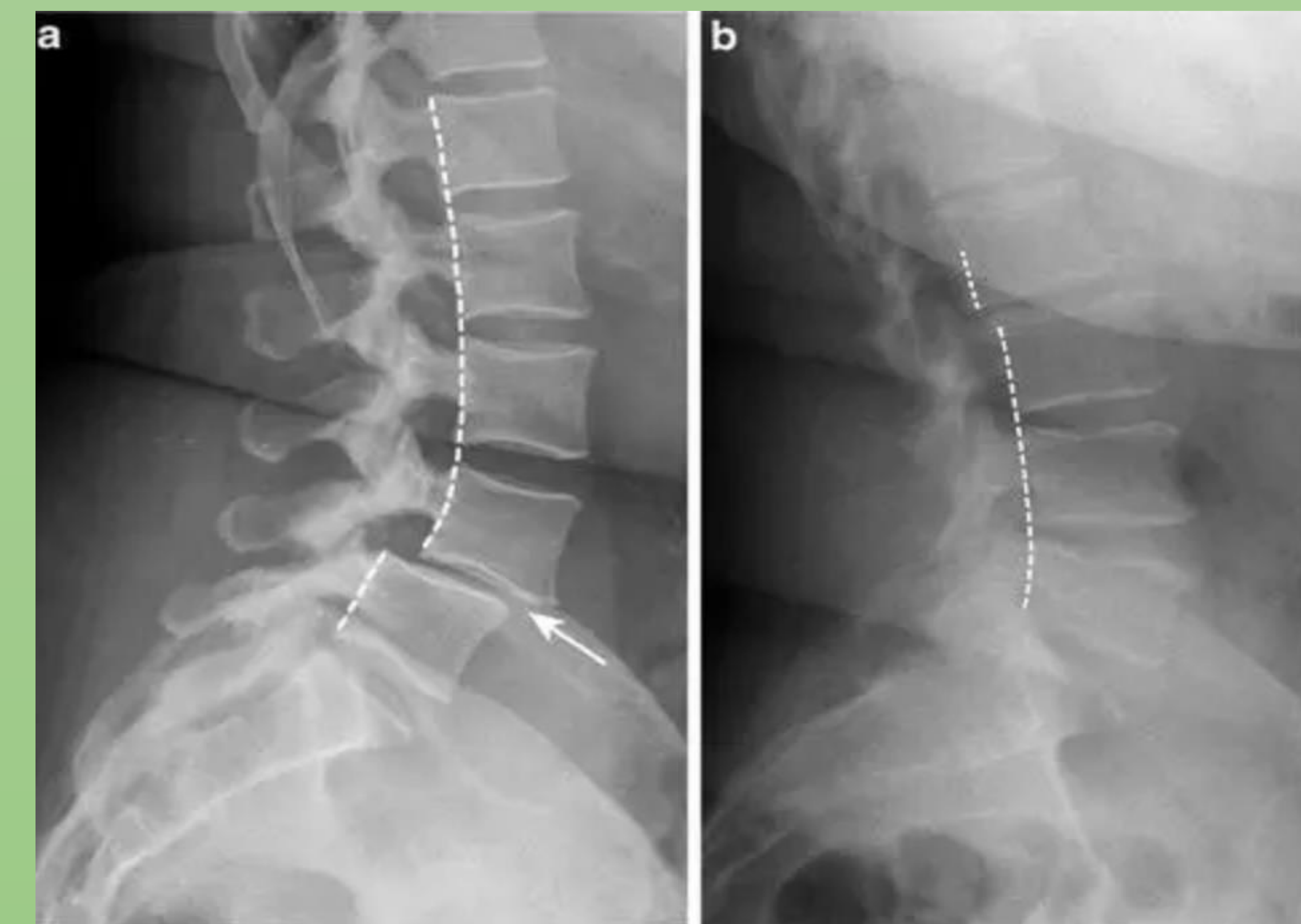
It is a condition that occurs when a vertebrae slips out of its normal alignment and onto the vertebrae below it. This slip can put pressure on the spinal nerves. Spondylolisthesis can occur at any vertebral level but is most often seen in the lumbar spine.

### Symptoms:

- Lower back pain
- Sciatica
- Stiffness in back
- Difficulty walking or standing
- Numbness or tingling in feet

### Common Types of Spondylolisthesis:

1. *Degenerative*- as vertebral disk spaces wear down with age the likelihood of a vertebral slip increases (L4/L5 most common)
2. *Congenital*- occurs when an infant's spine does not develop properly before birth
3. *Isthmic*- occurs when there is a break in the pars interarticularis and the fractured vertebrae slips out of alignment (L5/S1 most common)



# S20 Diagnostic Imaging's Role in Diagnosing Spondylolisthesis

## How X-ray is Used to Diagnose Spondylolisthesis:

A series of X-rays will be ordered by a provider to diagnose a patient with Spondylolisthesis. Most typical is a lumbar spine series as this is where the condition most often occurs.

The lateral view is most important in assessing Spondylolisthesis because it will show a slip of alignment in the posterior cortices of a vertebrae when the condition is present.

### How is Spondylolisthesis is Graded:

The Meyerding classification is used to grade the severity of the slip. A lateral spine X-ray image is assessed by a measurement of the space between two lines drawn along the posterior cortex superior and inferior vertebra. Next, the length of the inferior vertebral body is measured. Finally, the grade is determined by dividing the space between the two lines and the length of the inferior vertebral body.

### Grades of Spondylolisthesis:

- Grade 1: 0 – 25 %
- Grade 2: 26 – 50 %
- Grade 3: 51 – 75%
- Grade 4: 75 – 100%
- Grade 5: > 100%

Grades 1 and 2: *low-grade*

Grades 3, 4, and 5: *high-grade*



## How Magnetic Resonance Imaging is Used to Diagnose Spondylolisthesis:

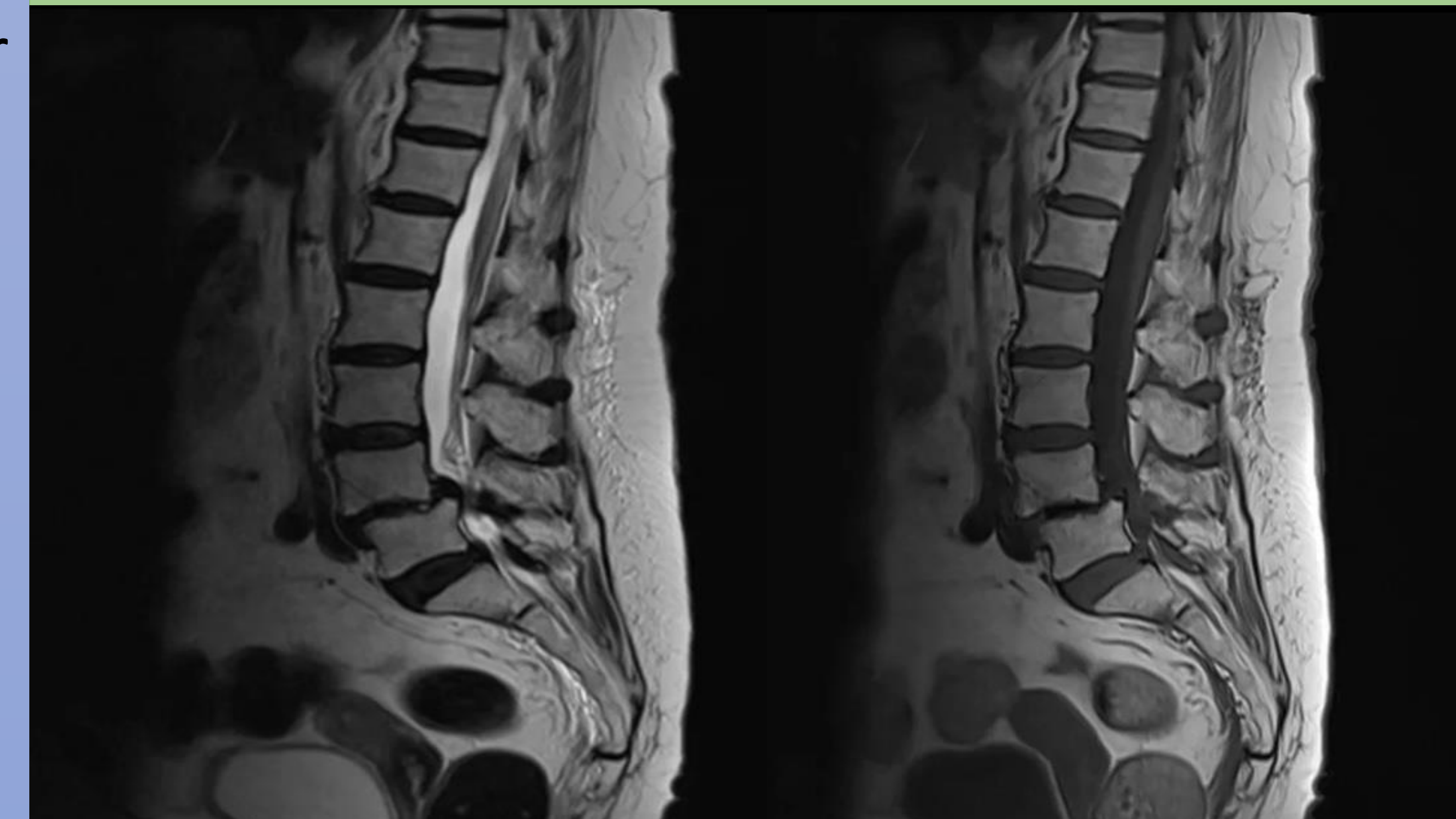
Multiple scanning phases in different body planes will be used to create various images of the patient's spine. MRI allows for better detail of soft tissue compared to X-ray in areas such as spinal cord, intervertebral disks, ligaments, and nerves.

### Scanning Phases:

*T1-weighted phase:* bone marrow appears brightest in this phase. In the case of Spondylolisthesis, the vertebrae that has slipped will appear to have a lower signal density compared to the unaffected vertebrae around it.

*T2-weighted phase:* water appears brightest in this phase and soft tissue is demonstrated well. When Spondylolisthesis is present it is used to evaluate degree of nerve root compression and damage of intervertebral disks.

*Short Tau Inversion Recovery phase:* suppresses signal from fat which makes edema more visible. When Spondylolisthesis is present, the bone marrow of the slipped vertebrae can swell up showing injury to the vertebrae.



### Conclusion:

Spondylolisthesis occurs when a vertebrae slips from its normal alignment and is most often seen in the Lumbar spine. X-ray images are usually taken first to diagnose a patient in which a lateral image will be used to assess and grade any present Spondylolisthesis. MRI can be used to further assess damage to soft tissue caused by Spondylolisthesis and to diagnose the condition as well.