



MED437  
KING SAUD UNIVERSITY



# Thoracolumbar spine

Lecture 5

Please check our [Editing File](#).

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

{ وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ }

# Objectives

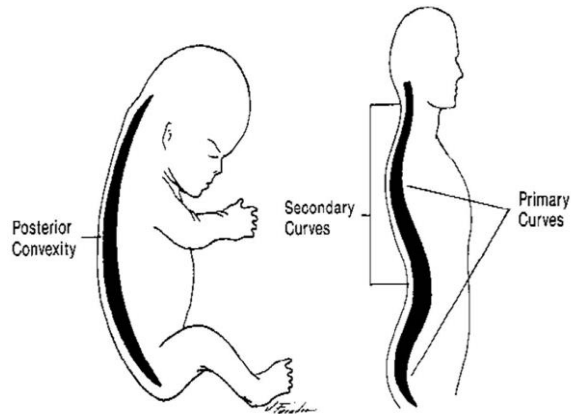
- Distinguish the thoracic and lumbar vertebrae from each other and from vertebrae of the cervical region
  - Describe the characteristic features of a thoracic and a lumbar vertebra
  - Describe the joints between the vertebral bodies and the vertebral arches
  - List and identify the ligaments of the intervertebral joints
  - Compare the movements occurring in thoracic and lumbar regions
  - Knew the normal & abnormal Curvatures of spine
- 
- Text in BLUE was found only in the boys' slides
  - Text in PINK was found only in the girls' slides
  - Text in RED is considered important
  - Text in GREY is considered extra notes

# curvatures of the human's vertebral column

## Normal Curvatures in Spine

Primary (**Thoracic & Pelvic**) "present at birth"

Secondary (**Cervical & Lumbar**)  
"present after birth"

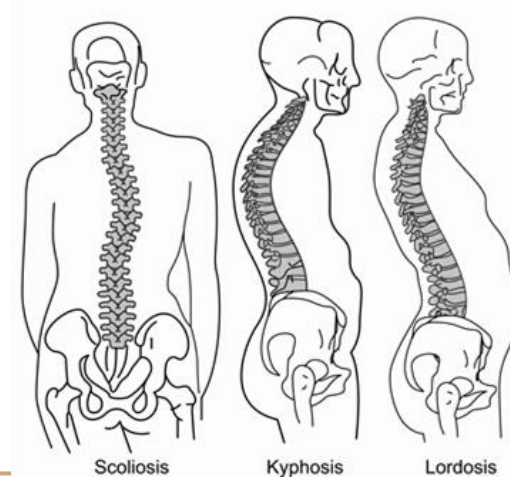


## Abnormal Curvatures in Spine

Exaggerated **Thoracic** curvatures (**Kyphosis**)

Exaggerated **lumbar** curvature (**Lordosis**)

**Lateral** curvature of spine (**Scoliosis**)



# Thoracic Vertebrae

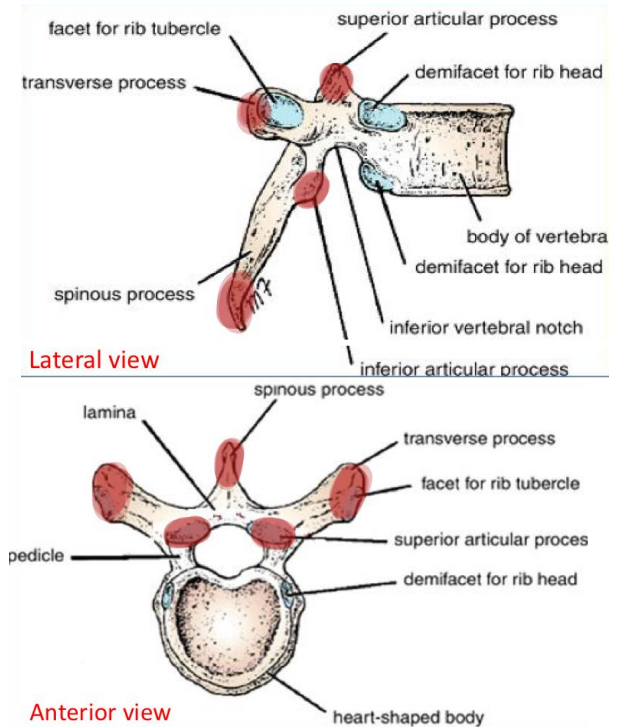
**Most** thoracic vertebrae are **typical** .

“اغلبها وليس كلها متماثلة ، الغير متماثلة ممكن تكوّن اخر كم وحده ”

- have bodies
- vertebral arches
- 7 processes “for muscular and articular connections”

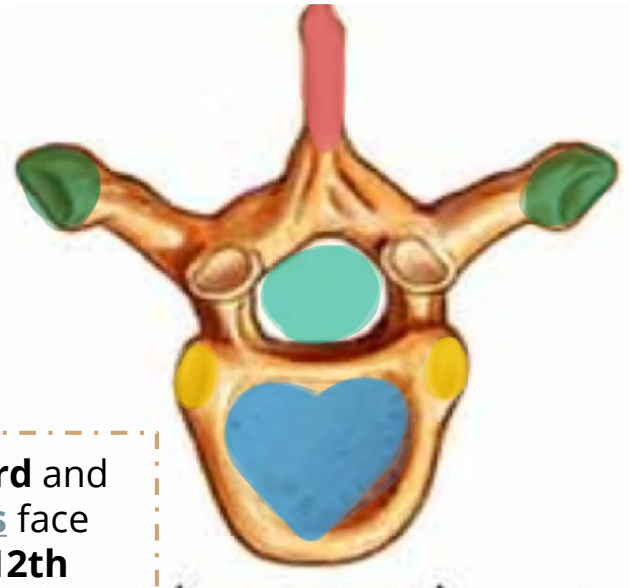
The 7 processes are :

- 2 Transverse process
- 2 Superior articular process
- 2 inferior articular process
- 1 Spinous process



# Characteristics Of Thoracic Vertebrae

- The **body** is **medium** size and **heart shaped**
- The **vertebral foramen** is **small** and **circular**
- The **spines** are **long** and **inclined downward**
- **Costal facets** are present on the **sides of the bodies** for articulation with the **heads of the ribs**
- **Costal facets** "surface" are present on the **transverse processes** for articulation with the **tubercles of the ribs**  
**(T11 and 12 have no facets on the transverse processes)**  
"Because the 11 and 12 ribs are Floating"

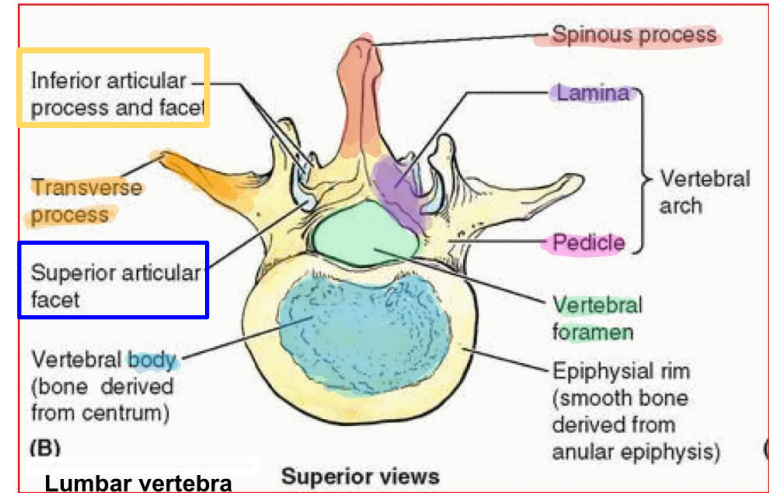


The **superior articular processes** bear **facets** that face **backward** and **laterally**, whereas the facets on the **inferior articular processes** face **forward** and **medially**. The **inferior articular processes** of the **12th vertebra** face **laterally**, as those of the **lumbar vertebrae**.

- The articular "superior & inferior" → Making a joint with each other

# Characteristics Of Typical Lumbar Vertebrae

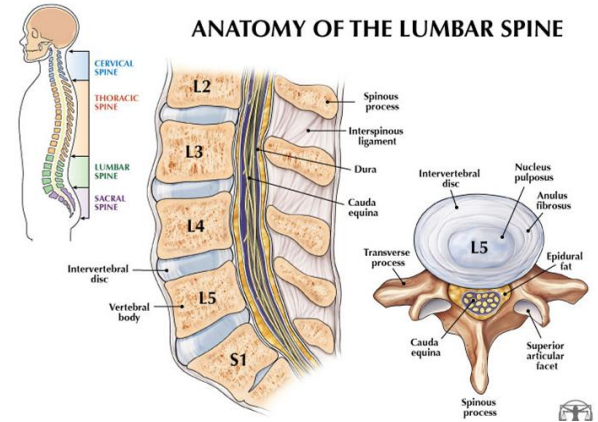
- The **body** is **large** size and **kidney** shaped
- The **vertebral foramina** are **triangular**
- The **laminae** are **thick** "joins transverse with spinous"
- The **pedicles** "joins body with transverse" are **strong** and **directed backward**
- The **spinous process** are **short** , **flat** & **quadrangular** and project **backward**
- The **transverse processes** are **long** and **slender** "no costal facet"



The **superior articular processes** bear facets that face **backward** and **laterally** whereas the facets on the **inferior articular processes** face **forward** and **medially**

# Lumbar Vertebrae (L5)

- The **largest movable** vertebra
- It has **massive body** and **thick transverse processes**
- It **carries the weight** of the whole upper body
- The **body** is **largely** responsible for the **lumbosacral angle** between the **long axis** of the **lumbar vertebral column** and that of the **sacrum**
- **Body weight** is transmitted from **L5 vertebra** to the base of the **sacrum**, formed by the superior surface of S1 vertebra

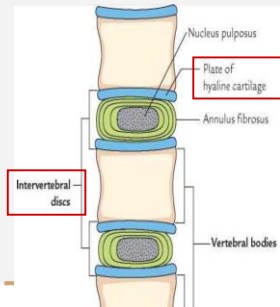


The fifth lumbar vertebra is by far **the most common site** of **spondylolysis** “fracture” (defect in the pars interarticularis of the vertebral arch) **spondylolisthesis** “displacement” (the forward displacement of a vertebra)

# Joints

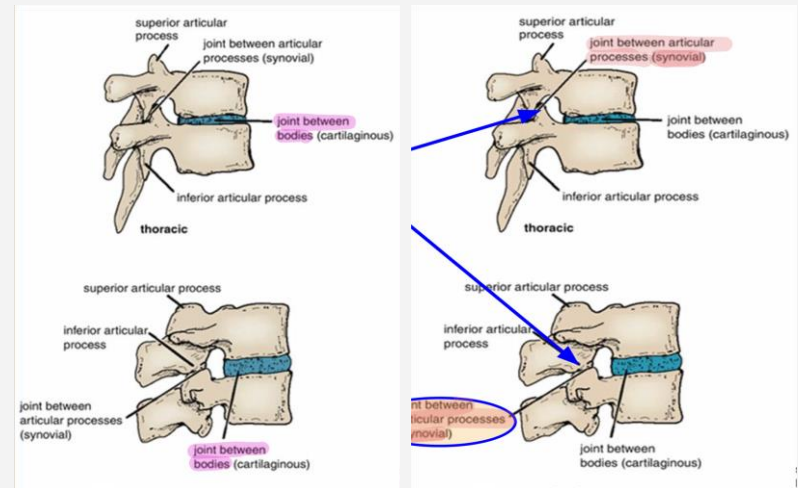
## Joints between two vertebral bodies

- **Cartilaginous joint**
- The **UPPER** and **LOWER** surfaces of the **BODIES** of adjacent vertebrae are covered by thin plates of **Hyaline Cartilage**
- Sandwiched between the plates of hyaline cartilage is an **intervertebral disc of fibrocartilage**
- The **COLLAGEN FIBERS** of the disc strongly unite the bodies of the two vertebrae



## Joints between two vertebral arches

- **Synovial joints**
- Between the **SUPERIOR** and **INFERIOR** Articular process of adjacent vertebrae





# Intervertebral Discs

- The **intervertebral discs** are responsible for **one fourth ( ¼ )** of the **length** of the **vertebral column**
- They are **thickest** in the cervical and lumbar regions, where the **movements** of the vertebral column are **greatest**
- **No discs** are found in the **1st & 2nd cervical vertebrae** or in the **sacrum** or **coccyx**

## Each disc consists of :

1) **Peripheral** “ribbon shape” part “shock absorptions” : the **annulus** “circular” fibrosus, composed of fibrocartilage

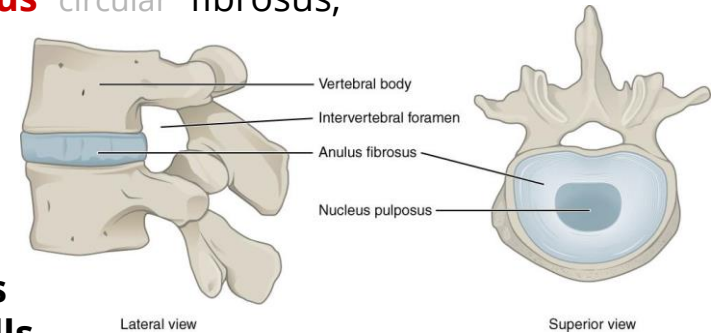
From 436 team

annulus= a: no or out, nulus: like nucleus so it's not the nucleus or outside it

(fibrosus= because it's composed of fibrocartilage)

2) **Central part:** the **nucleus pulposus**, a mass of **gelatinous material**, a **lot of water**, **few collagen fibers & cartilage cells**

(pulposus = زي البؤبؤ في وسط العين)



Lateral view

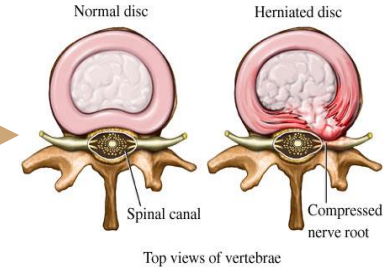
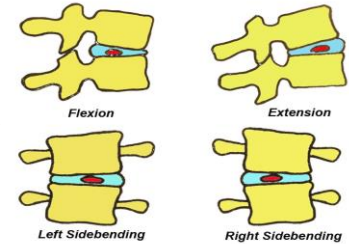
Superior view

# Function of the intervertebral Discs

Allow vertebra to **rock** forward or backward on another like **flexion** and **extension** of **vertebral column**

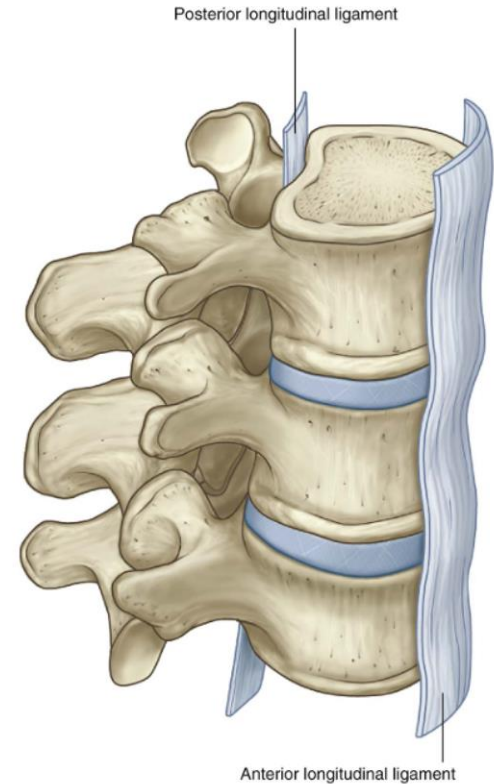
**Serve as shock absorbers** when the load on the vertebral column increased, as when one is **jumping** **from a height**

Sometimes, the **annulus fibrosus** ruptures allowing the **nucleus pulposus** to **herniate** and **protrude** into the **vertebral canal**, where it may press on spinal nerve roots, spinal nerve, or even spinal cord



# Ligaments

- **The anterior and posterior longitudinal ligaments** run as continuous bands down the **anterior** and **posterior surfaces** of the vertebral column **from the skull to the sacrum**
- The **anterior longitudinal ligament** is **wide** and is **strongly** attached to the front and sides of the vertebral bodies and to the intervertebral discs
- The **posterior longitudinal ligament** is **weak** and **narrow** and is attached to the posterior borders of the discs
- These ligaments **hold the vertebrae firmly together** but at the same time permit a **small amount of movement** to take place between them



# Ligaments

## Ligamentum flavum:

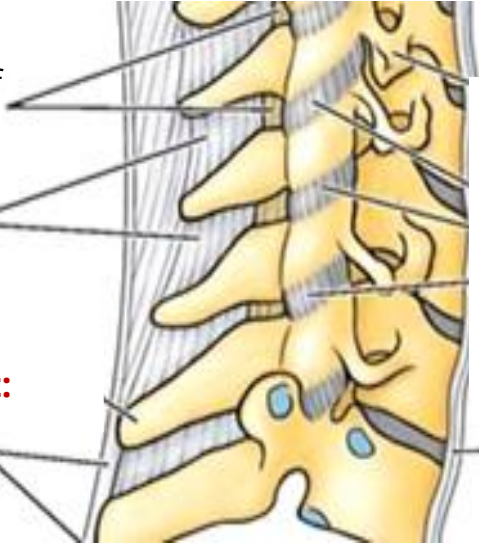
connects the laminae of adjacent vertebrae

## Interspinous ligament:

connects adjacent spines

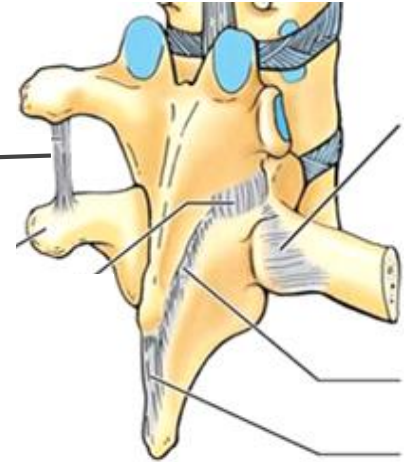
## Supraspinous ligament:

runs between the tips of adjacent spines



## Intertransverse ligaments:

run between adjacent transverse processes



# Movement Of The Thoracolumbar Spine

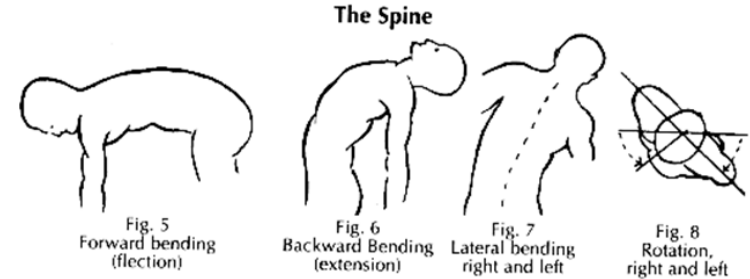
The following movements are possible on the spine:

1. flexion.
2. extension.
3. lateral flexion.
4. Rotation.
5. Circumduction = circular movement.

The type and range of movements possible in each region of the vertebral column largely depend on :

- The **Thickness** of the **intervertebral discs**
- The **Shape** and **direction** of the **articular processes**.

In the **thoracic region**, the ribs, the costal cartilages, and the sternum severely **restrict the range of movement**.



## Flexion & Extension Lateral flexion

Extensive in the lumbar regions

Restricted in the thoracic regions

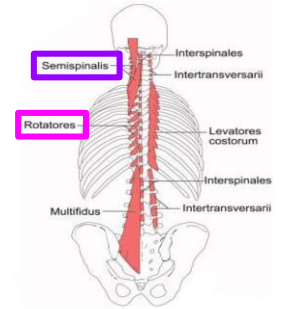
## Rotation

Extensive in the thoracic regions

**Least extensive** in the lumbar regions

# Muscles producing movements

Thoracic region			
<b>rotation</b>	(1) <b>semispinalis muscle</b> (2) <b>rotator muscle</b>	assisted by the <b>oblique muscles</b> of the anterolateral abdominal wall	
Lumbar region			
<b>Flexion</b>	(1) <b>rectus abdominis</b> (2) <b>psoas muscles</b>	<b>Extension</b>	(1) <b>postvertebral muscles</b>
<b>Rotation</b>	(1) <b>rotator muscles</b> (2) <b>oblique muscles</b> of the anterolateral abdominal wall	<b>Lateral</b>	(1) <b>postvertebral muscles</b> (2) <b>quadratus lumborum</b> (3) <b>oblique muscles</b> of the anterolateral abdominal wall (4) <b>psoas</b> may also play a part in this movement



# Summary

	Cervical	Thoracic	Lumber
<b>Number of vertebrae</b>	7	12	5
<b>Atypical vertebrae</b>	C1- Atlas C2- Axis C7- Cervica prominens	T1 T11 T12	L5
<b>Typical vertebrae</b>	C3,C4,C5,C6	T2,T3,T4,T5,T6,T7, T8,T9,T10	L1,L2,L3,L4
<b>Body</b>	<ul style="list-style-type: none"> <li>- Small</li> <li>- Longer horizontal</li> <li>- C1 doesn't have body</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Heart shaped</li> </ul>	<ul style="list-style-type: none"> <li>- Large</li> <li>- Kidney shaped</li> </ul>
<b>Spine</b>	All of them have spine except C1	All of them have spine	All of them have spine
<b>Vertebral foramen</b>	Triangular	Circular	Triangular

# Summary

	<b>Cervical</b>	<b>Thoracic</b>	<b>Lumber</b>
<b>Spinous process</b>	<ul style="list-style-type: none"><li>- short</li><li>- bifid</li></ul>	<ul style="list-style-type: none"><li>- long</li><li>- inclined downward</li></ul>	<ul style="list-style-type: none"><li>- short</li><li>- flat</li><li>- quadrangular</li><li>- projects backward</li></ul>
<b>Transverse process</b>	Has transverse foramen	-	Long and slender
<b>Superior articular process</b>	Upward & backward	Backward & laterally	Forward & medially
<b>Inferior articular process</b>	Downward & forward	Forward & medially	Backward & laterally



# MCQs

(1) The inferior articular process of the 12th thoracic vertebrae faces \_\_\_\_\_ :

- A- laterally
- B- medially
- C- frontal

(2) Lateral curvature of the spine .....

- A- lordosis
- B- scoliosis
- C- kyphosis

(3) The most common vertebrae for spondylitis \_\_\_\_\_ :

- A- L5
- B- T5
- C- S5

(4) Muscle responsible for lumbar flexion.....

- A- psoas
- B- rectus abdominis
- C- A and B

(5) Thoracic rotation muscles are?

- A- quadratus lumborum and psoas
- B- rotator muscle and semispinalis muscle
- C- quadratus lumborum only

# Answers

1-A

2-B

3-A

4-C

5-B

# Team Members

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Afnan Abdulaziz Almustafa  
Ahad Algrain  
Alanoud Almansour  
Albandari Alshaye  
AlFhadah abdullah alsaleem  
Arwa Alzahrani  
Dana Abdulaziz Alrasheed  
Dimah Khalid Alaraifi  
Ghada Alhaidari  
Ghada Almuhanha  
Ghaida Alsanad  
Hadeel Khalid Awartani  
Haifa Alessa  
Khulood Alwehabi  
Layan Hassan Alwatban  
Lojain Azizalrahman  
Lujain Tariq AlZaid

Maha Barakah  
Majd Khalid AlBarrak  
Norah Alharbi  
Nouf Alotaibi  
Noura Mohammed Alothaim  
Rahaf Turki Alshammari  
Reham Alhalabi  
Rinad Musaed Alghoraiby  
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Saleh Almoaiqel  
Abdulaziz Alabdulkareem  
Abdullah Almeaither  
Yazeed Aldossari  
Muath Alhumood  
Abdulrahman Almotairi

Abdulelah Aldossari  
Abdulrahman Alduhayyim  
Hamdan Aldossari  
Mohammed Alomar  
Abdulrahman Aldawood  
Saud Alghufaily  
Hassan Aloraini  
Khalid Almutairi

Abdulmajeed Alwardi  
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Abduljabbar Al-yamani  
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