

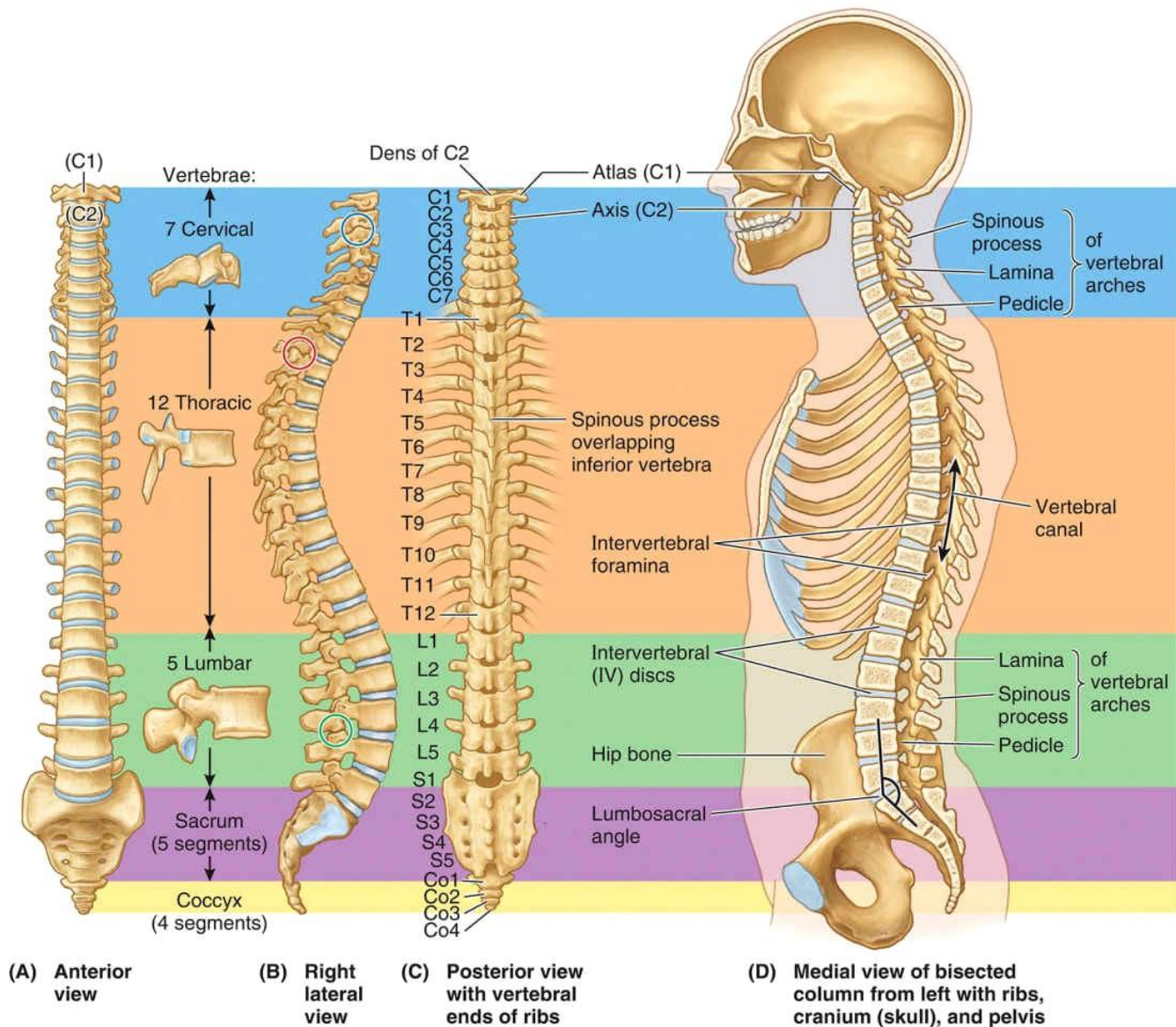


بنام مهربان ترین

گروه علوم تشریحی
دانشکده پزشکی شیراز

سعید کربلایی دوست 140401

Vertebral column

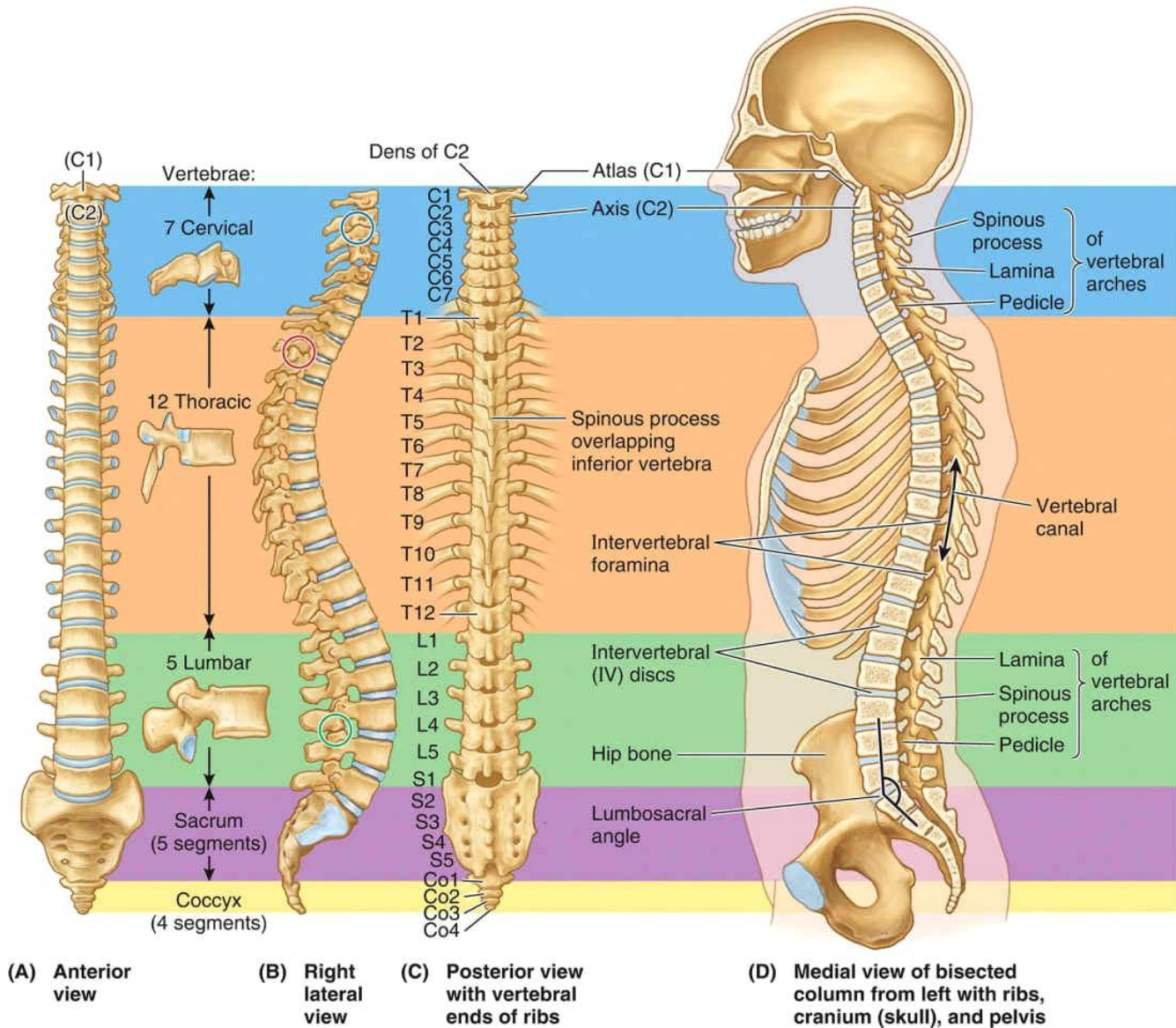


اهداف یادگیری

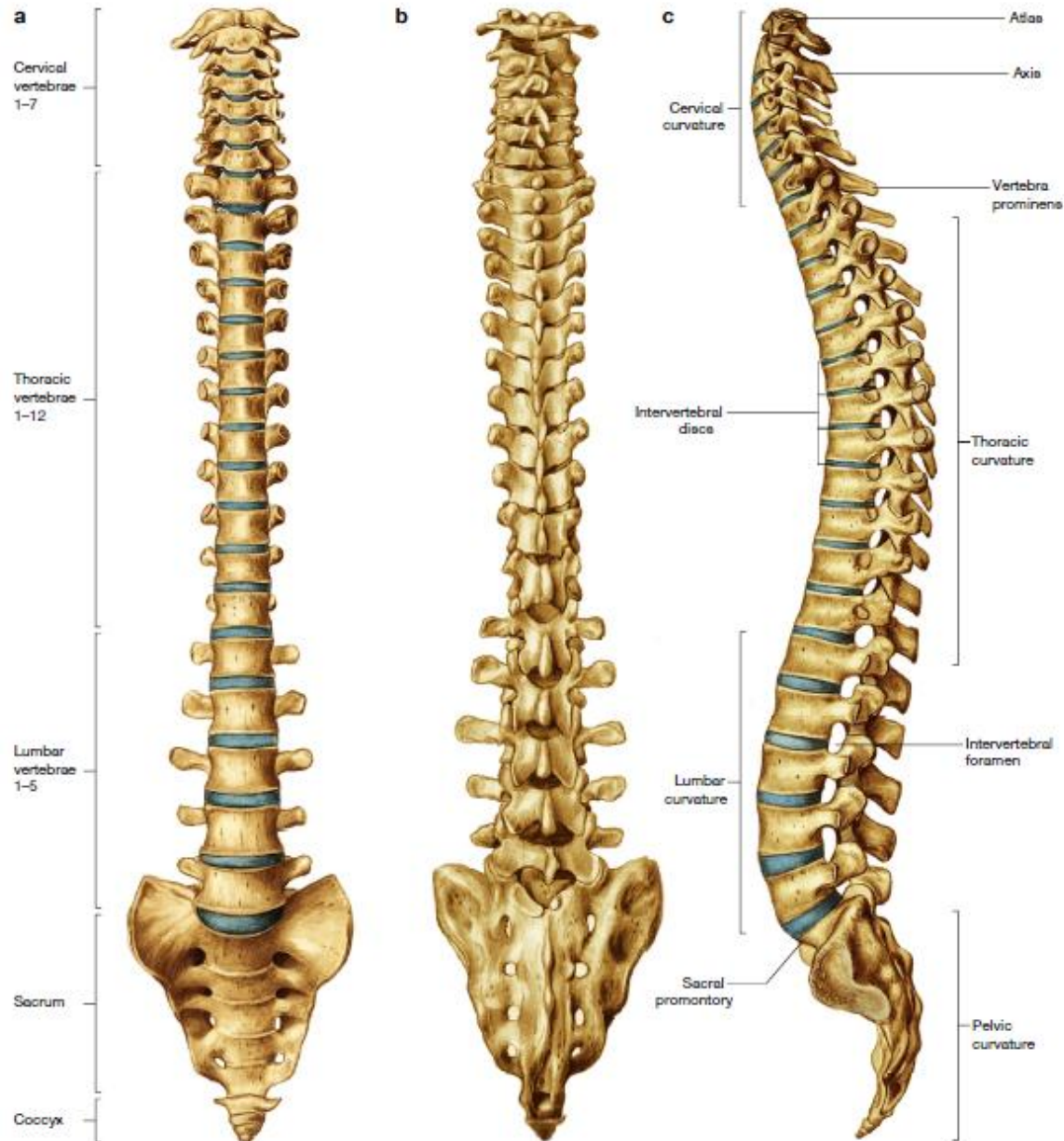
در انتهای این مبحث از یادگیرنده انتظار می رود:

- آناتومی استخوان بندی ستون مهره ها را بیان نماید
- مشخصات یک مهره نمونه و تفاوت مهره ها را توضیح دهد
- در صورت بیان نکات کلینیکی، دیدن عکس های MRI , CTS و دیدن مولاژ، آناتومی مرتبط با آن را شرح دهد.

The vertebral column



The vertebral column



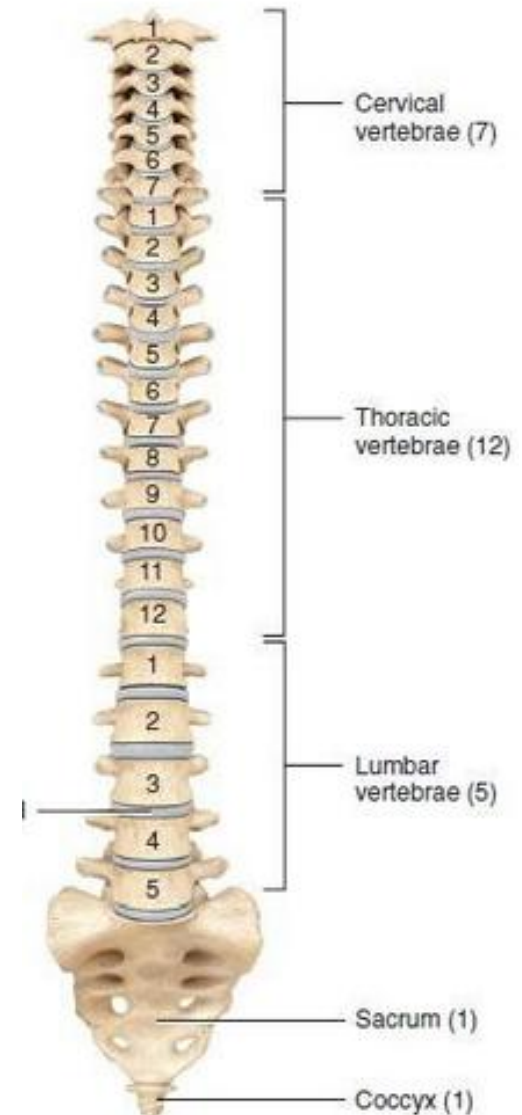
Cervical Vertebrae – 7 bones, (C₁, C₂, etc.)

Thoracic Vertebrae – 12 bones, (T₁, T₂, etc.)

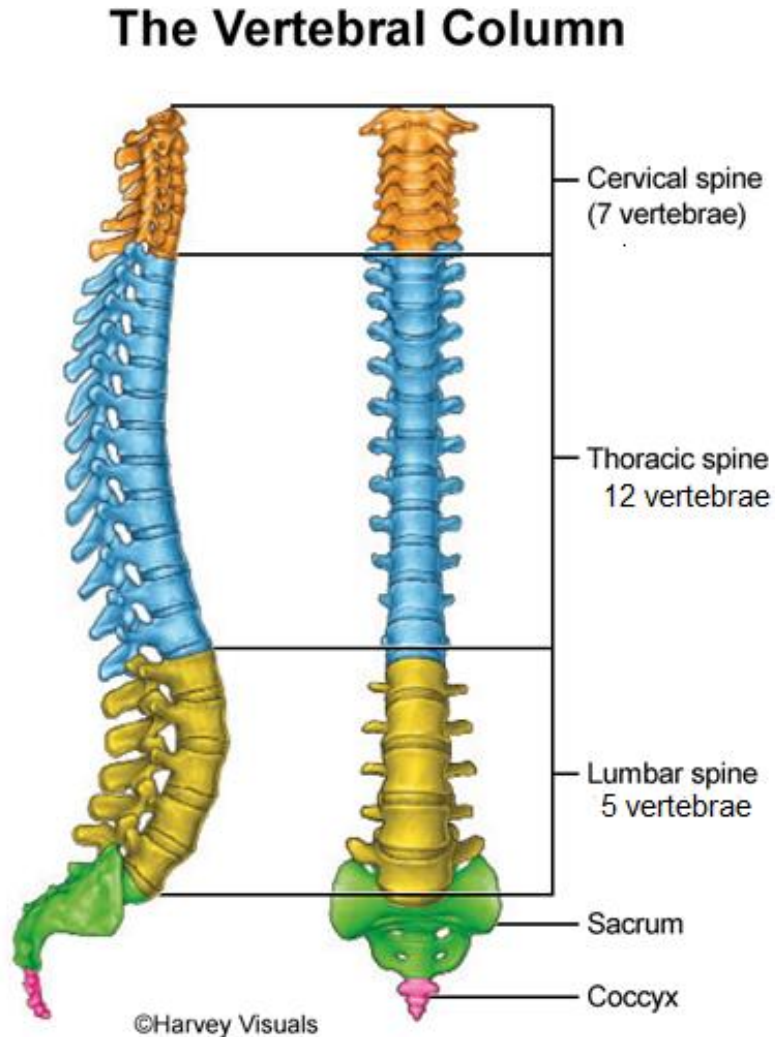
Lumbar Vertebrae – 5 bones, (L1, L2, etc.)

Sacral Vertebrae – 5 fused to form sacrum

Coccygeal Vertebrae – 3 to 4 are commonly fused



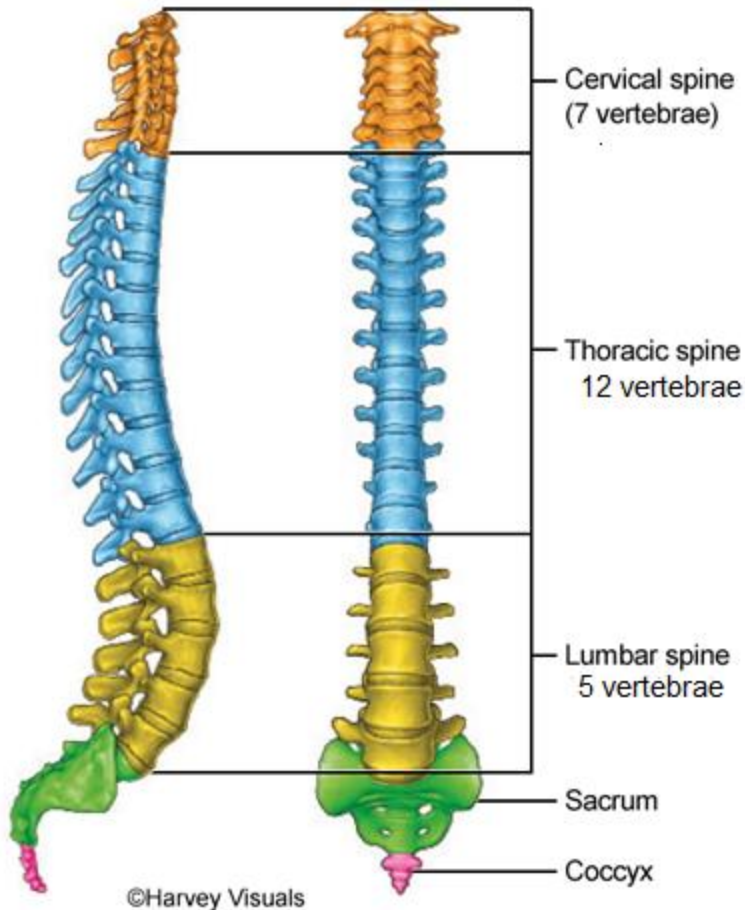
Curvatures of the vertebral column



- The adult vertebral column presents four curvatures:
- Thoracic and sacral, both convex posteriorly
- Cervical and lumbar, both convex anteriorly

Curvatures of the vertebral column

The Vertebral Column



Cervical curvature (C2-T2)

Thoracic curvature (T2-T12)

Lumbar curvature (T12-sacrum)

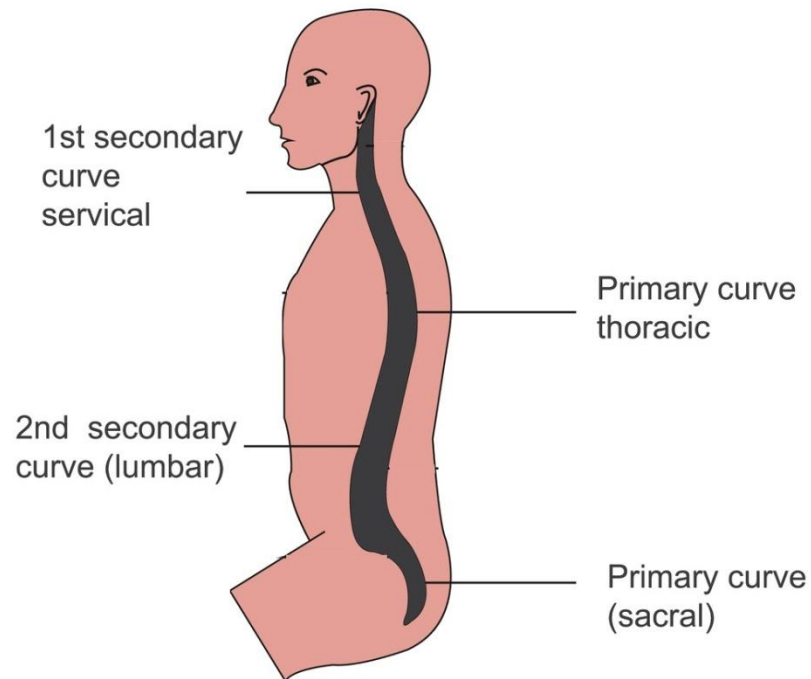
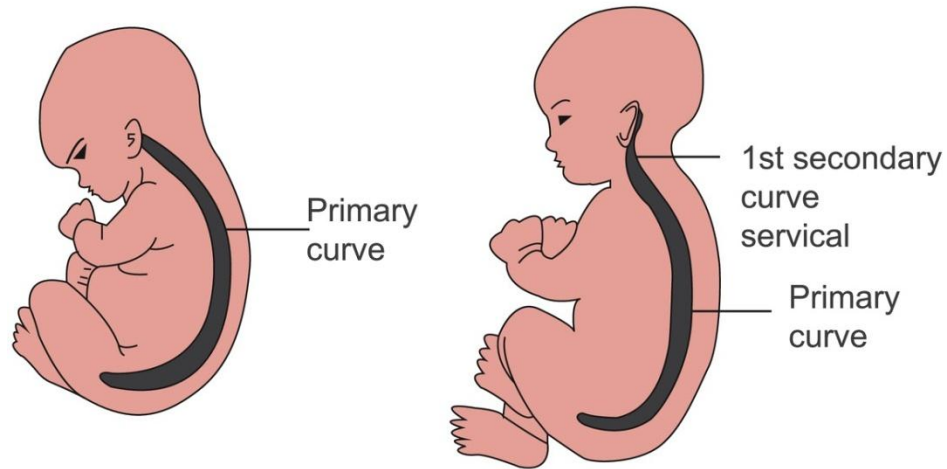
Newborn Spinal Curvature



- Spine exhibits one continuous **C-shaped** curve
- Known as primary curvature



Curvatures of the vertebral column



Bones of the vertebral column

Curvatures:

Cervical, the top 7

The Cervical Curvature is a secondary curvature

Thoracic, attach to ribs, there are 12, cause there are 12 pairs of ribs!

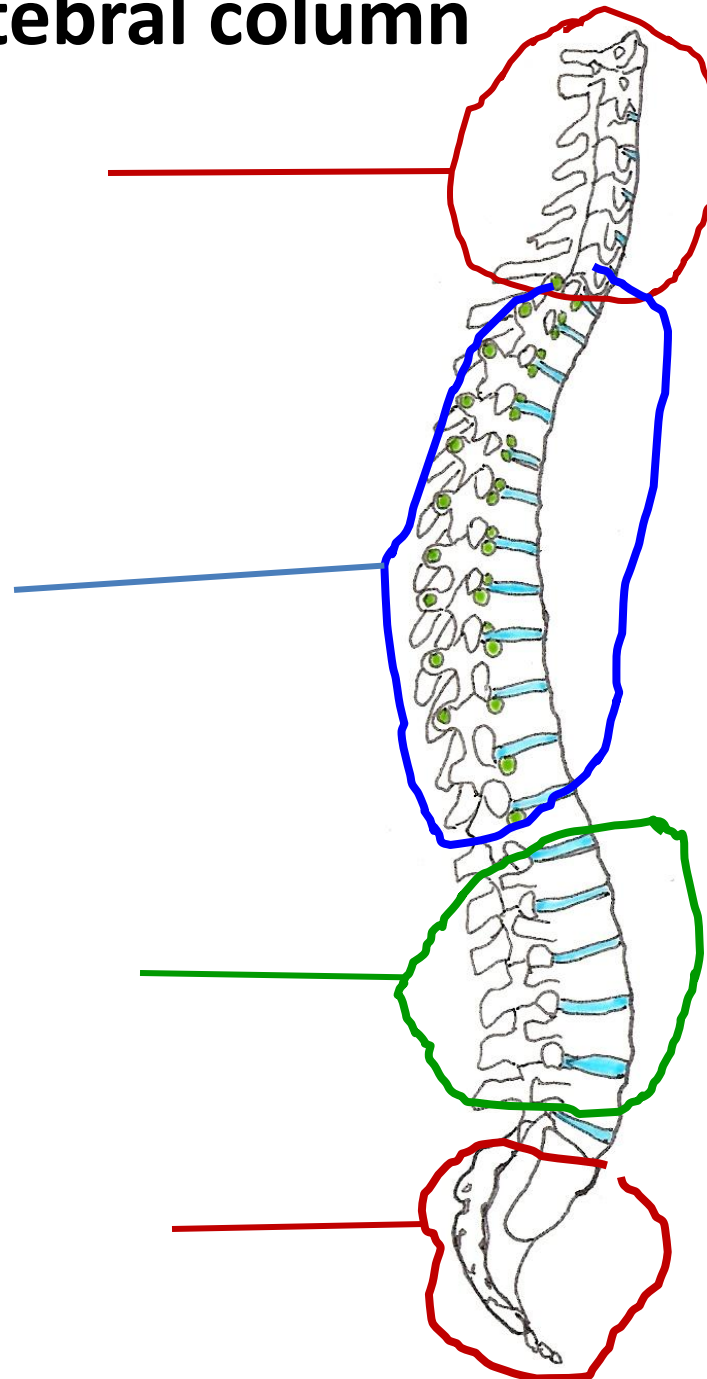
The Thoracic Curvature is a primary curvature

Lumbar, big bottom ones!

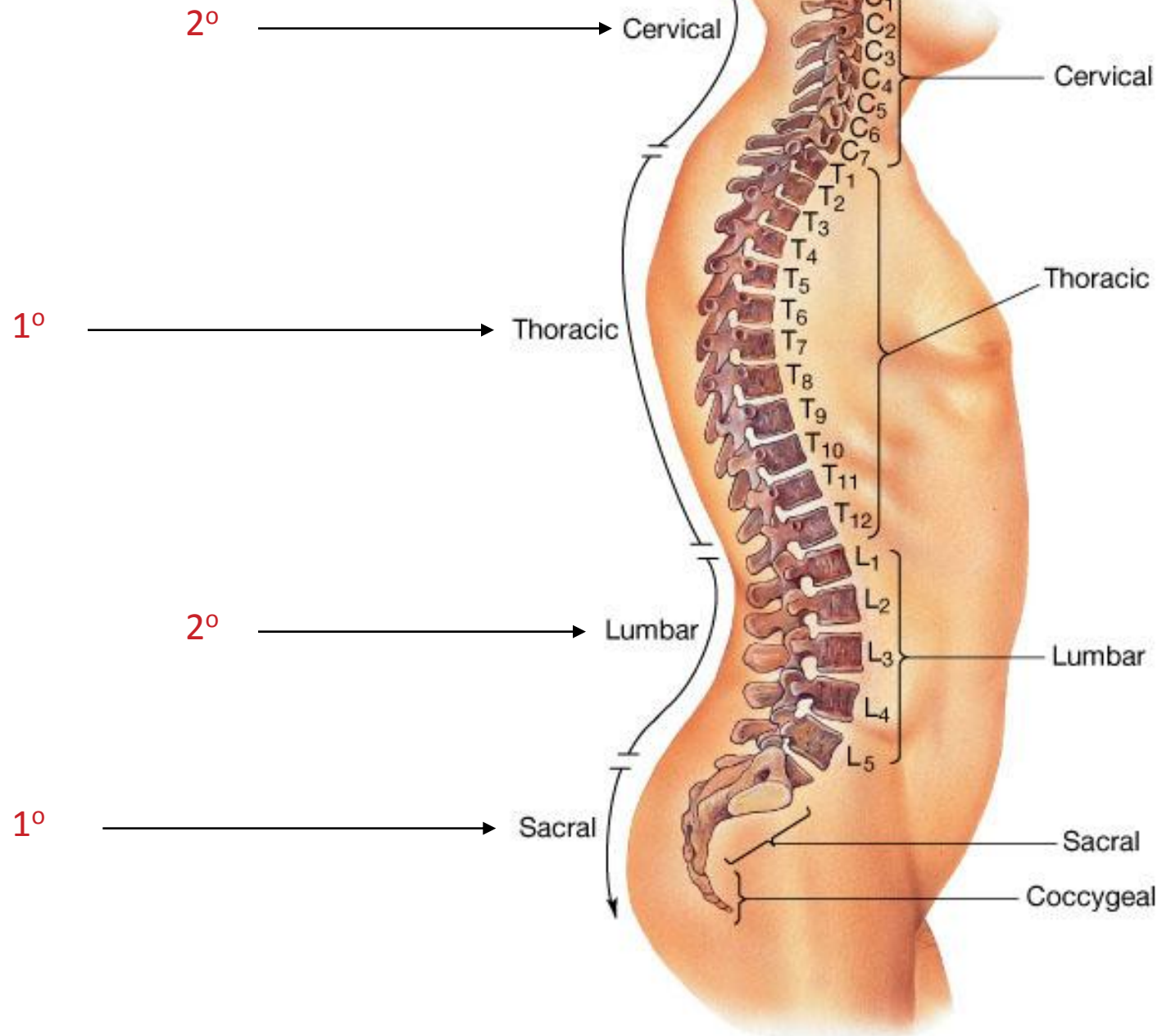
The Lumbar Curvature is a secondary curvature

Sacral and coccyx, these babies are all fused!

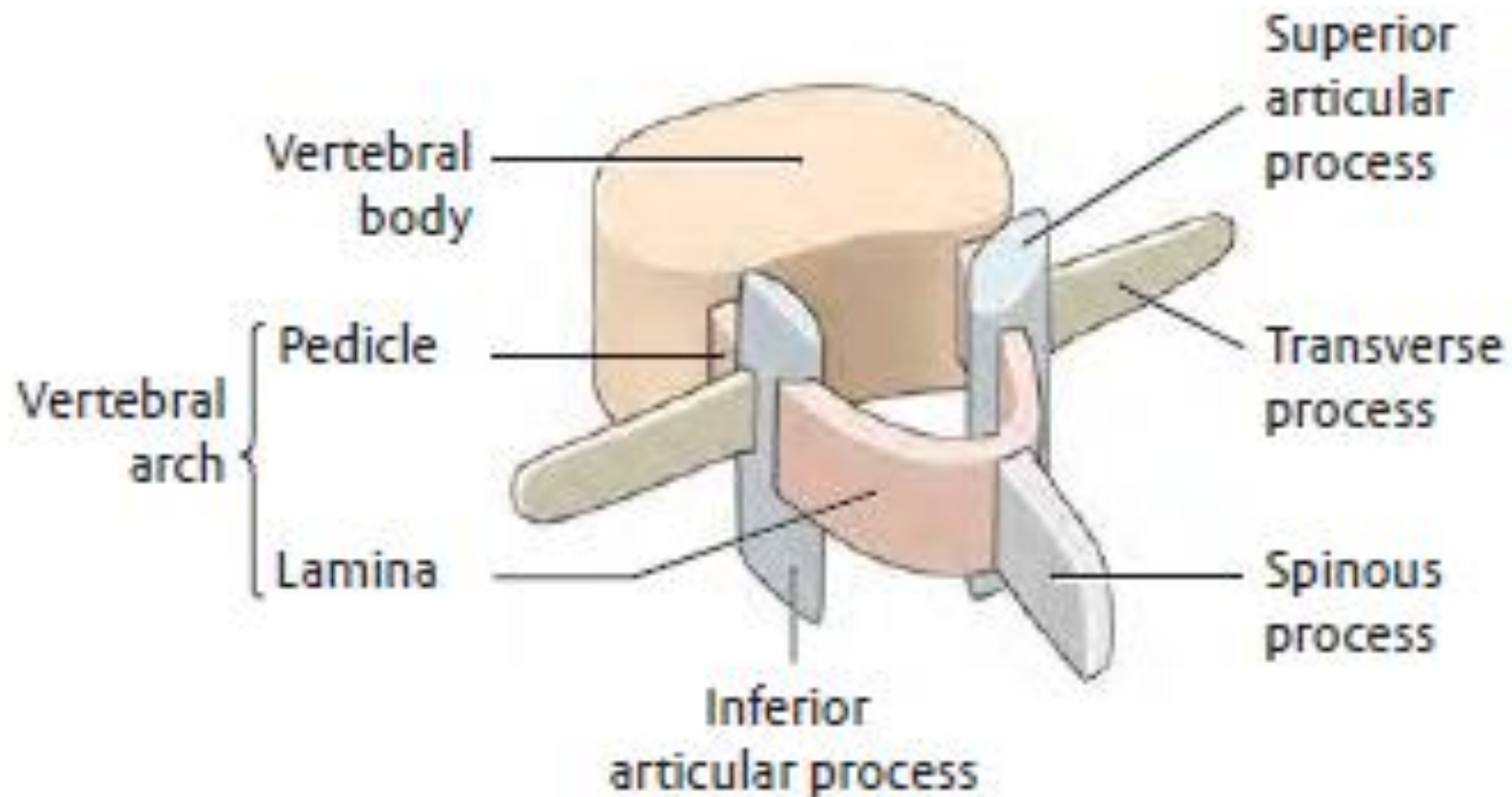
The Sacral Curvature is a primary curvature



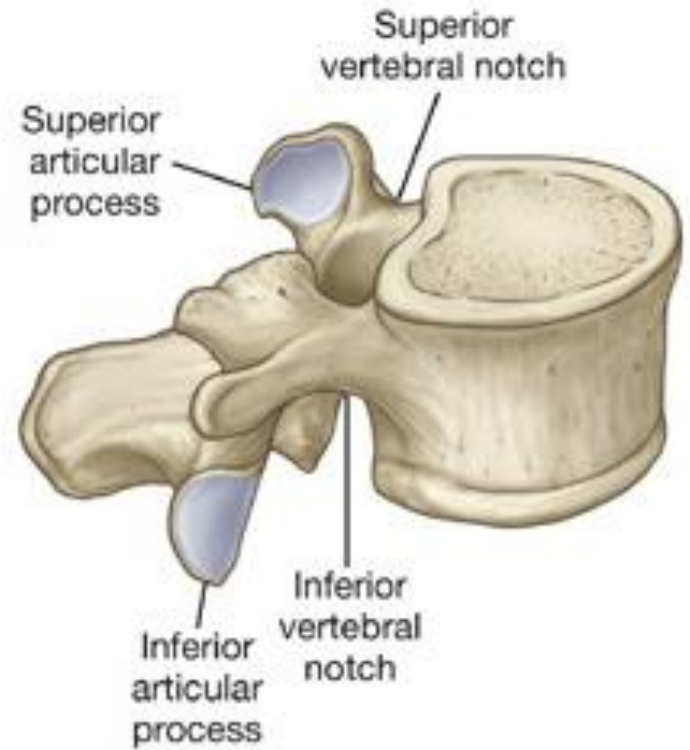
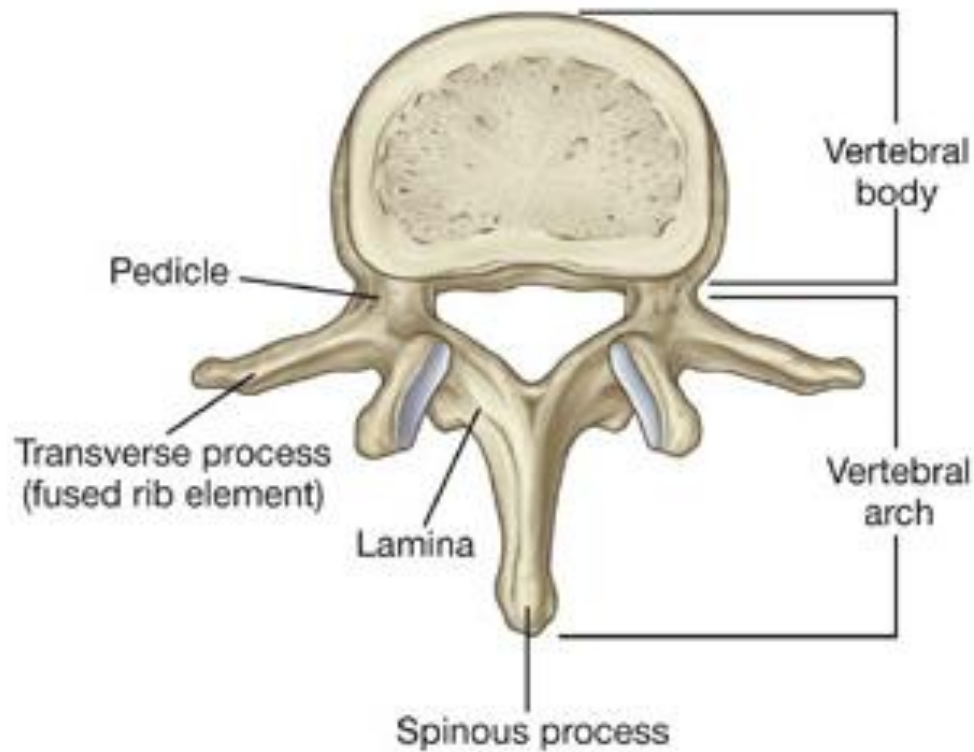
Normal Spinal Curvature



The major components of a typical vertebra



Vertebra



1-A rounded body anteriorly

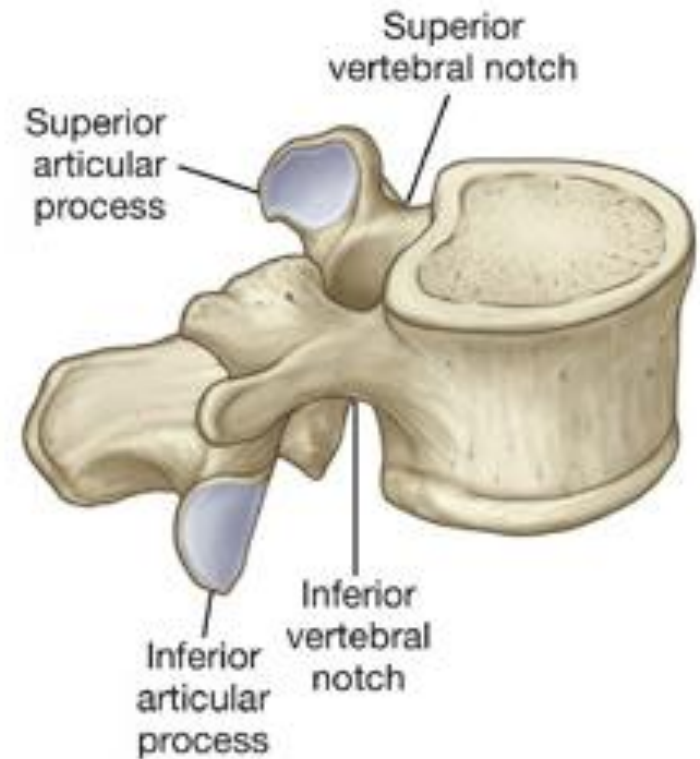
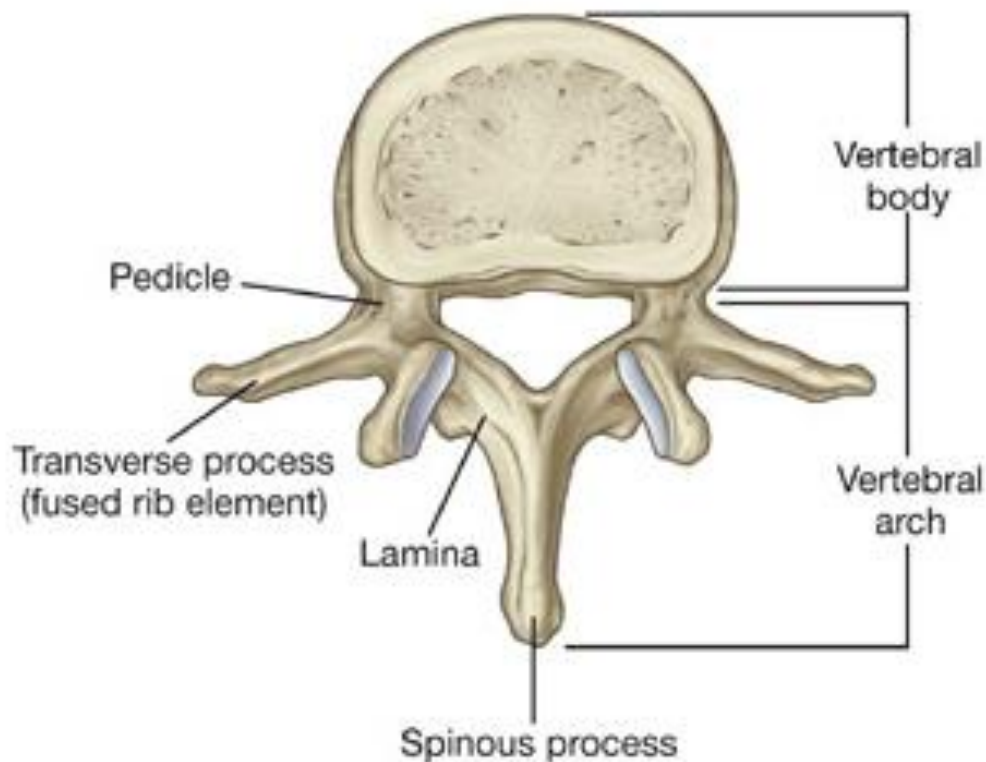
2-Vertebral arch posteriorly

3-Between the body and the arch is the vertebral foramen

4-Seven processes

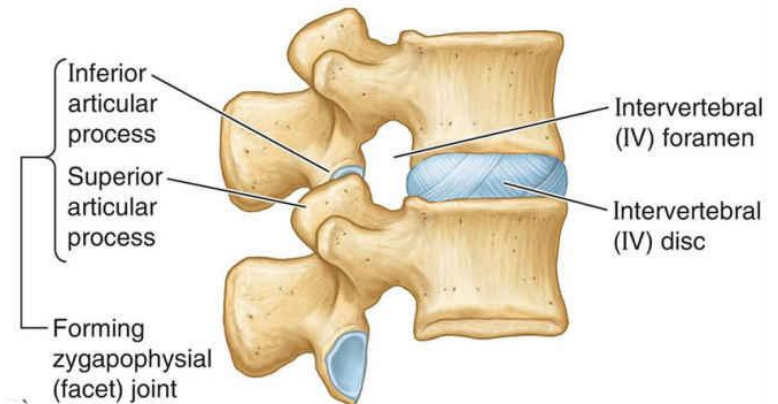
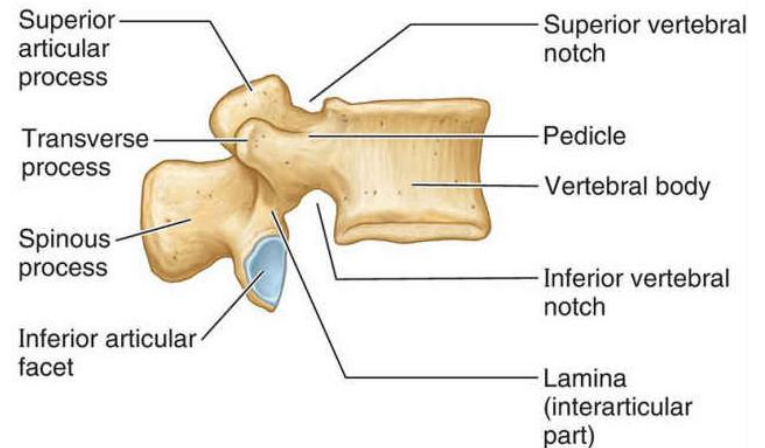
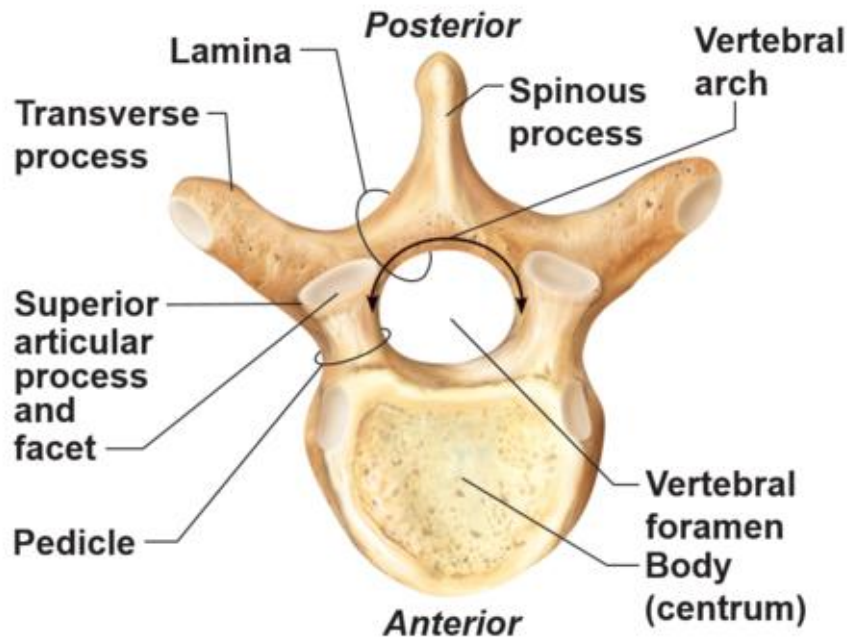
Vertebra body

The **vertebral body** is the anterior and has 2 surfaces (superior and inferior)



Vertebra arch

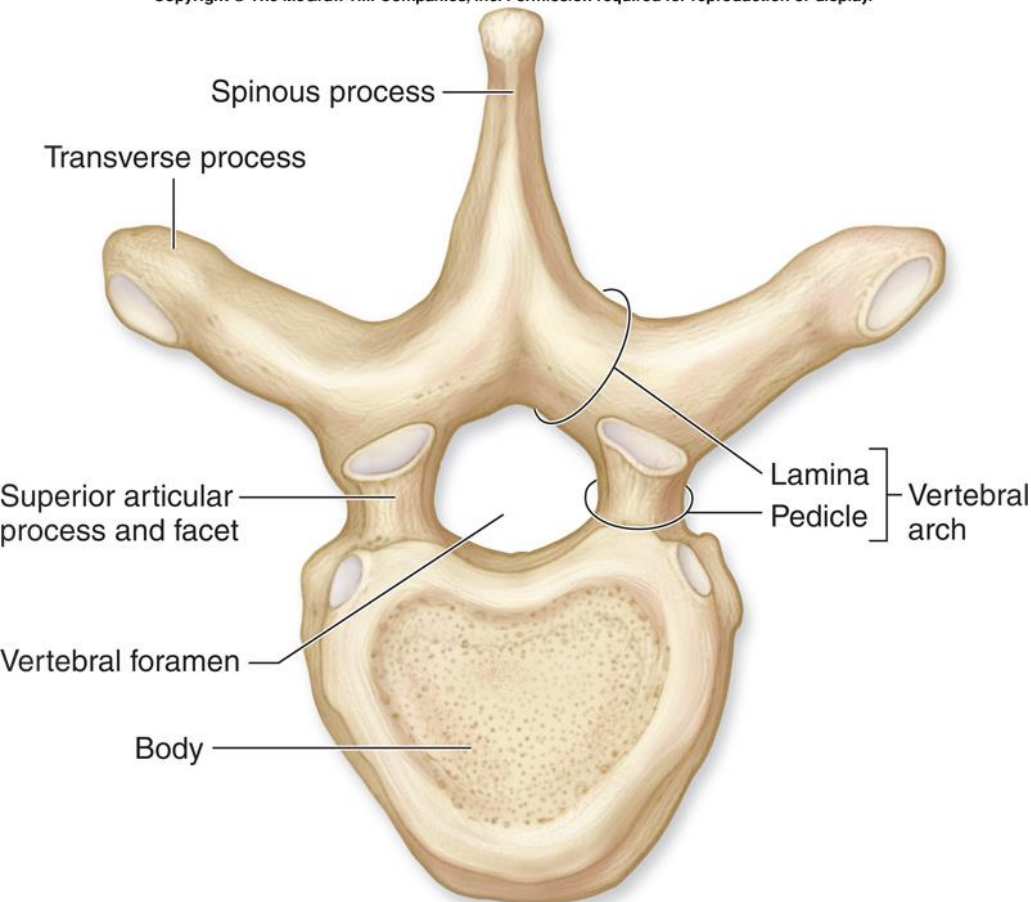
The **vertebral arch** consists of right and left pedicles (which connect it to the body) and right and left laminae, which complete the arch posteriorly.



Vertebral foramen

The sum of the vertebral foramina forms the **vertebral canal**, which contains the spinal cord

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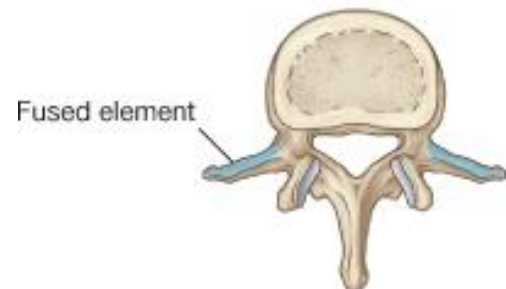
(a) Superior view



Cervical vertebra

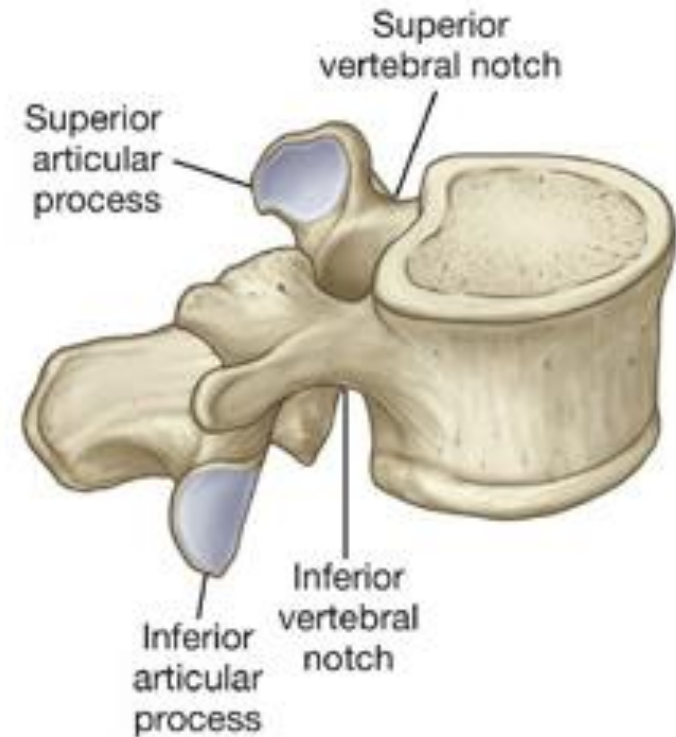
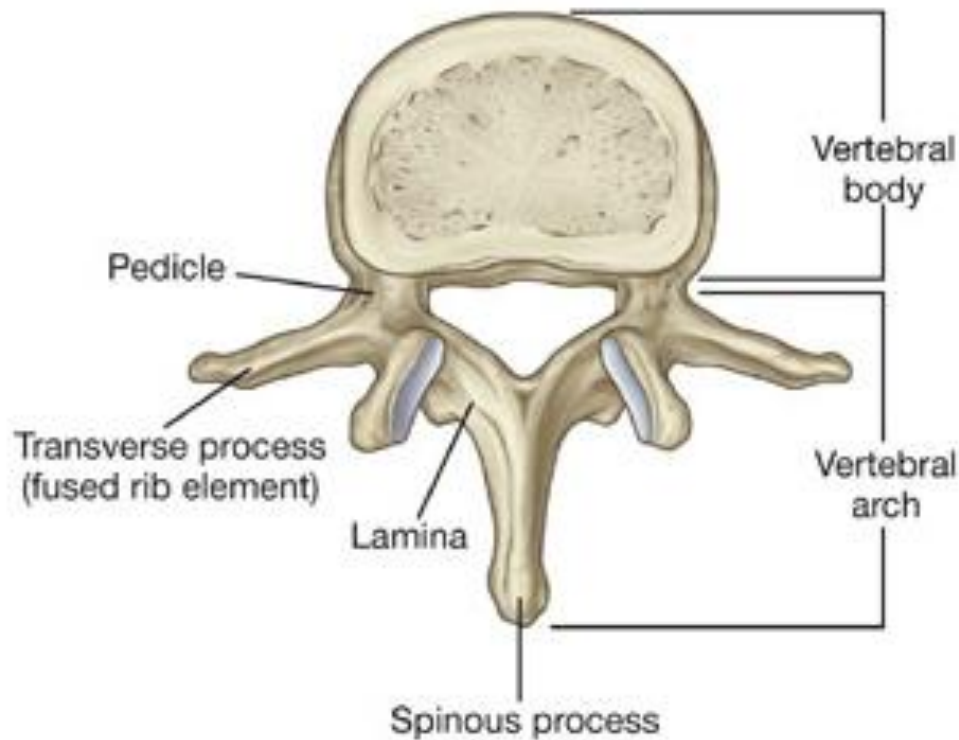


Thoracic vertebra



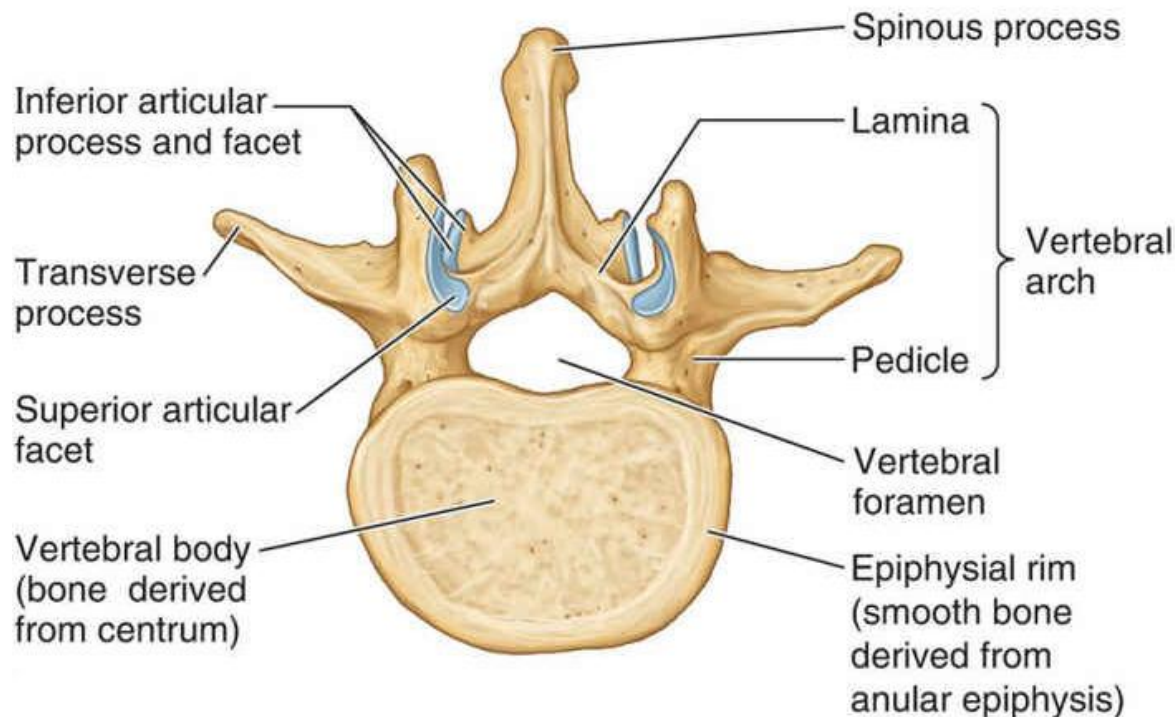
Lumbar vertebra

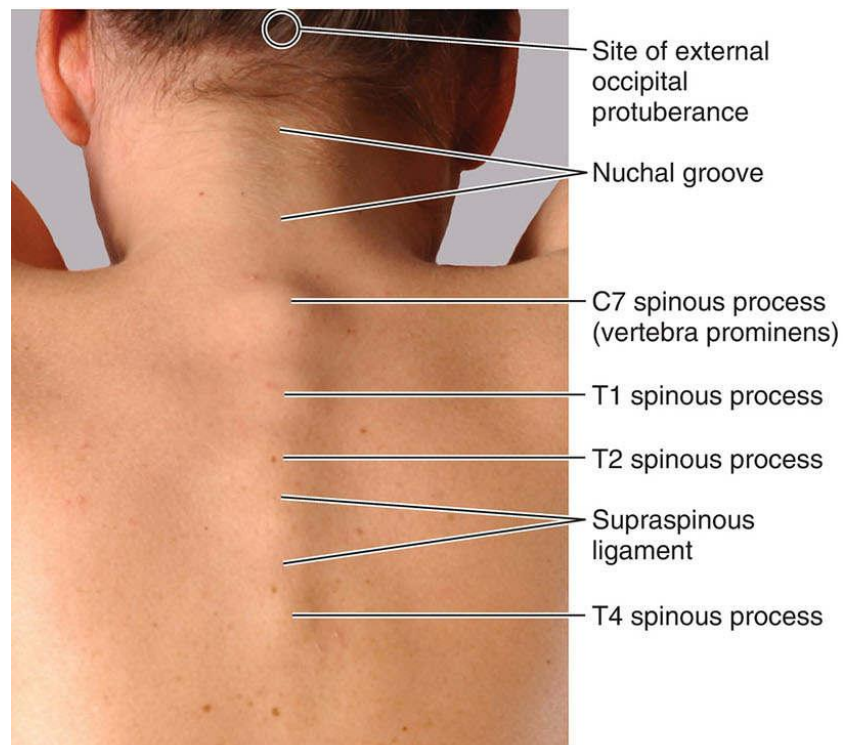
Vertebral processes



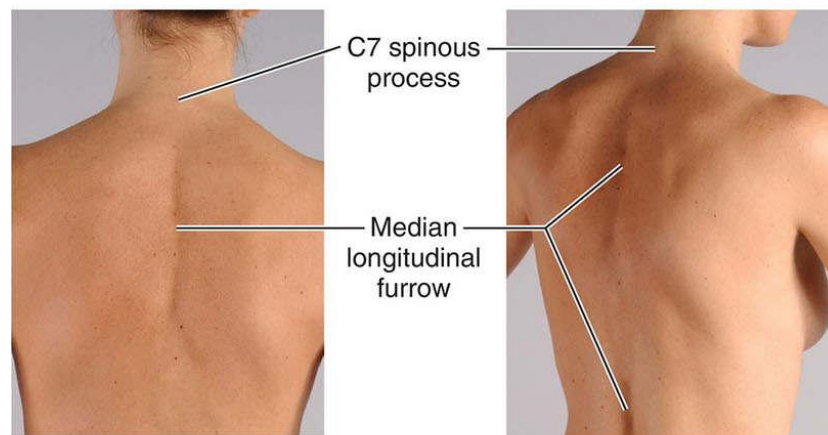
Spinous process

- A spinous process projects posteriorly from the junction of the two laminae





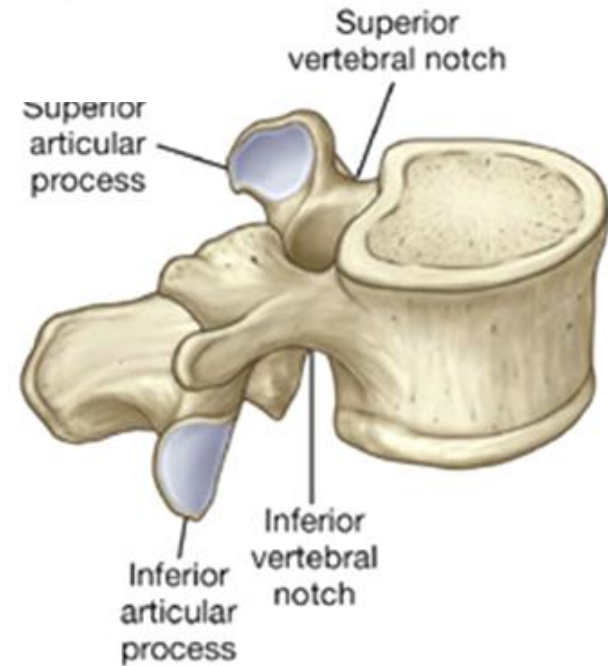
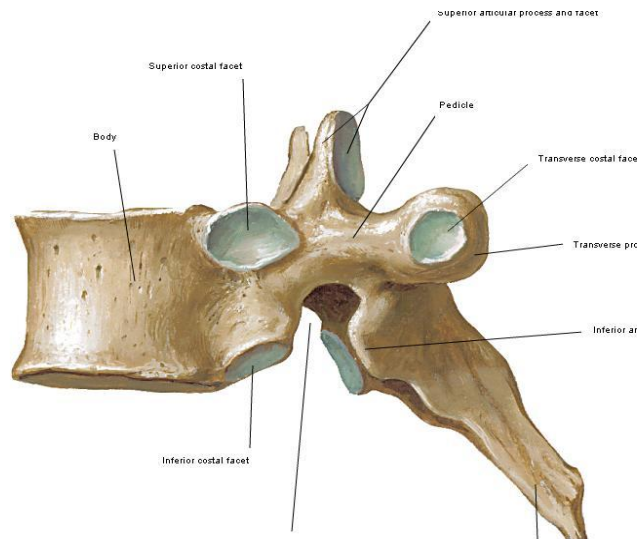
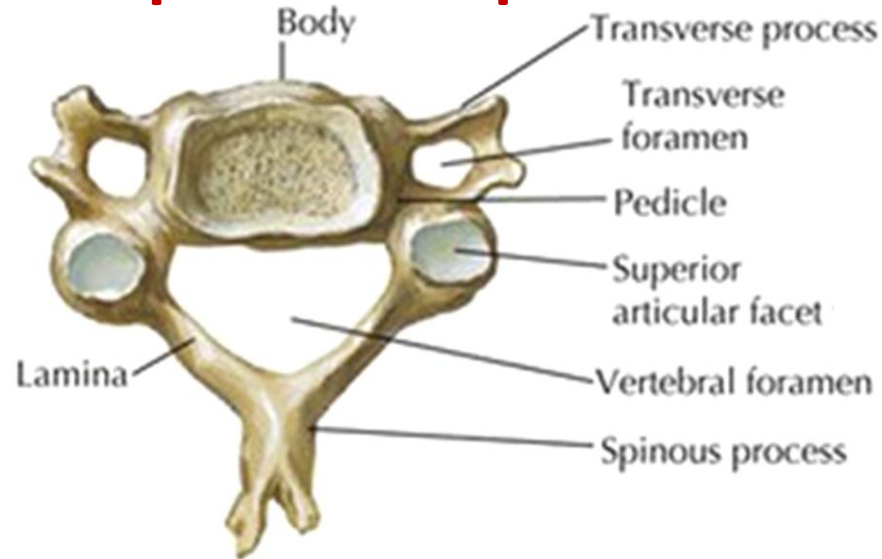
(A) Posterior view with neck and back flexed and scapulae protracted



(B) Posterior view, anatomical position

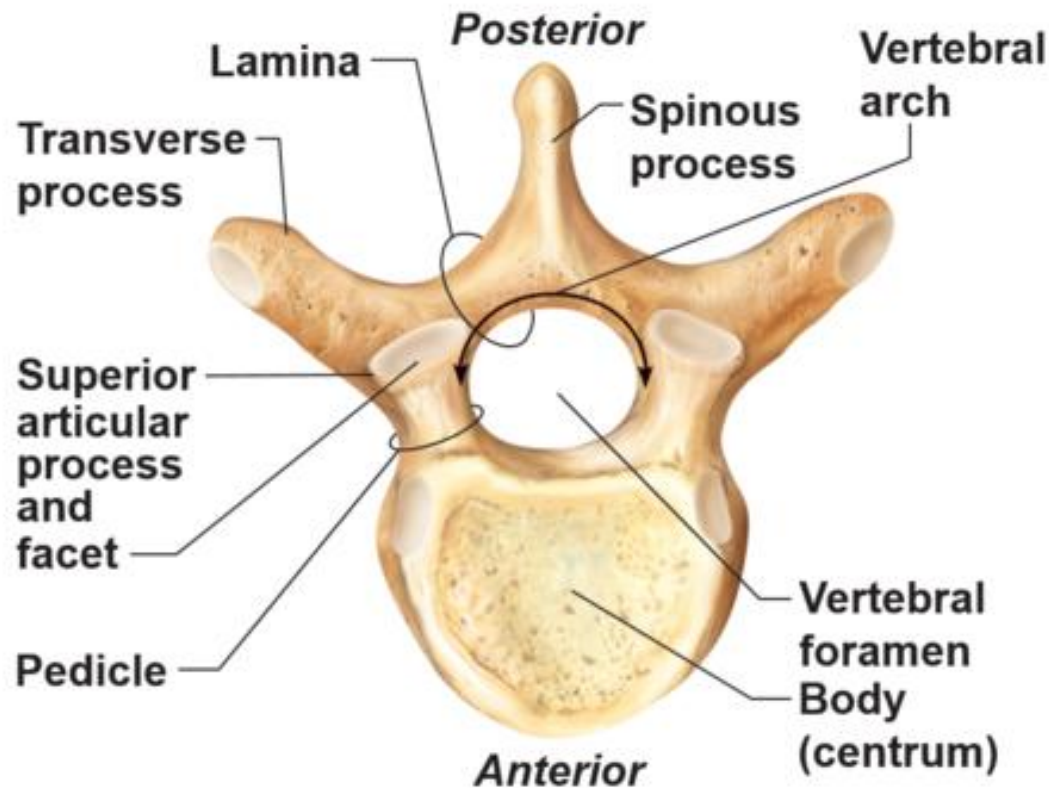
(C) Posterior view, left arm slightly extended, right arm slightly flexed

Spinous process



Transverse process

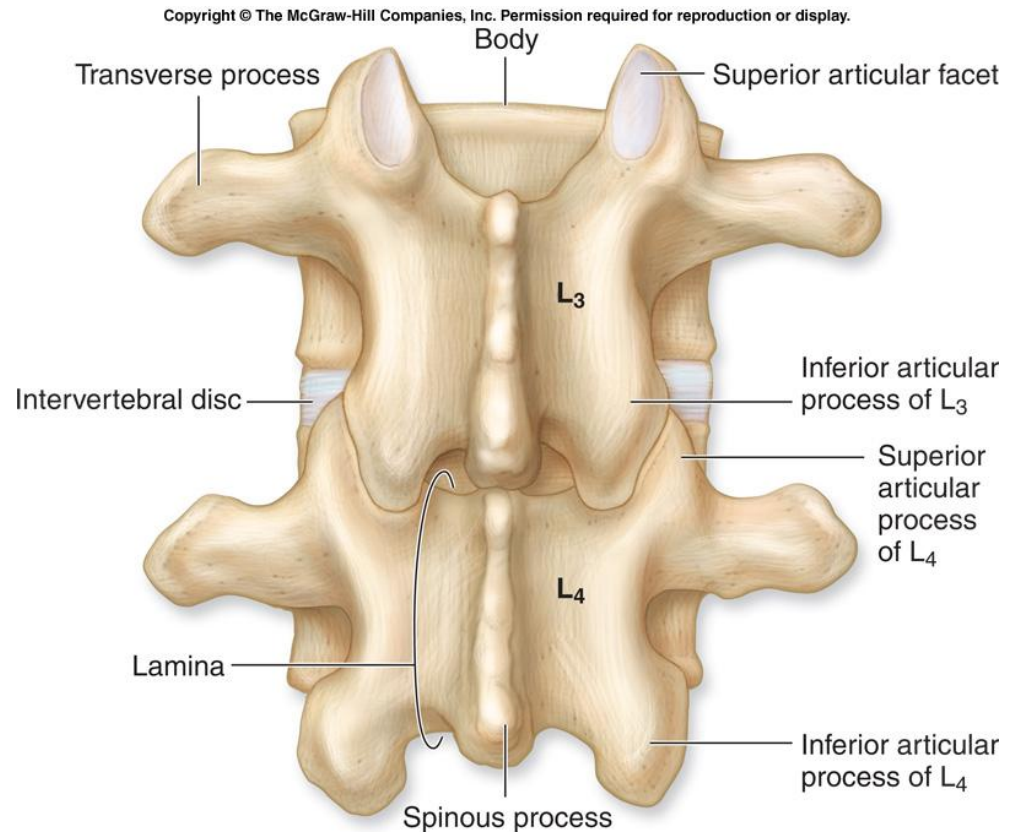
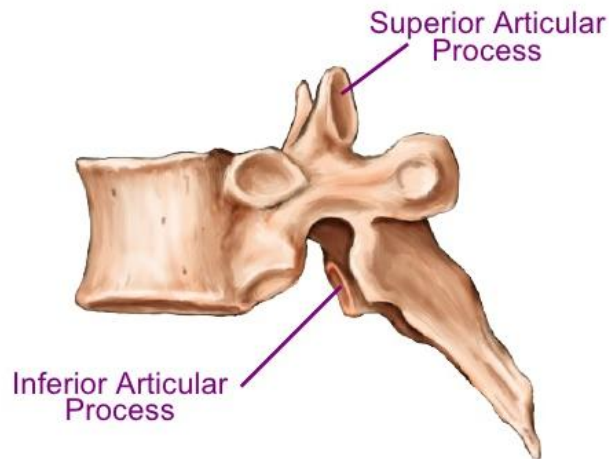
- Two transverse processes project laterally from the junction of the pedicle and laminae



Articular process

- Four articular processes – two superior and two inferior – also arise from the junction of the pedicle and laminae

- Articular processes

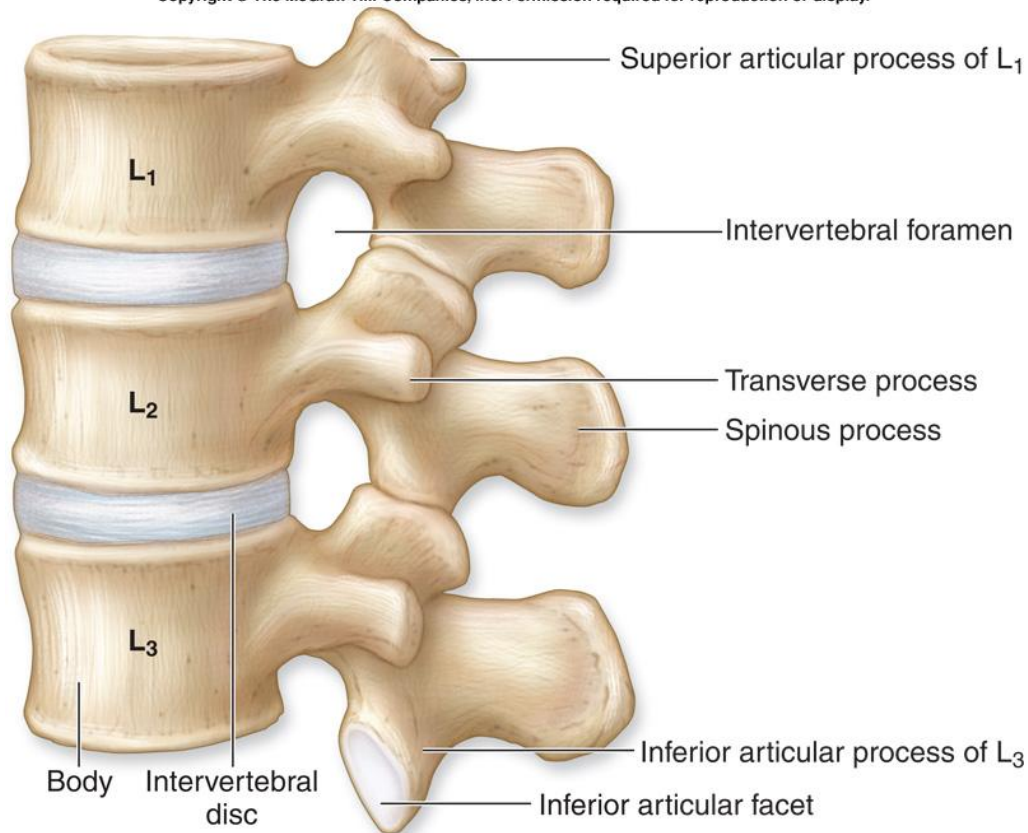


(b) Posterior view

Intervertebral foramen

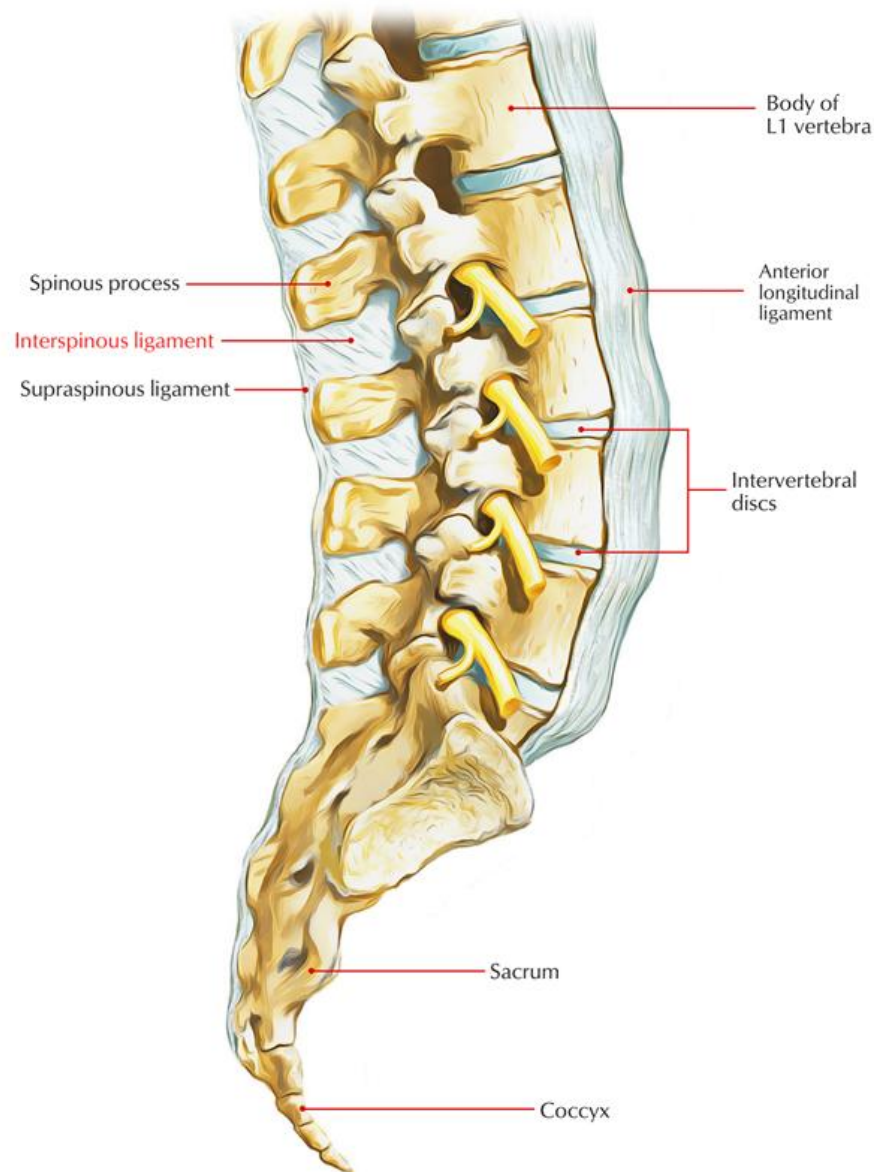
When vertebrae are in their anatomical position, notches between adjacent pedicles form intervertebral foramina, each of which typically transmits spinal nerve.

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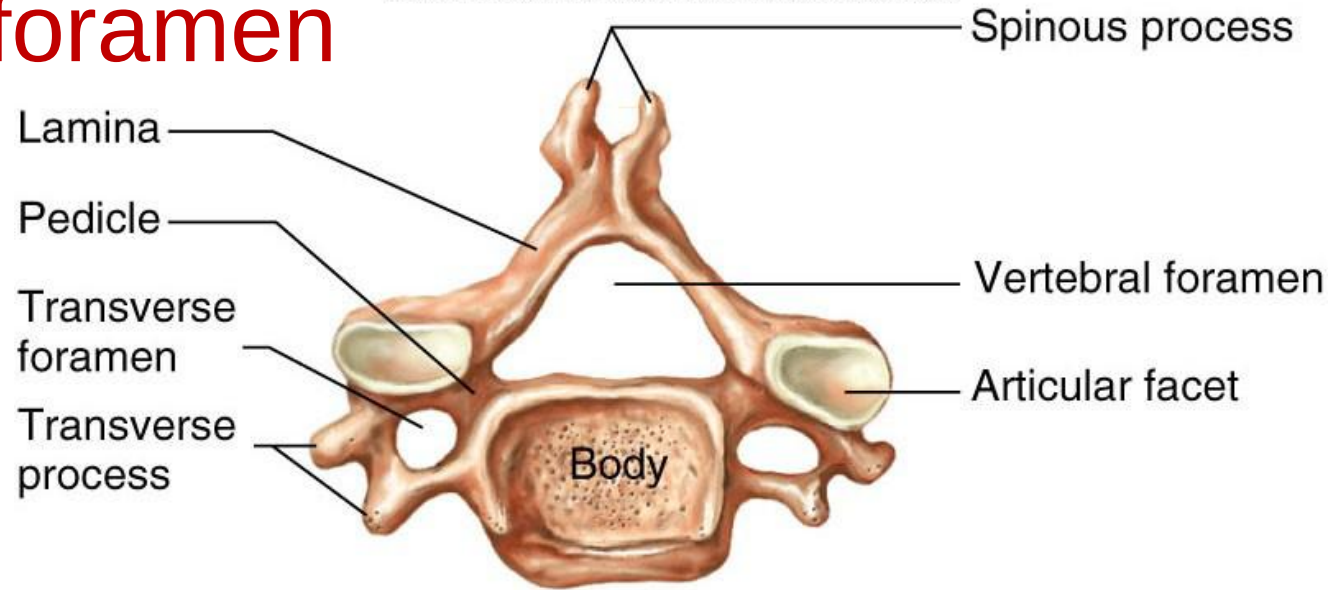
(c) Lateral view

Intervertebral foramen



vertebral foramen

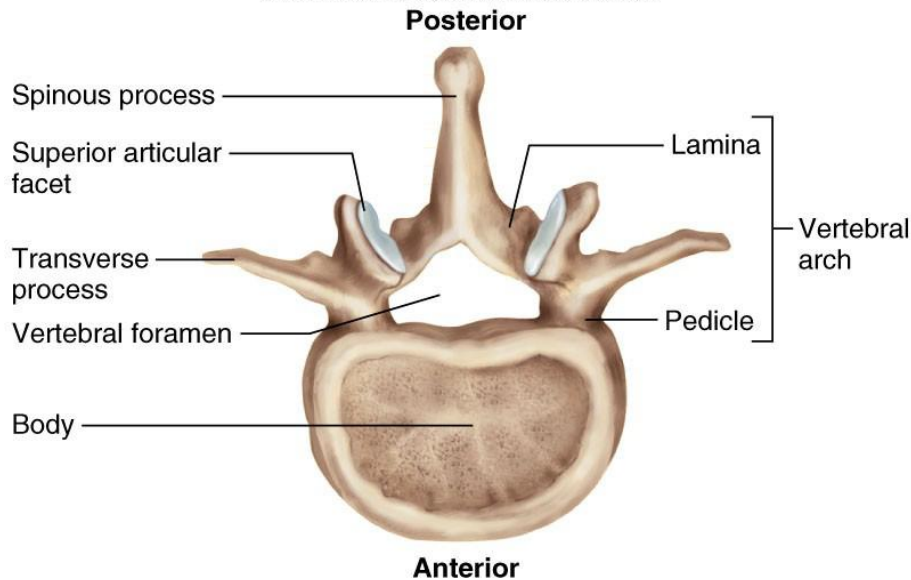
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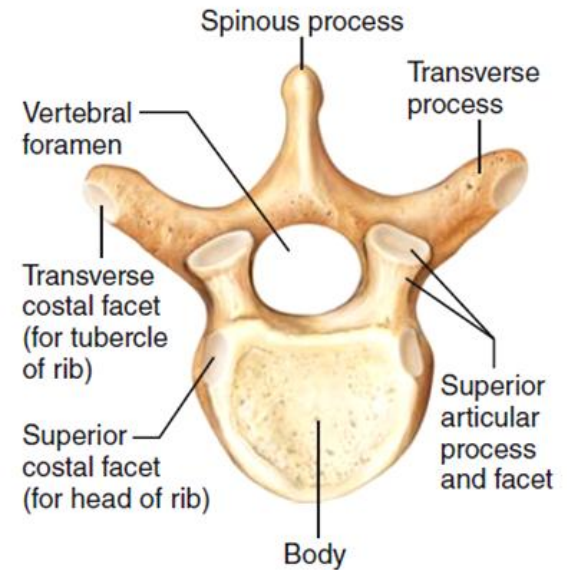
(c)

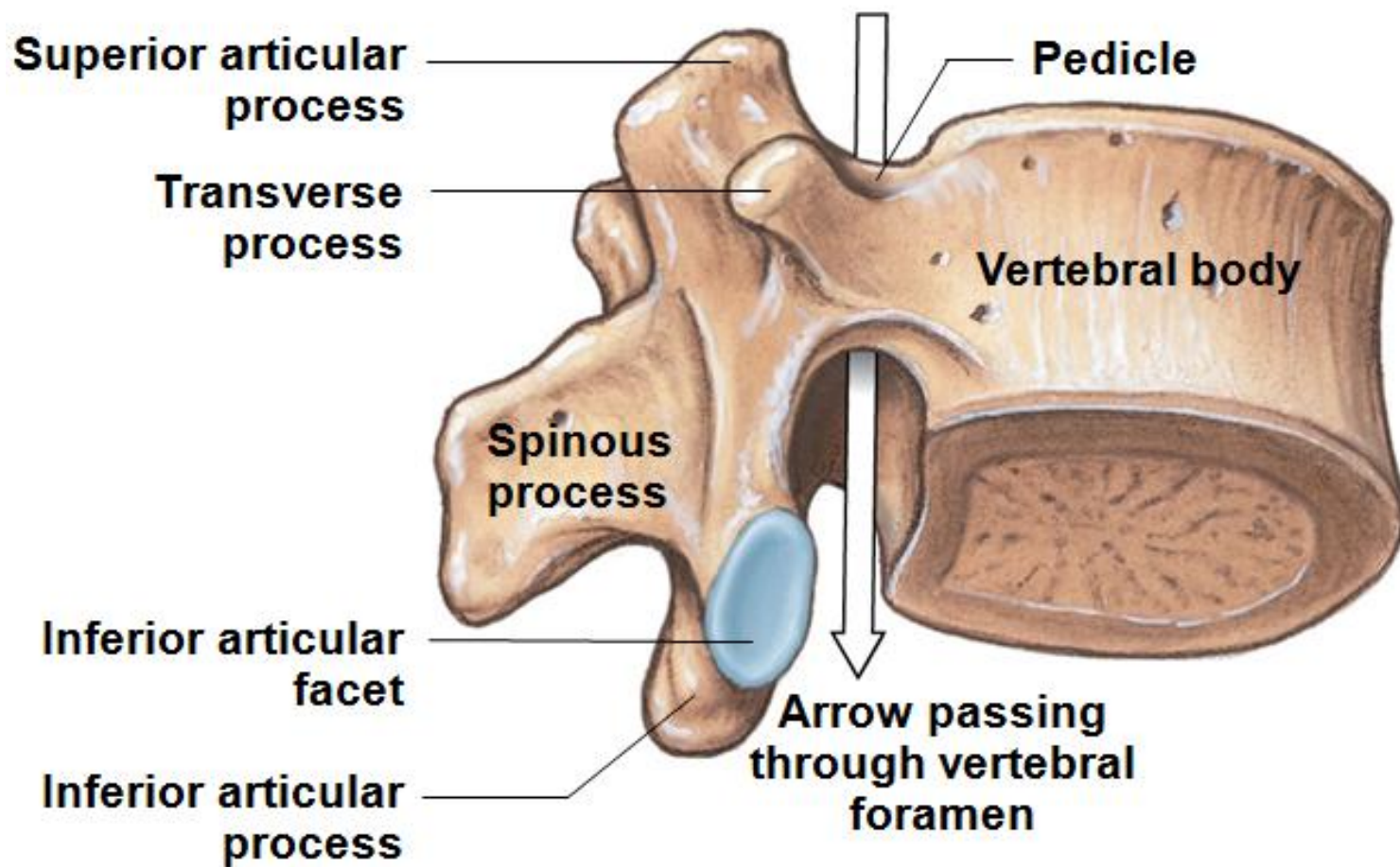
Cervical vertebra, superior view

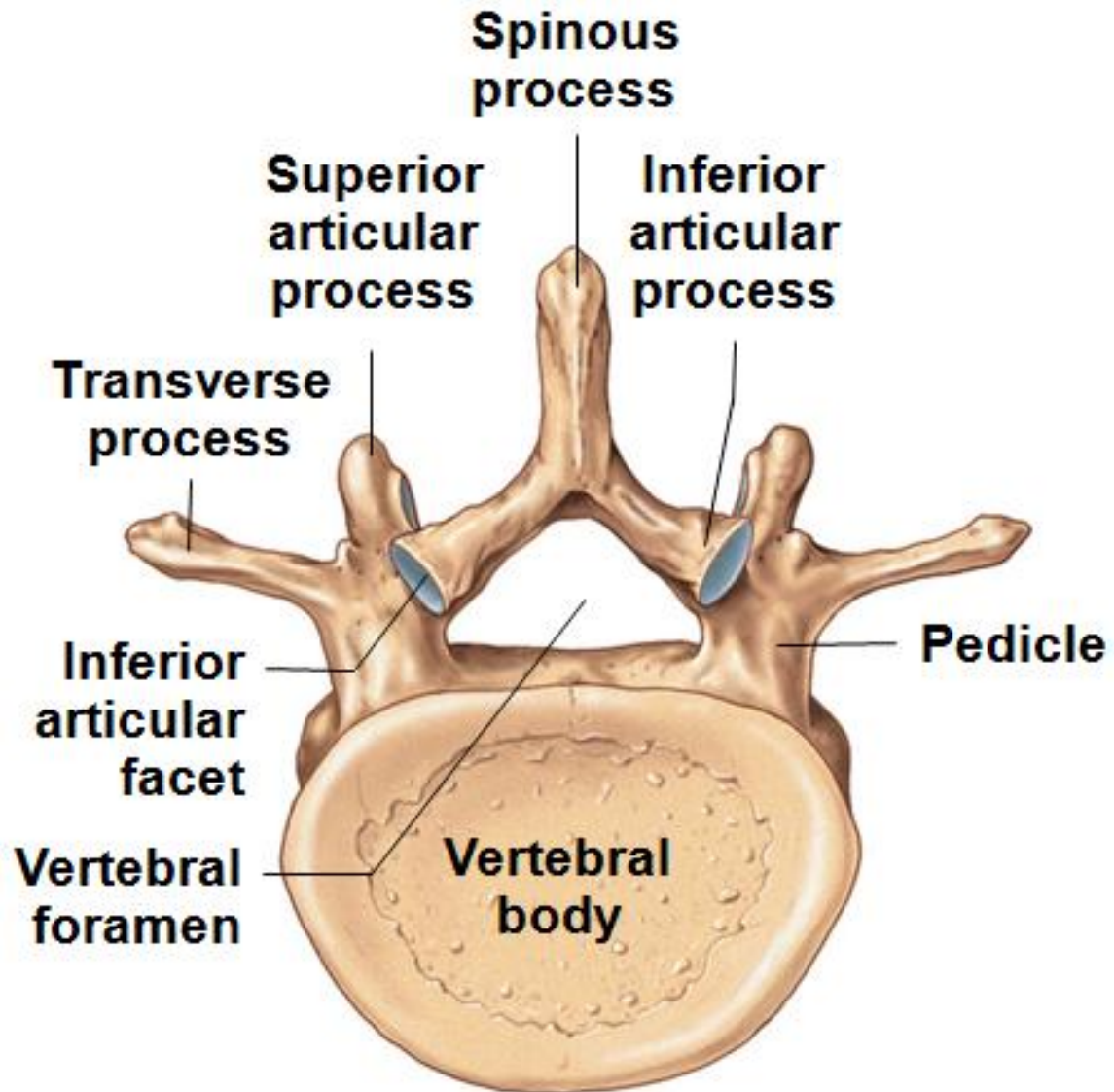
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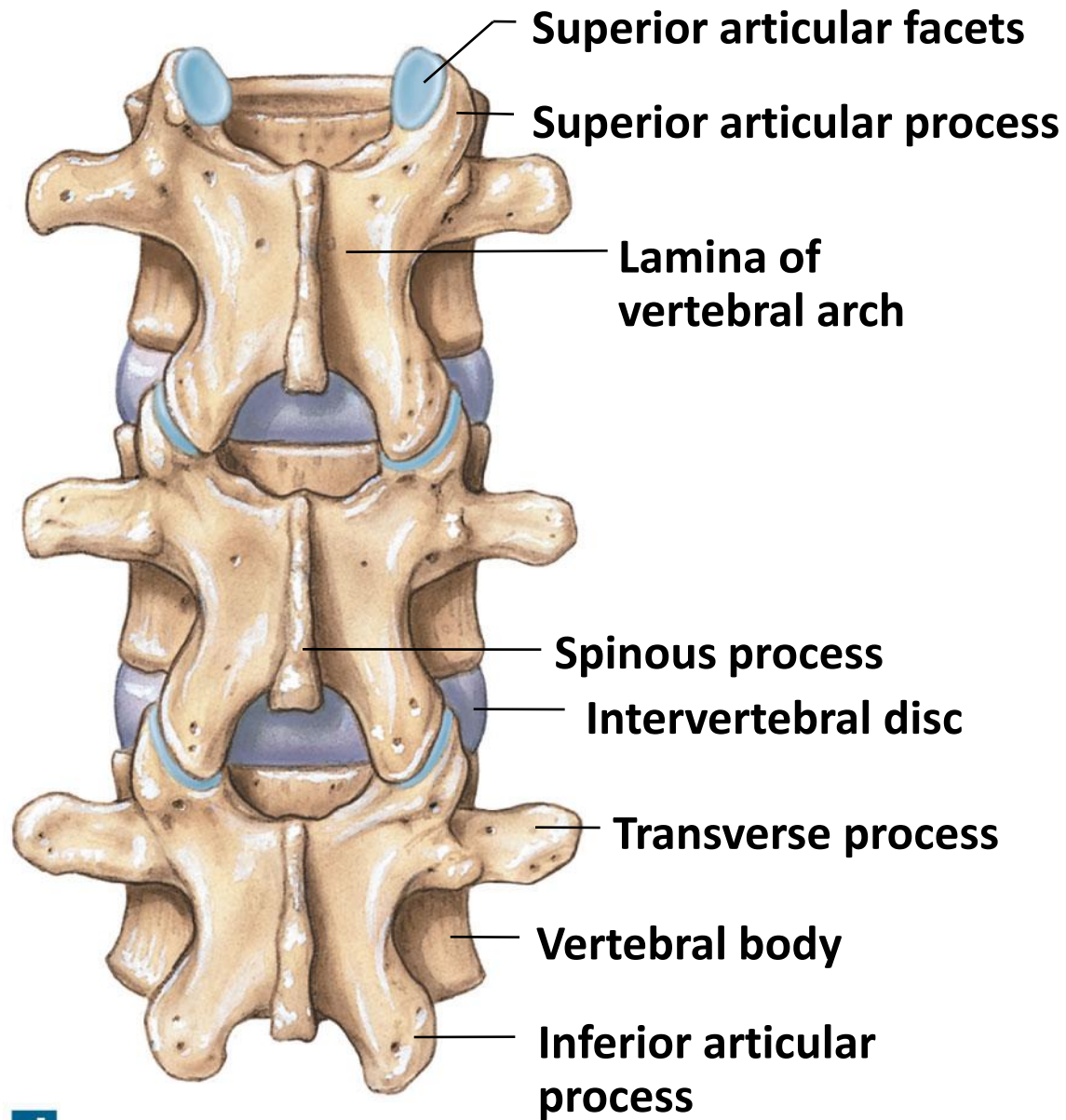


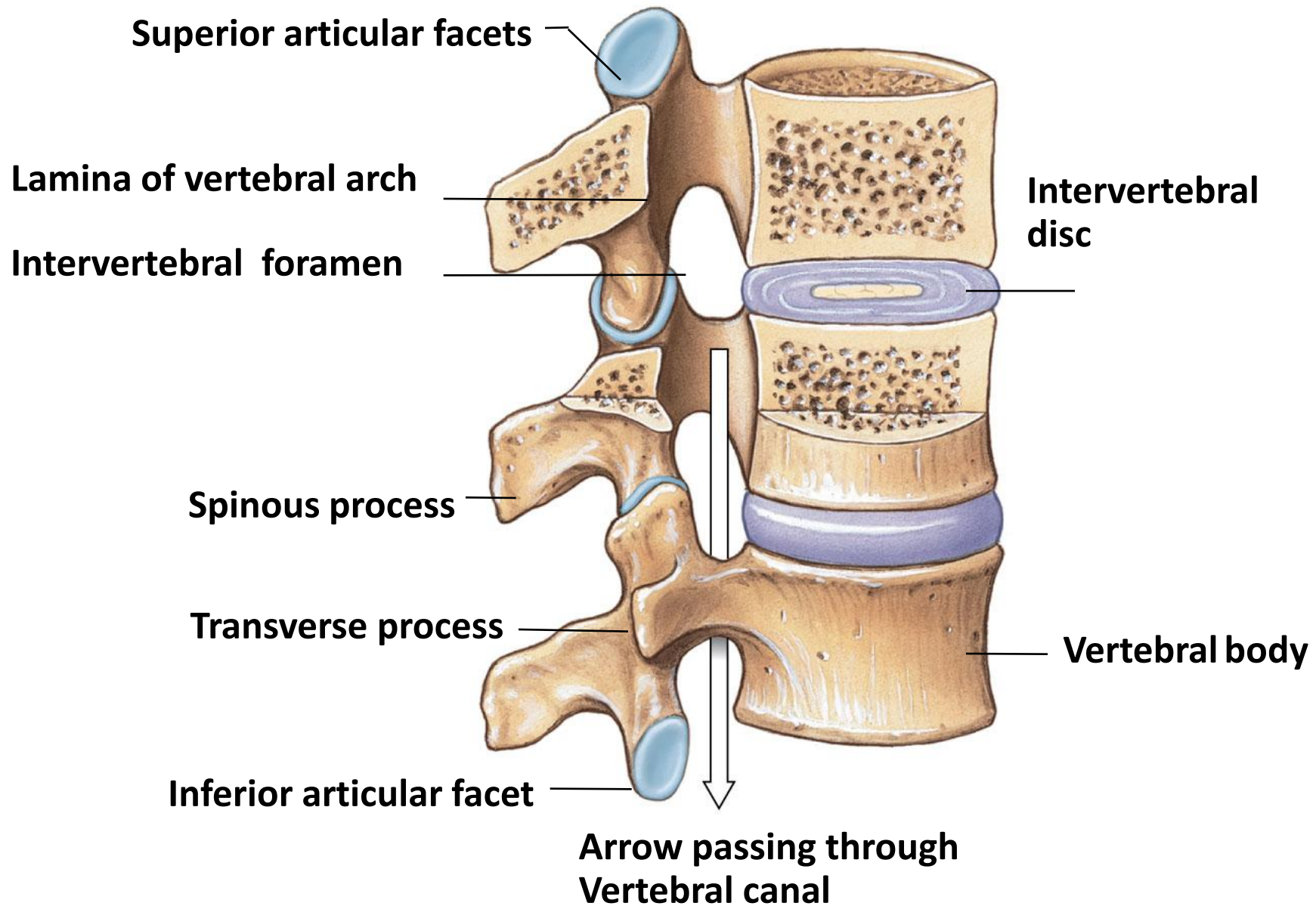
(a) 2nd lumbar vertebra (L2)



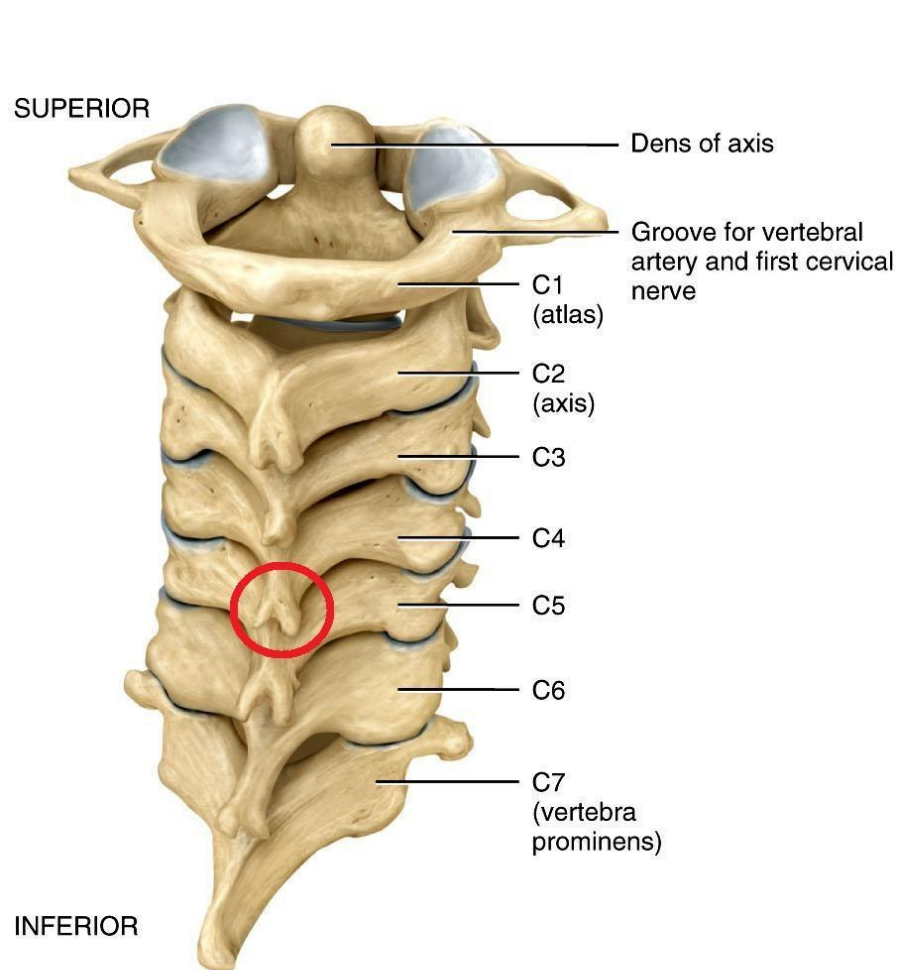




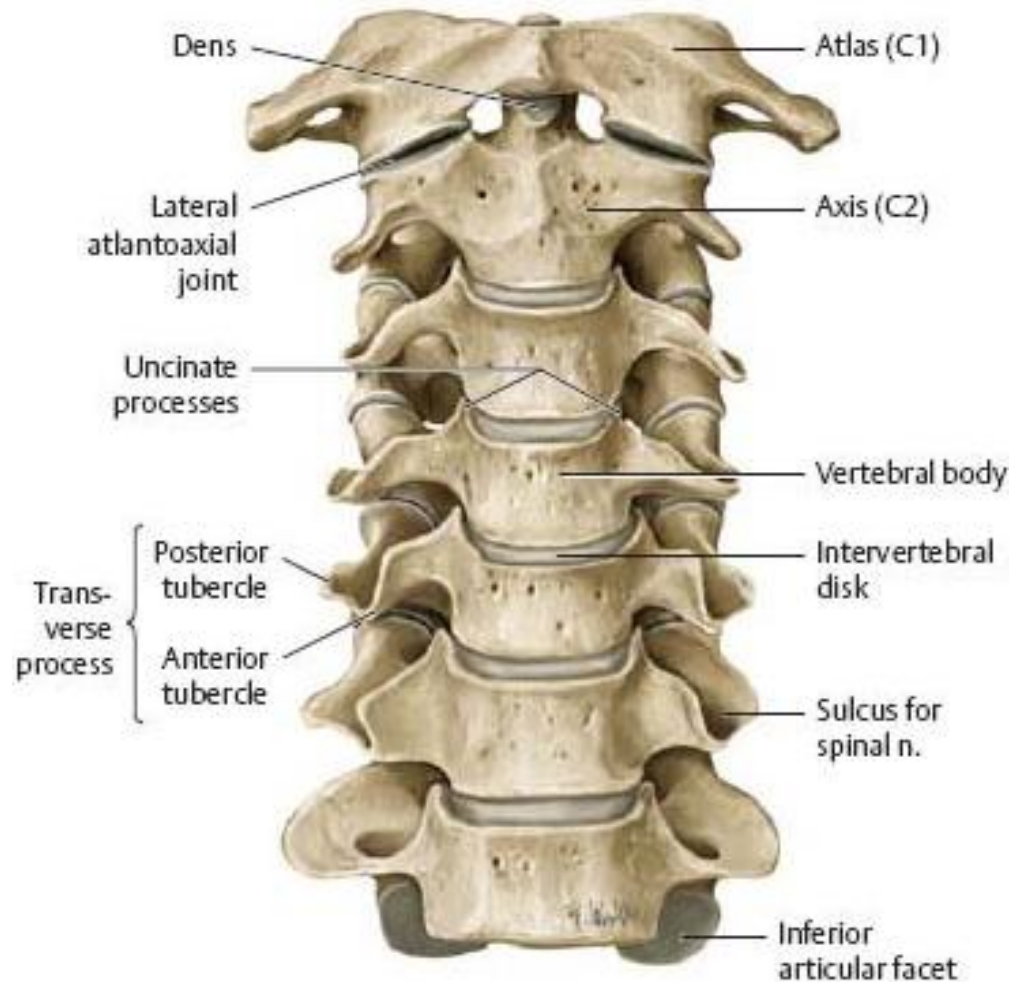


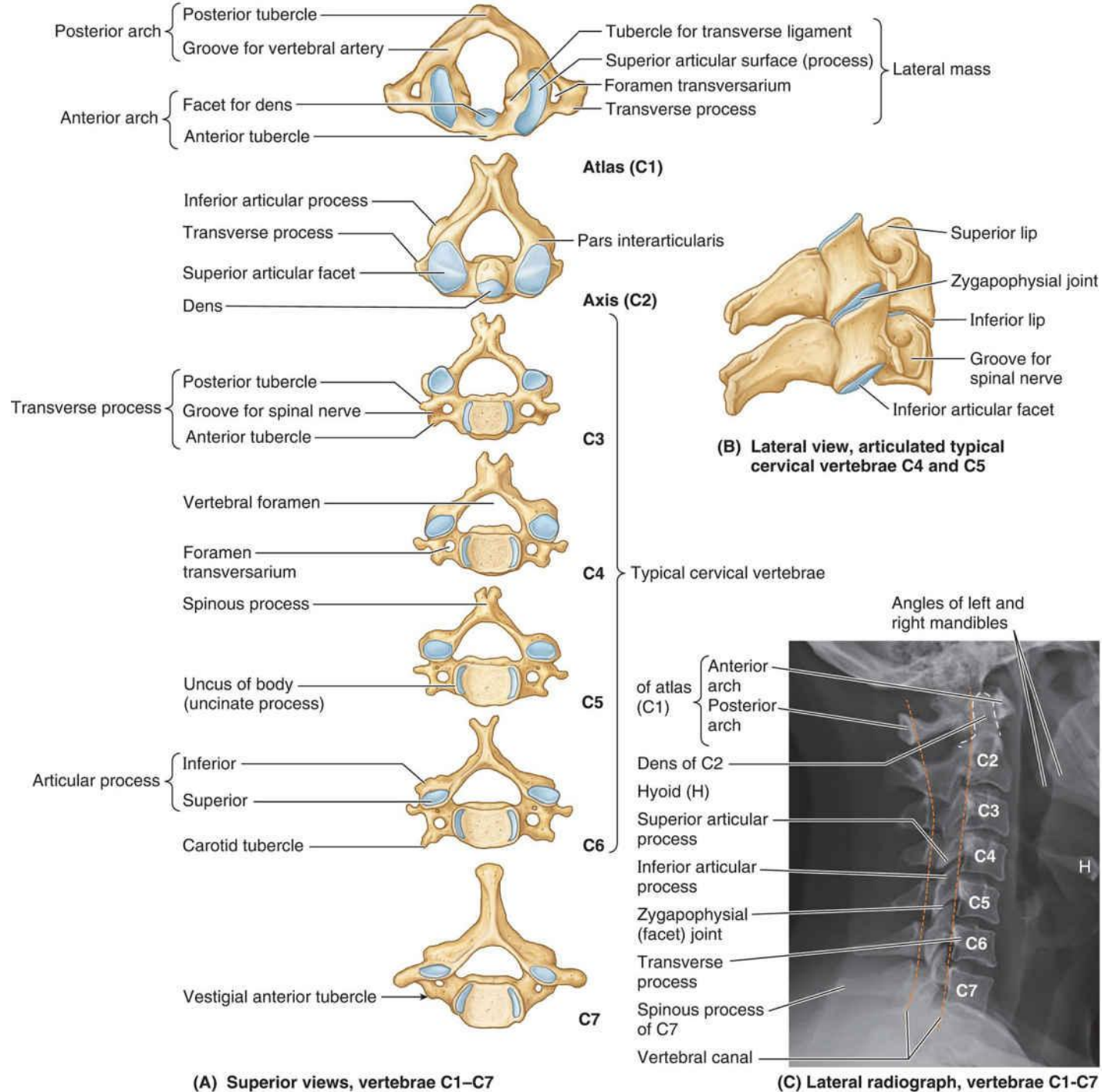


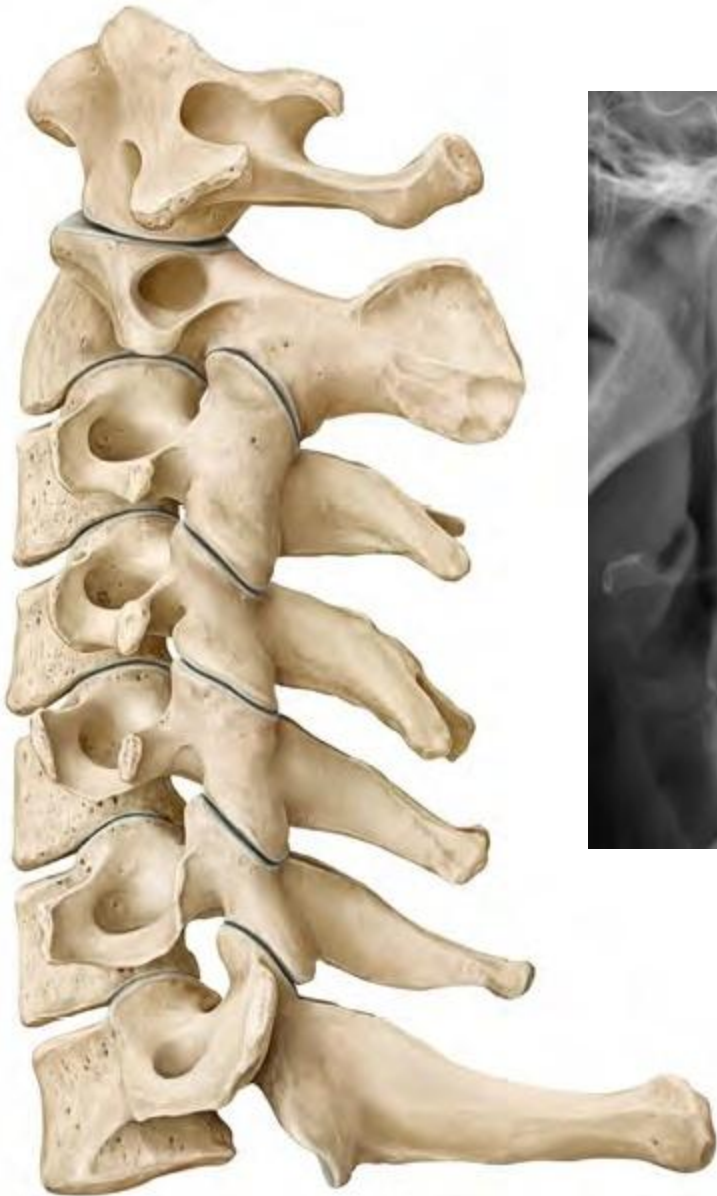
Cervical vertebrae



(a) Posterior view of articulated cervical vertebrae

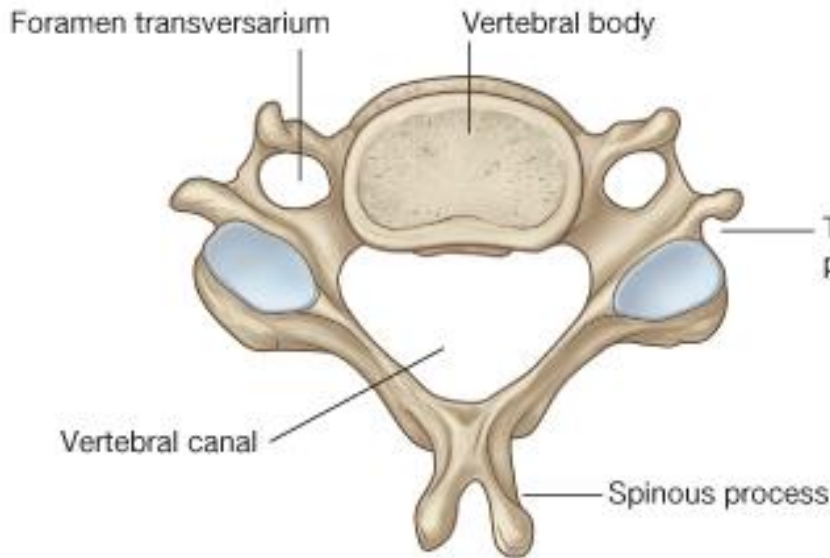




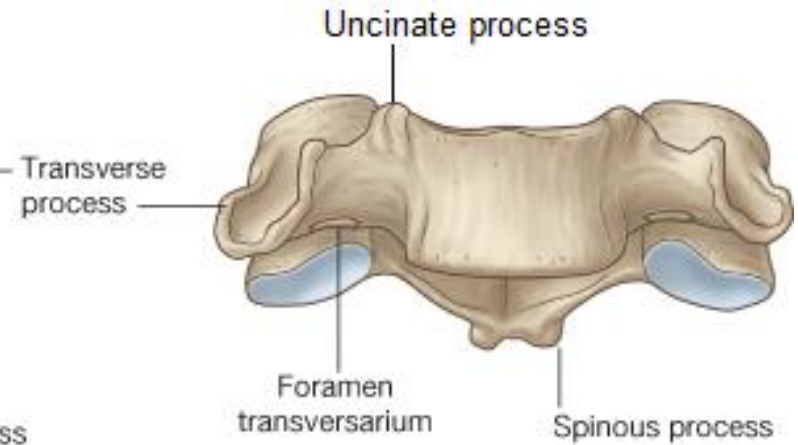




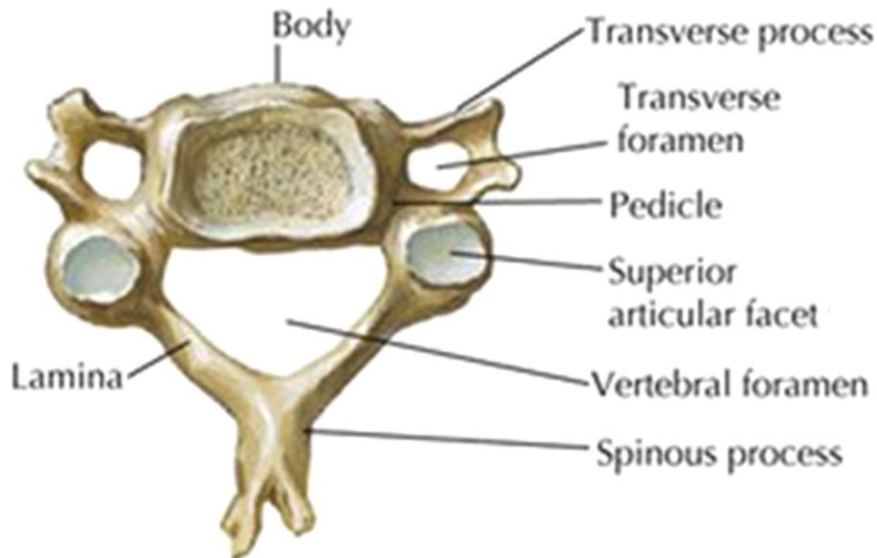
Typical vertebrae



Superior view

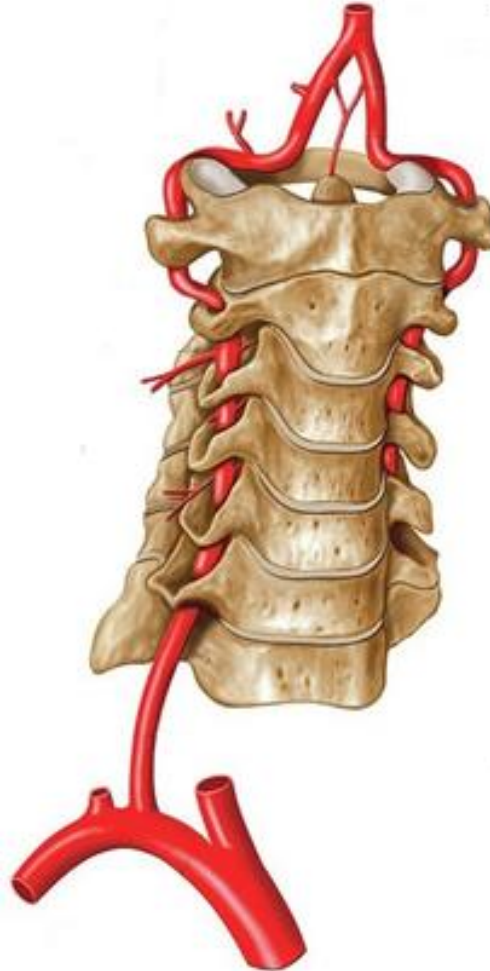


Anterior view

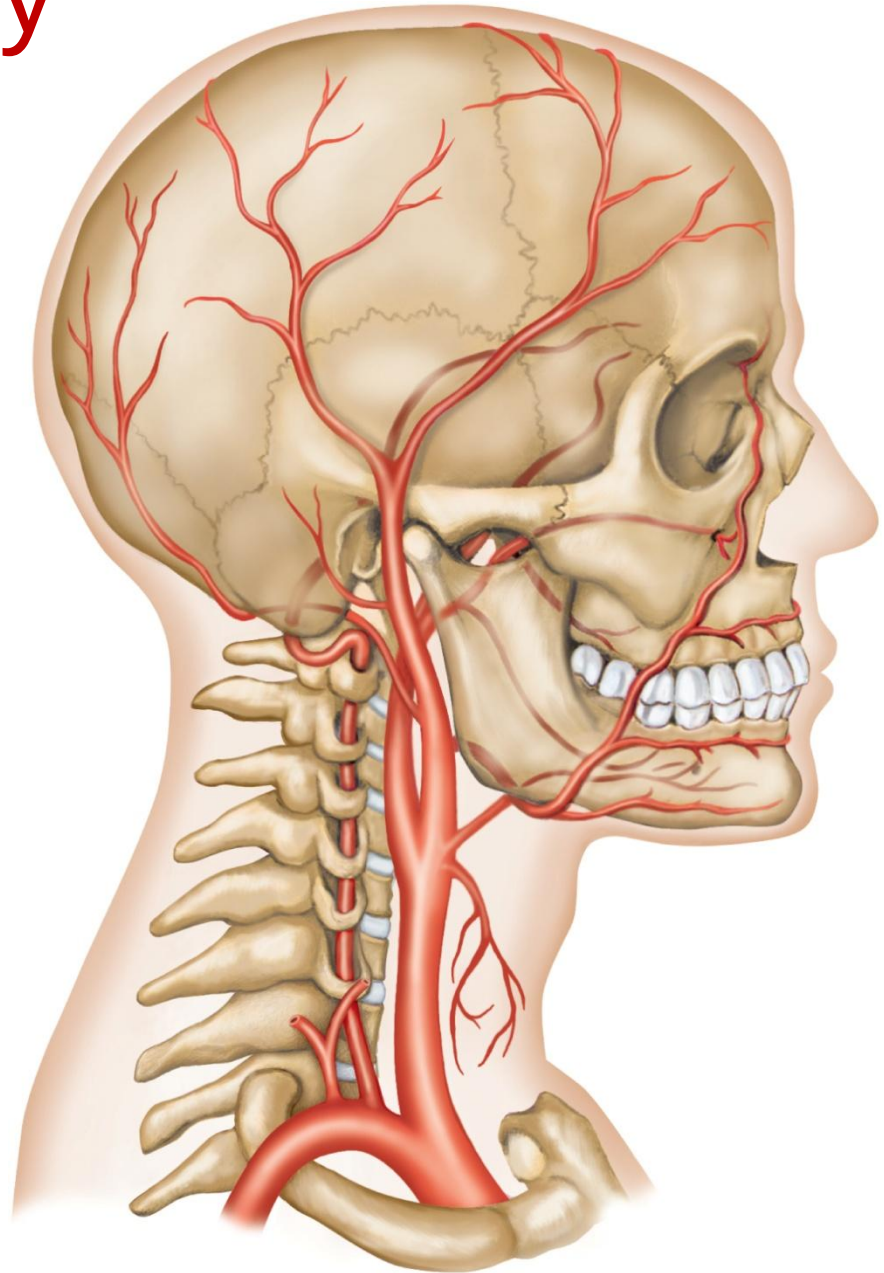


Cervical vertebrae

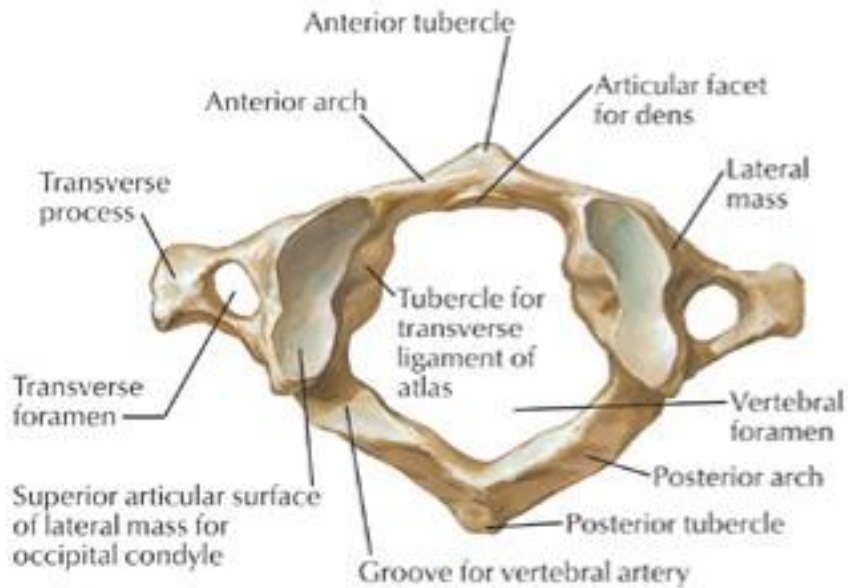
Vertebral artery



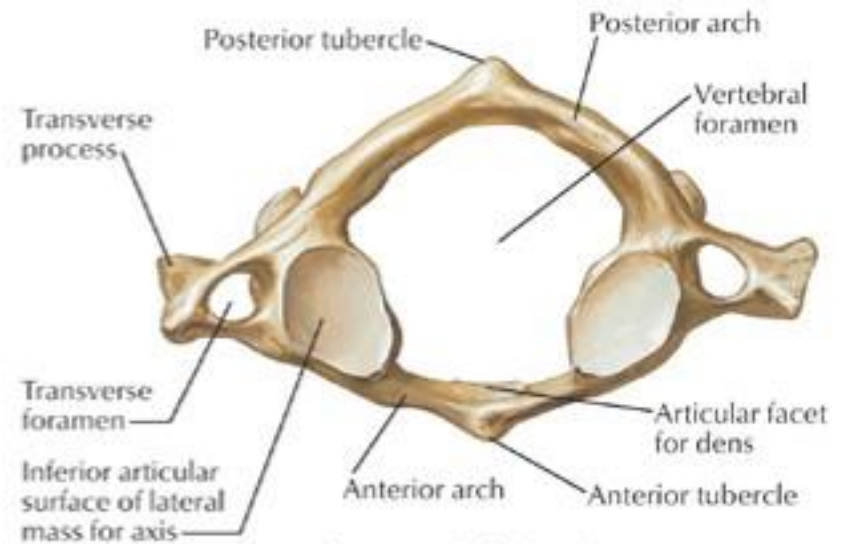
Vertebral artery



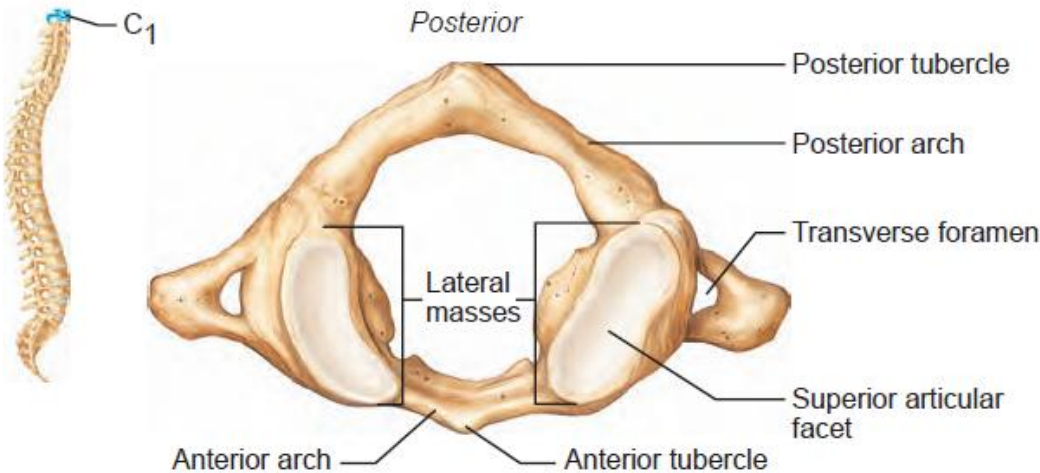
Atlas



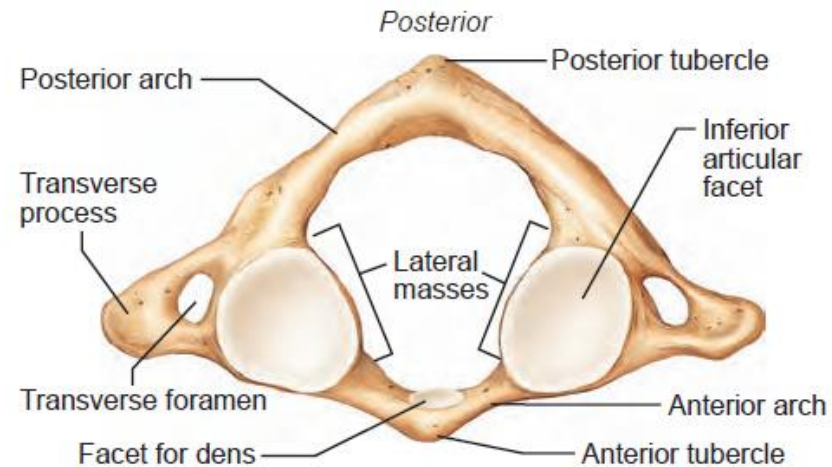
Atlas (C1): superior view



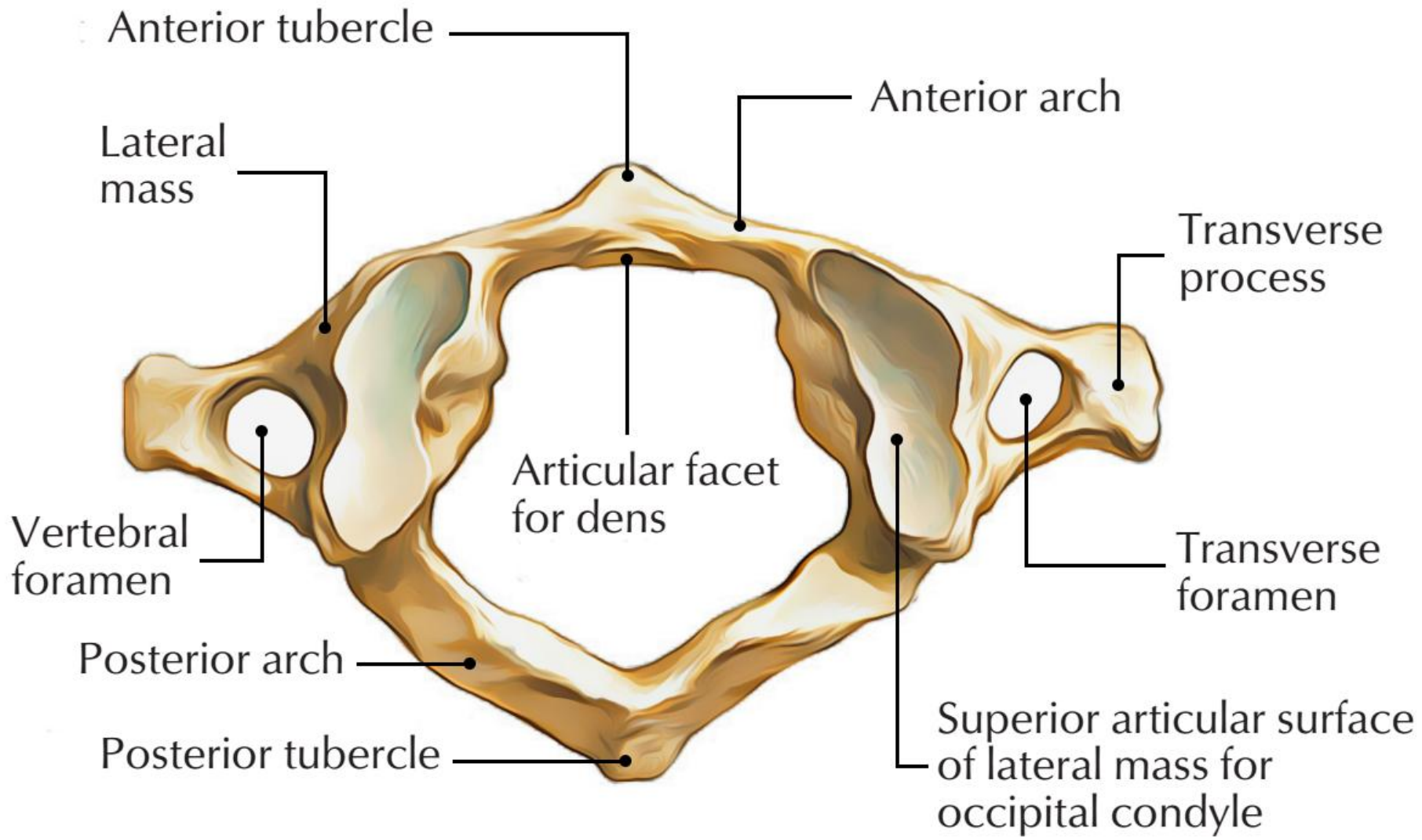
Atlas (C1): inferior view

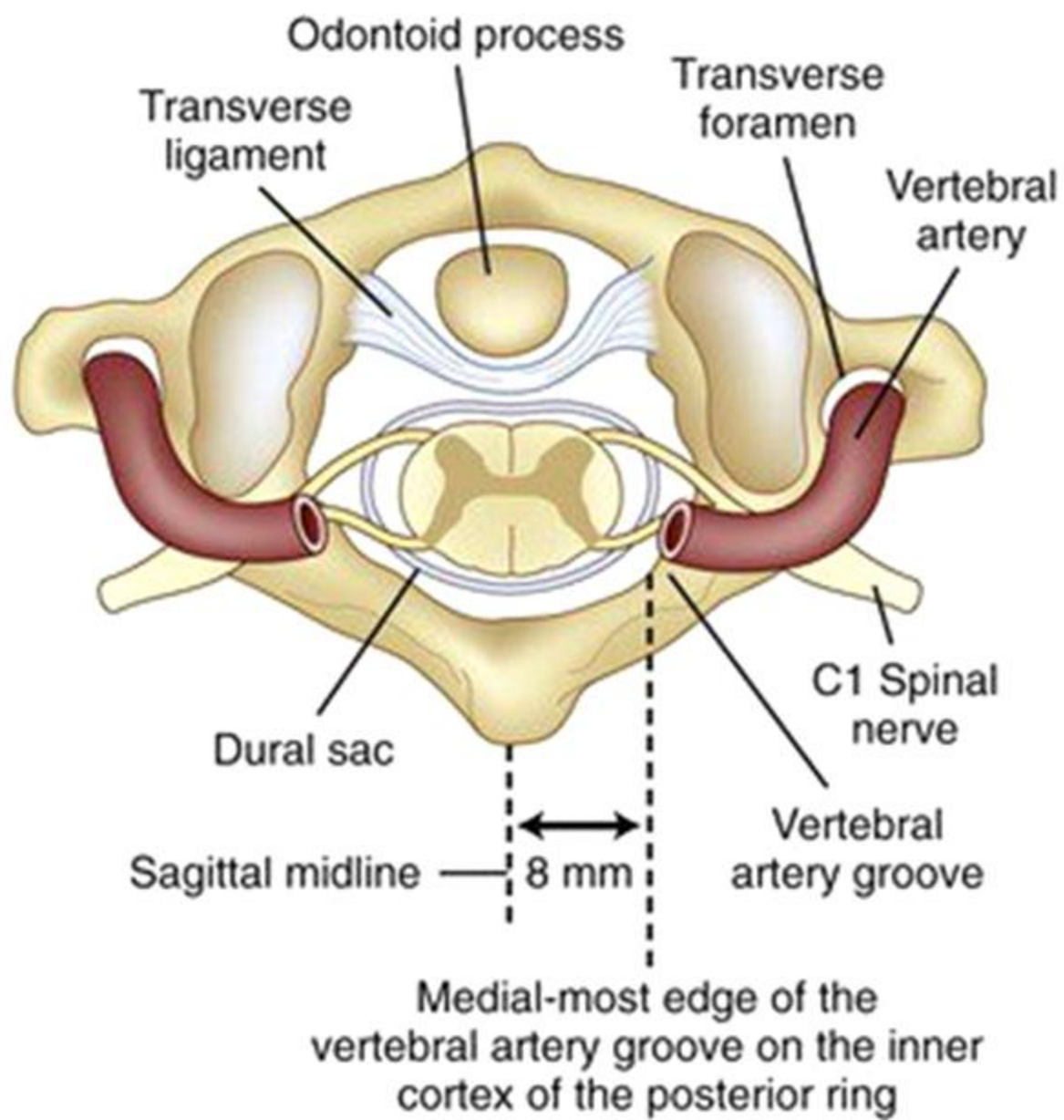


(a) Superior view of atlas (C₁)

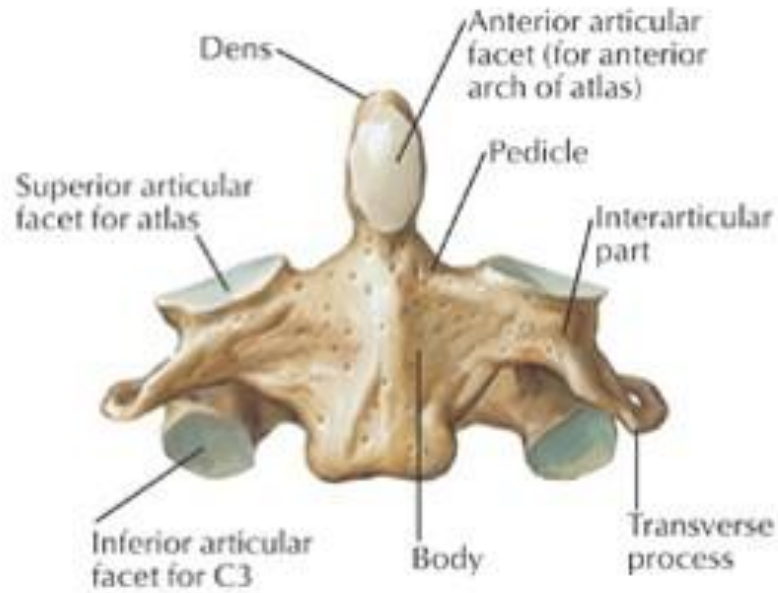


(b) Inferior view of atlas (C₁)

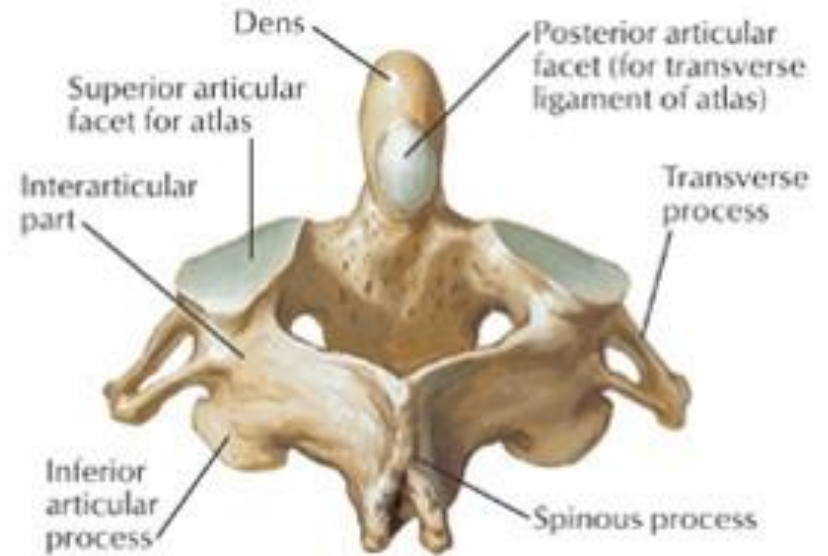




Axis



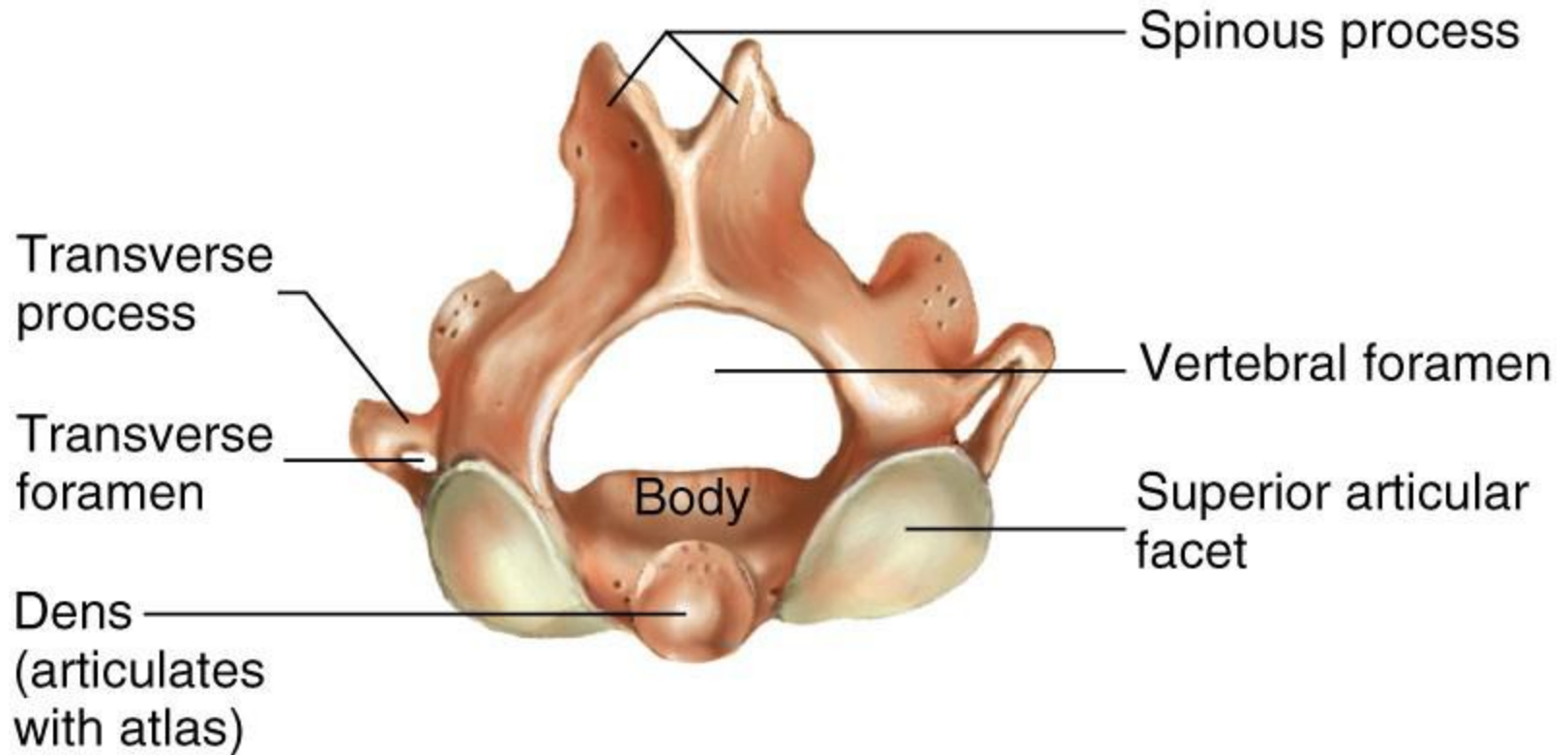
Axis (C2): anterior view



Axis (C2): posterosuperior view

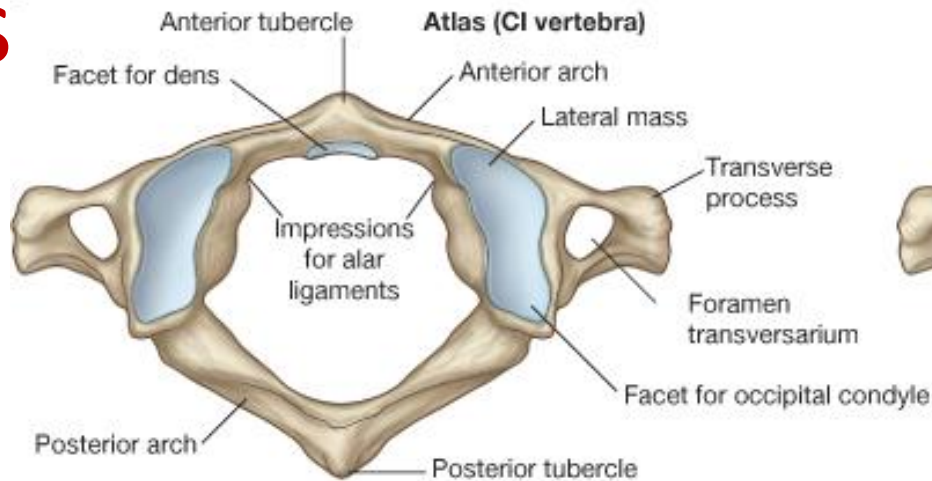


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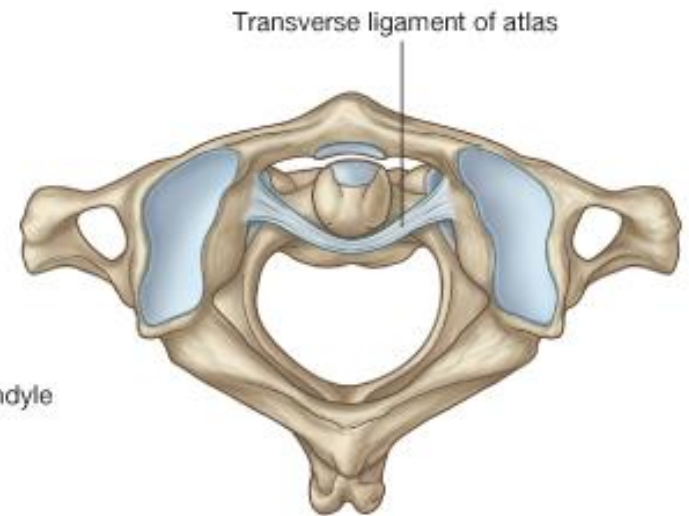


(b) **Axis (second cervical vertebra), superior view**

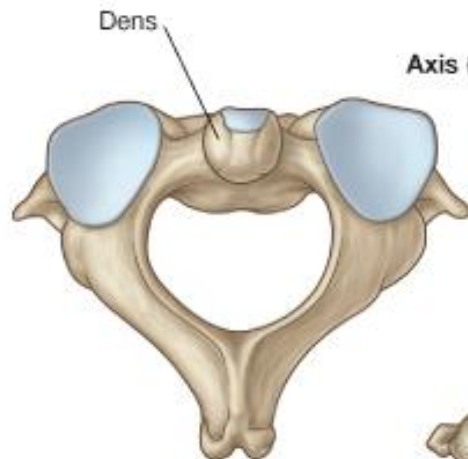
Axis^B



Superior view

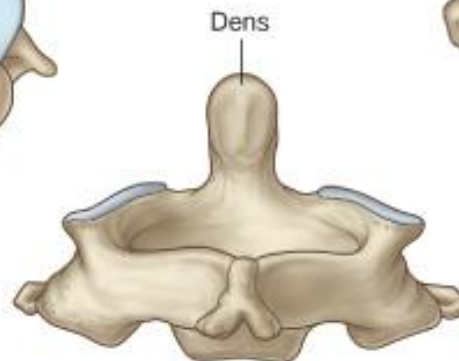


Superior view

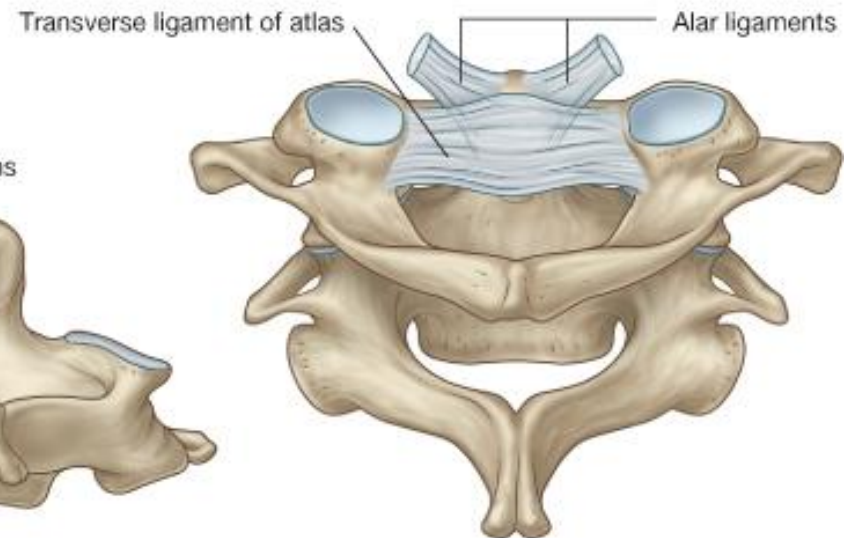


Superior view

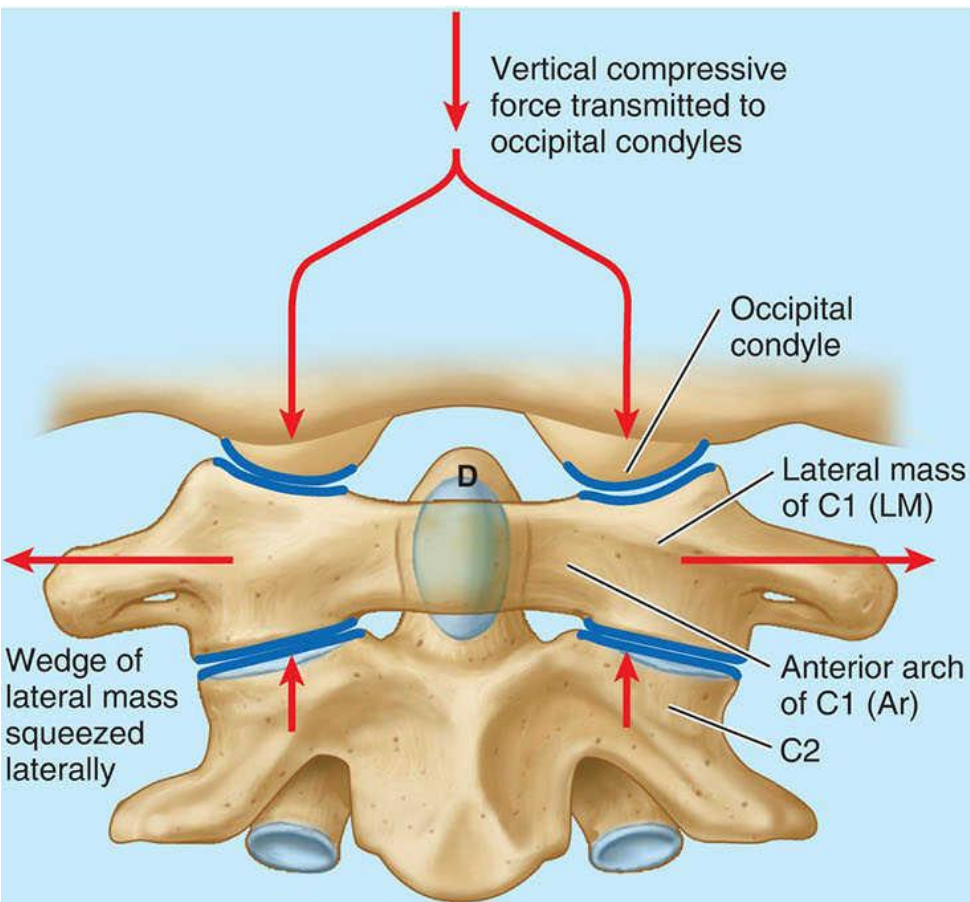
Axis (C2 vertebra)



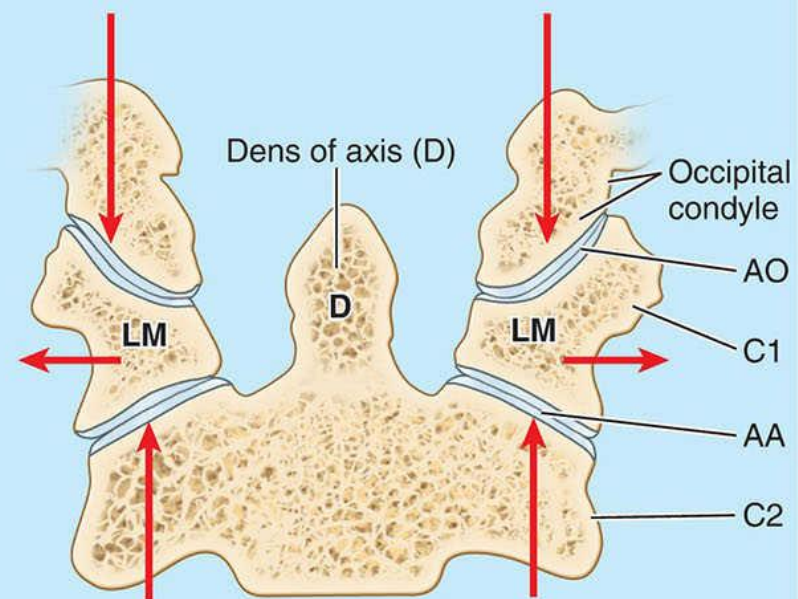
Posterior view



Posterosuperior view

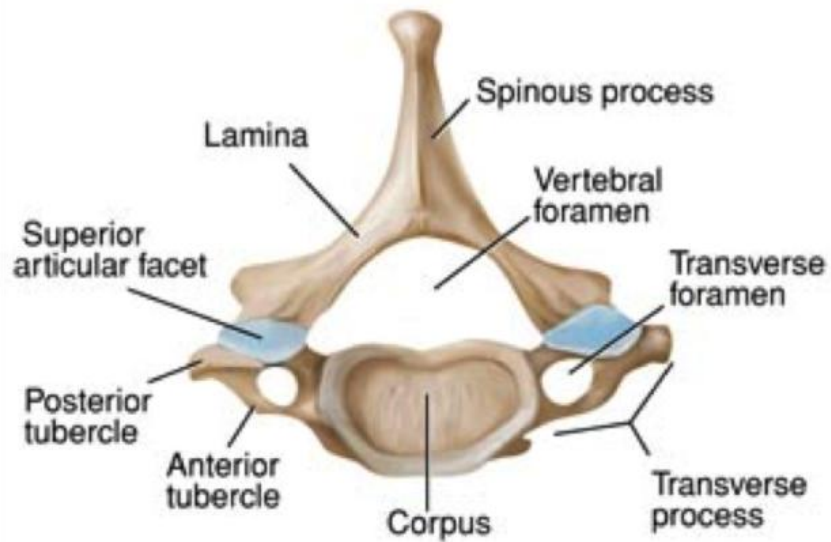
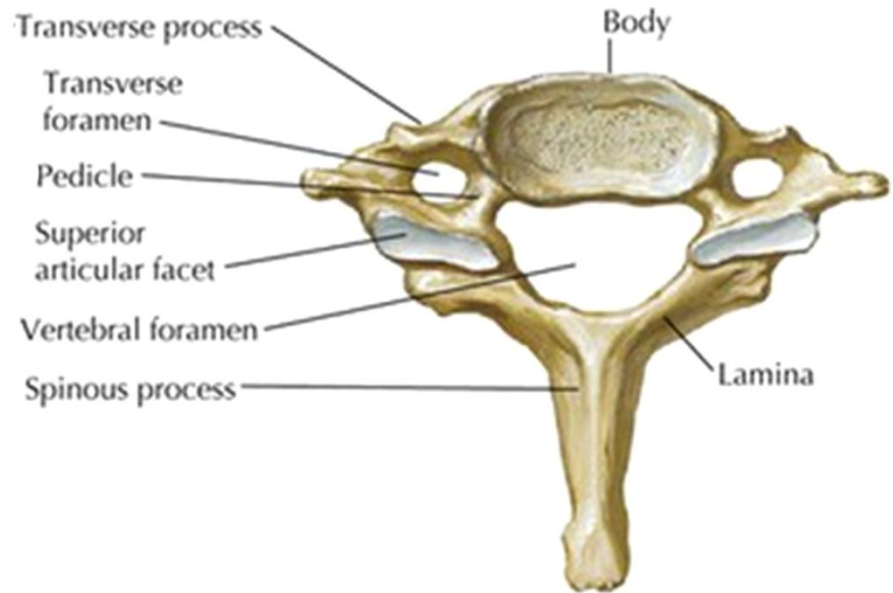


(A) Anterior view of occipital condyles, atlas and axis

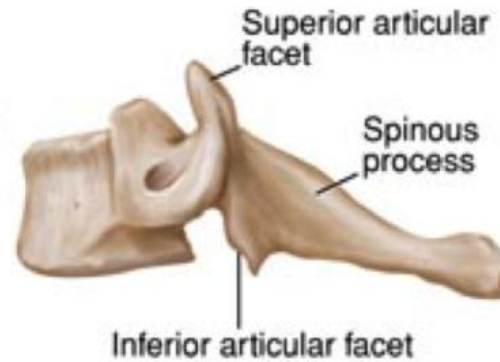


(B) Anterior view of coronal section of craniovertebral [atlanto-occipital (AO) and lateral atlanto-axial (AA)] joints. Compare with radiograph in Fig 4.6E.

C7 vertebrae



SUPERIOR VIEW

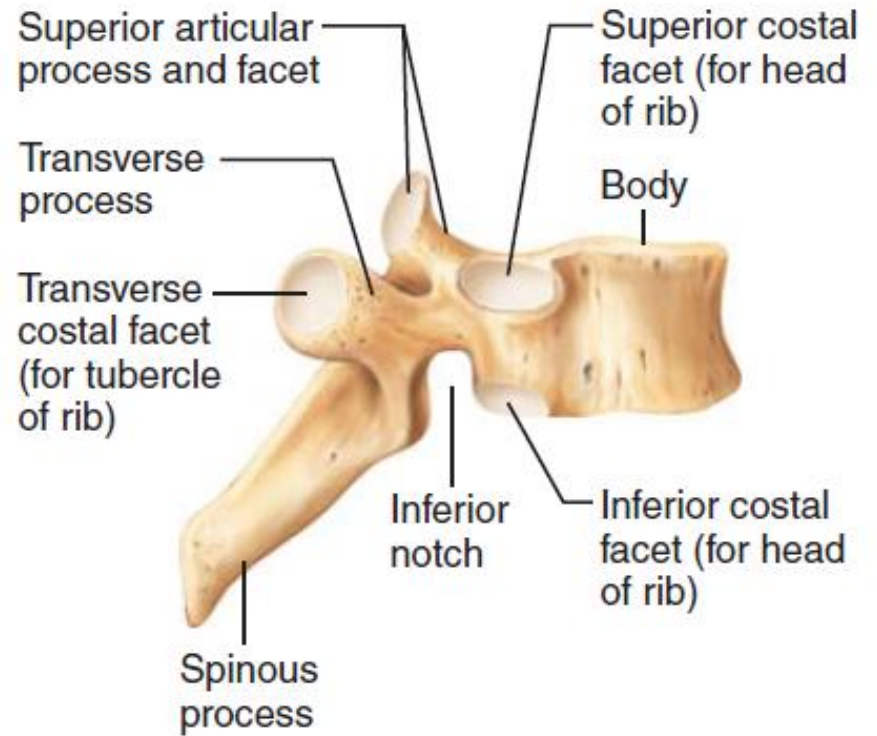
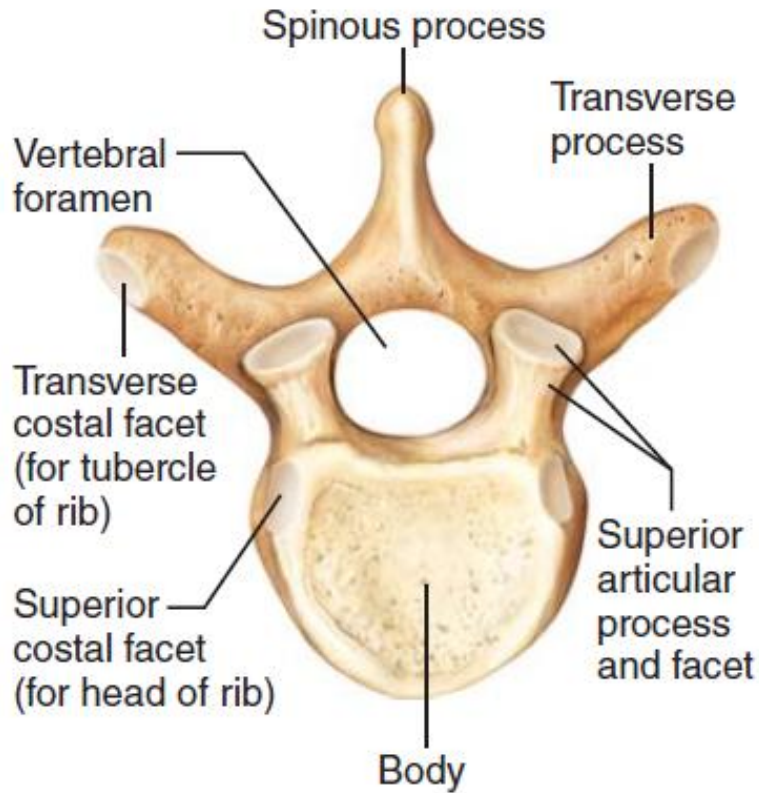


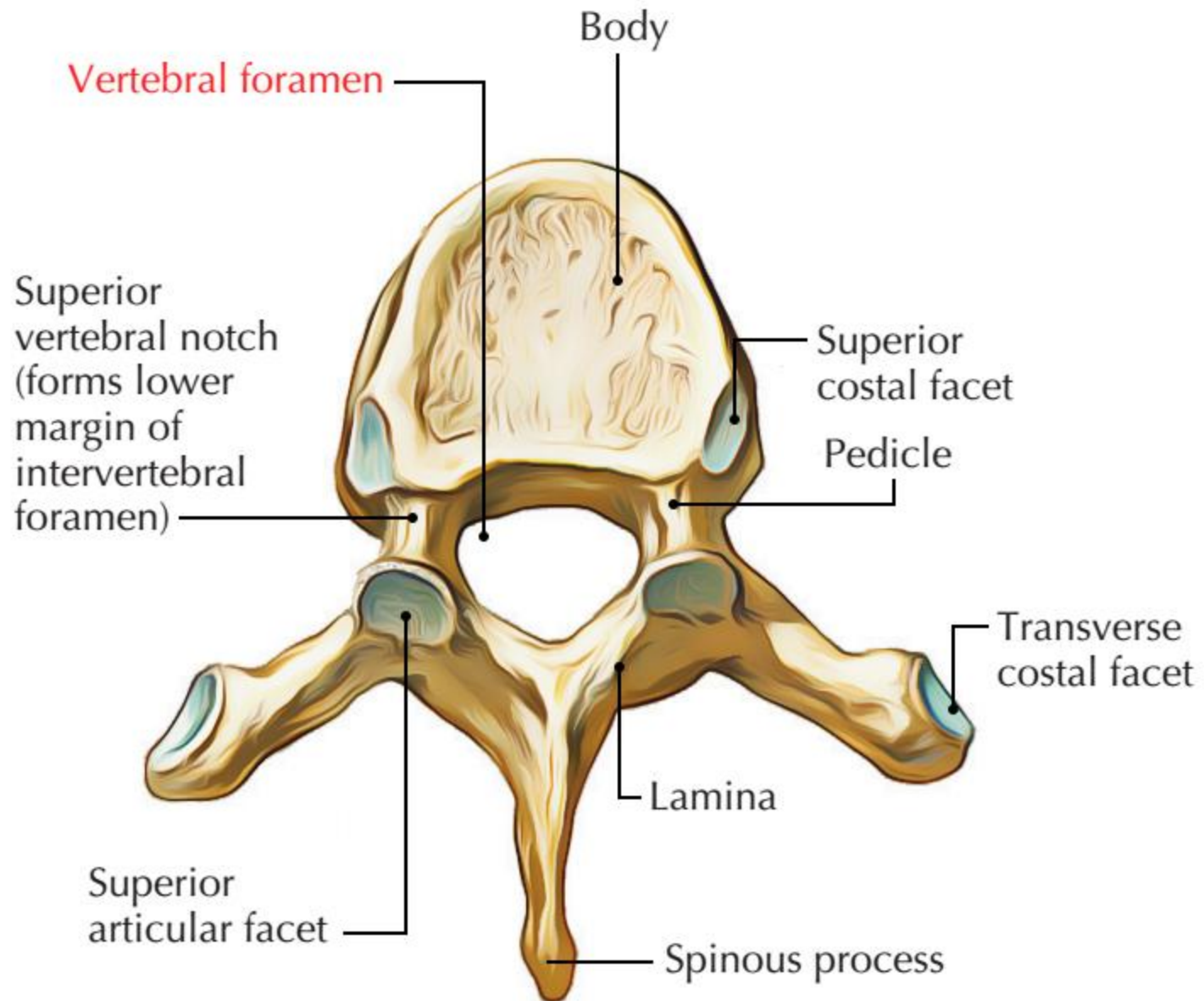
LATERAL VIEW

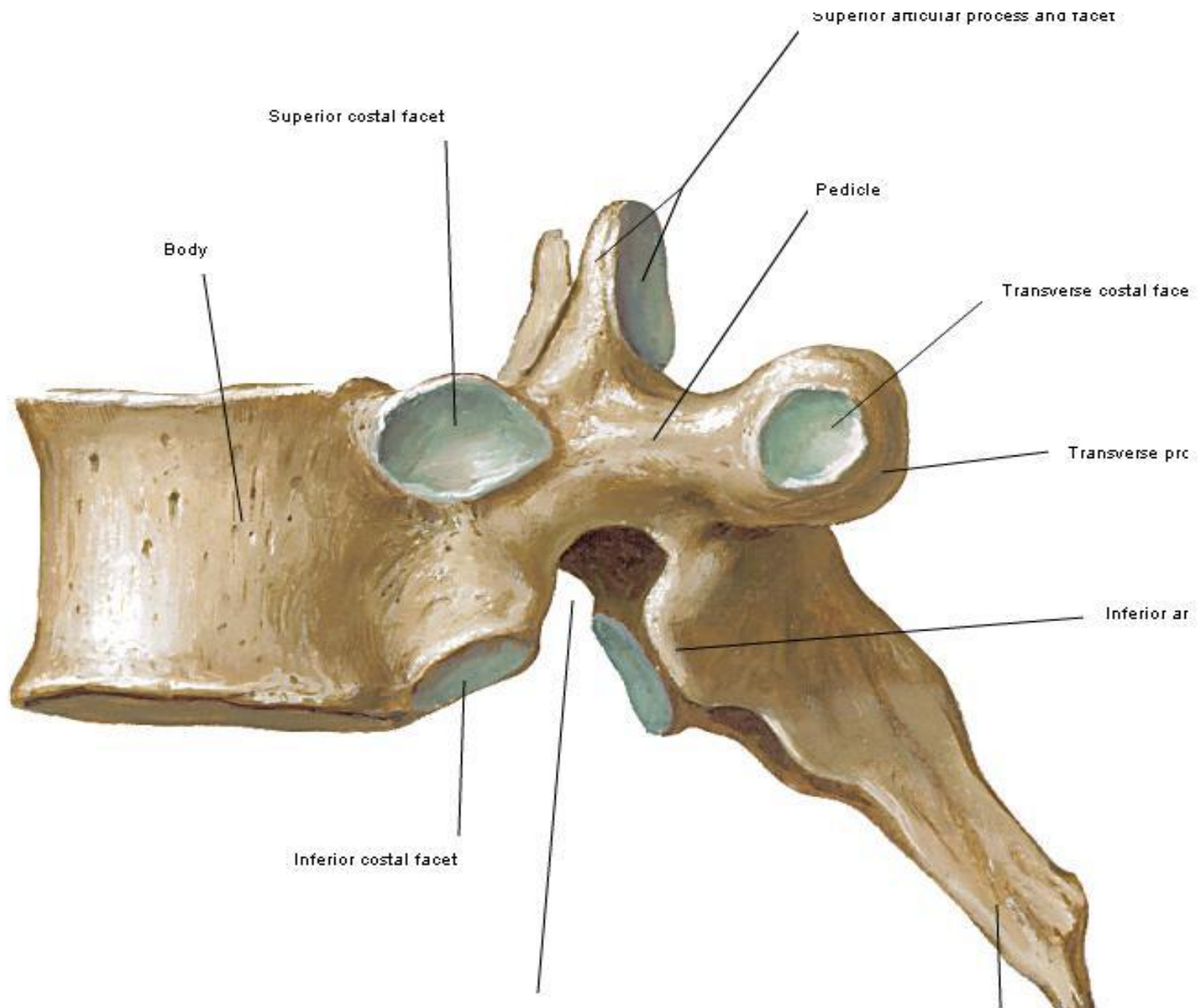
Thoracic Vertebrae

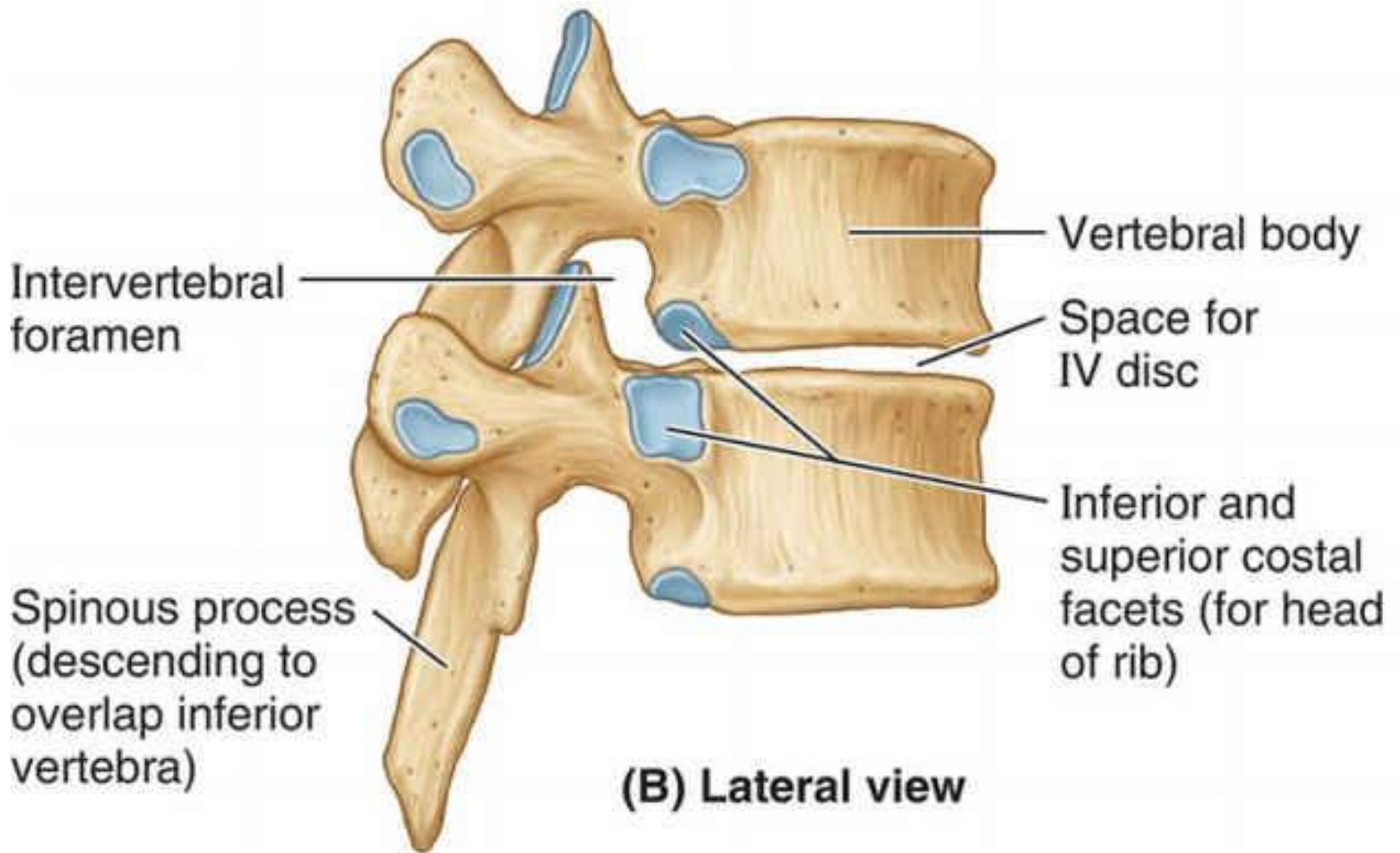


Thoracic Vertebrae

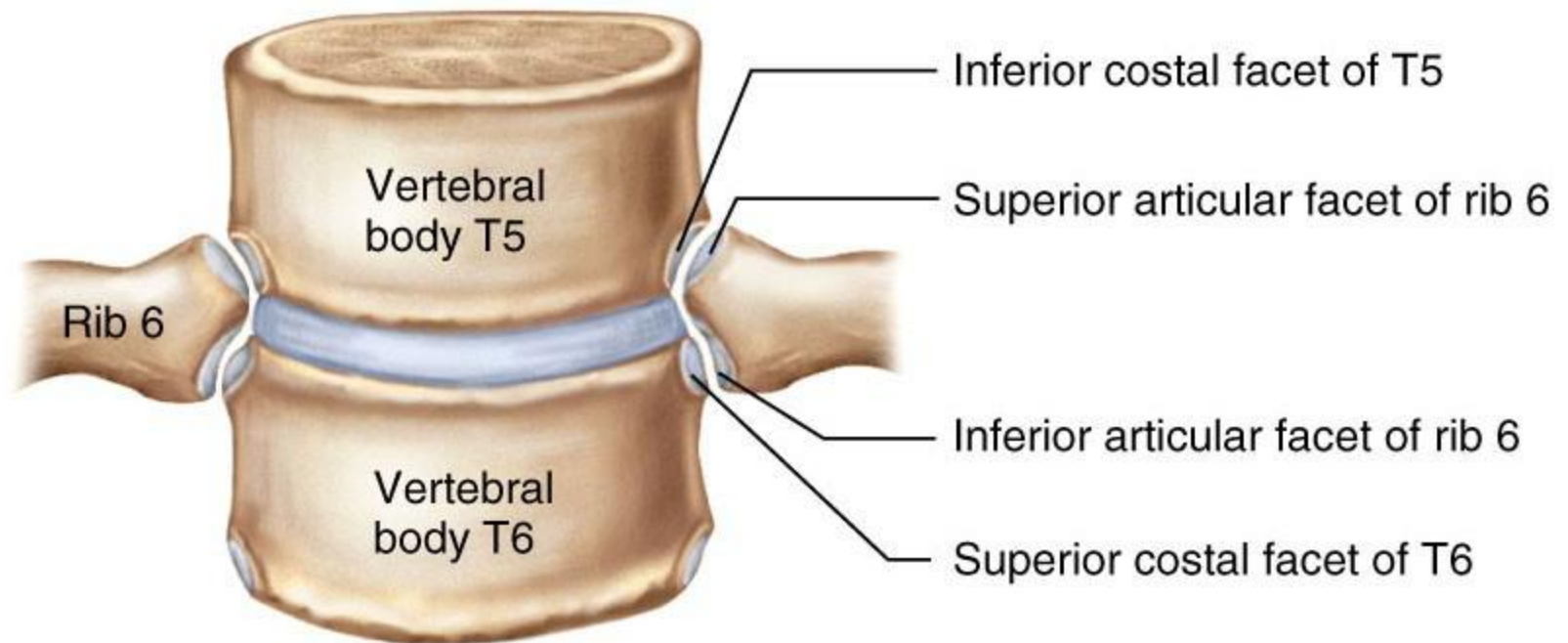




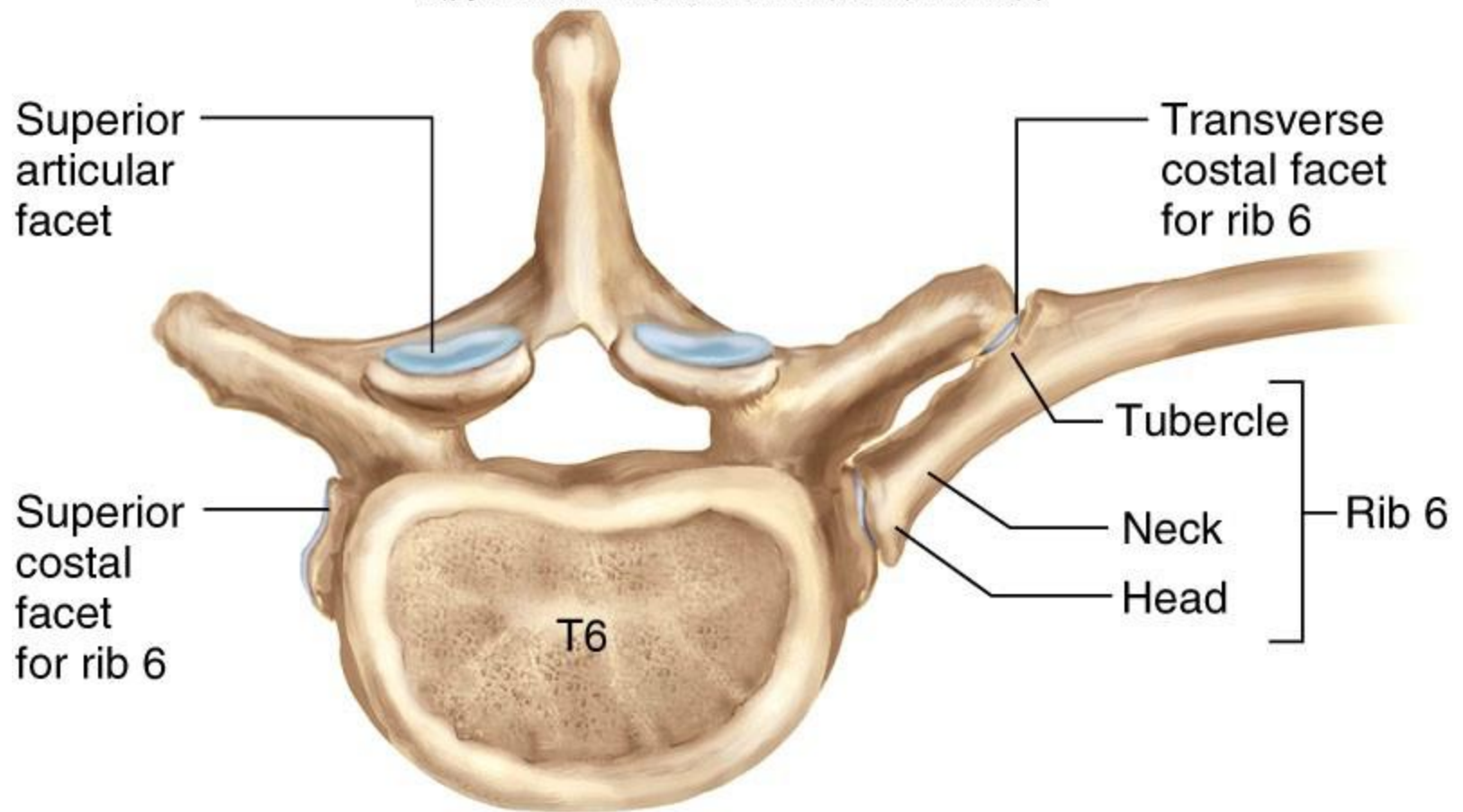




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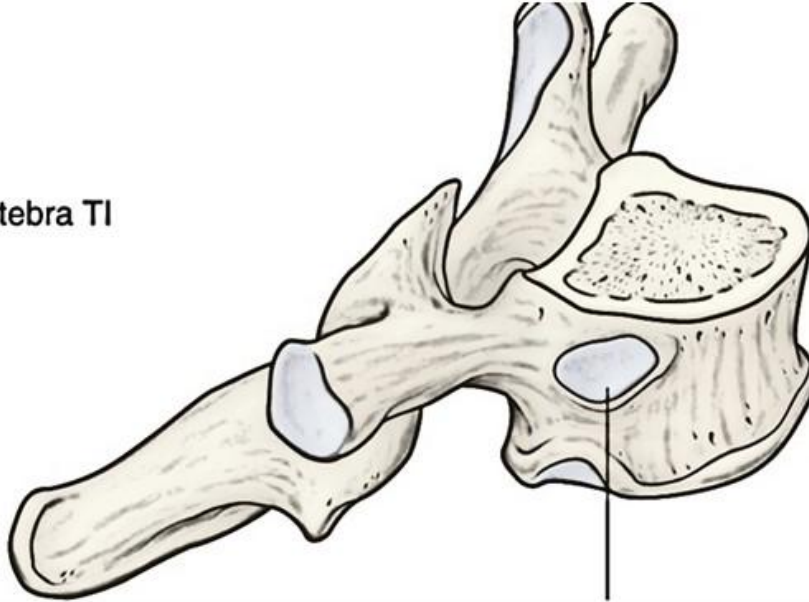


(a) Anterior view



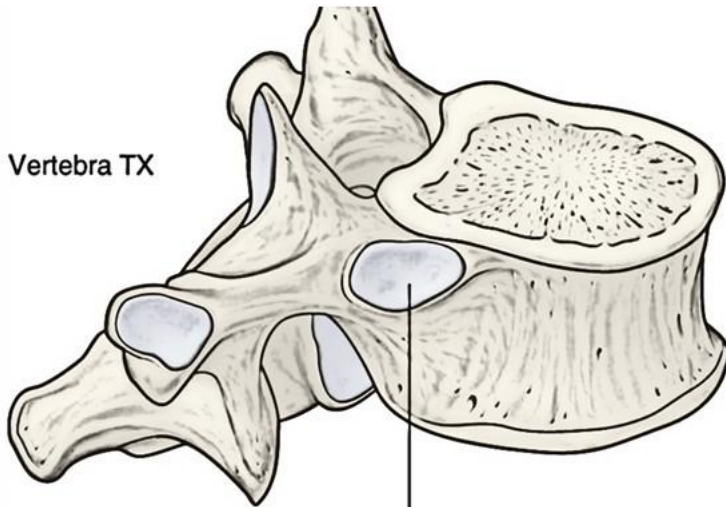
(b) Superior view

Vertebra T1



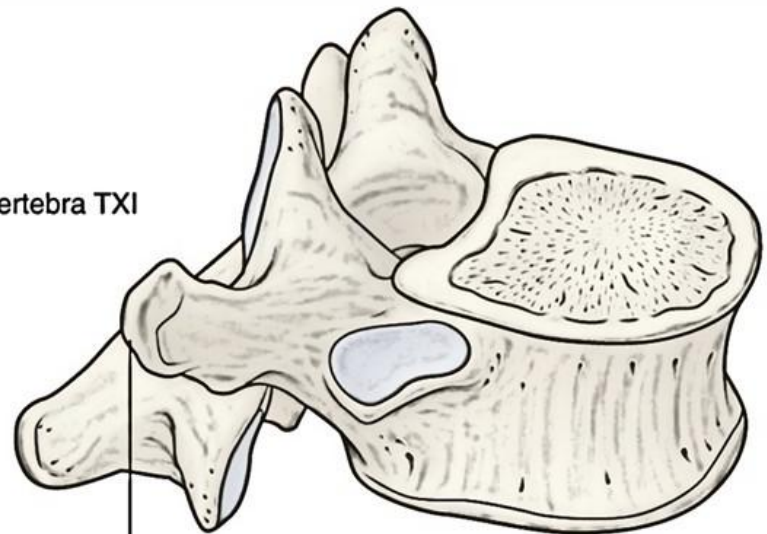
Superior costal facet for head of rib 1

Vertebra TX



Single complete costal facet for head of rib X

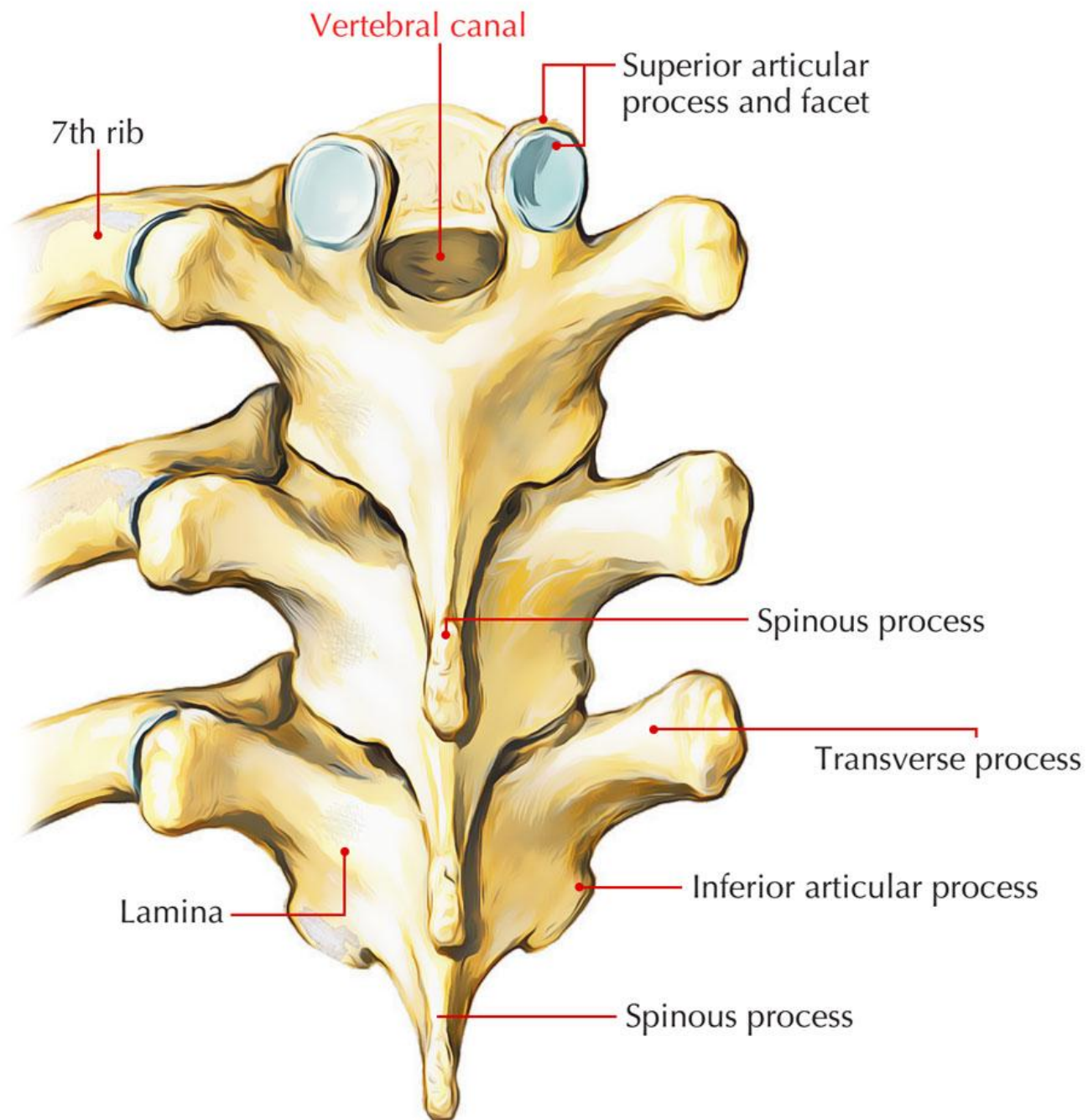
Vertebra TXI



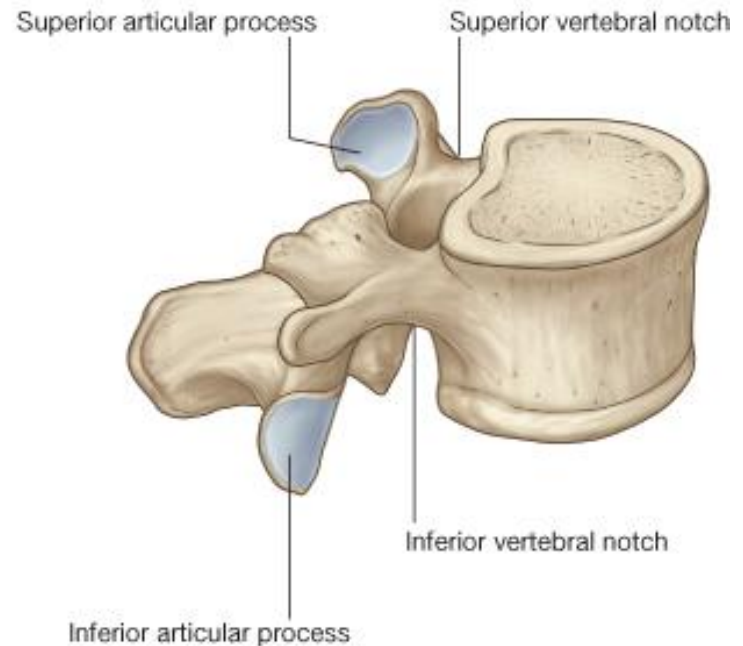
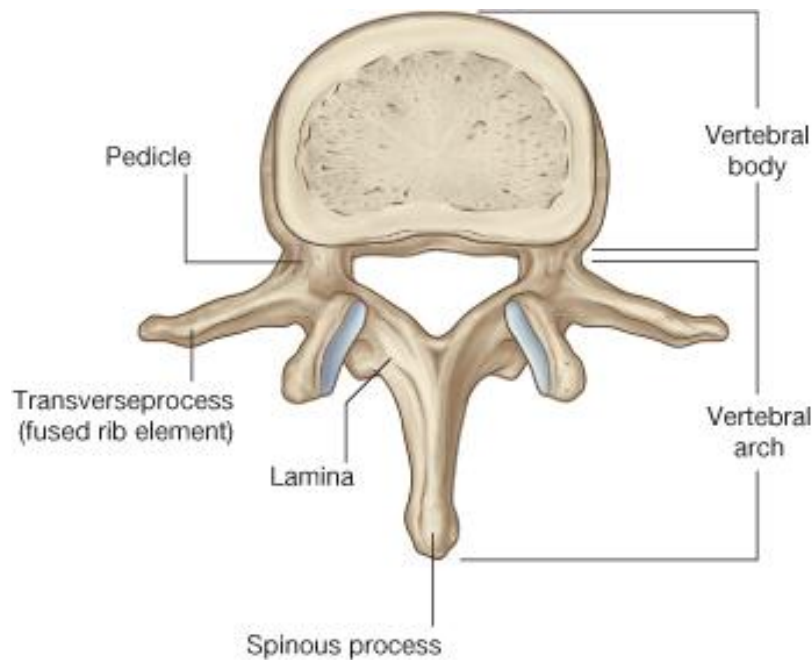
No costal facet on transverse process

Lumbar Vertebrae

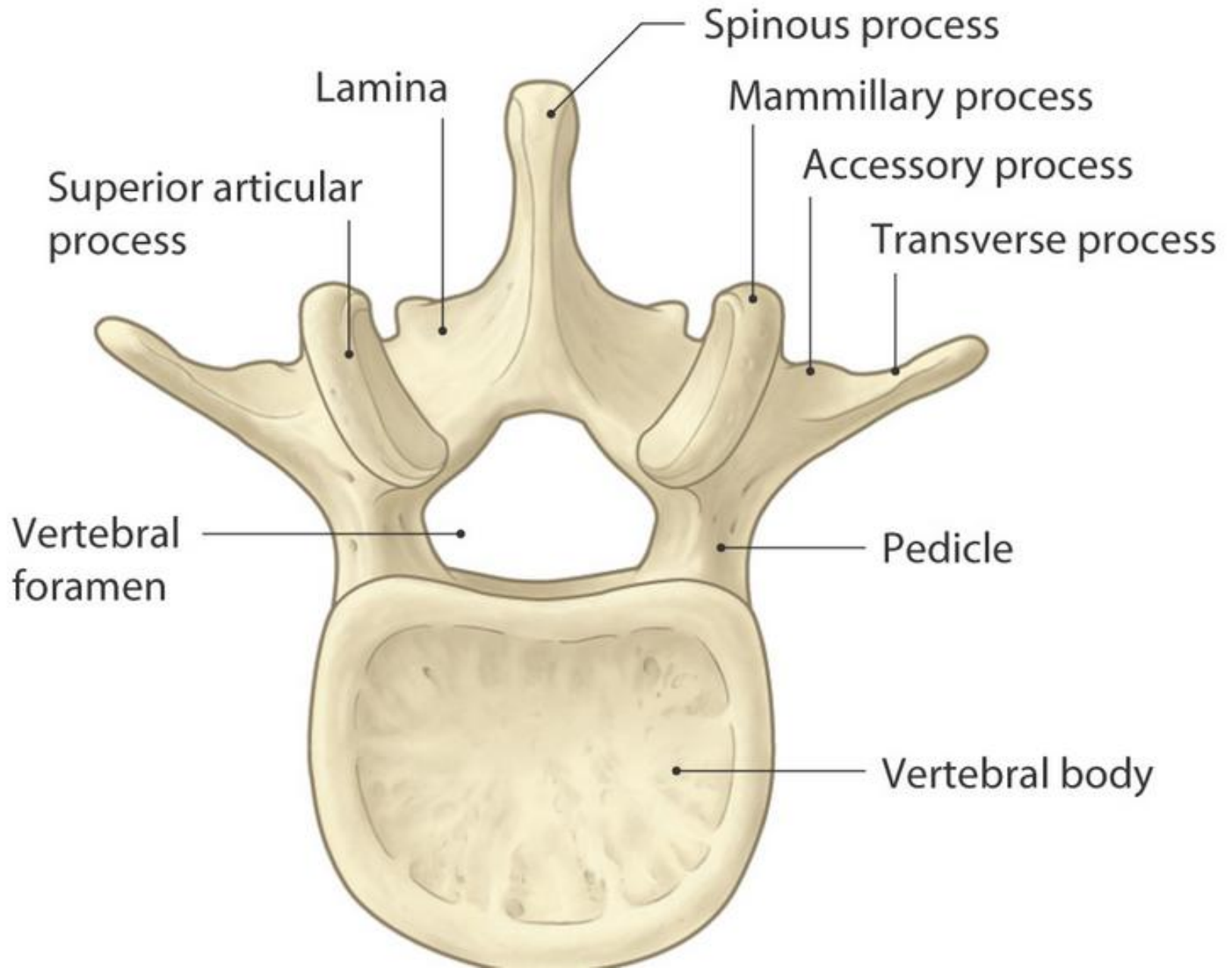


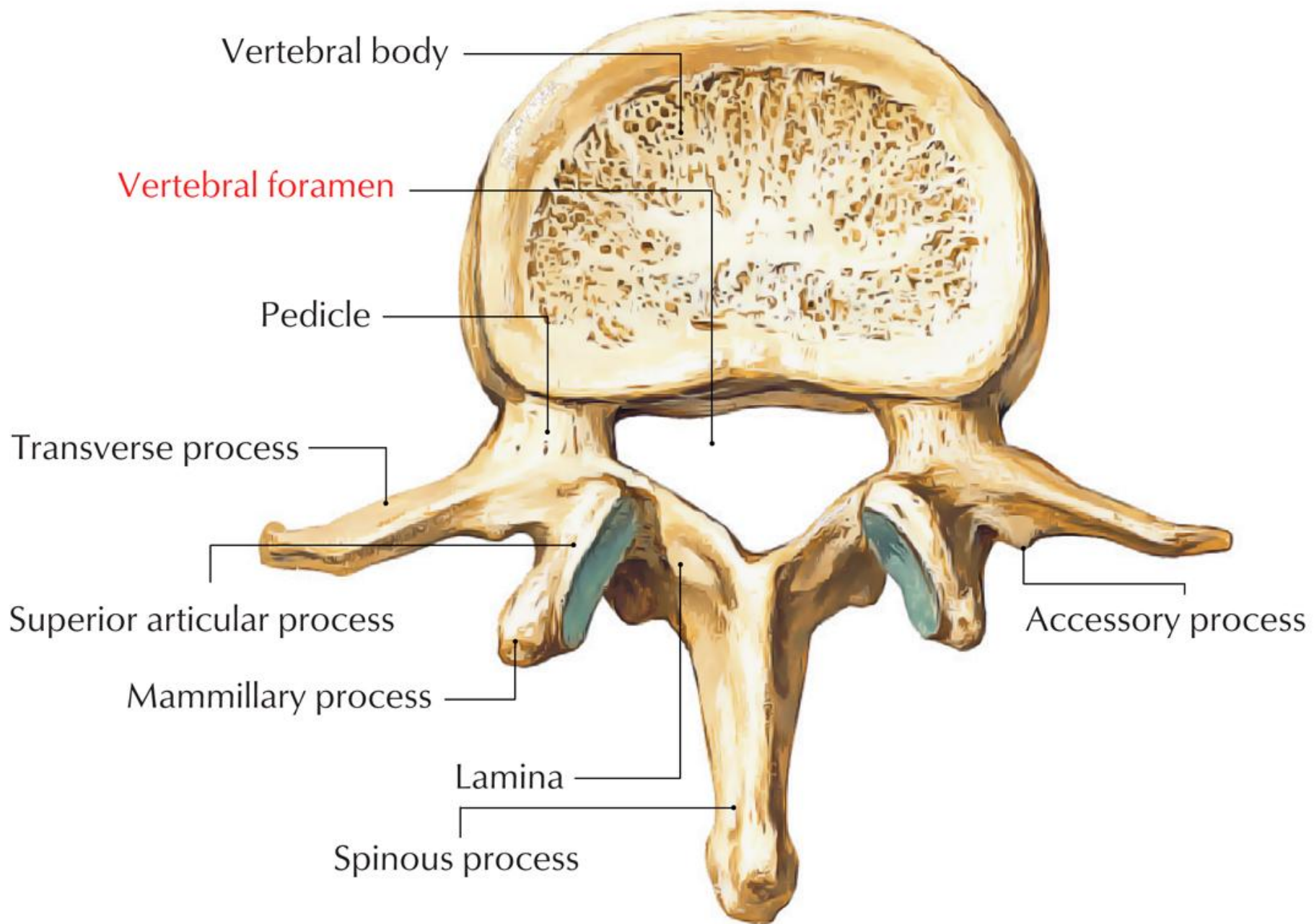


Lumbar Vertebrae

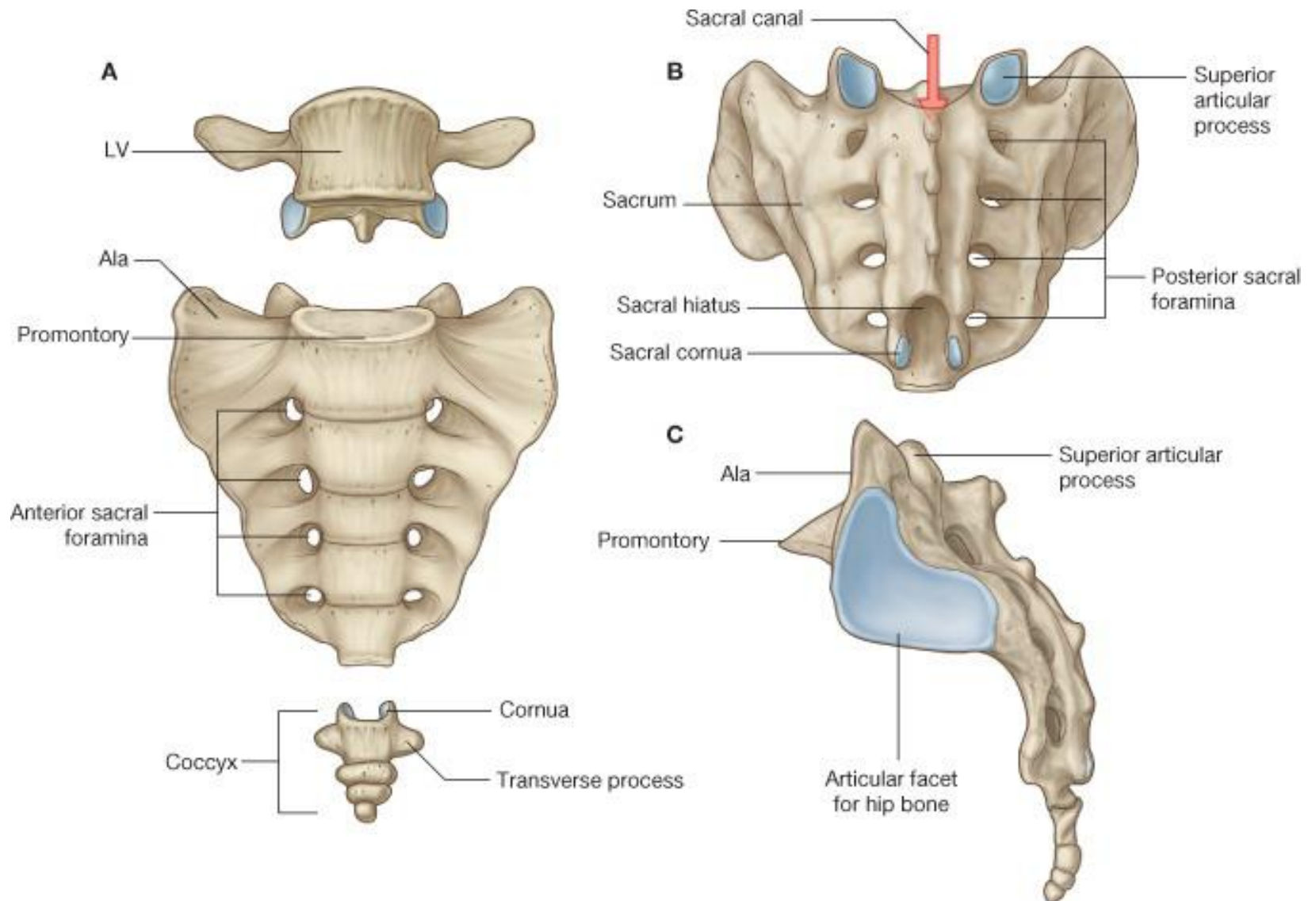


Lumbar Vertebrae

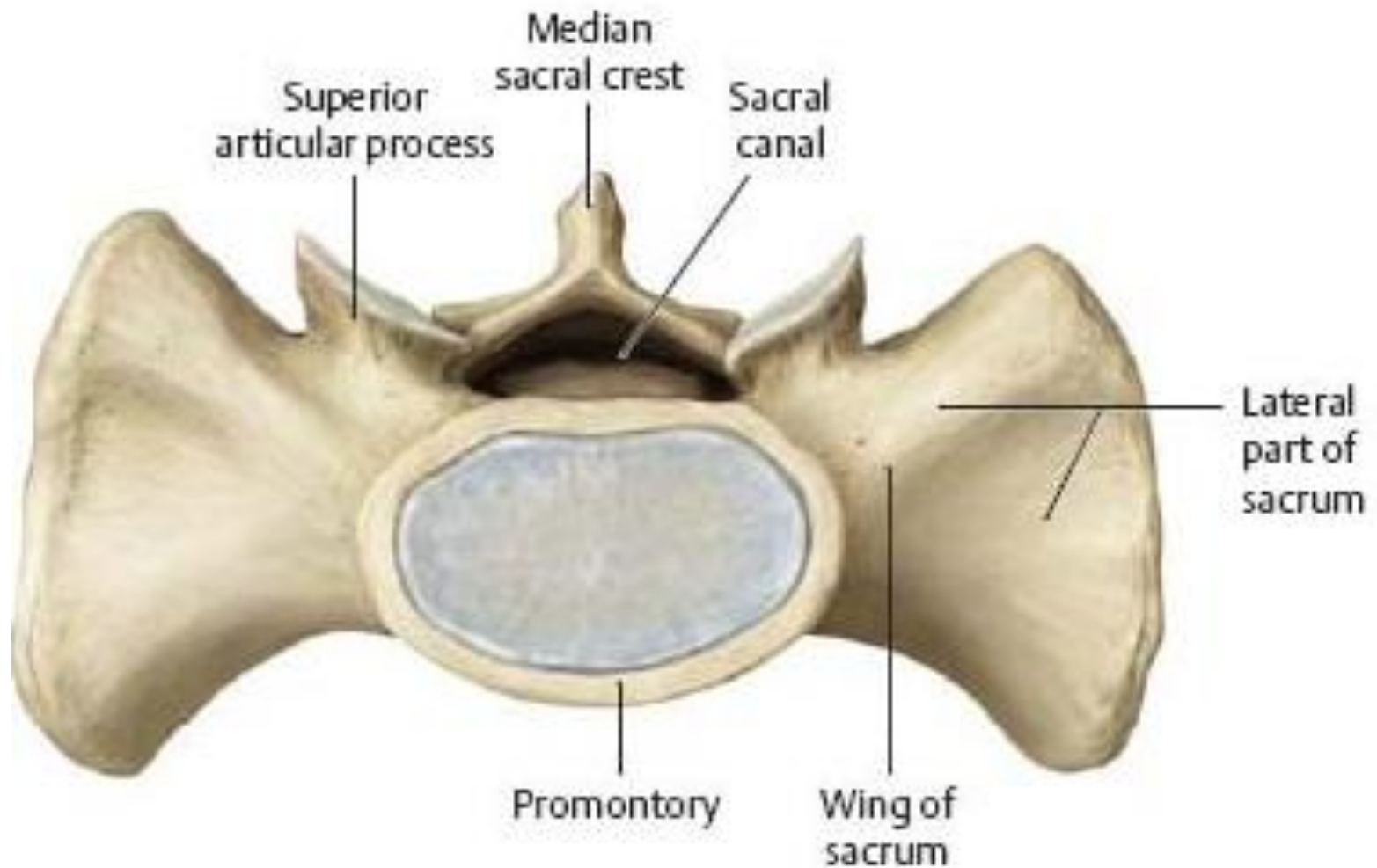




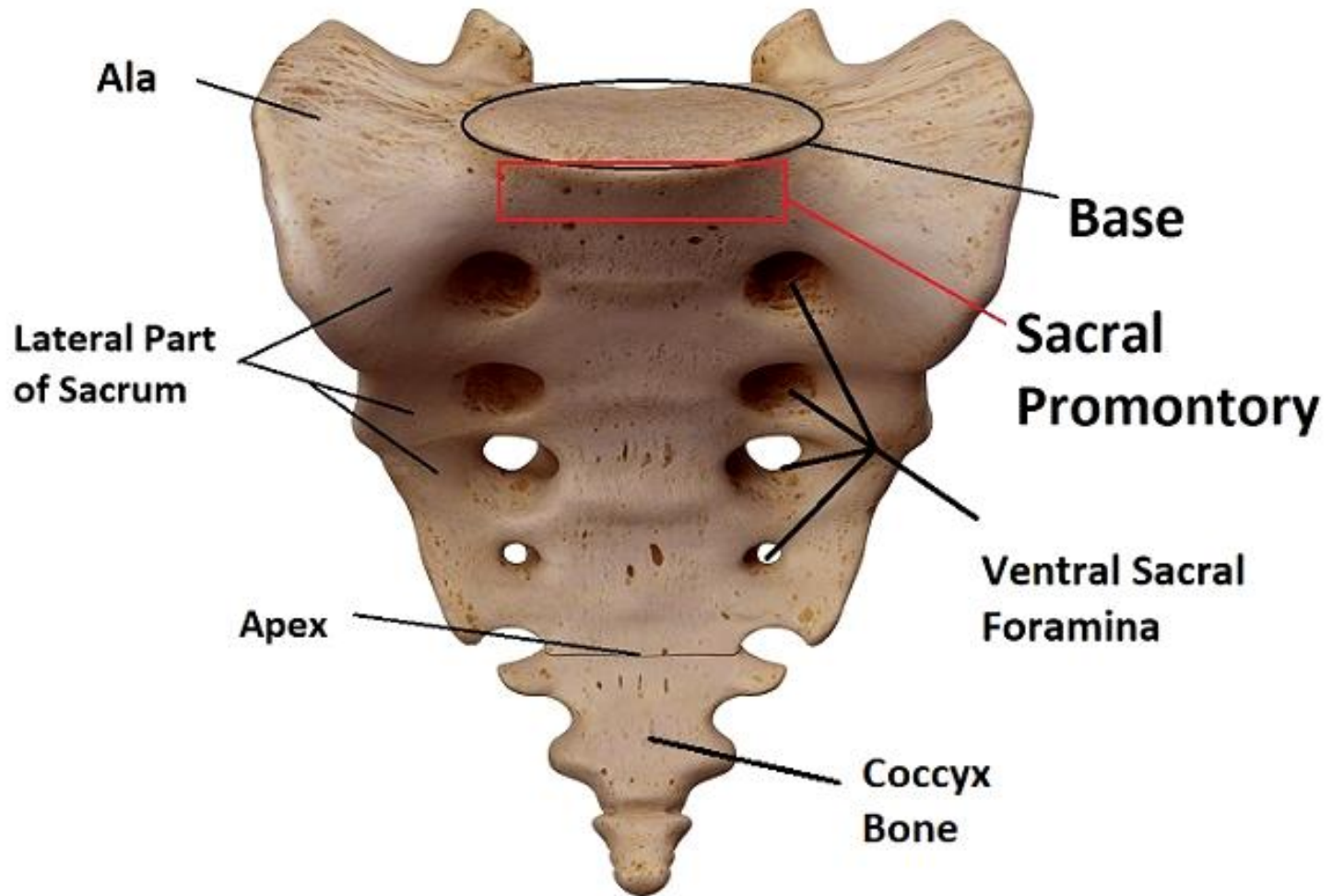
Sacrum



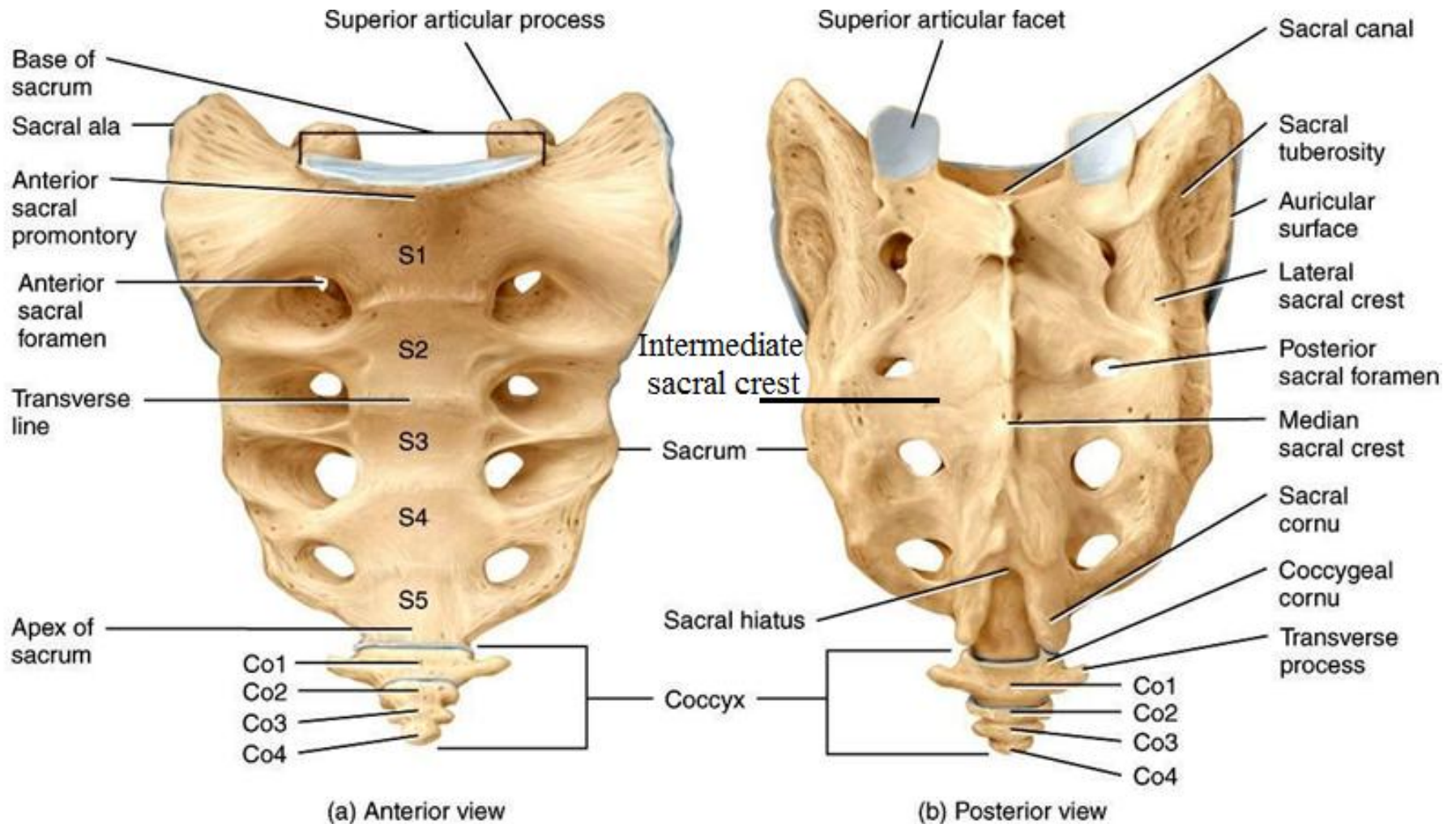
Sacrum (base)



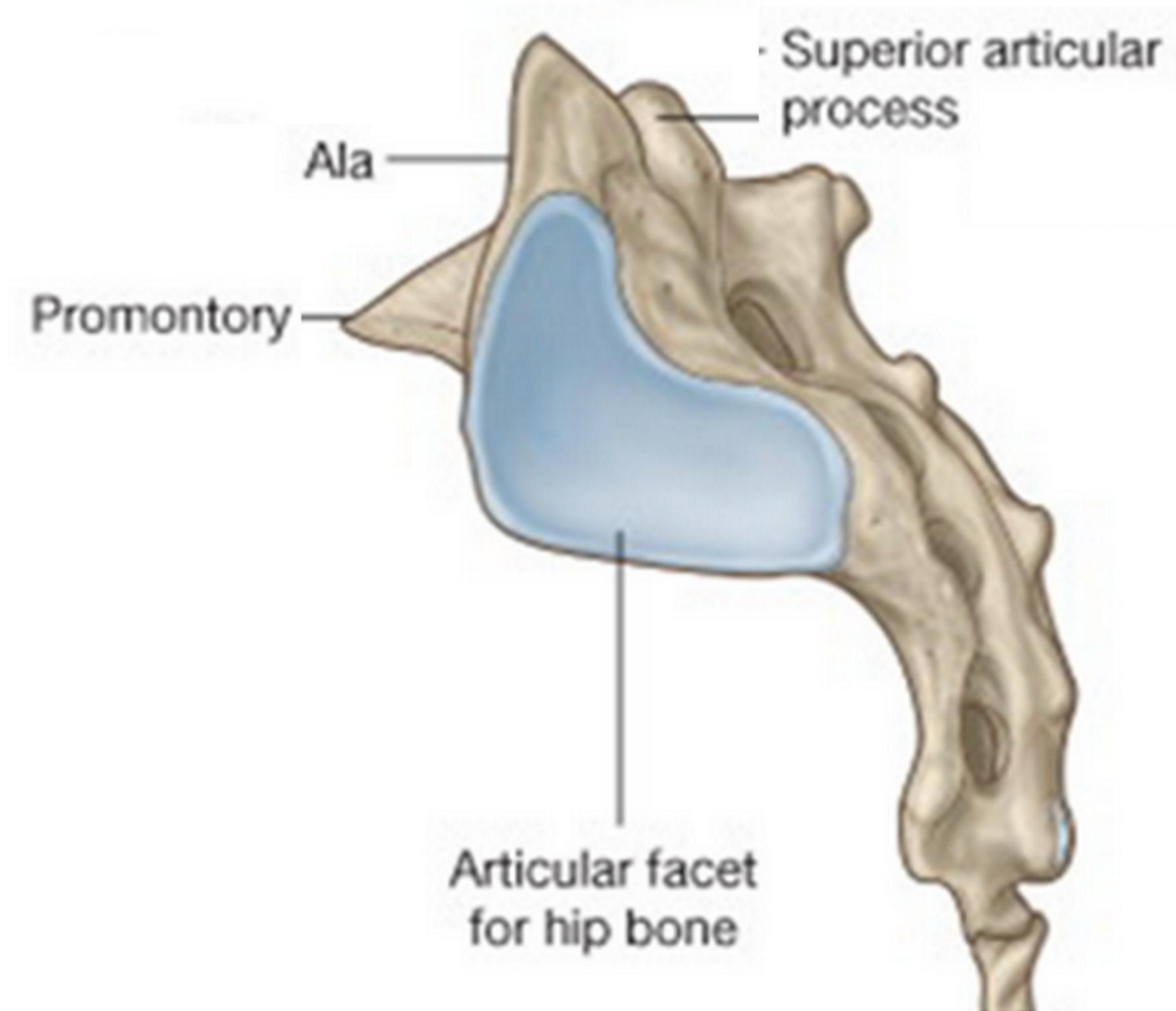
Sacrum (apex)



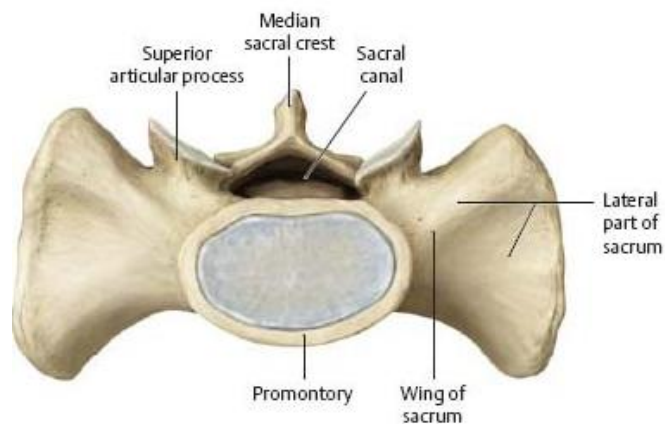
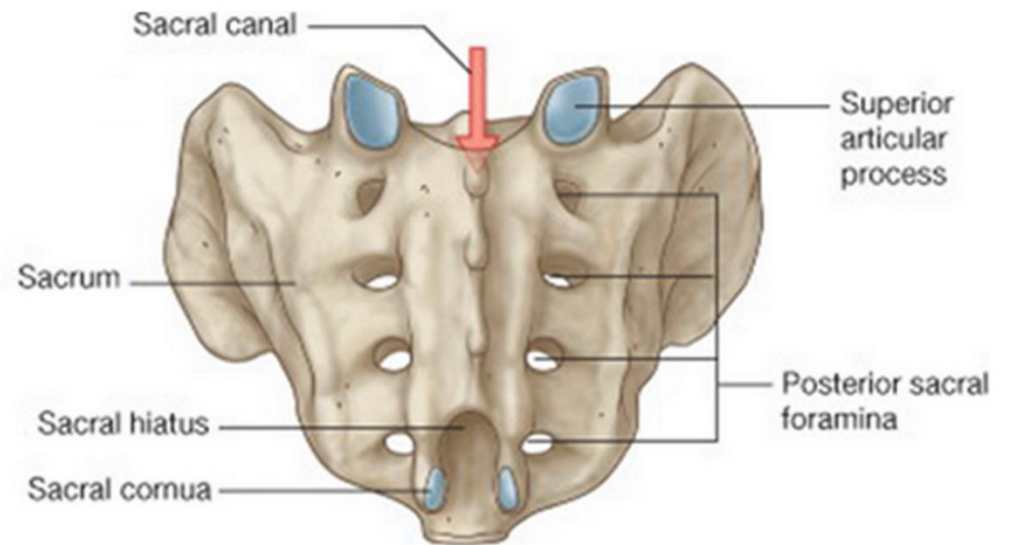
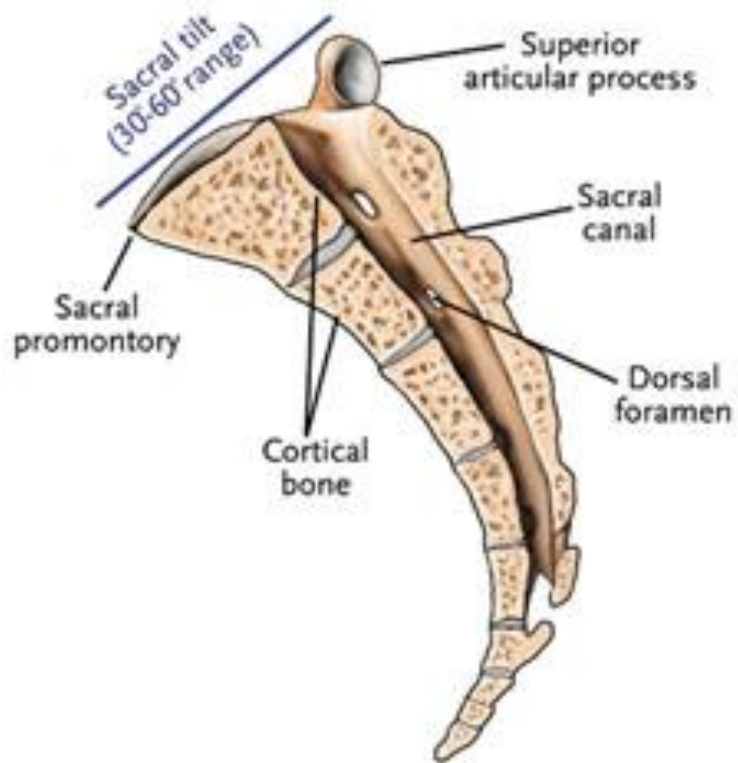
Sacrum surface



Sacrum (surface)

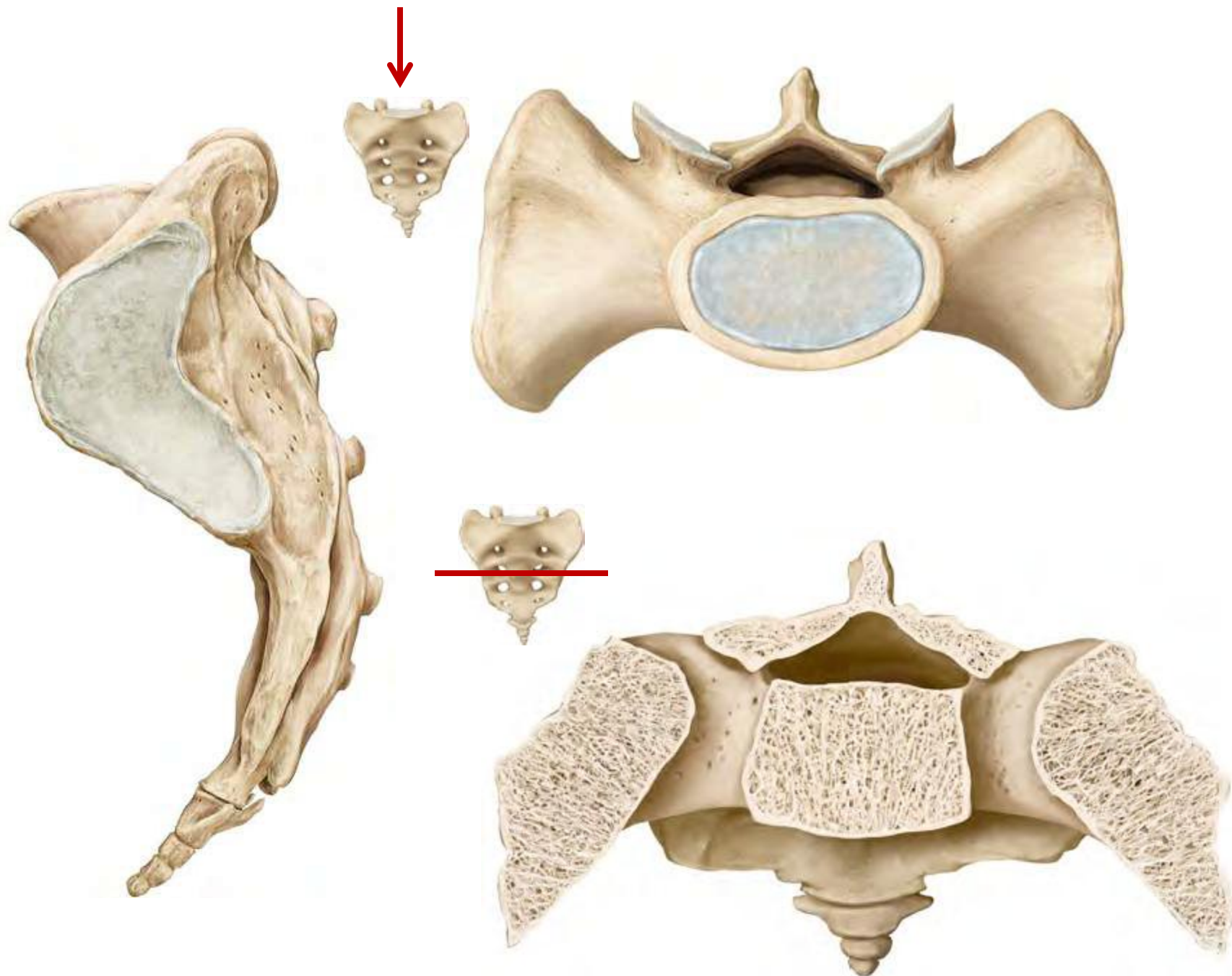


Sacral canal



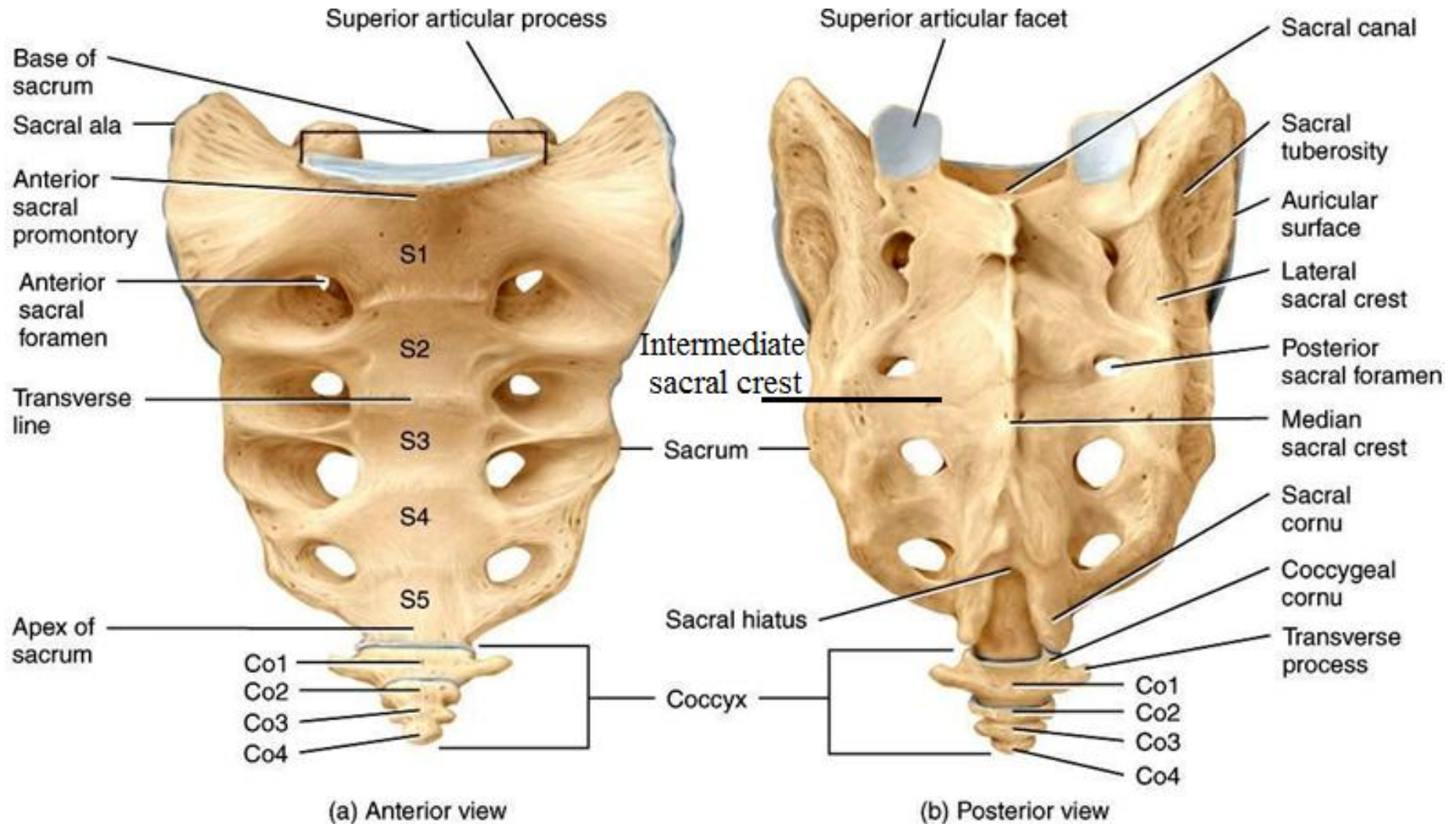
Sacrum

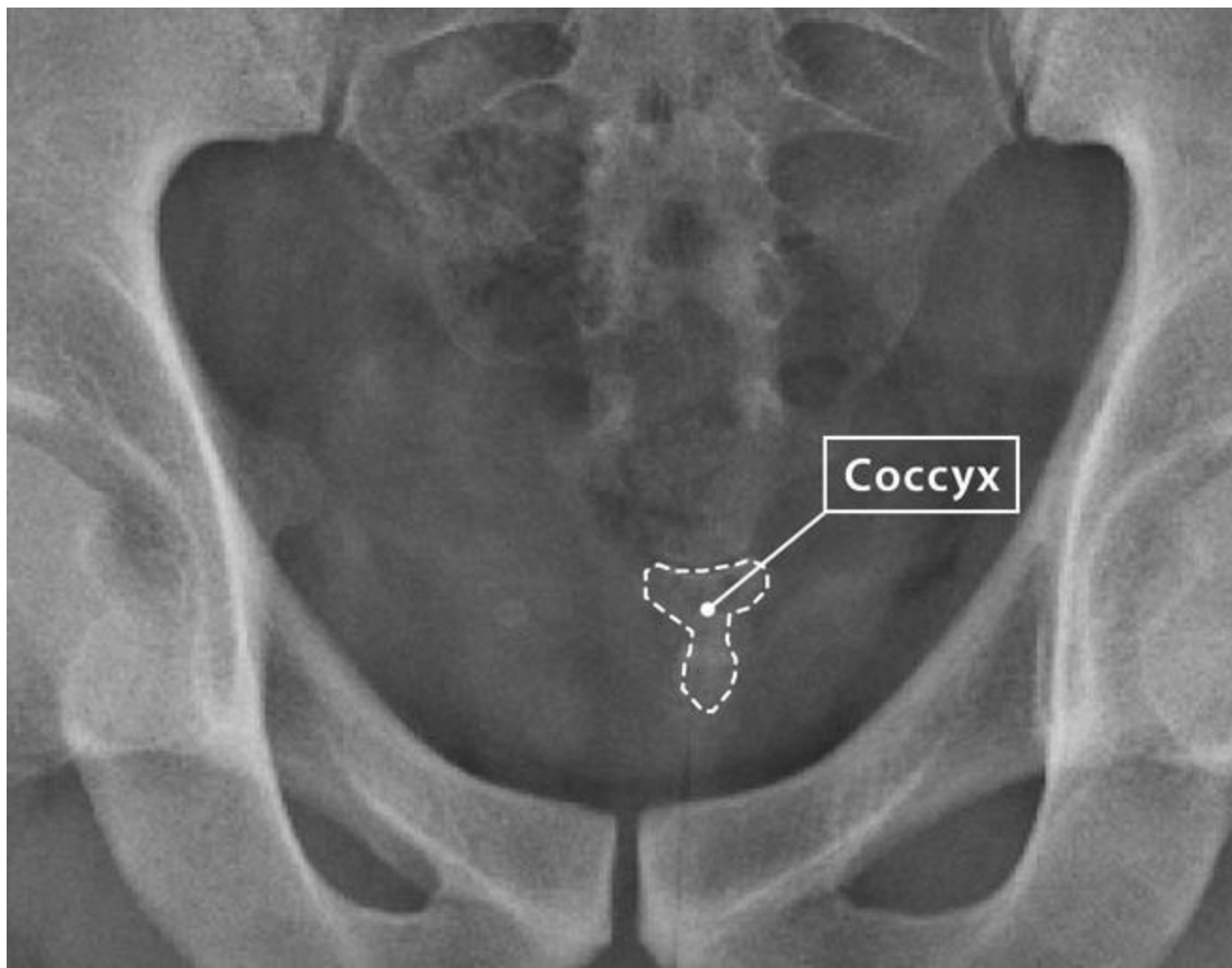




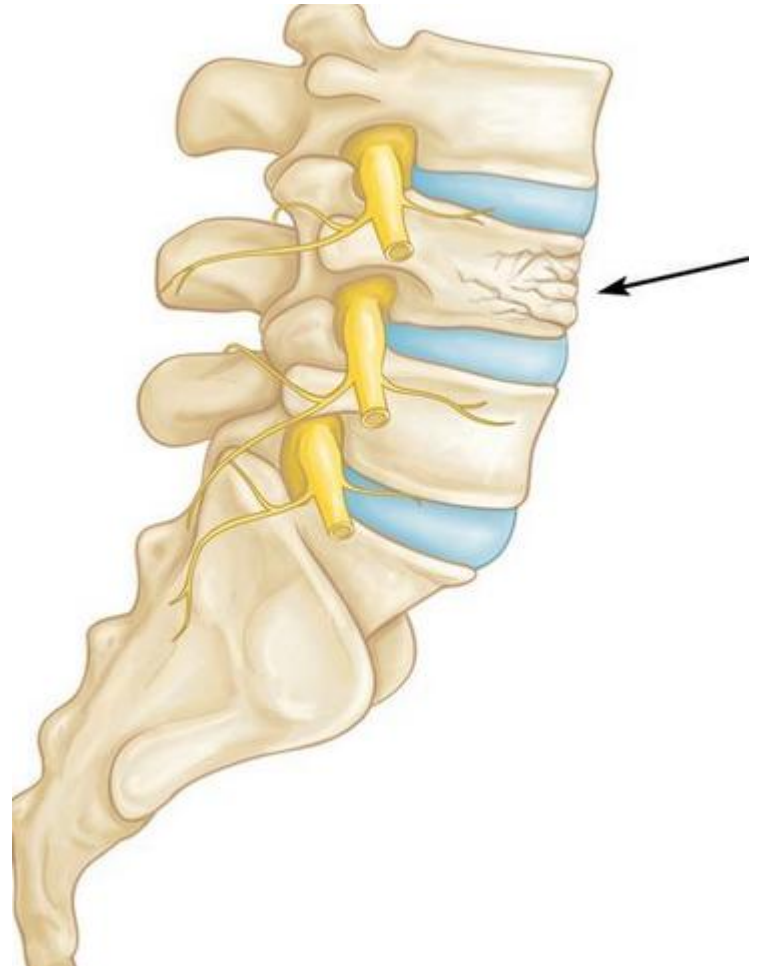
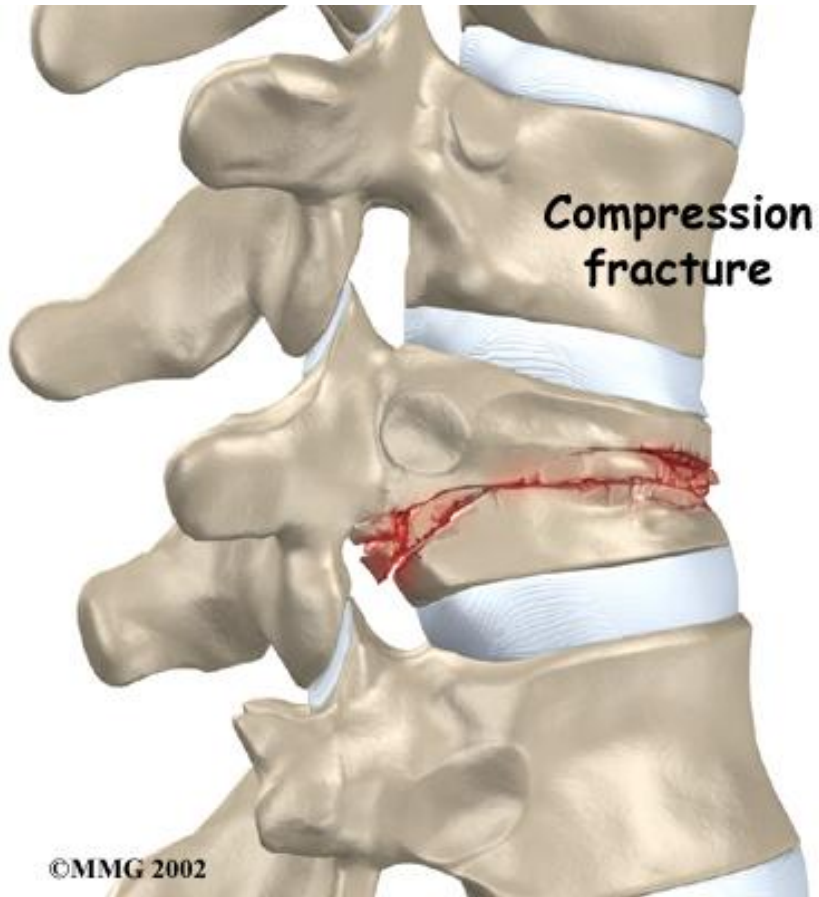


Coccyx

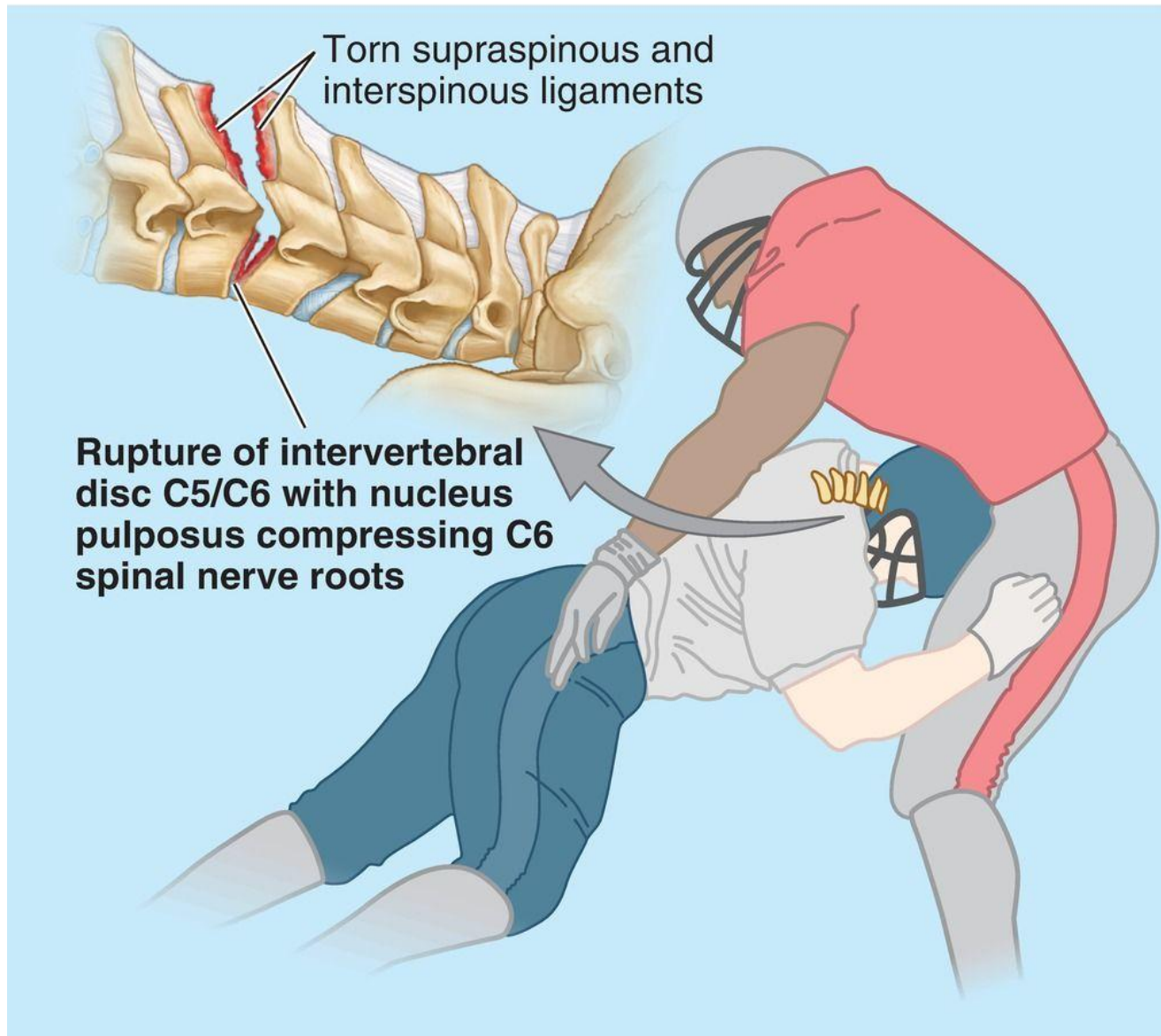


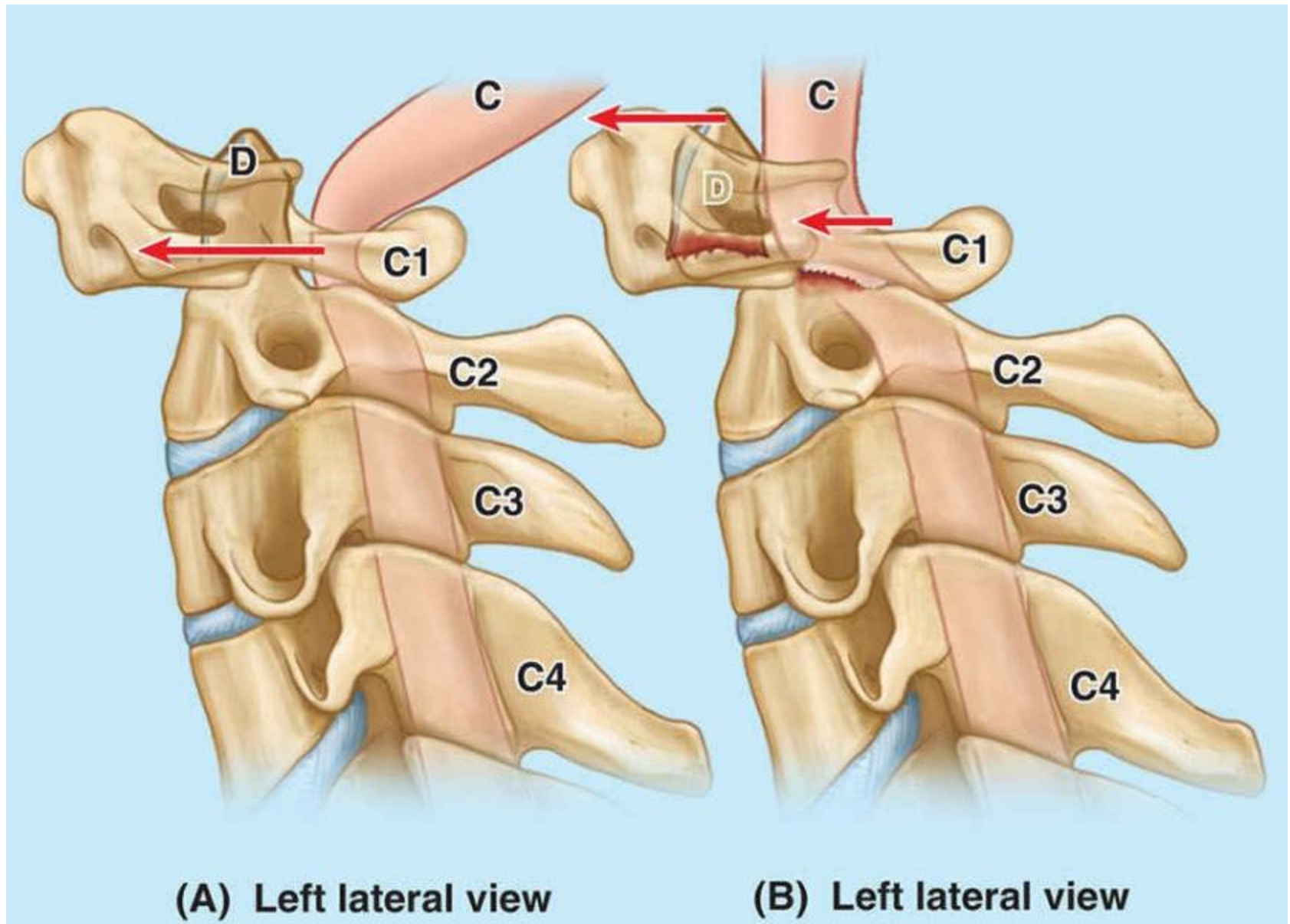


Fracture



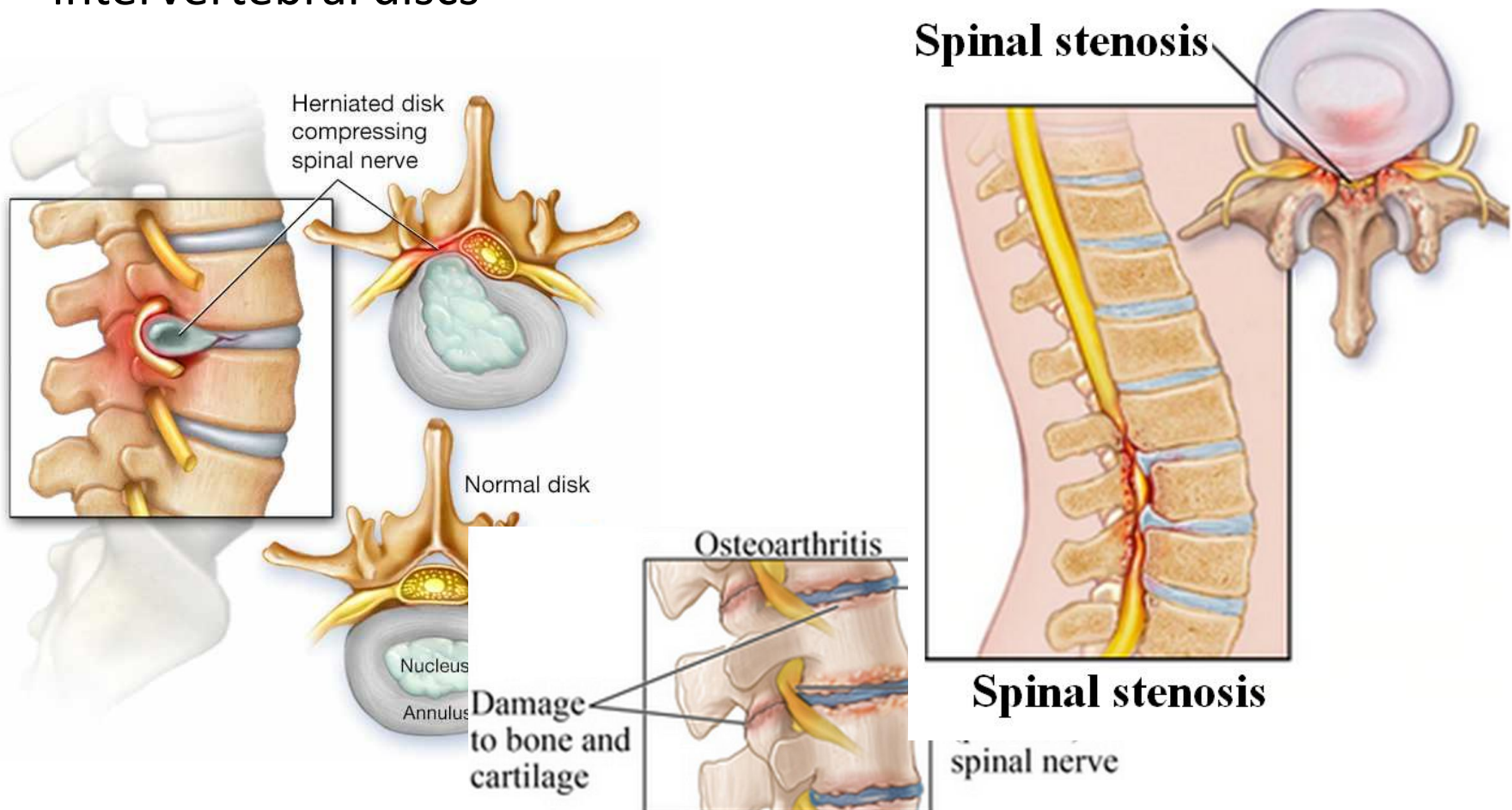
Fracture





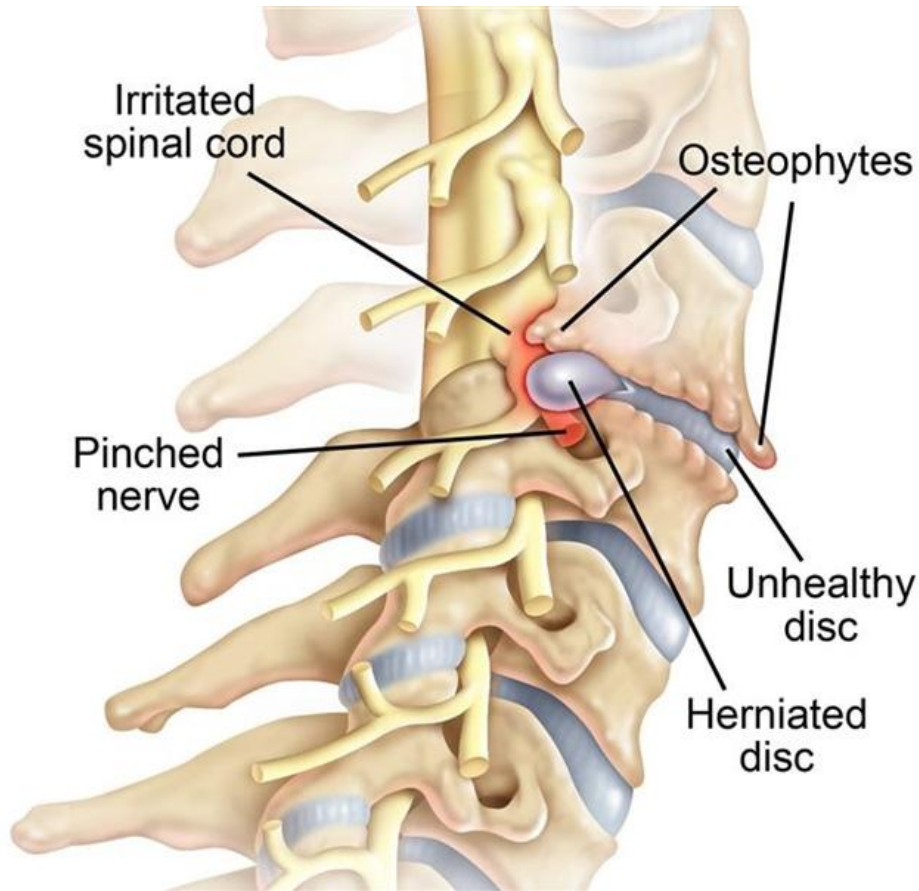
Narrowing of the Spinal Canal

- **Osteoarthritis** (is a type of joint disease that results from breakdown of joint cartilage), degenerative changes in the intervertebral discs

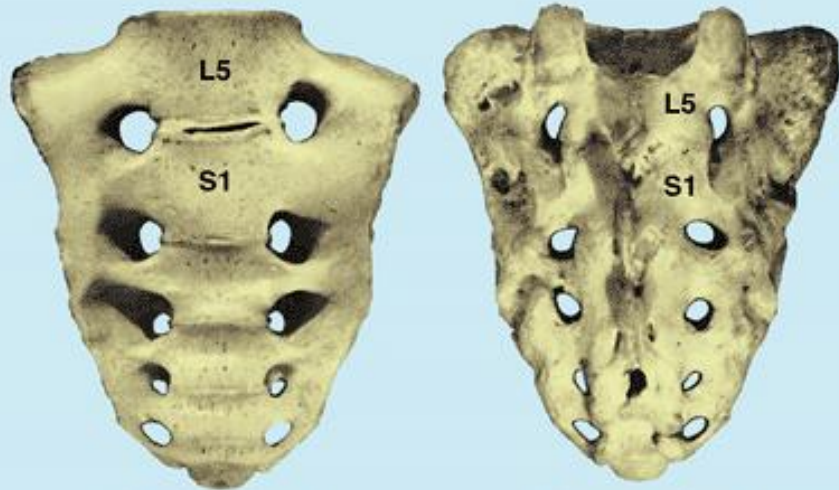


Narrowing of the Spinal Canal

- **Osteophytes** are bony spurs that grow on the bones of the spine
- Narrowing of the spinal canal and intervertebral foramina.



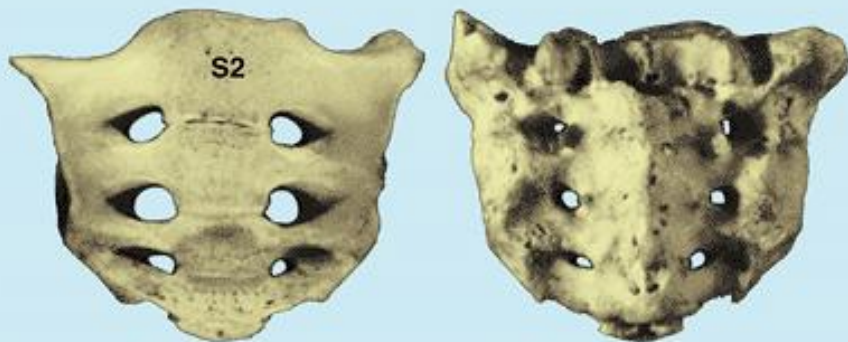
Lumbarization ,Sacralization



Pelvic surface

Dorsal surface

(A) Sacralization of L5 vertebra



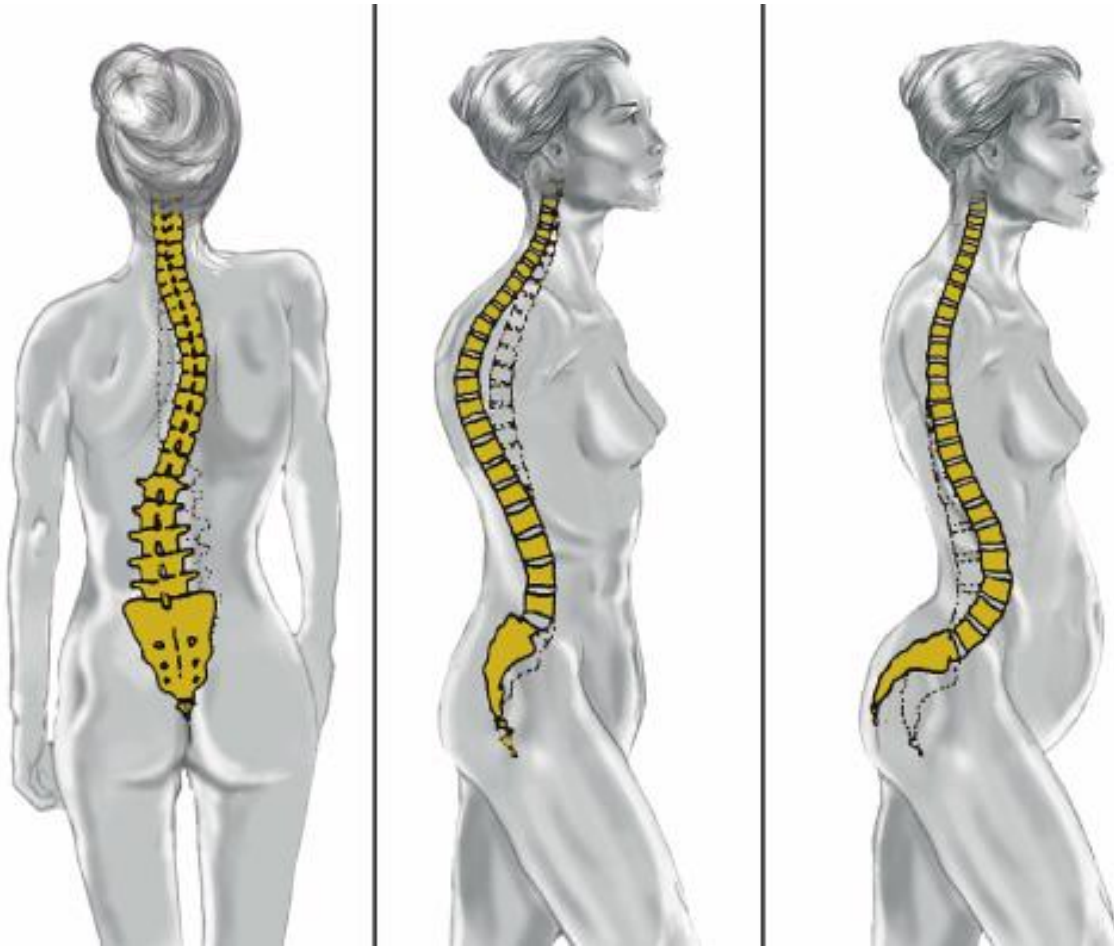
Pelvic surface

Dorsal surface

(B) Lumbarization of S1 vertebra
(S1 is not part of sacrum)

- **Sacralization of L5 vertebra**
- L5 vertebra is partly or completely incorporated into the sacrum
- **Lumbarization of S1 vertebra**
- S1 vertebra is more or less separated from the sacrum and is partly or fused with L5 vertebra

Abnormal Spinal Curvatures



Scoliosis

An abnormal lateral curvature

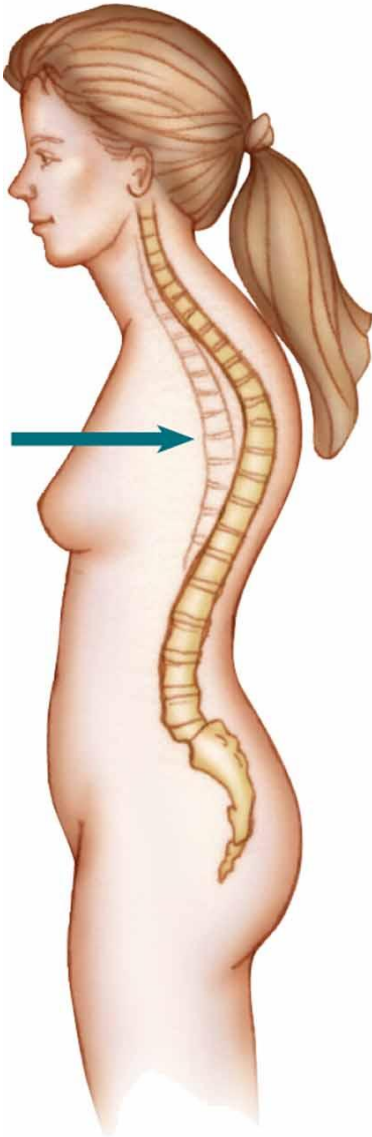
Kyphosis

An abnormal increase in the thoracic curvature

Lordosis

An abnormal increase in the lumbar curvature

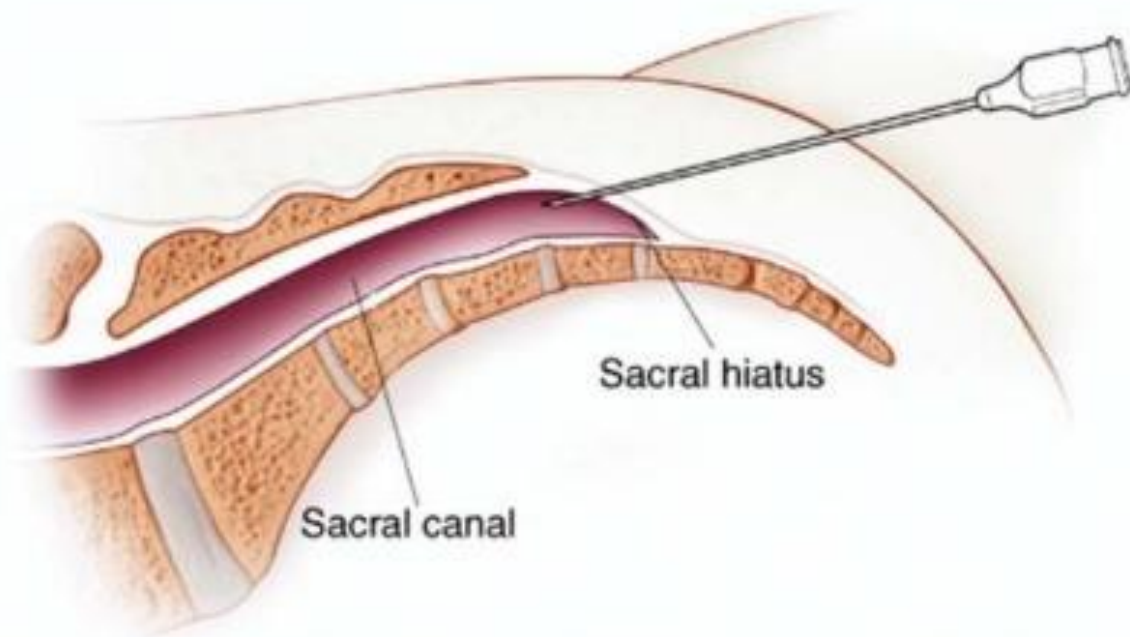
Abnormal Curvatures of the Spinal Column



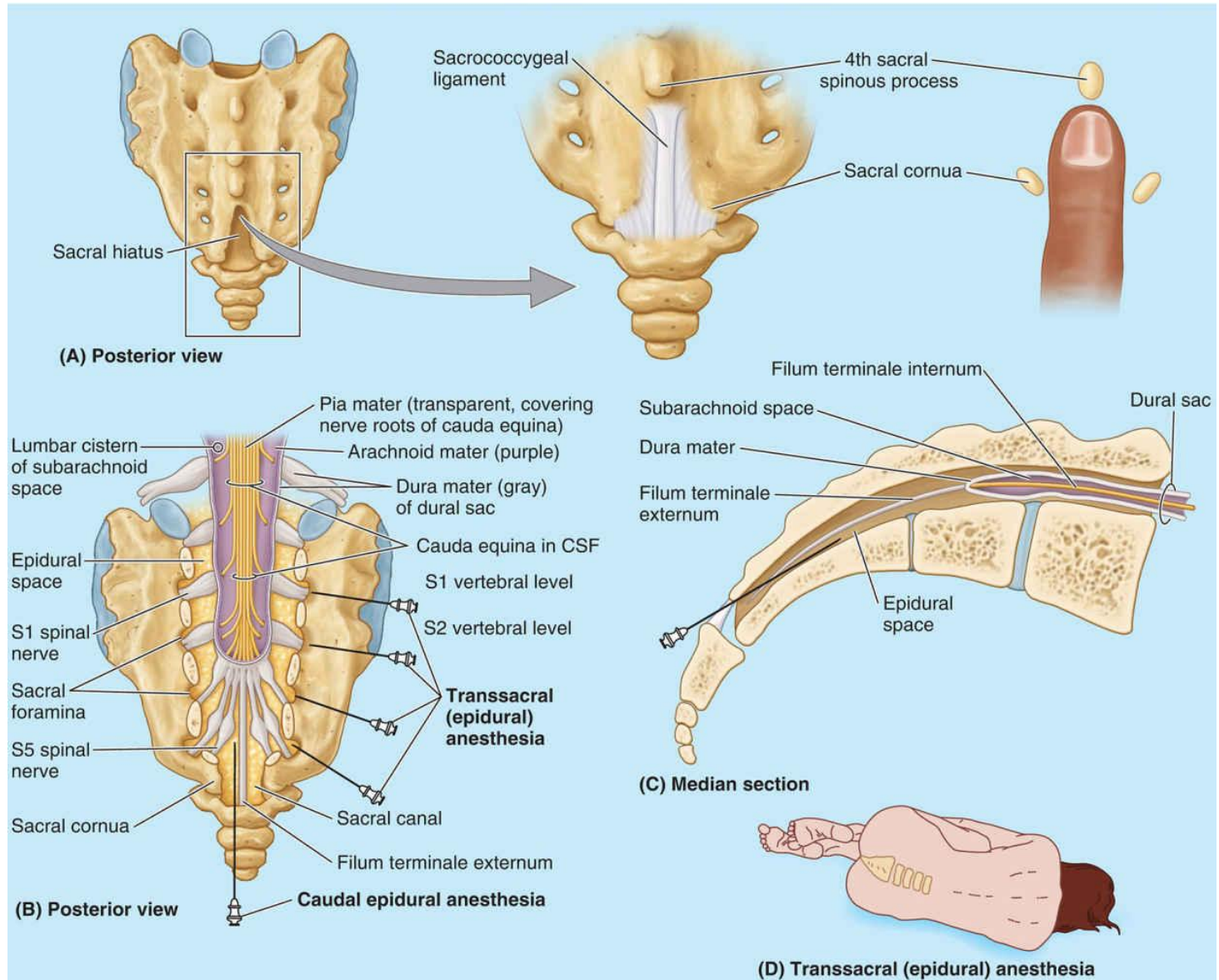
A

Caudal anesthesia

- An anesthetic for the spinal nerves may be injected extradurally through the sacral hiatus (caudal anesthesia).

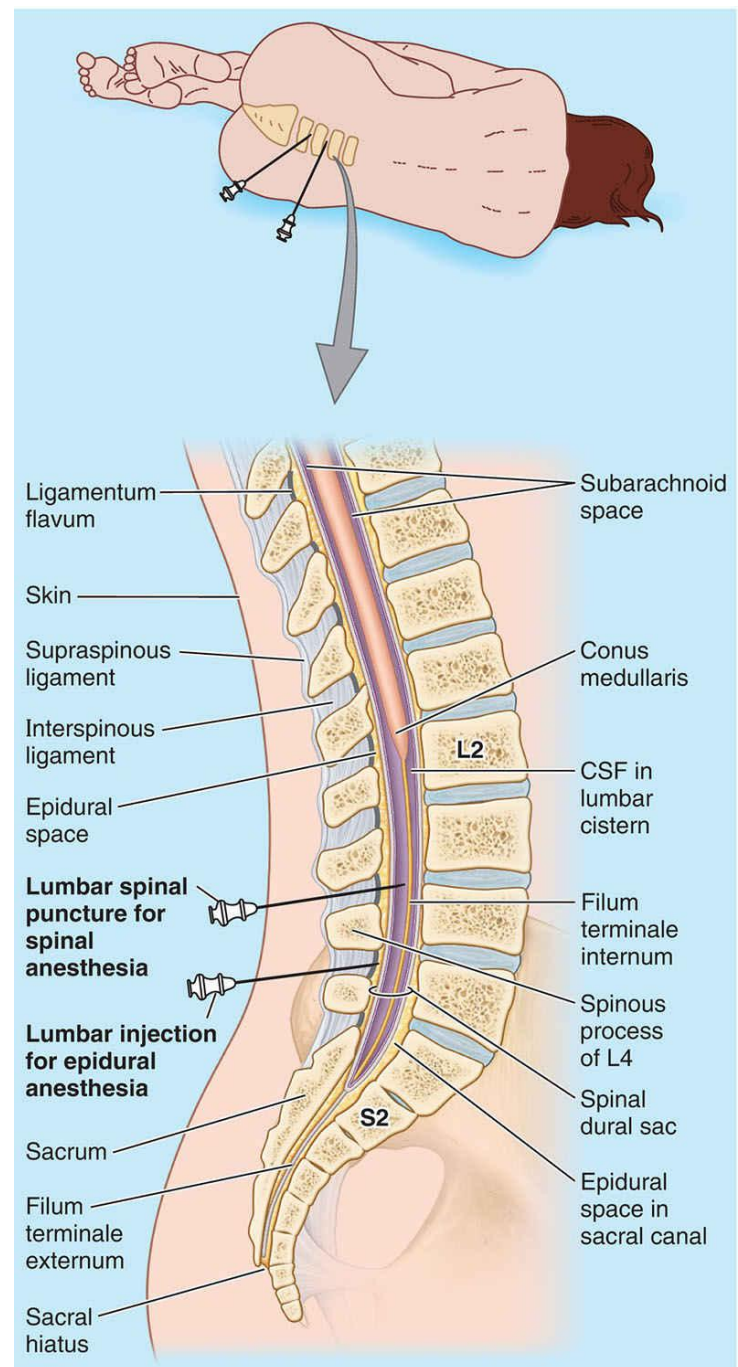


Caudal anaesthesia

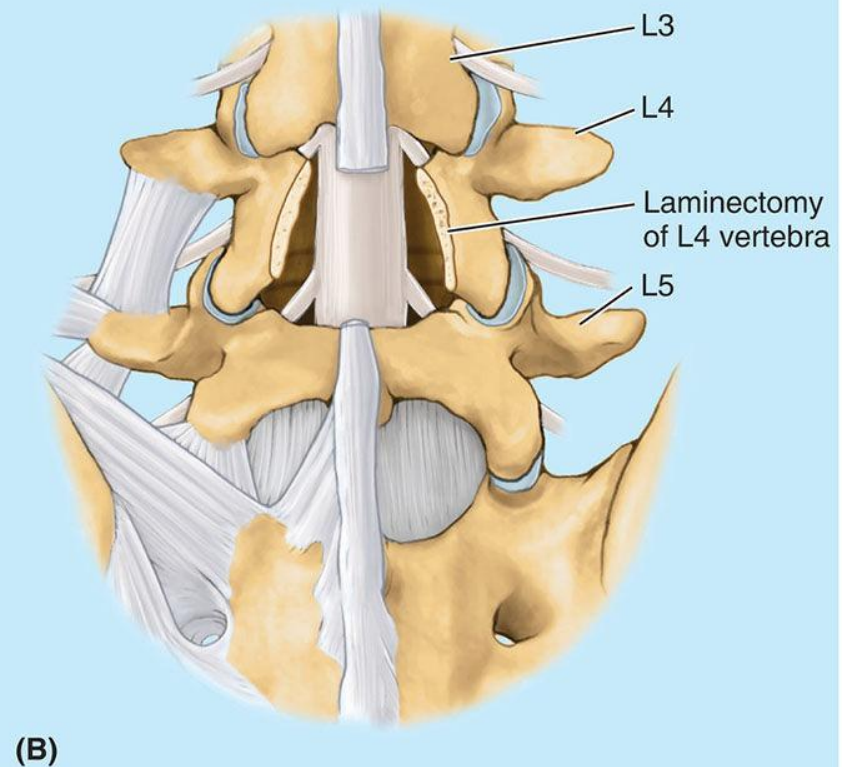
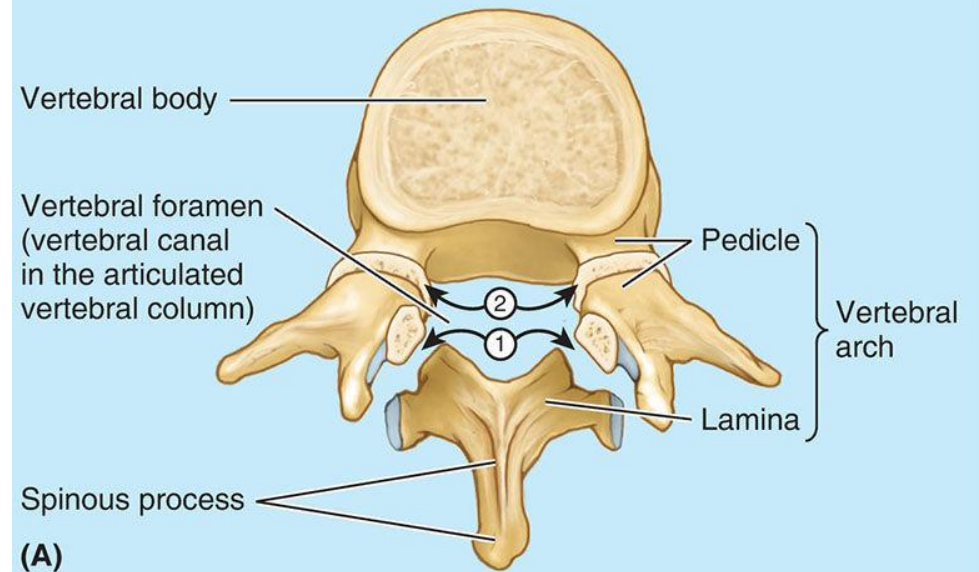


Lumbar spinal puncture
for spinal anesthesia

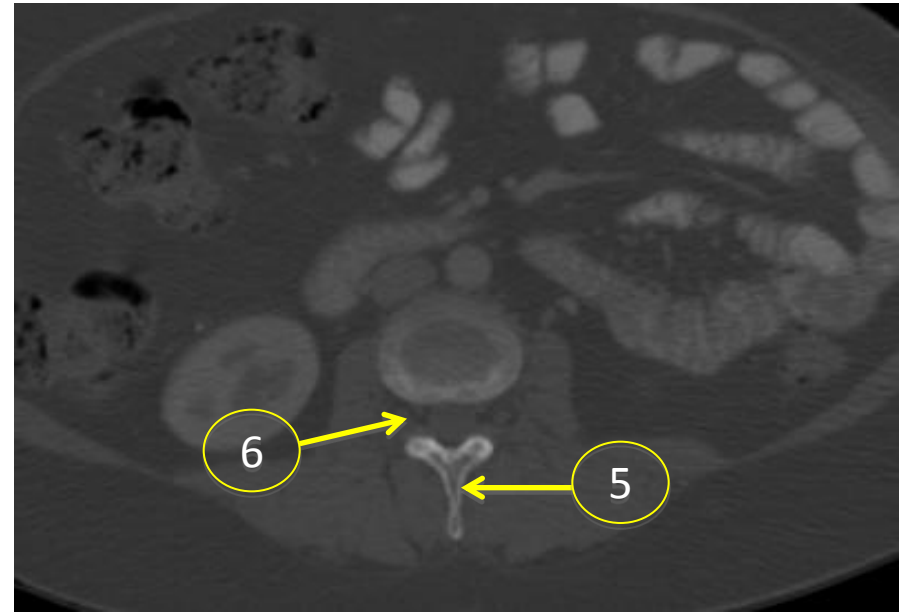
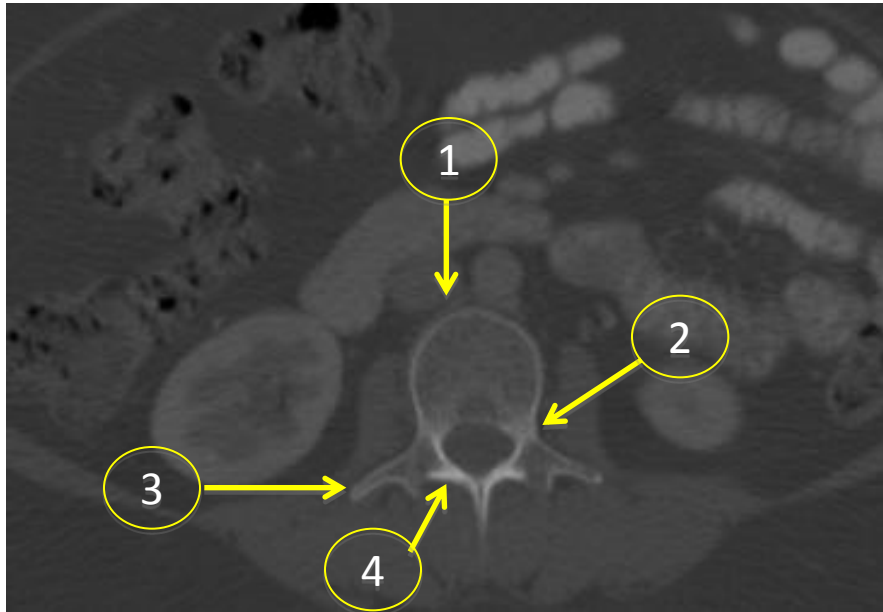
Lumbar injection for
epidural anesthesia



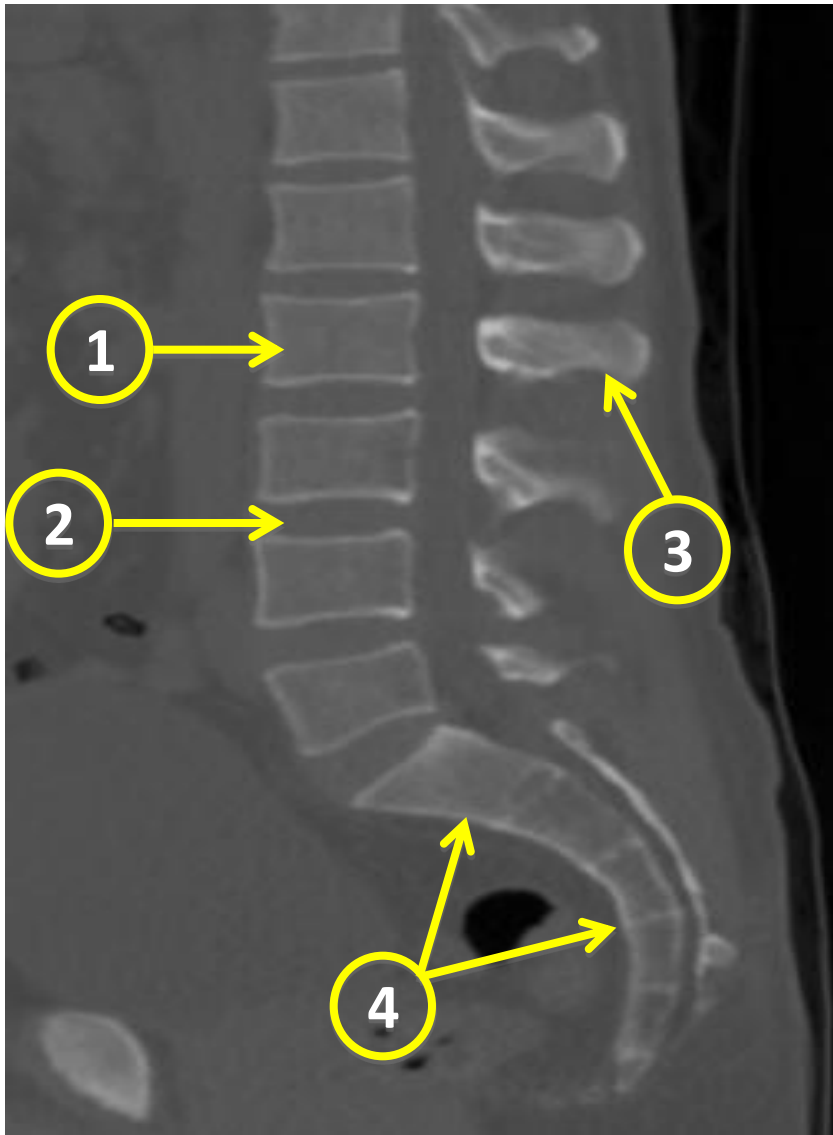
Laminectomy



Radiological anatomy of the spine

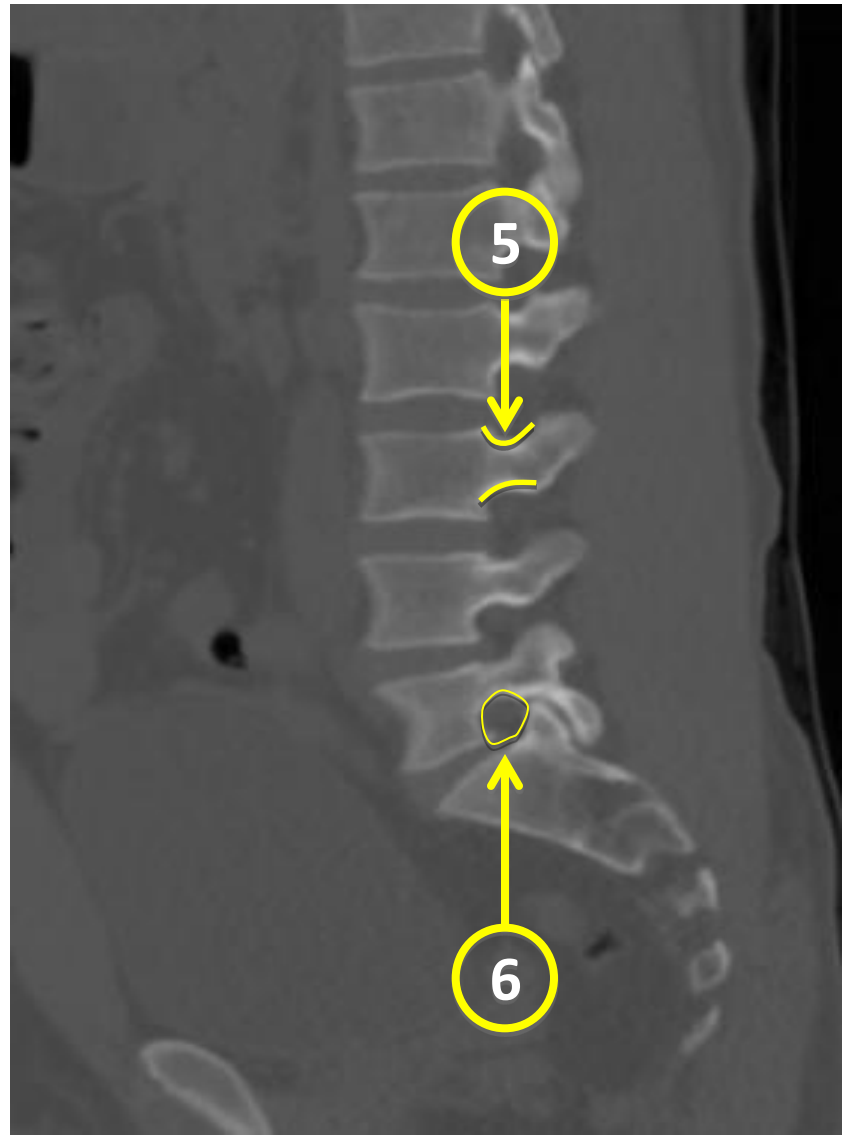


1. Vertebral body
2. Pedicle
3. Transversers process
4. Lamina
5. Spinous process
6. Neural foramen

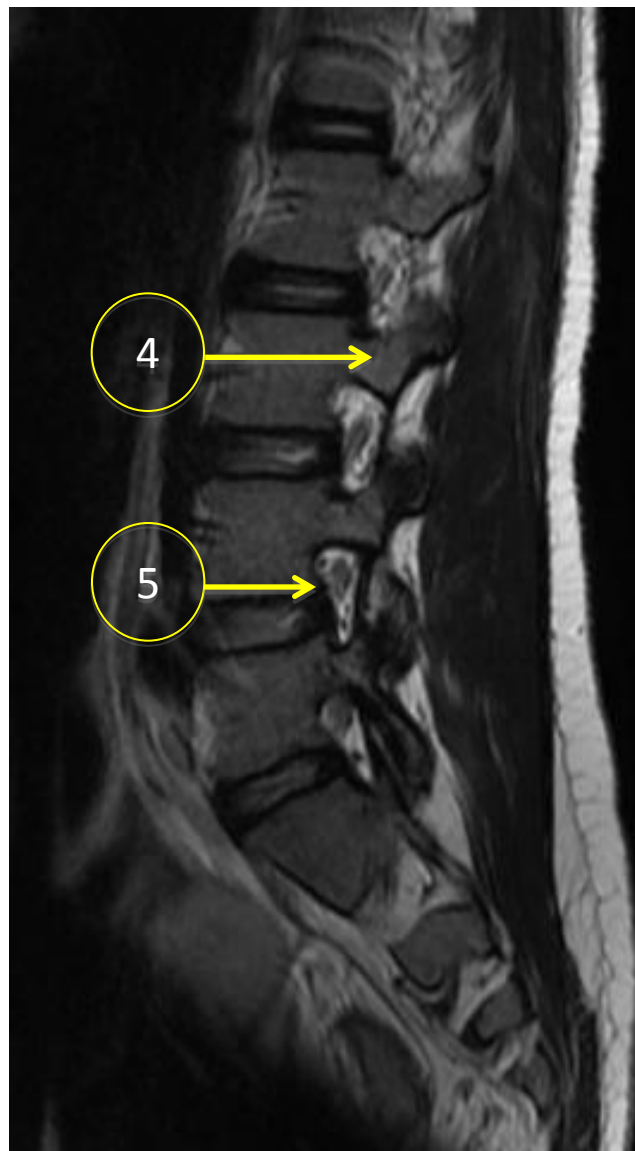
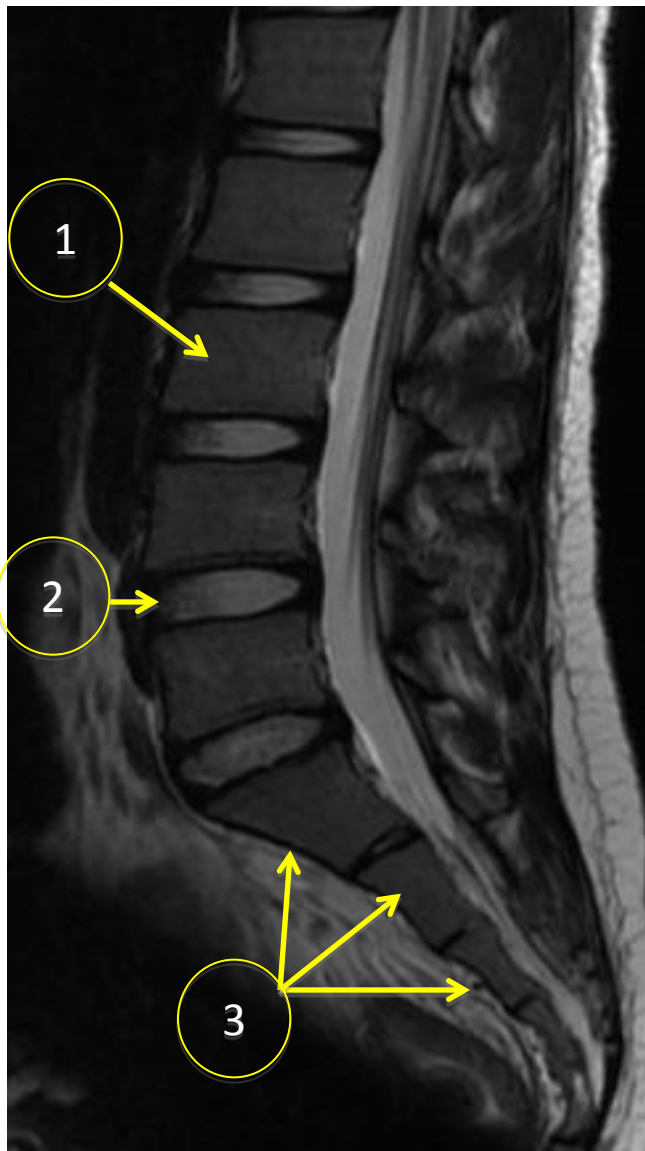


1- Vertebral body
2- Intervertebral disc

3- Spinous process
4- sacrum

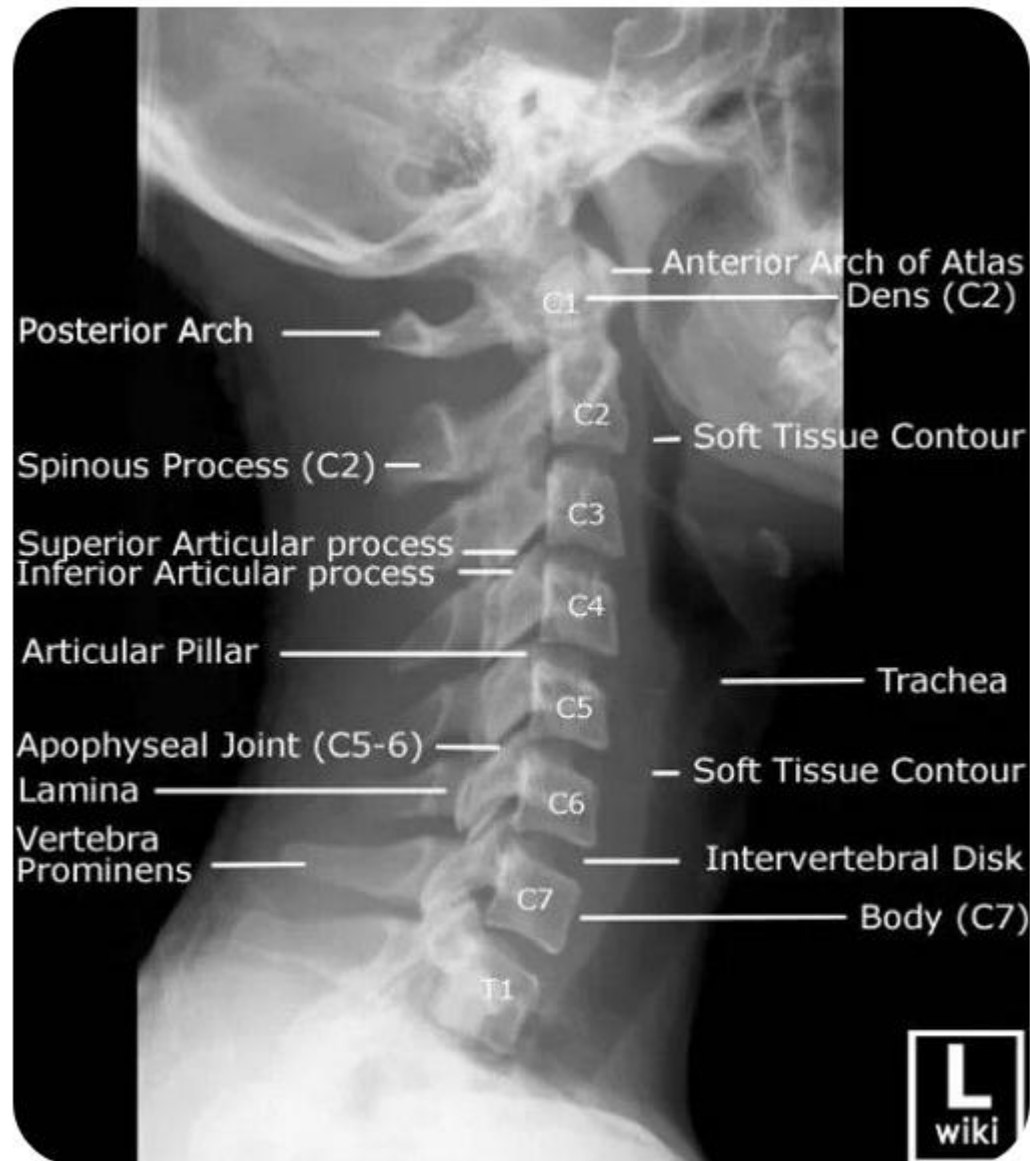


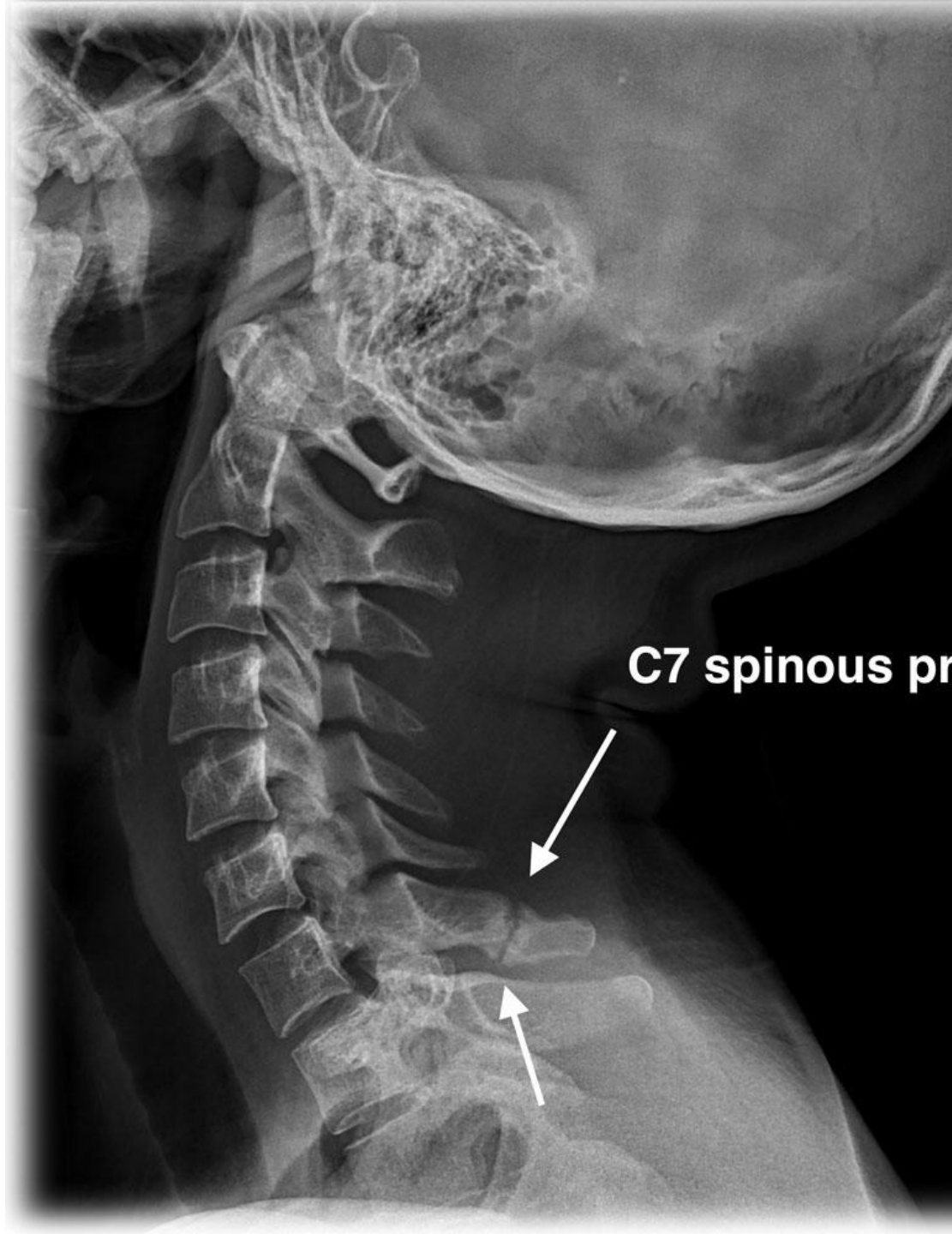
5- Pedicle
6- Neural foramen/canal



1. Vertebral body
2. Intervertebral disc
3. Sacrum
4. Pedicle
5. Neural foramen

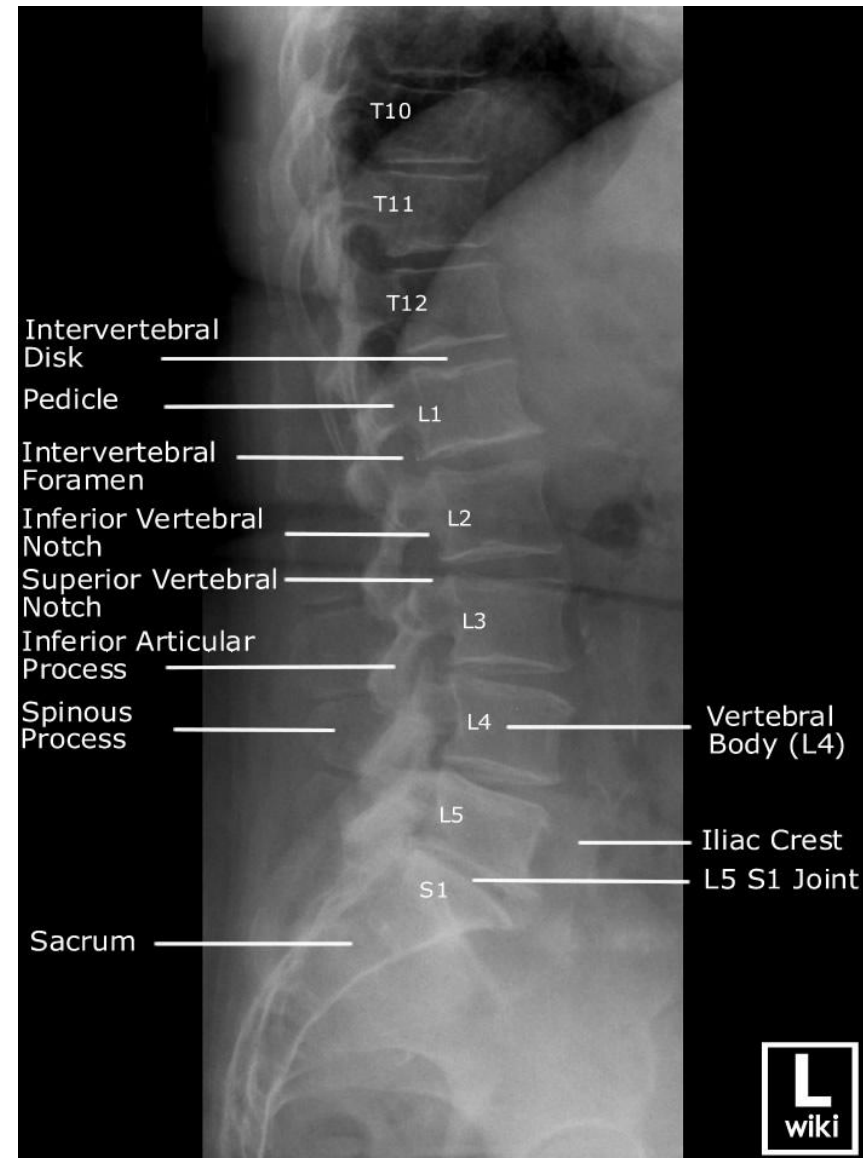
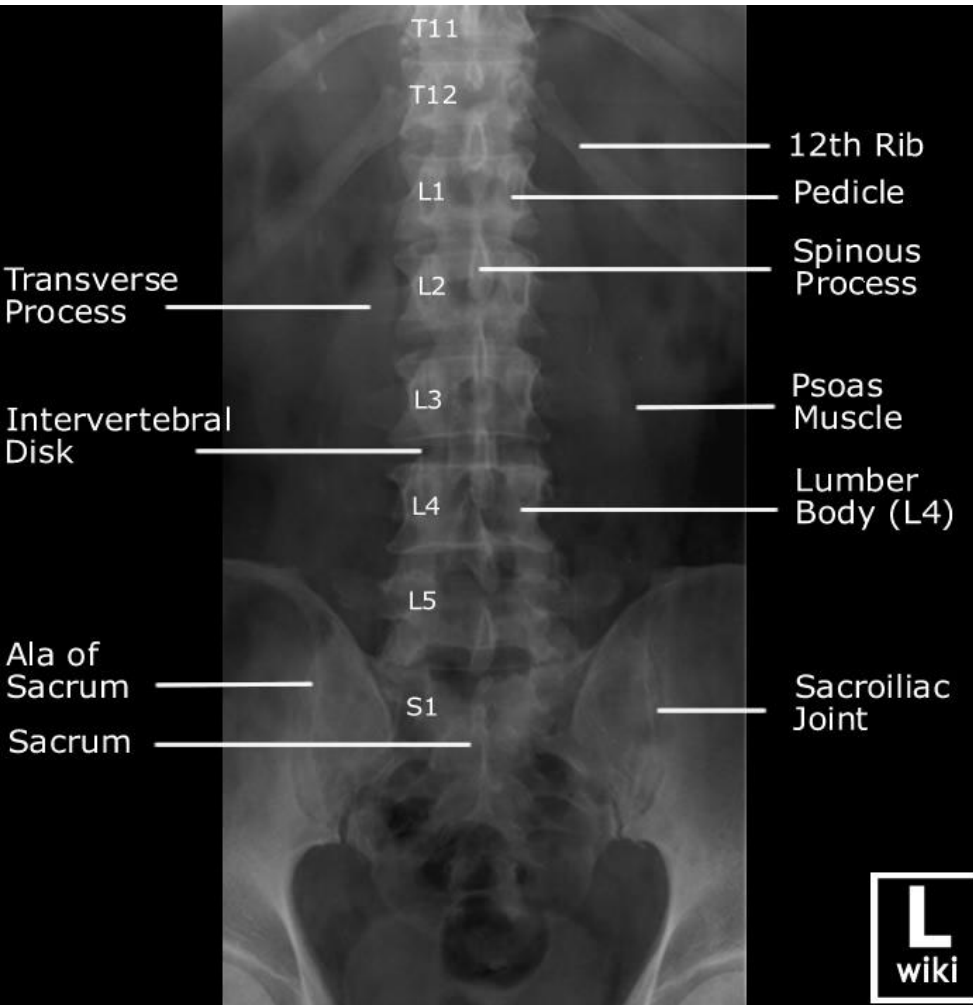
Radiography



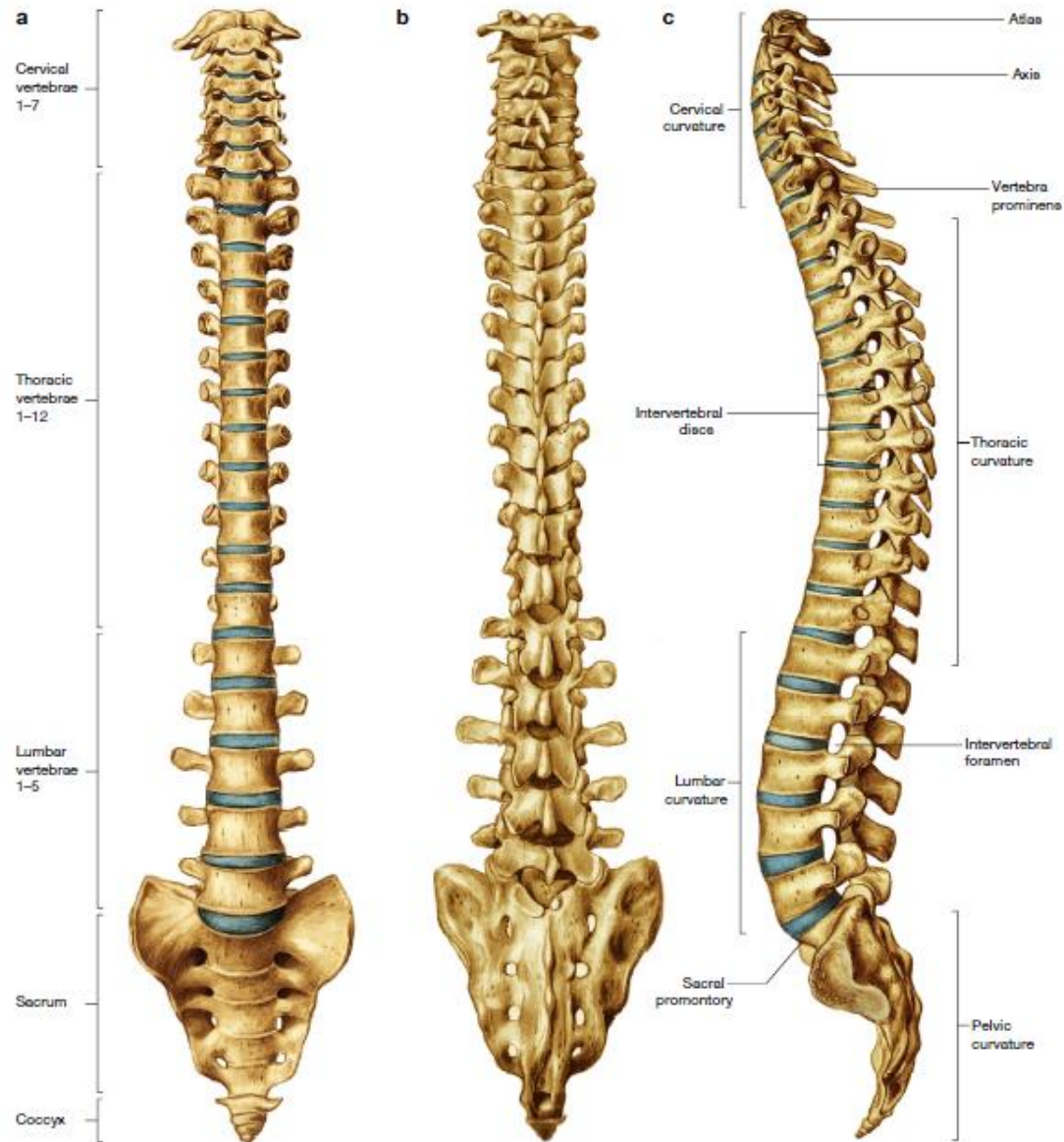


C7 spinous process fracture

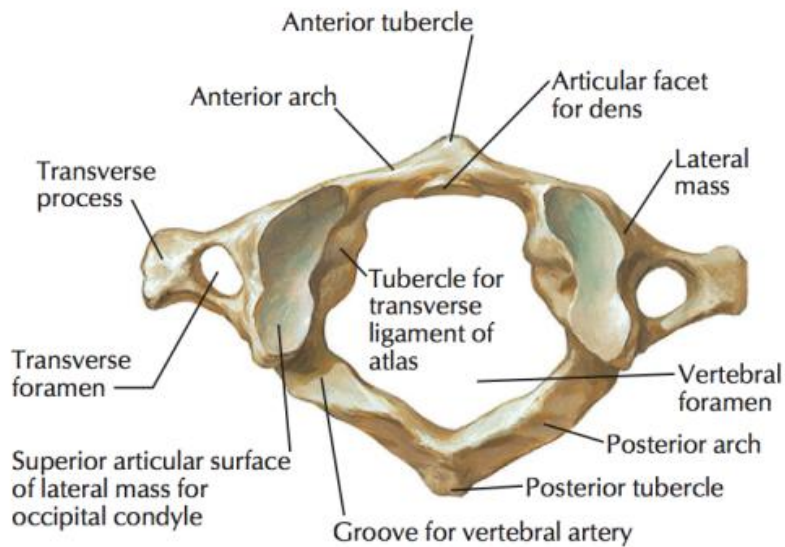
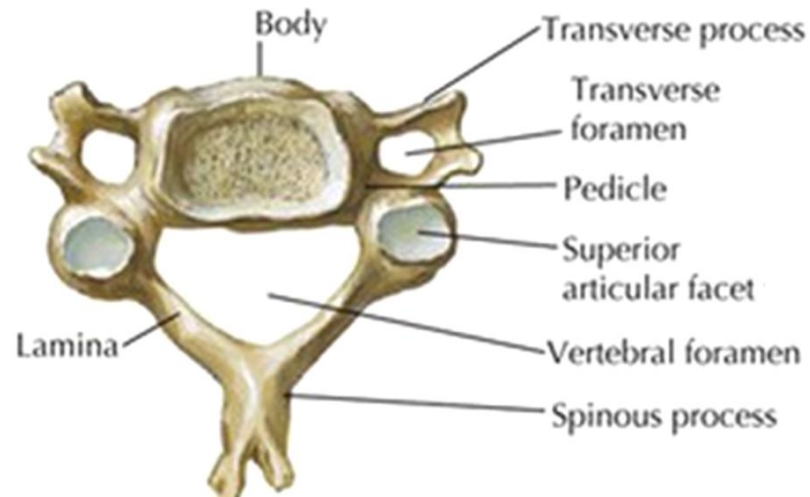
Radiography



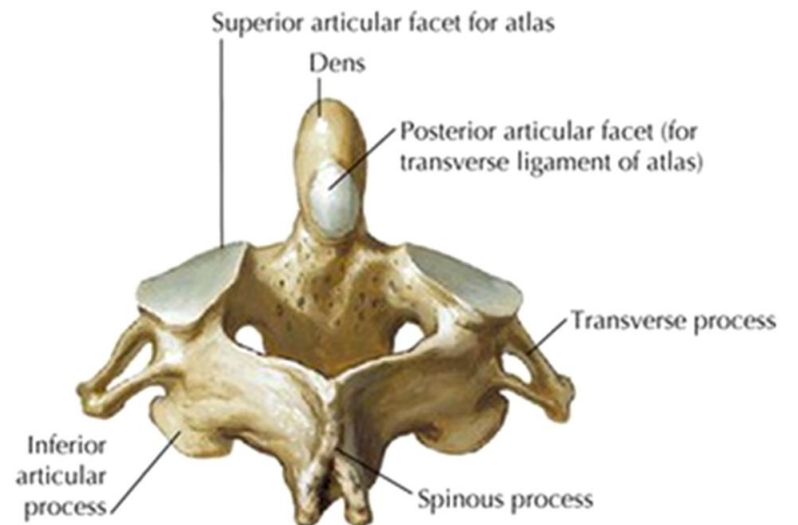
خلاصه



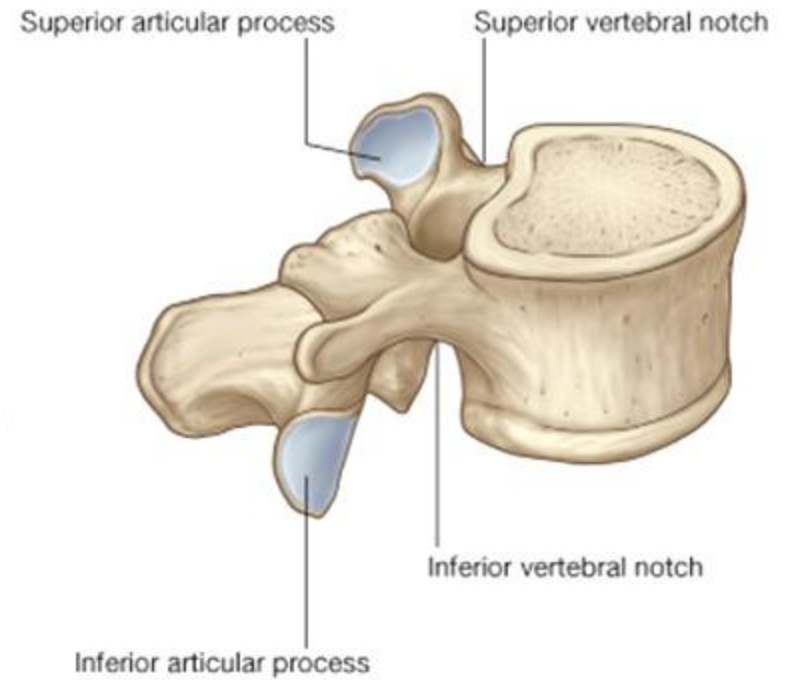
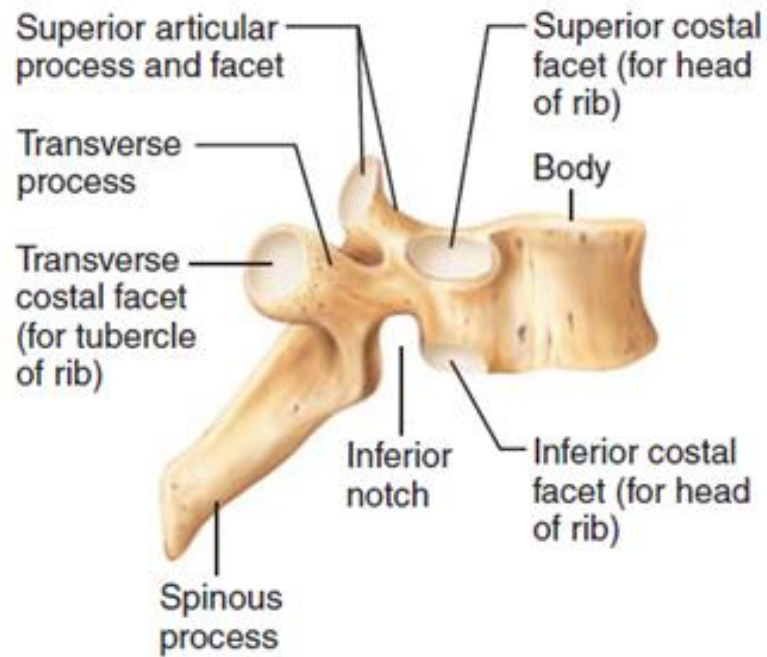
خلاصه



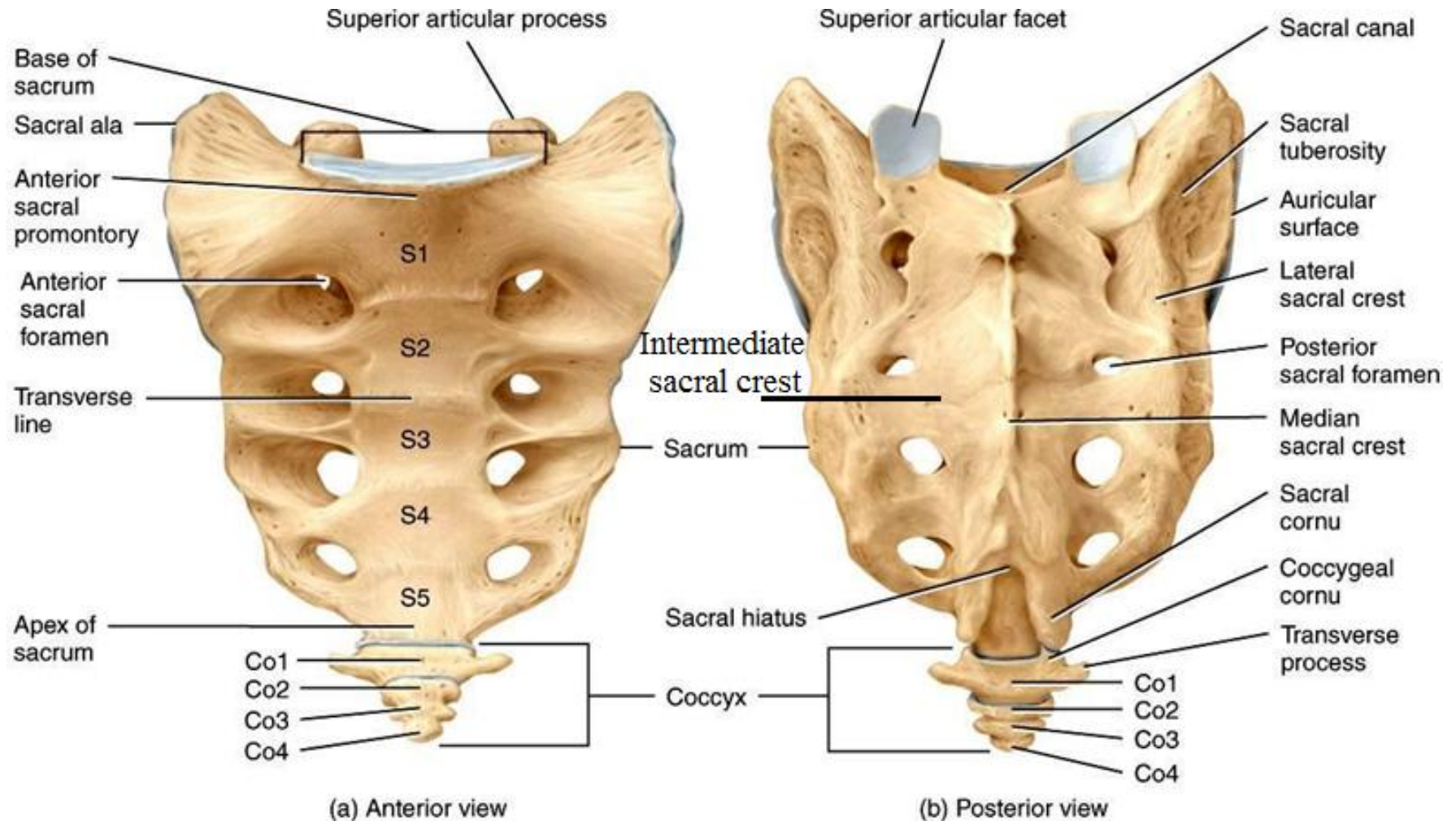
Atlas (C1): superior view



خلاصه



خلاصه



آزمون

1- کدام قسمت از مهره Lateral sacral crest را درست می کنند؟

A- Spinous process

B- Body

C- Lamina

D- Transverse process

2- Lordosis را تعریف کنید

3- با شکستگی کدام قسمت مهره احتمال صدمه به نخاع وجود دارد؟

A- Pedicle

B- Body

C- Lamina

D- All of the above

4- مهمترین مشخصه مهره های پشتی را بنویسید.

- 1-Clinical Anatomy by Regions by Richard S. Snell , 2017
- 2-Gray's Anatomy for Students, 3rd Edition, 2017
- 3-Clinical Oriented Anatomy, KL Moore, 2017

شاد و سلامت باشید

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دانشکده پزشکی شیراز
سعید کربلانی دوست