

RU RMT 02

Skeletal Lecture 12

Vertebral Column - Cervical

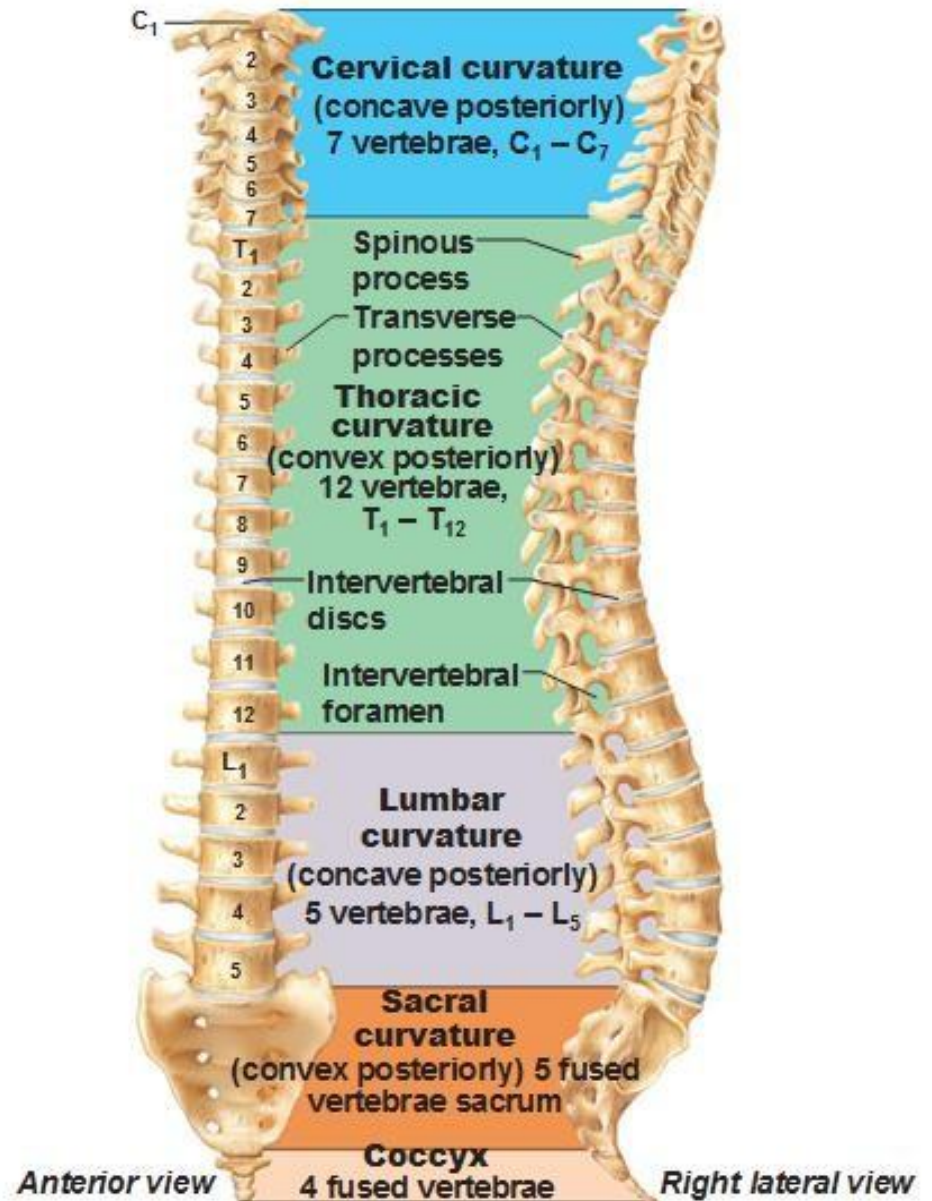
Vertebral Column

One of the components of the axial skeleton (also have ribs, sternum and skull)

- ☐ **Function:** Posture, support body weight, locomotion and protection for the spinal cord and spinal roots
- ☐ We have **33 vertebrae** in the 5 regions (alternate 32-34 as individual finding) or 26 separate bones
- ☐ **There are 5 regions:**
 - ☐ **Cervical** - 7 vertebrae
 - ☐ **Thoracic** - 12 vertebrae
 - ☐ **Lumbar** - 5 vertebrae
 - ☐ **Sacral** - 5 vertebrae
 - ☐ The 5 sacral vertebrae fuse to make the sacrum
 - ☐ **Coccygeal** - 2-4 vertebrae
 - ☐ The 2-4 coccygeal vertebrae fuse to make the coccyx

Vertebral Column

Between most of the vertebrae there are intervertebral discs, which separate the vertebrae and makeup $\frac{1}{4}$ of the length of our vertebral column (3/4 of the length is formed by the vertebrae)



Vertebral Ossification

PRENATAL

1 Central Ossification
Center

2 in Vertebral arch

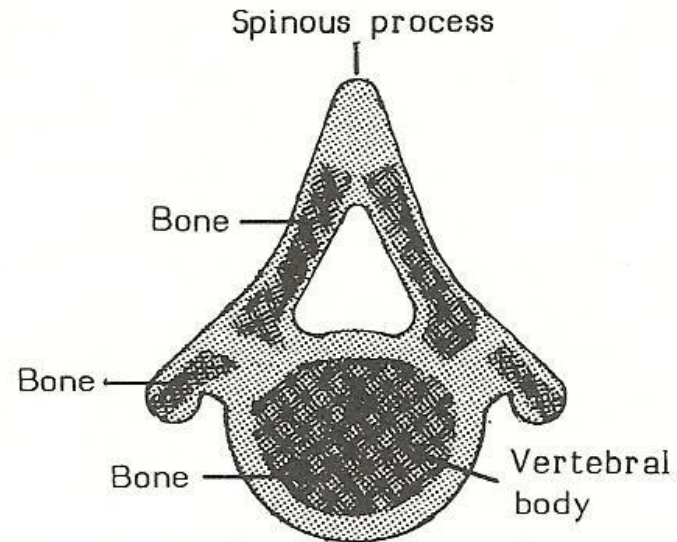


Figure 6.3. The early stages of vertebral ossification.

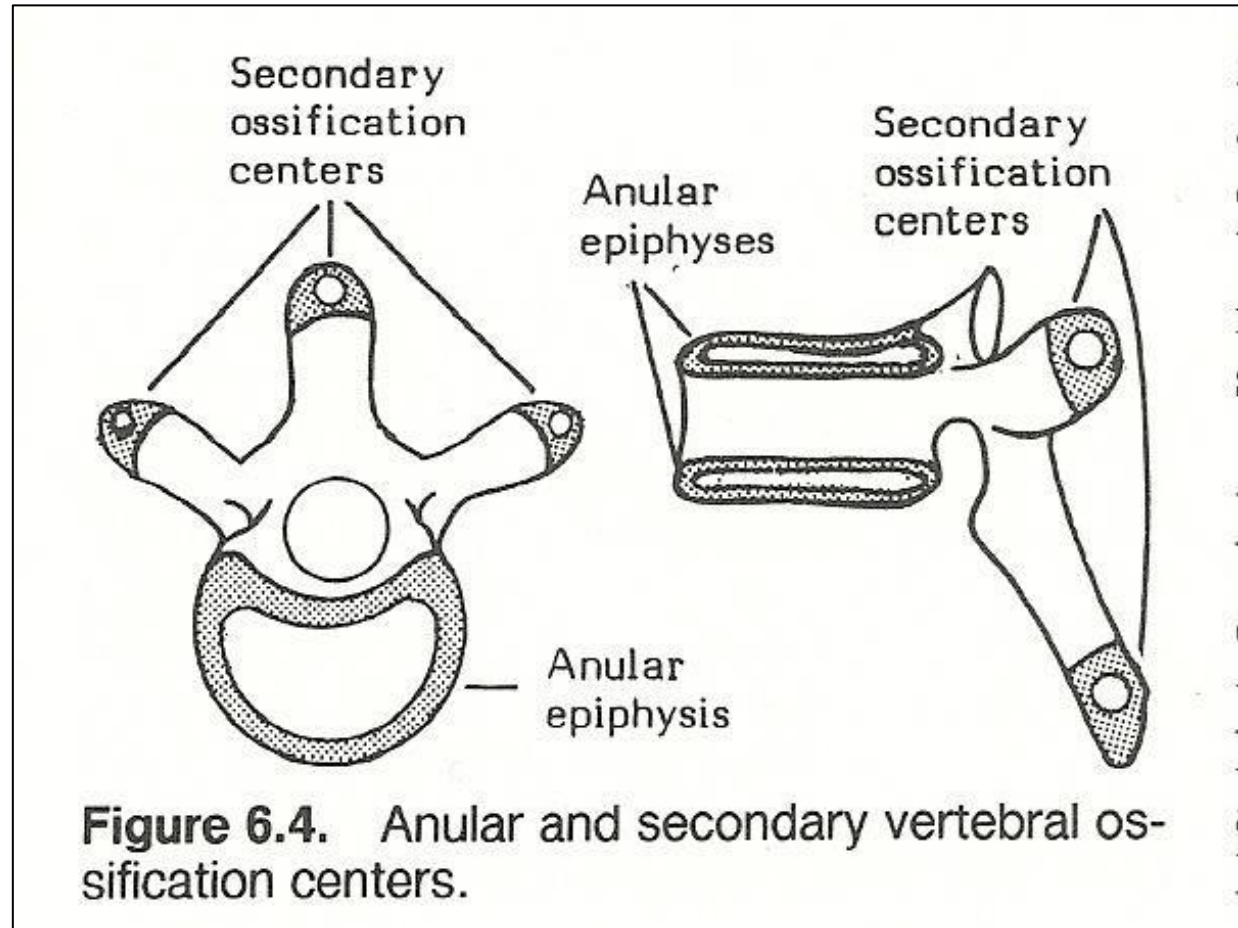
Vertebral Ossification

POSTNATAL

2 on vertebral
body (1 superior
'ring',
1 inferior 'ring')

1 on the end of the
SP

2 on the end of the
TVP



Vertebral Column

Curvature of the spinal column and their development There are 4 normal curvatures in the adult spine

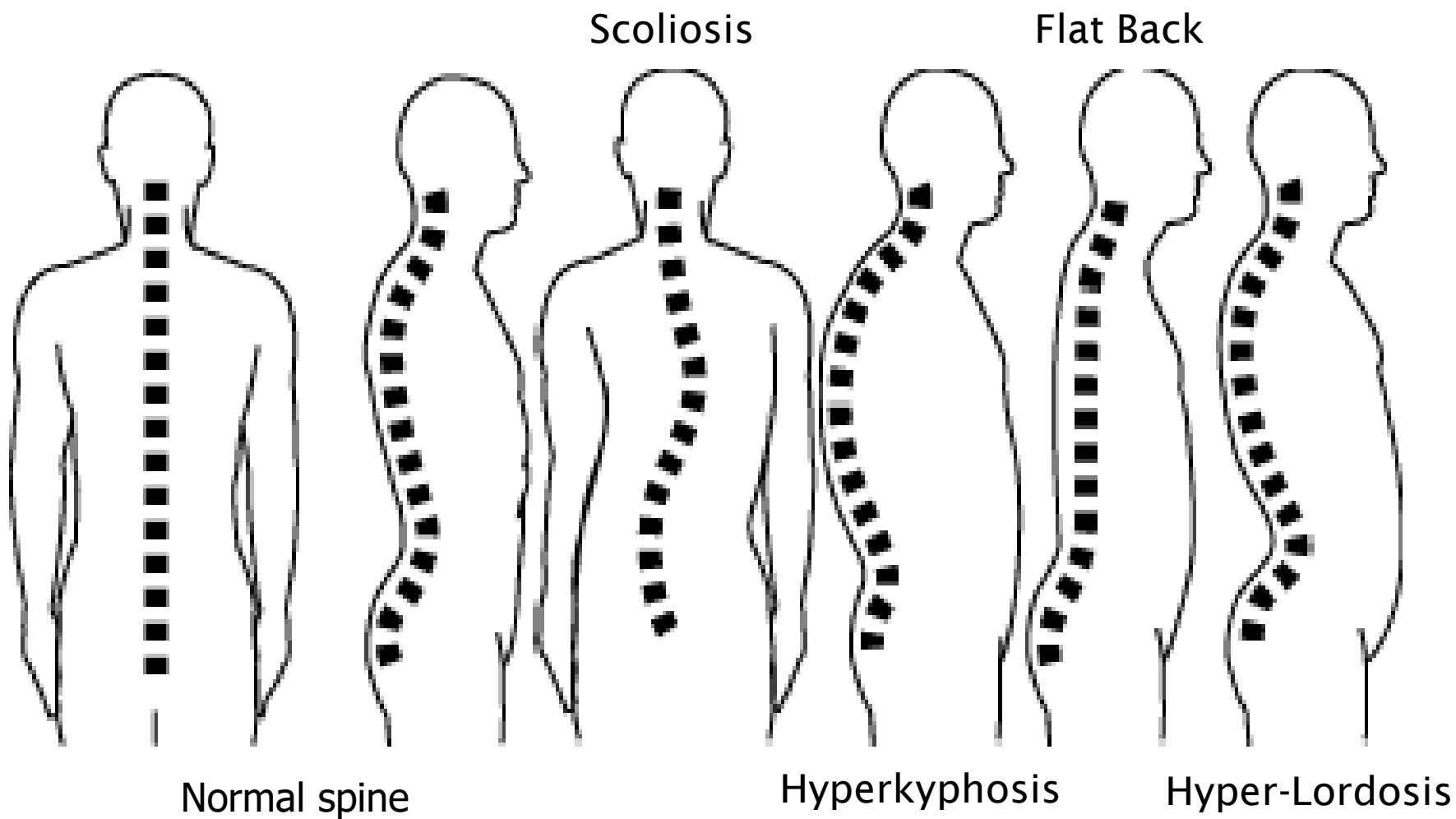
Primary Curves: Develop during fetal life and they are all concave anteriorly

- **Kyphosis:** Shape of the thoracic and sacral regions (concave anteriorly or convex posteriorly), it is a normal curve = PRIMARY CURVE

Secondary Curves: Develop in response to postural stresses and are concave posteriorly (the cervical curve develops due to lifting of our heads – approximately at 3 months; and the lumbar curve develops when we begin to walk – approximately at 1 year)

- **Lordosis:** Shape of the cervical and lumbar regions (concave posteriorly or convex anteriorly), it is a normal curve = SECONDARY CURVE

Scoliosis: Abnormal lateral curvature of the spine (left or right), first the normal



Typical

Bony Features:

1. Vertebral body
2. Pedicles
 - A. Superior and Inferior vertebral notches
 - B. Intervertebral foramen
3. Laminae
4. Vertebral/neural arch (formed by 2 + 3)
5. Vertebral foramen/spinal canal
6. Spinous process (SP)
7. Transverse process (TVP)
8. Superior articular processes (articular facet)
9. Inferior articular processes (articular facet)

Typical Vertebrae

- Large anterior portion
- Function to support weight
- Smallest in the Cervical region and largest in the Lumbar region

Vertebral Processes (there are 7)

- **1 SP** at the laminar junction
- **2 TvPs** at the junction of the pedicle and laminae
- **4 Articular Processes:** 2 Superior and 2 inferior bilaterally

Typical Vertebrae

Vertebral arch / Neural arch

- Forms the posterior portion of the vertebrae
- Encloses the vertebral foramen (successive vertebral foramina make up the spinal canal)
- Consists of 2 pedicles, 2 laminae and a Spinous Process

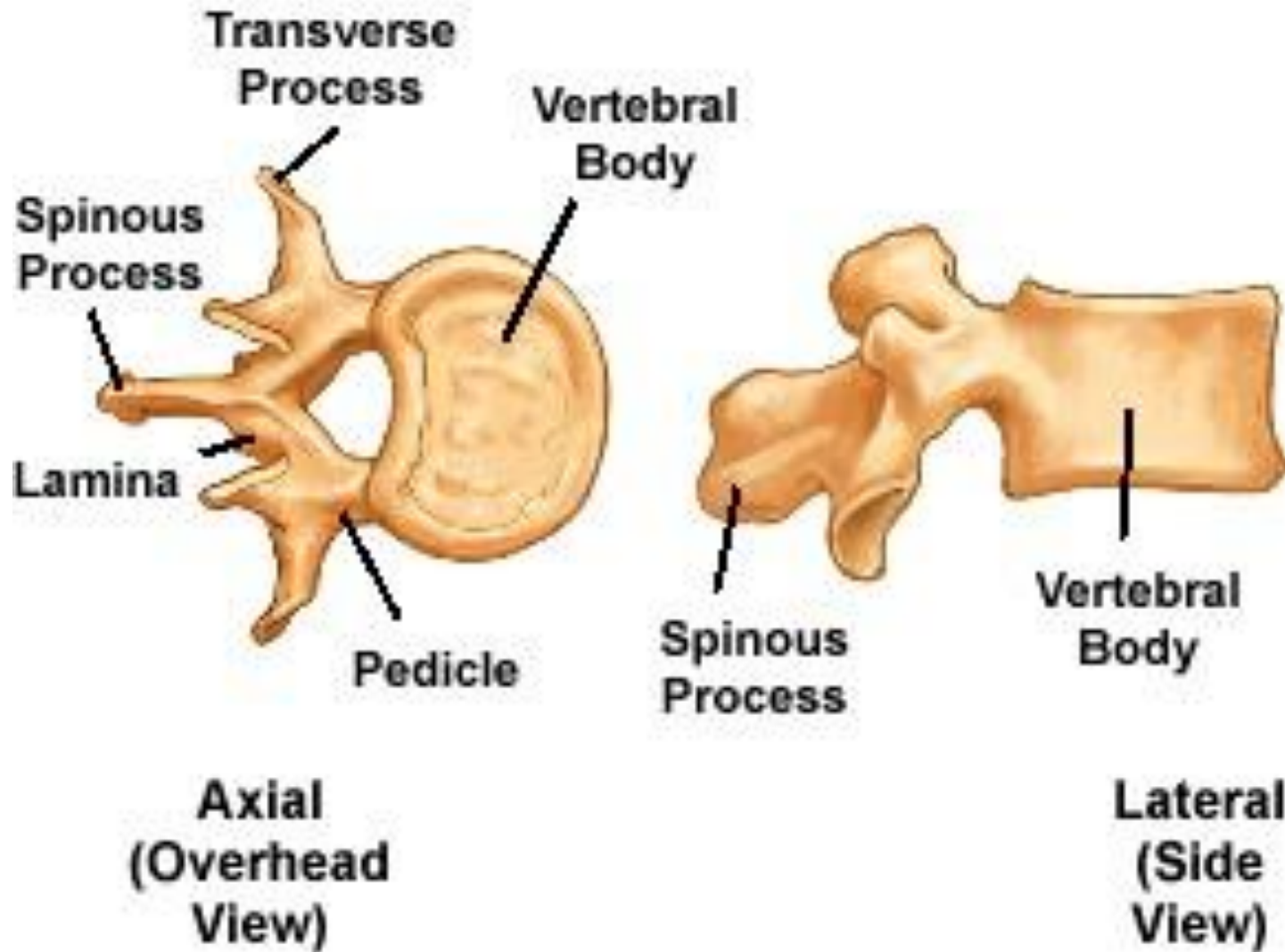
Foramina (2 types)

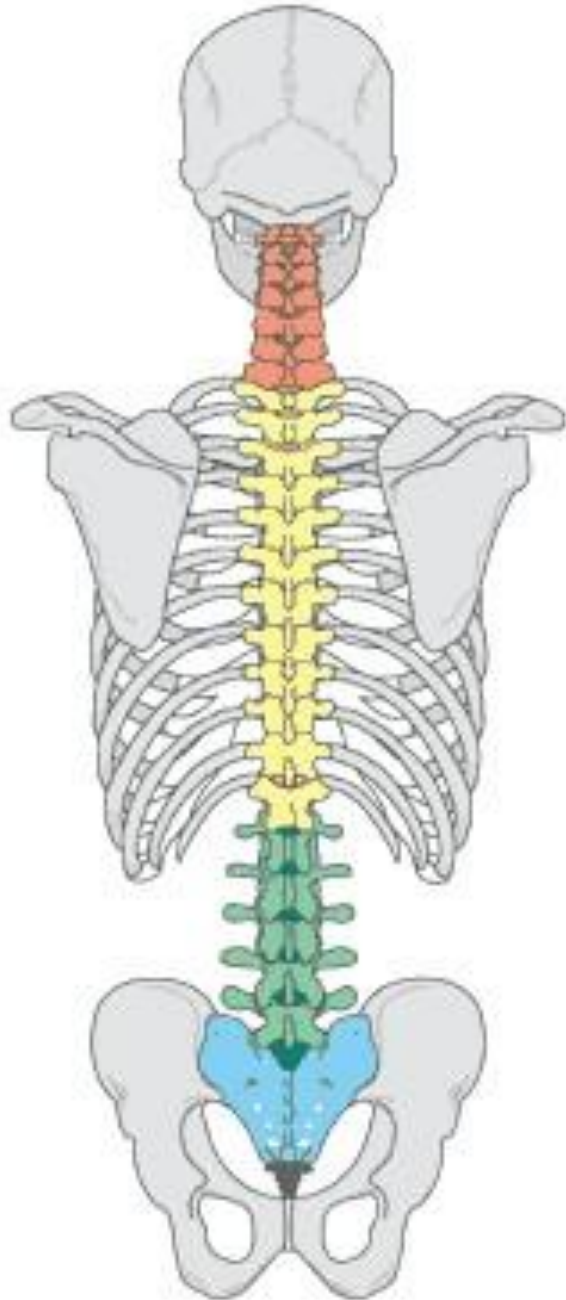
- **Vertebral foramen:** Houses the spinal cord
- **Intervertebral foramen:** Houses the left and right spinal nerve roots

Zygapophyseal / Facet Joints / Z Joints:

- Joint between the superior articular facet of the vertebrae below and the inferior articular facet of the vertebrae above

Lumbar Vertebrae





Some levels to be aware
of for palpation:

C7 – base of the neck

T2 – Superior angle of scapula

T7 – Inferior angle of scapula

L1 – Subcostal border

L4 – Top of iliac

crest S2 – PSIS

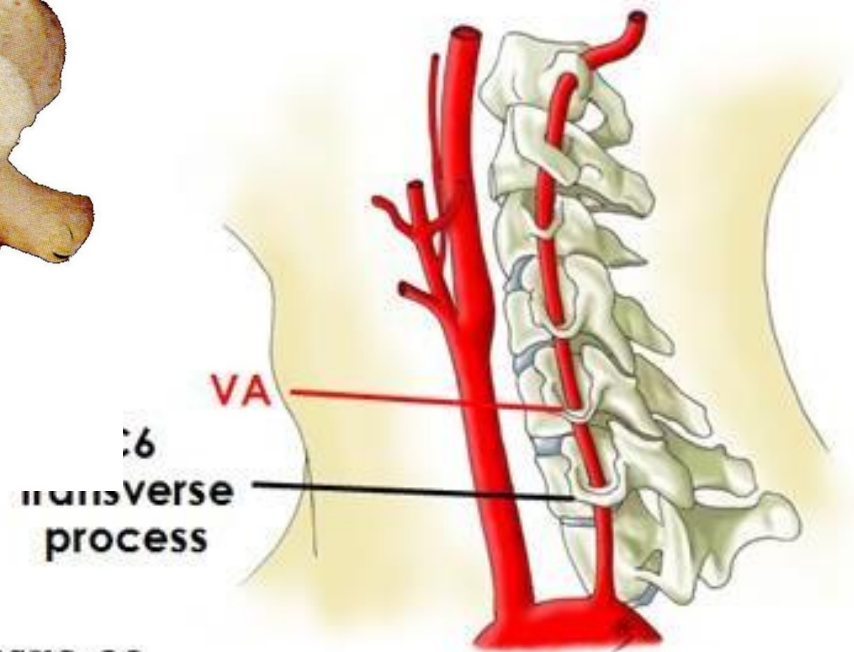
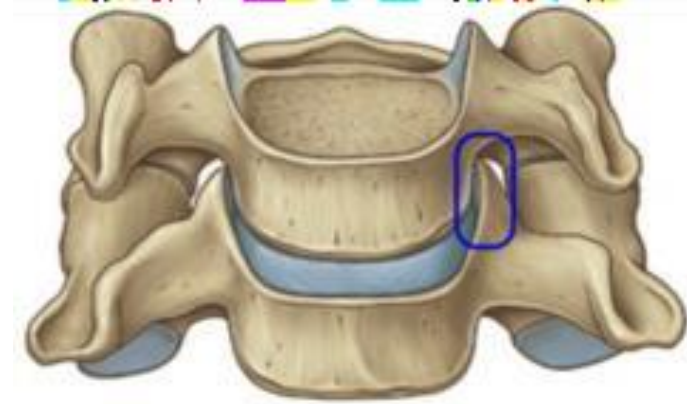
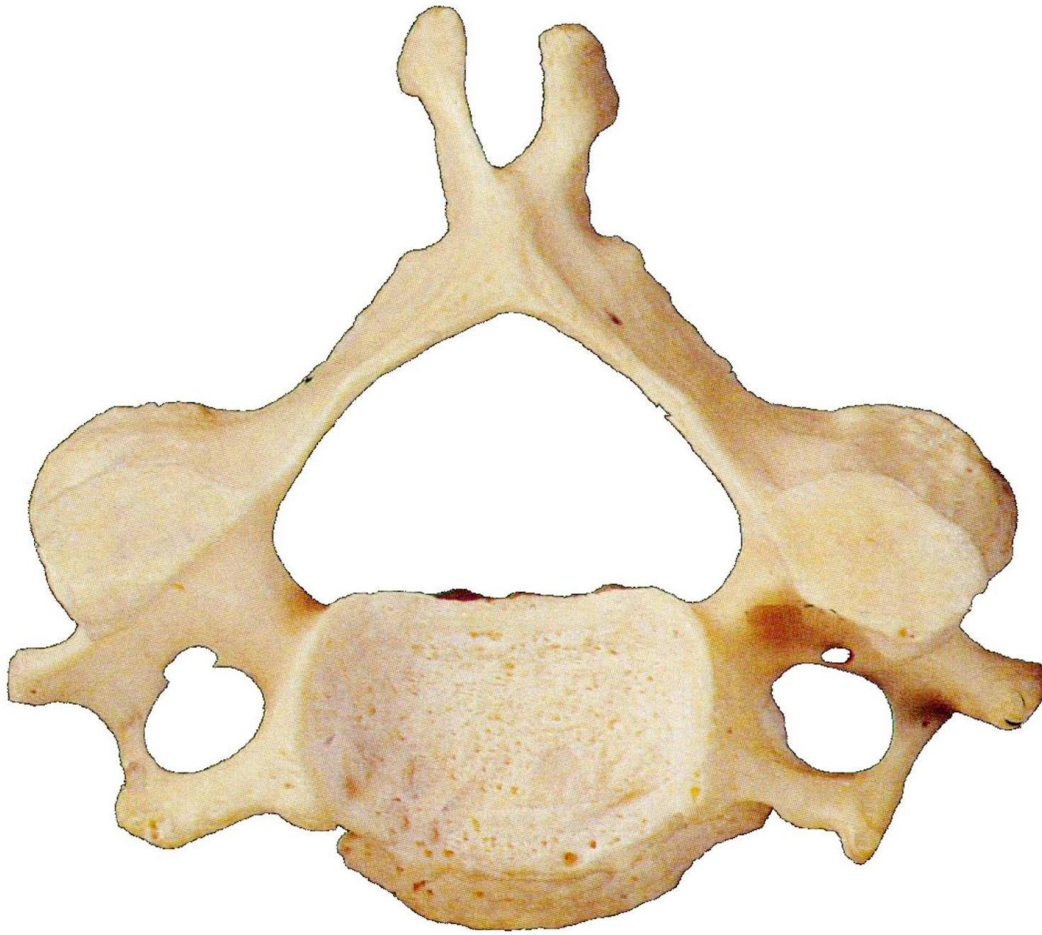
Regional

Characteristics

Typical Cervical Vertebrae (C3 to C6 Vertebrae)

- **Body** – small and round
 - **Uncinate processes** are formed by the **superior edges** of the vertebral bodies (curves the upper surface of the vertebral bodies).
 - **Semilunar facet** are formed by the **inferior edge** of the vertebral bodies and make a perfect match with the uncinate process of the vertebra below.
 - These two structures (the uncinate process and the semilunar facet form the **uncovertebral joints of Luschka**)
- **TVPs** – Short and bifid
 - Unique to the cervical region are **transverse foramen** which houses the **vertebral artery** from C1 to C6 (NOT C7)
 - There are **anterior and posterior tubercles** on the transverse process
- **SPs** – Short and bifid
 - Exceptions are C1 and C7

Uncinate Processes



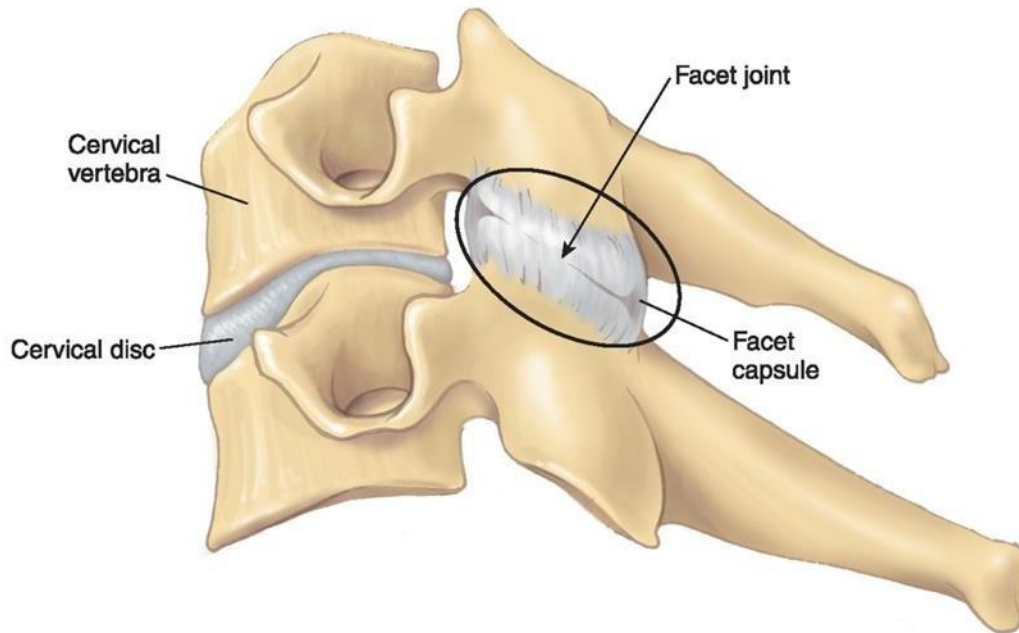
Regional

• Characteristics

• **Intervertebral foramen** – Large and triangular in shape

• **Articular Processes** – Superior and inferior

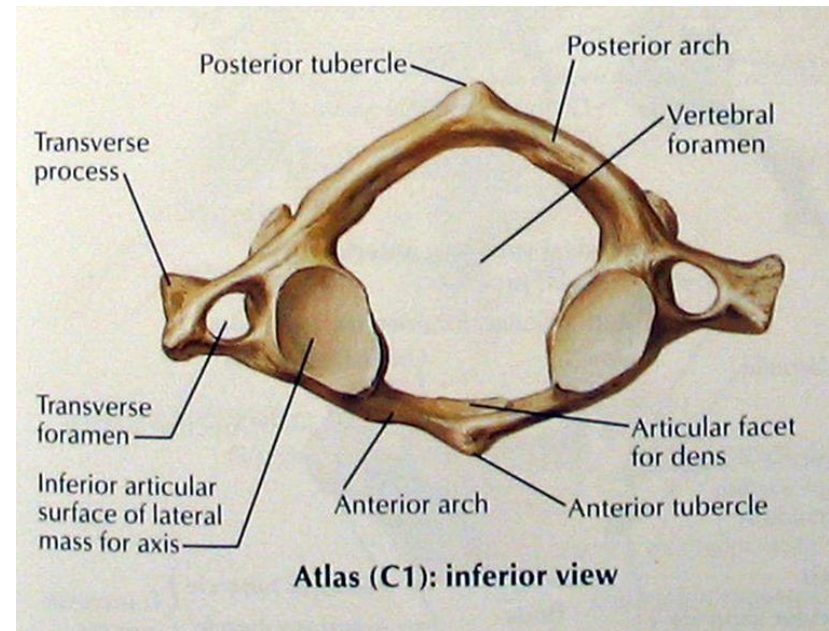
- The articular facets are on an oblique angle
- **Motions of the Cervical Spine:** Flexion/extension, rotation and lateral flexion
- **Articular Pillars** – Column of bone formed by stacked facet joints just posterior to TVPs (extra surface area for muscle attachment)



Atypical Cervical

Vertebrae

- **No vertebral body** at C1 (therefore no intervertebral disc)
- Ring shaped bone formed by the anterior and posterior arches
 - Anterior tubercle and Posterior tubercles
- Lateral masses on either side have TvP's
- There is an articular facet for the dens on the inner surface of the anterior arch
- The superior articular surfaces are kidney shaped and articulate with the condyles of the occiput
- On the superior surface of the posterior arch there is a groove for the vertebral artery

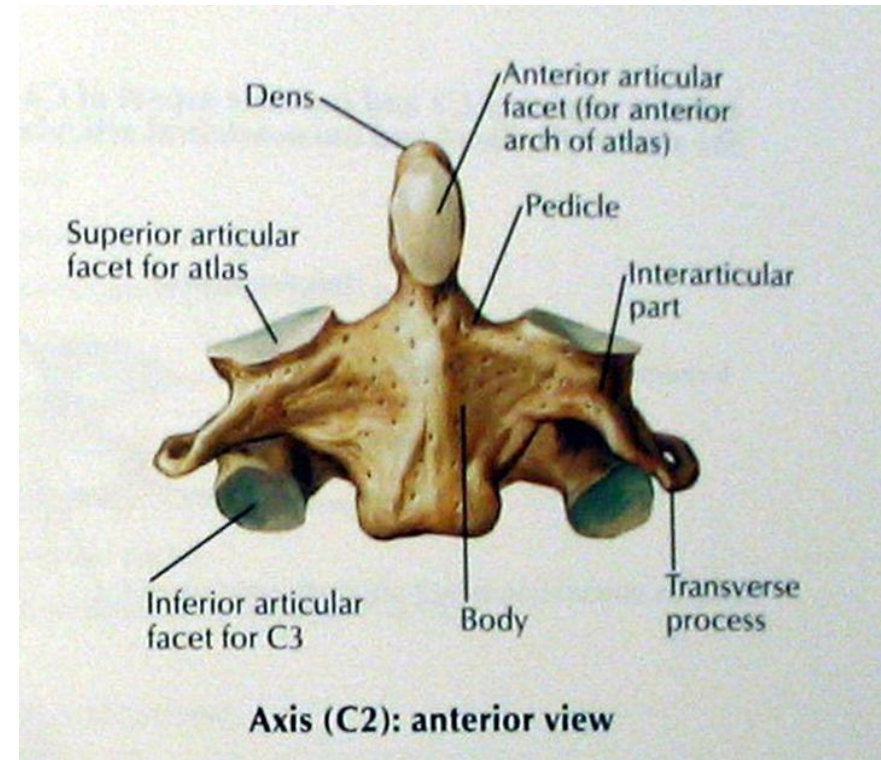


Atypical Cervical

Vertebrae

Axis (C2)

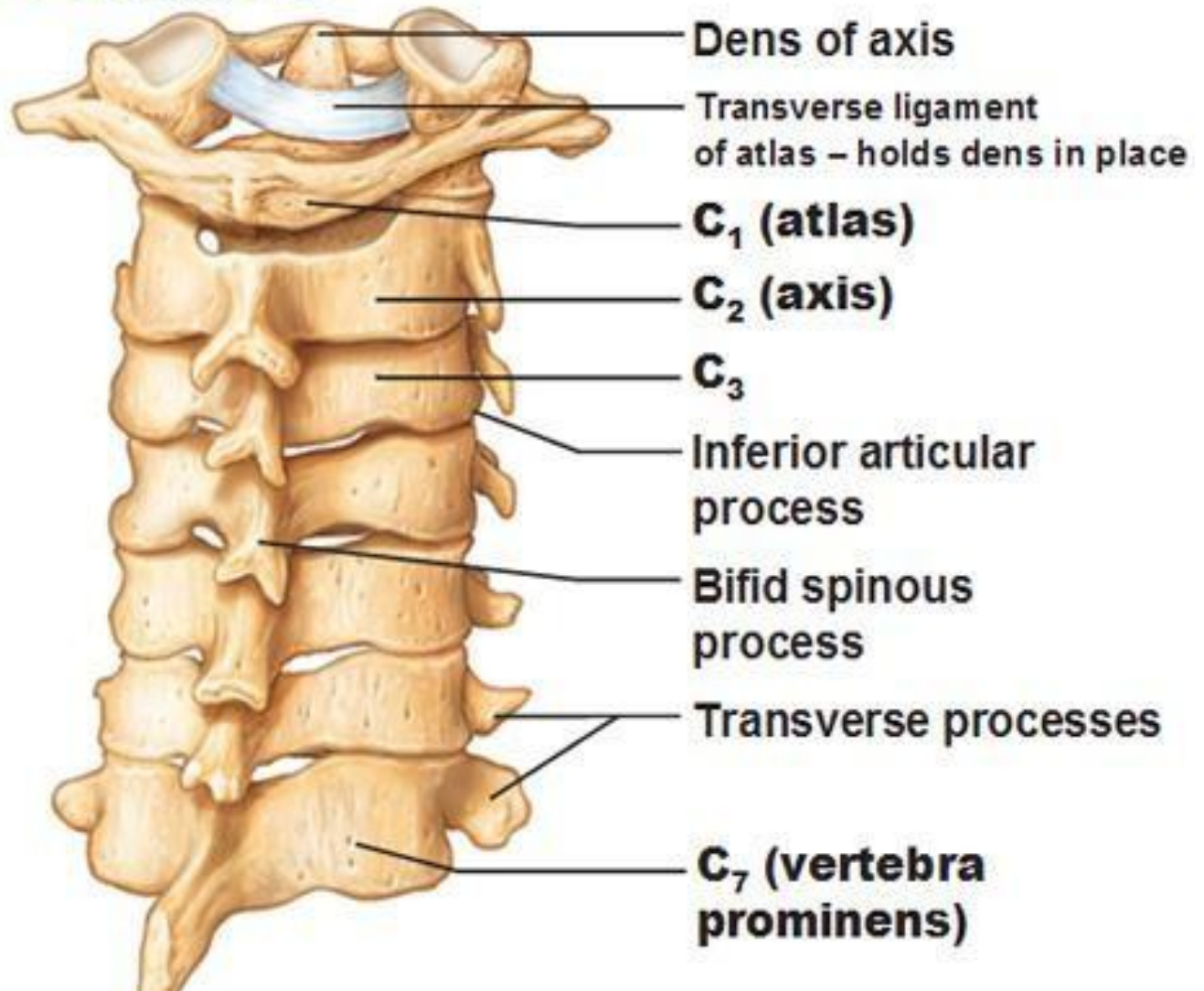
- The unique feature is the dens (**aka odontoid process**) which projects superiorly and articulates with the articular facet on the inner surface of the anterior arch of C1
- The dens is held in place by the transverse ligament of the axis (C2), this ligament prevents horizontal movement of the atlas (C1)
- There is no disc between C1 and C2



Vertebral Prominence (7th Cervical Vertebra)

- Longest spinous process

Cervical Vertebrae



CERVICAL SPINE

Cervical SPs **PALPATION**

*** Not on Palp OP**

- Partner supine
- Place two finger pads on the external occipital protuberance and slide inferiorly along the cervical spinous processes
- Try to palpate each individual SP as you trail inferiorly

Cervical TVPs

*** Not on Palp OP**

- Partner supine
- Place fingers on the mastoid process
- Rotate head 45 degrees (TVPs will form a straight line from mastoid

process to center of clavicular shaft)

- Explore the TVPs inferiorly along entire length of neck. You will not feel individual TVPs, but a continuous ridge

CERVICAL SPINE

PALPATION

Spinous Process of C2

- Partner supine

Starting Landmark: EOP

Trail: Lay your fingers vertically across base of patient's skull

- Move slightly inferior into a small depression of soft tissue
- Continue slightly inferior (1/4 inch) along the midline of the neck and you should fall onto prominent SP of C2

CERVICAL SPINE PALPATION

C1 TVP

- Partner supine and rotate neck 20° contralaterally

Starting Landmark: mastoid process

Trail: Move slightly inferior and anterior from mastoid process to feel for the solid bump of C1 TvP

- It may be uncomfortable, so use a soft touch