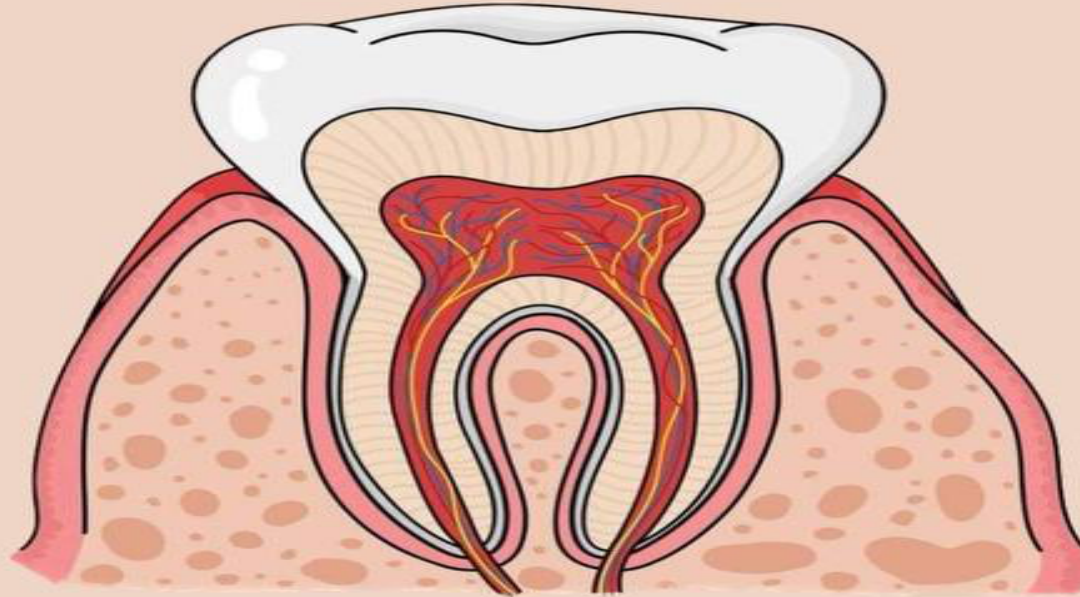




# ANATOMY



LEC NO. : L-3

DONE BY : Malak AL-huseid

وَبِقَوْلِ رَبِّيَ عَلِيمًا

# ■ The Axial Skeleton

**Axial Skeleton**



# Facial Bones:

Maxillae bone articulates with every bone of the face except the mandible

## عظام الانف

### Nasal Bones

- Form the bridge of the nose

يتم فصل الفك العلوي مع جميع عظام

الوجه باستثناء الفك السفلي

### Maxillae الفك العلوي

- Form the upper jawbone
- Has the following processes:
  1. Frontal process superiorly
  2. Zygomatic process laterally
  3. Palatine process posteriorly
  4. Alveolar process inferiorly. This one contains sockets for the teeth.
- The palatine process form most of the hard palate
  - Separates the nasal cavity from the oral cavity

يحتوي على الرئس تبعون الاسنان العلوية الجبهي الاعلى

الوجني الجانبي

الحنك من الخلف

هو سقف الحلق Hard palate  
عبارة (roof of the mouth)  
عن عظمتين

### Zygomatic Bones عظام الوجنتان

- Commonly called cheekbones, form the prominences of the cheeks
- The **temporal** process of this bone unite with the **zygomatic** process of the temporal bone to form the **zygomatic arch**.

Temporal + zygomatic = عظمة عشكل قوس (zygomatic arch)

## ■ Lacrimal Bones جزء من تجويف العين

- Form a part of the medial wall of each orbit

## ■ Palatine Bones

- Form the posterior portion of the hard palate الحنك

## ■ Inferior Nasal Conchae <sup>بروز</sup> الجزء الجدار الجانبي السفلي من تجويف الانف

- Form a part of the inferior lateral wall of the nasal cavity

## ■ Vomer الجزء السفلي من حاجز الانف

- Forms the inferior portion of the nasal septum

عنا ثلاث بروزات :

1. Inferior بطلع من مكان محدد
2. Superior بطلعوا من
3. Middle Ethmoid

Nasal septum :ethmoid bone الجزء العلوي يتكون من:  
والجزء السفلي من vomer

FRONTAL BONE

Frontal squama

PARIETAL BONE

Squamous suture

SPHENOID BONE

Orbit

سموها هيك

لاتو فيها غدة

دمعية

lacrimal

gland

ETHMOID BONE

LACRIMAL BONE

Zygomatofacial  
foramen

ZYGOMATIC BONE

Perpendicular plate  
of ethmoid bone

INFERIOR NASAL  
CONCHA

VOMER

Mental foramen

Coronal suture

Supraorbital foramen

Supraorbital margin

Optic foramen (canal)

Superior orbital fissure

TEMPORAL BONE

NASAL BONE

Inferior orbital fissure

Middle nasal concha

Infraorbital foramen

MAXILLA

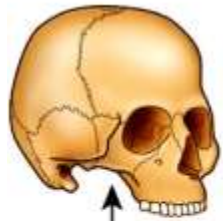
Alveolar process  
of maxilla

Alveolar process  
of mandible

MANDIBLE

Anterior view





View

Zygomatic arch

VOMER

SPHENOID BONE

Foramen ovale

Foramen spinosum

Mandibular fossa

Carotid foramen

Jugular foramen

Occipital condyle

TEMPORAL BONE

OCCIPITAL BONE

Inferior nuchal line

Superior nuchal line

Incisor teeth

MAXILLA:

Incisive foramen

Palatine process

ZYGOMATIC BONE

PALATINE BONE  
(horizontal plate)

Inferior nasal concha

Pterygoid processes

Articular tubercle

Foramen lacerum

Styloid process

External auditory  
meatus

Stylomastoid foramen

Mastoid process

Foramen magnum

Mastoid foramen

PARIETAL BONE

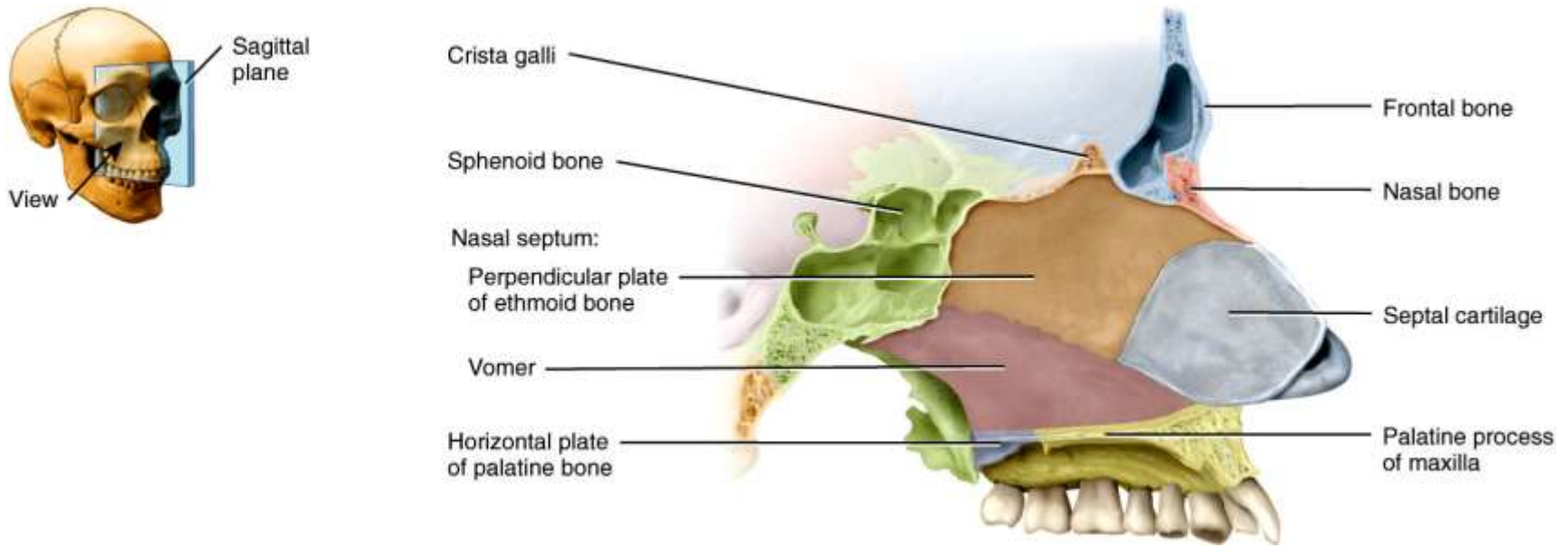
Lambdoid suture

External occipital  
protuberance

Inferior view

TMJ

# The Nasal Septum:



A partition that divides the nasal cavity into right and left halves. It's formed of **2 bony part** and **1 cartilaginous part**:

- 1. Ethmoid bone** علوي
- 2. The vomer bone** سفلي
- 3. Septal cartilage (hyaline cartilage) anteriorly.**

# Main Sutures:

## 1) Coronal Suture:

between the frontal and the two parietal bones.

## 2) Sagittal Suture:

between the two parietal bones.

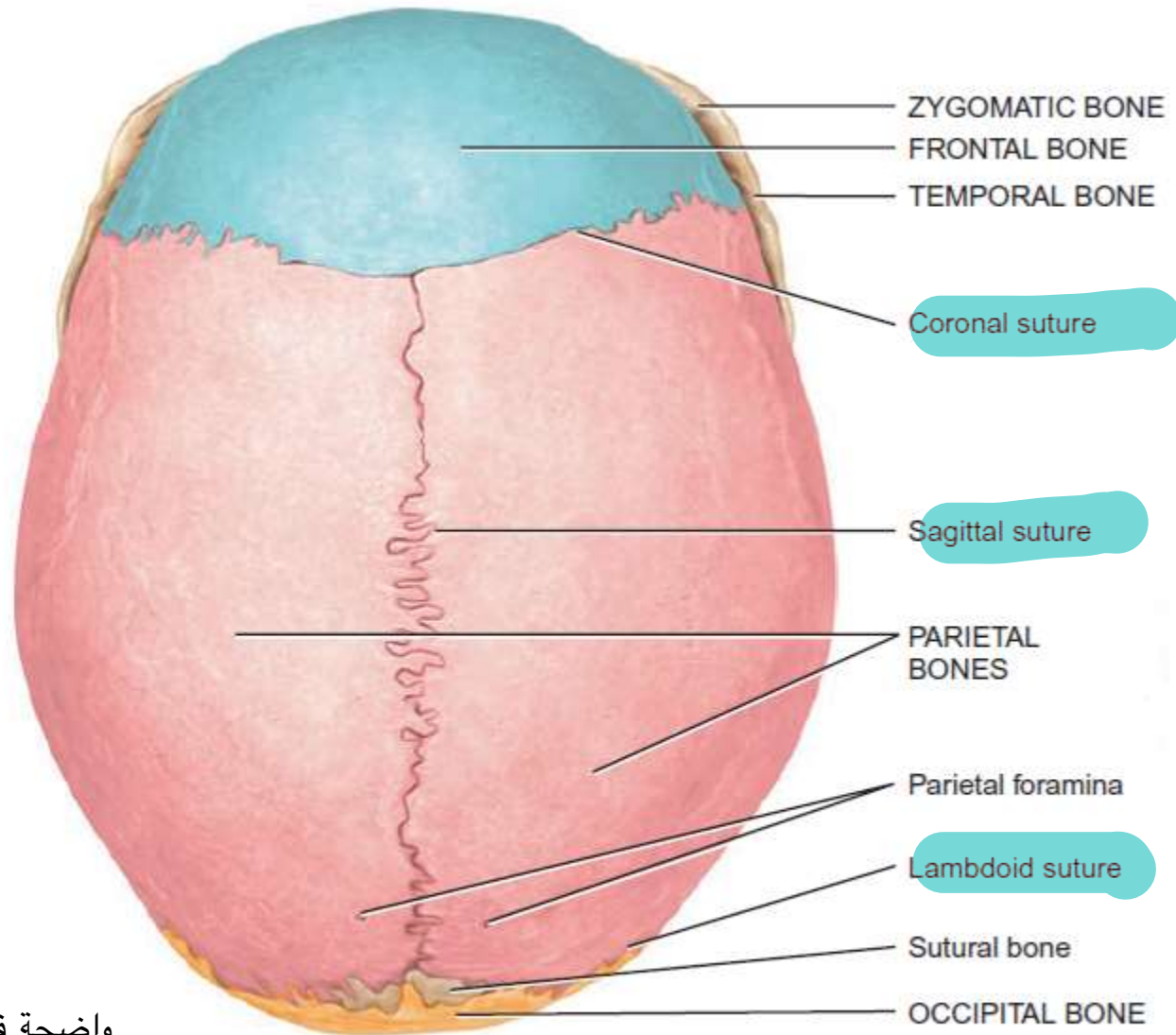
## 3) Lambdoid Suture:

between the two parietal and the occipital bones.

## 4) Squamous suture:

Temporal and parietal

واضحة في سلايد 4



(a) Superior view



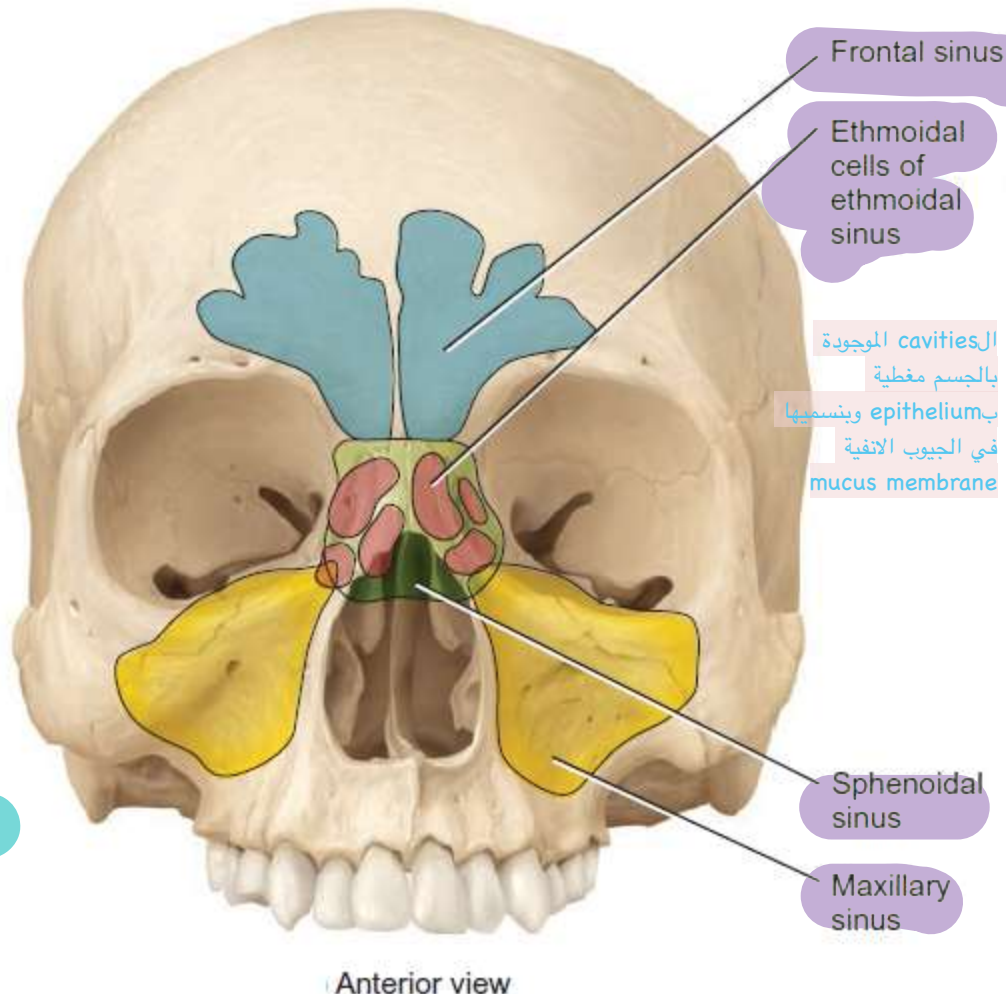
# Paranasal Sinuses:

تجاويف صغيرة داخل عظام الانف والوجه

❖ Cavities **within** cranial and facial bones near the nasal cavity

❖ Secretions produced by the **mucous membranes** which line the sinuses, **drain into the nasal cavity**

❖ Serve as **resonating chambers** that intensify and prolong sounds



❖ Found in the following bones

**1-Frontal**

**2-Ethmoid**

**3-Sphenoid**

**4-Maxillary : Largest**

قريب من الاضراس العلوية

التهاب الجيوب الانفية

**Sinusitis is an inflammation of the mucous membrane.**

Mucus membrane وظائف :

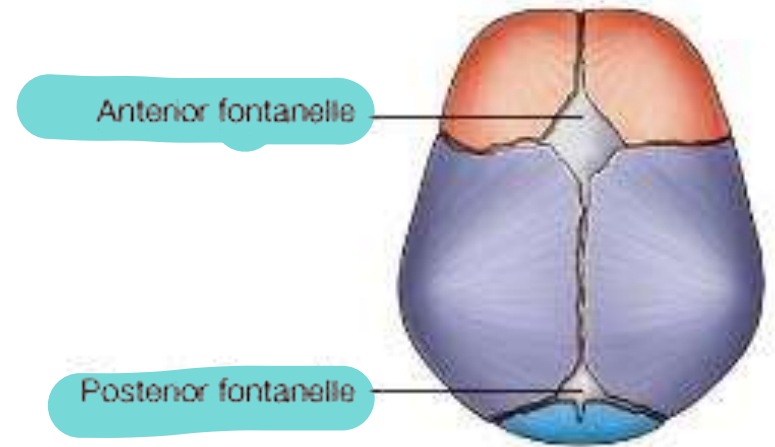
1. الترطيب
2. weight of the skull بتقلل
3. quality of the sound اهم وظيفة اله في

بتعمل صدى للصوت عشان هيك لما تلتهب  
الحيوب بتغير الصوت

عند الاطفال حديثي الولادة بنلاحظ انه منطقة الالتقاء sutures بتكون لينة يعني عبارة عن tissue بتكون الbone فيها لسا ما تكونت بنلاقي فيها anterior +posterior lateral وبتحتاج anterior فترة من سنة ونص لسنتين حتى بسكر و posterior بتحتاج ست اشهر  
الهم اهمية في تسهيل الولادة بحيث يعطو flexibility

# Fontanelles:

- ❑ Areas of **unossified** tissue that link the cranial bones at birth
- ❑ Eventually, they are **replaced with bone** to become sutures
- ❑ Provide **flexibility to the fetal skull**, allowing the skull to change shape as it passes through the birth canal



	Anterior Fontanel	Posterior Fontanel
Location	Between the frontal and parietal bones	Between the parietal and occipital bones
Shape	Diamond ◆	Triangular ▲
Size	Larger than the posterior	Smaller than the anterior
Closes	Later than the posterior (1.5 - 2 years)	Before the anterior (6 months)

# Principal Foramina of the Skull

هاي الثقوب او الفتحة الموجودة

في الbones

## Foramen

لما 20 وحدة مطلوب منا بس جدول والهم وظائف داخل وخارج skull

## Location

## Structures passing through

**Olfactory**

Ethmoid

Cranial nerve I

First nerve

**Optic**

Sphenoid

Cranial nerve II

Second nerve

**Carotid**

Temporal bone

Internal carotid artery

بطلع الدم الغير موكسد

من الbrain

**Jugular**

Between  
Temporal and  
Occipital

Internal jugular vein

**Mandibular**

Mandible

Mandibular branch of  
Fifth  
nerve  
cranial nerve V

بخرج منها اخر جزء من الbrain اسمو

Medulla oblongata  
**Magnum**

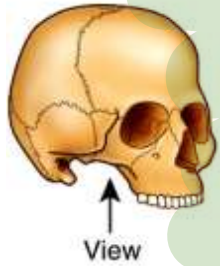
Occipital

Medulla oblongata and  
meninges



# Medulla oblongata

بعدين بدخل على العمود الفقري ويكون spinal cord



Zygomatic arch

VOMER

SPHENOID BONE

Foramen ovale

Foramen spinosum

Mandibular fossa

Carotid foramen

Jugular foramen

Occipital condyle

TEMPORAL BONE

OCCIPITAL BONE

Inferior nuchal line

Superior nuchal line

Incisor teeth

MAXILLA:

Incisive foramen

Palatine process

ZYGOMATIC BONE

PALATINE BONE  
(horizontal plate)

Inferior nasal concha

Pterygoid processes

Articular tubercle

Foramen lacerum

Styloid process

External auditory meatus

Stylomastoid foramen

Mastoid process

Foramen magnum

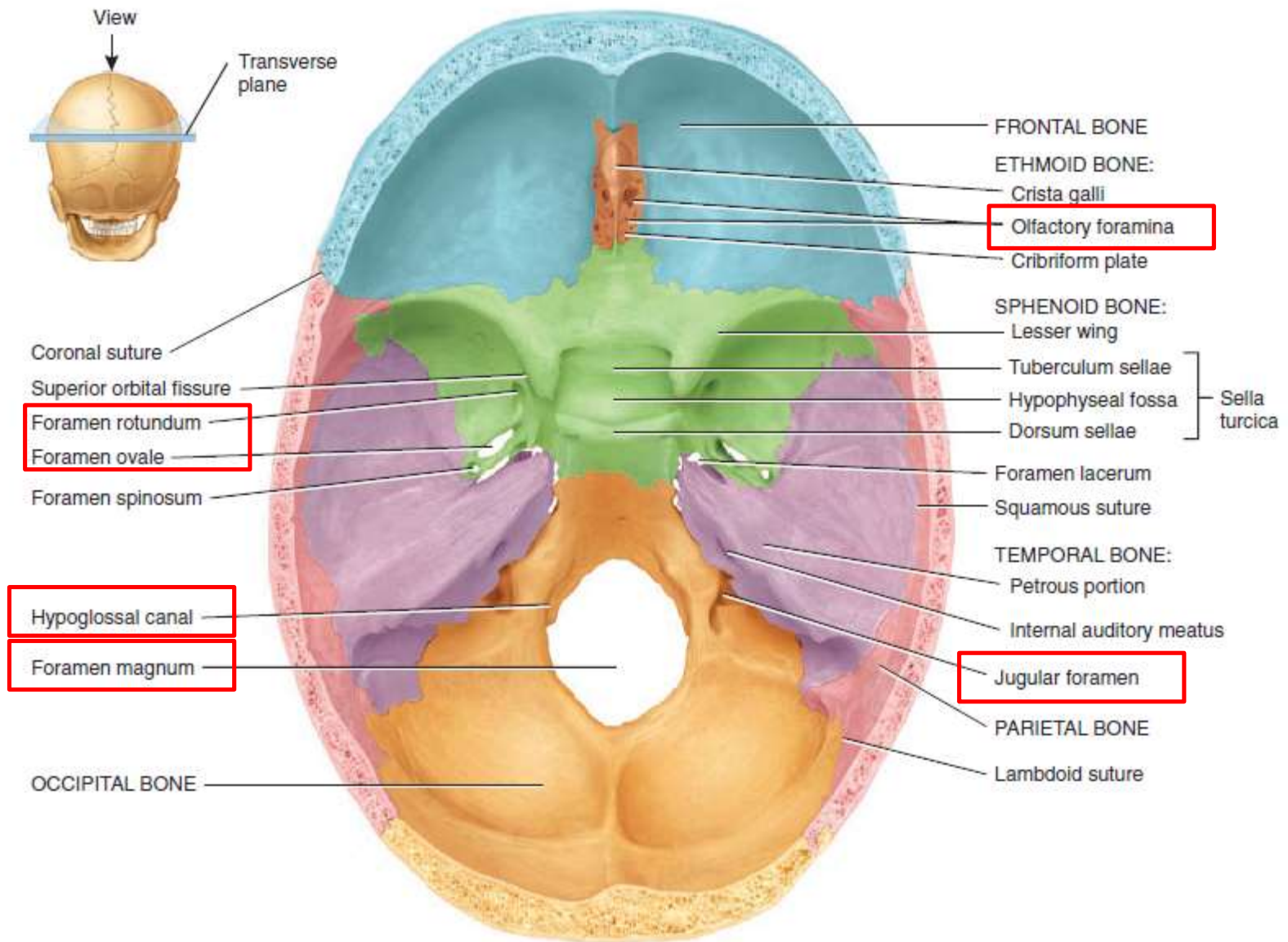
Mastoid foramen

PARIETAL BONE

Lambdoid suture

External occipital protuberance

Inferior view



(a) Superior view of sphenoid bone in floor of cranium

# Mandible

- Lower jawbone
- The largest, strongest facial bone
- The only movable skull bone

\*\* Is formed of two bones, (right and left) which unite at the **symphysis menti** after the first year.

\*\* The mandible is formed of **a body** and **two rami**.





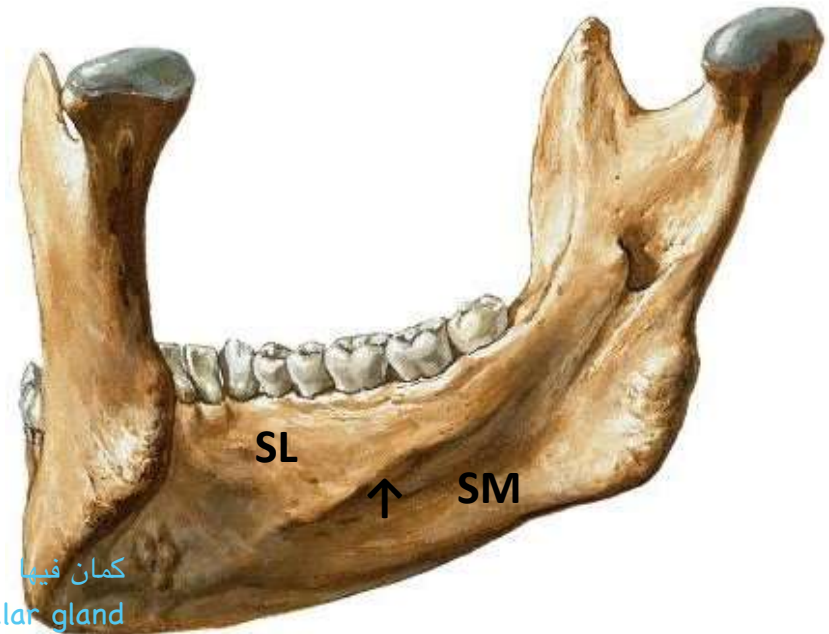
# A. The body

## \* Internal surface :

- It shows the **mylohyoid line** (↑).
- Below this line is the **submandibular fossa (SM)**, while above this line is the **sublingual fossa (SL)**.

عضلة اساسية في الفك مهمة في عملية swallowing  
and speaking

Cavity

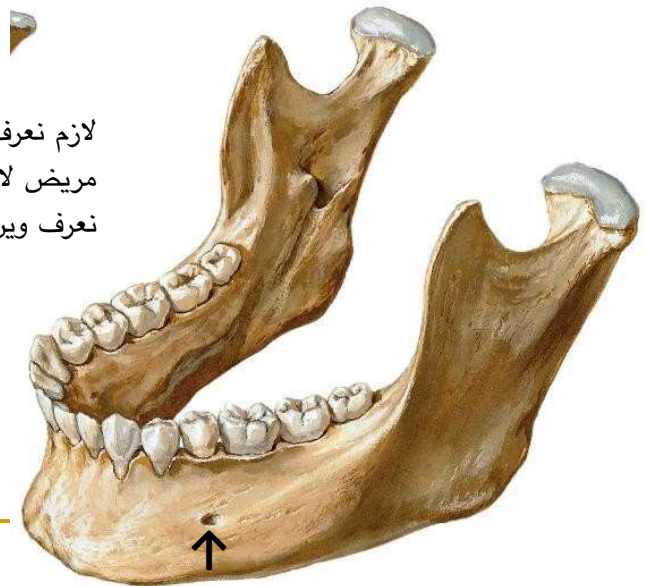


كمان فيها  
submandibular gland  
وهي من الغدد اللعابيك

## \* External surface:

- \* **The mental foramen** lies midway between upper & lower borders, below 2<sup>nd</sup> premolar tooth.

لازم نعرف وين مكانها لكل  
مريض لانها مهمة عشان  
نعرف وين نحت البنج





## B. Ramus of mandible

\* It has two surfaces.

1. The medial surface: shows the mandibular foramen which leads to mandibular canal.

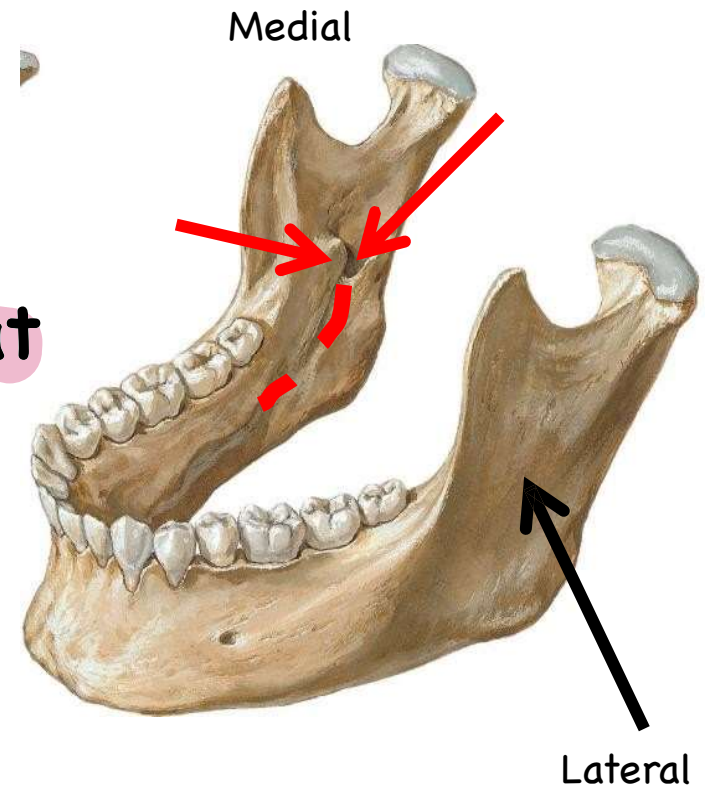
بطلع منها العصب الخامس

• Projecting over the foramen is the lingula.

بروز بشبه اللسان

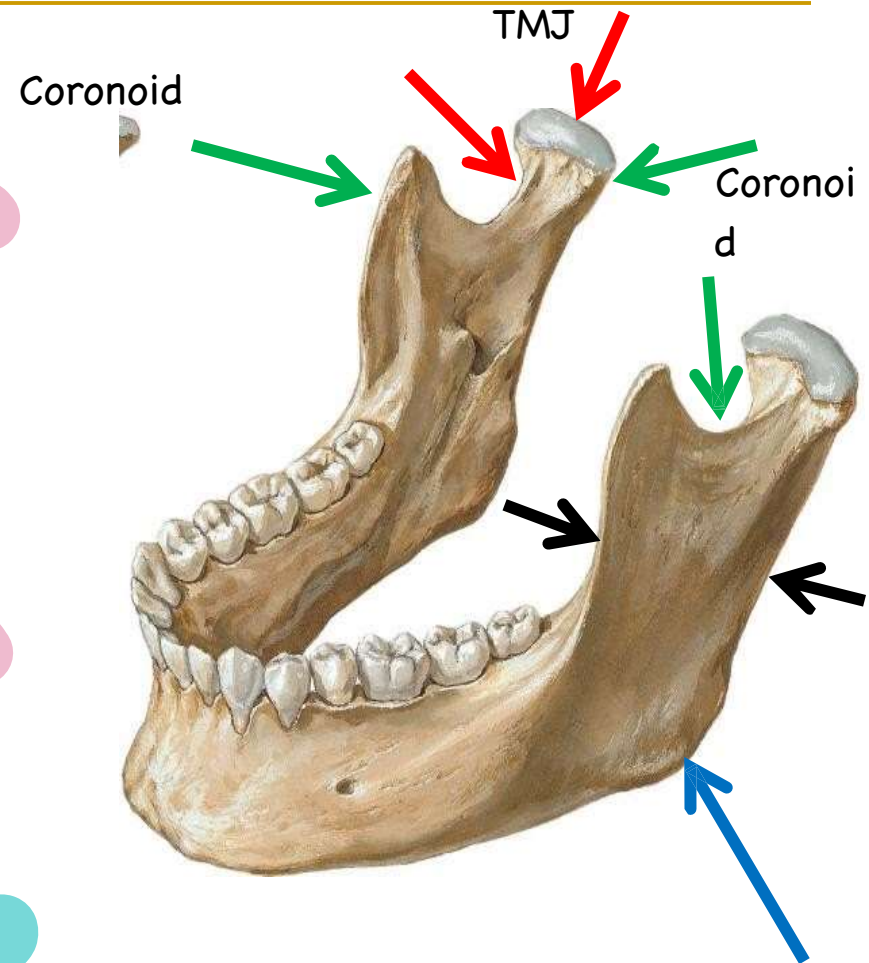
2. The lateral surface: is flat

مهمة للعضلات



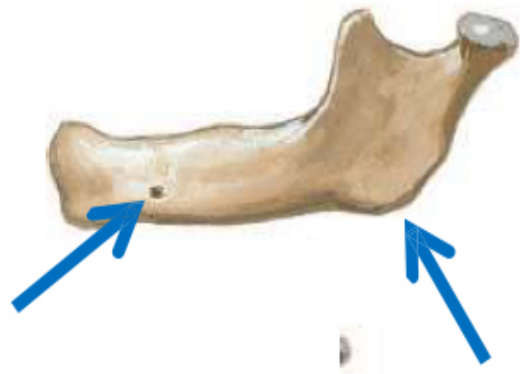
## \*\* Upper border:

- Shows two process **coronoid** anteriorly and **condylar** process posteriorly and in between **the mandibular notch**.
- The condylar process is expanded to form the **head** of the mandible (**TMJ**).
- The constricted area below the head is the **neck**.
- **Angle** of the mandible is the area of meeting of body and the ramus .

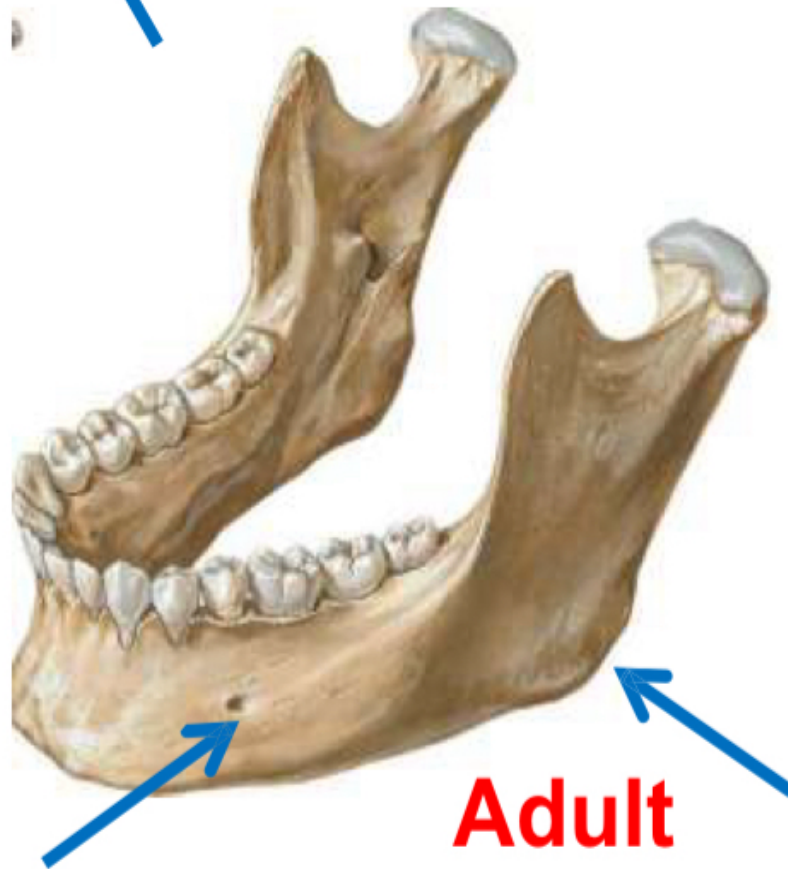


**Temporomandibular joint (TMJ)**  
**Temporal bone and the mandible**

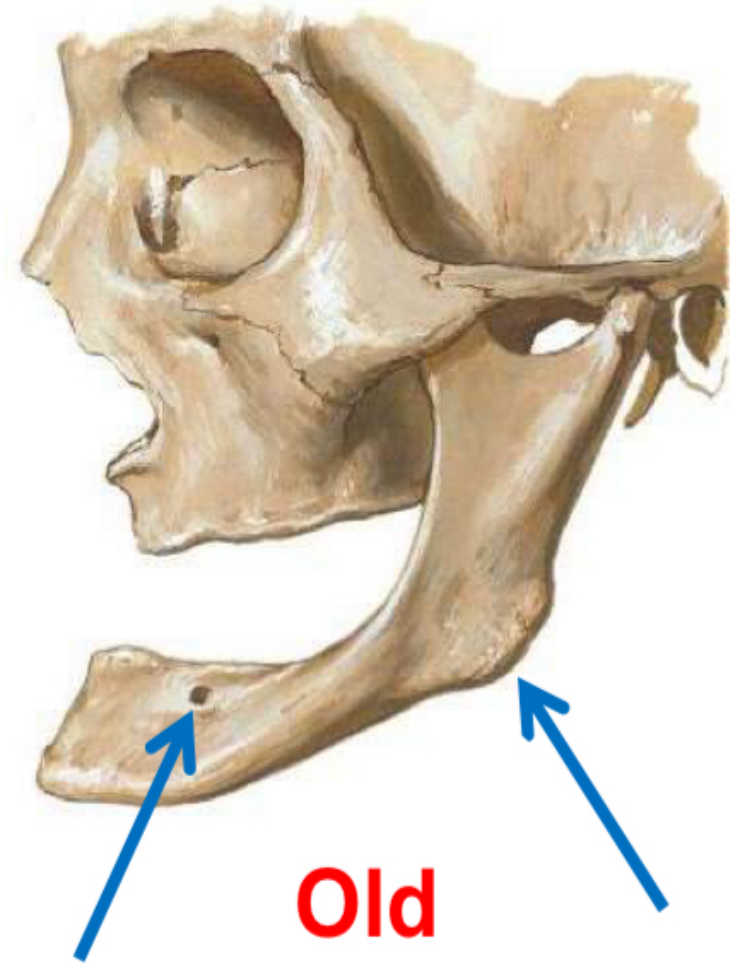
# Age changes of the mandible



**Infant**

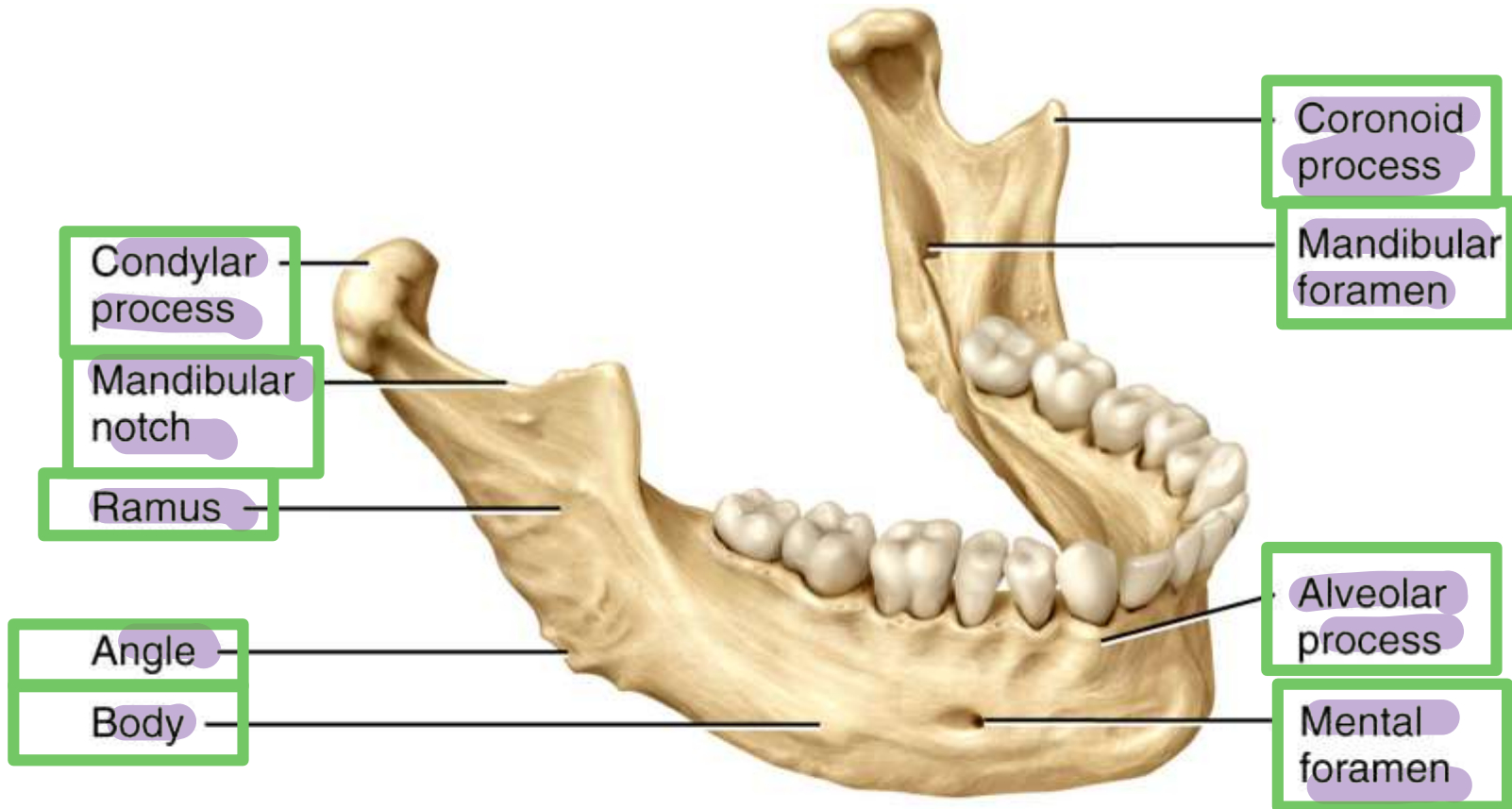


**Adult**



**Old**

# Parts of the Mandible:



Right lateral view



# The Hyoid Bone

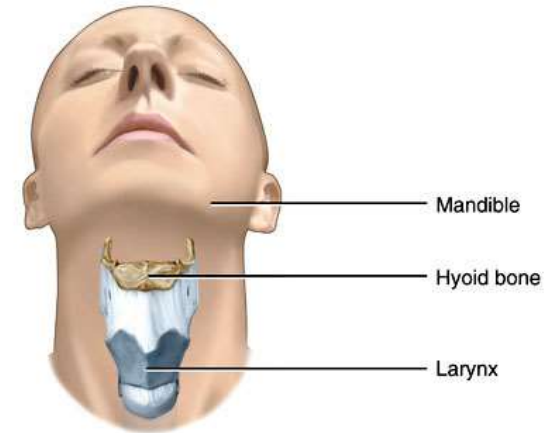
Single bone

- Located in the **upper part of the neck**
- The only bone in the body that does **not articulate** with any other bone
- Supports the tongue, providing attachment sites for some tongue muscles and for muscles of the neck and pharynx and some ligaments
- Formed of **body, greater horns** and **lesser horns**

③

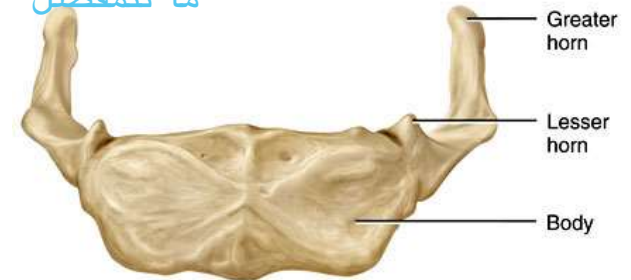
①

②

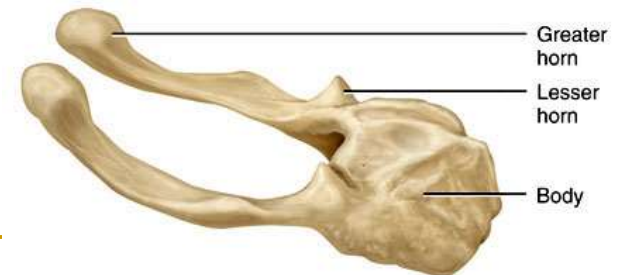


(a) Position of hyoid

الوحيدة الي  
ما تتفصل



(b) Anterior view



(c) Right lateral view

# The Vertebral Column

العمود

- Also called the spine, backbone, or spinal column
- Functions to:
  - Protect the spinal cord
  - Support the head
  - Serve as a point of attachment for the ribs, pelvic girdle, and muscles
- Composed of a series of bones called **vertebrae** (Adult=26)
  - 7 **cervical** are in the neck region
  - 12 **thoracic** are posterior to the thoracic cavity
  - 5 **lumbar** support the lower back
  - 1 **sacrum** consists of five fused sacral vertebrae
  - 1 **coccyx** consists of four fused coccygeal vertebrae

الارتباط مع العمود الفقري  
stability and less  
بعطي flexibility



منطقة العنق

منطقة الصدر

اسفل الظهر

الفقرة الحجزية

الفقرة

العصرصية

ما بترتبط بشكل مباشر مع العمود الفقري بترتبط عن Shoulder  
بتساعدها على more flexibility طريق العضلات وهاد يعطيها

The vertebral column is curved to varying degrees in different locations

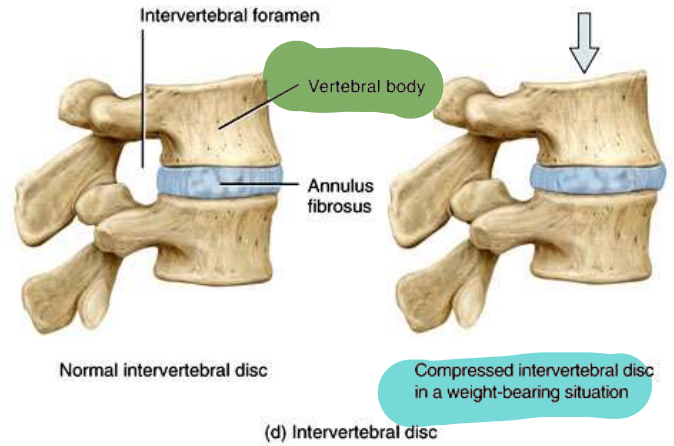
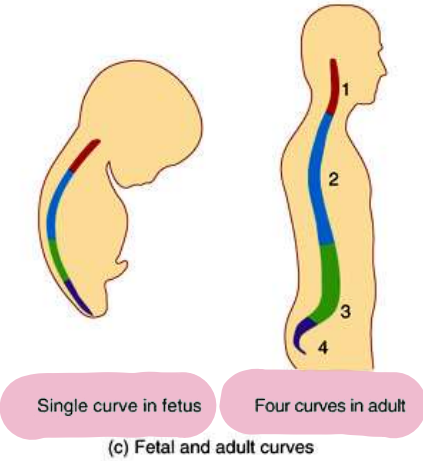
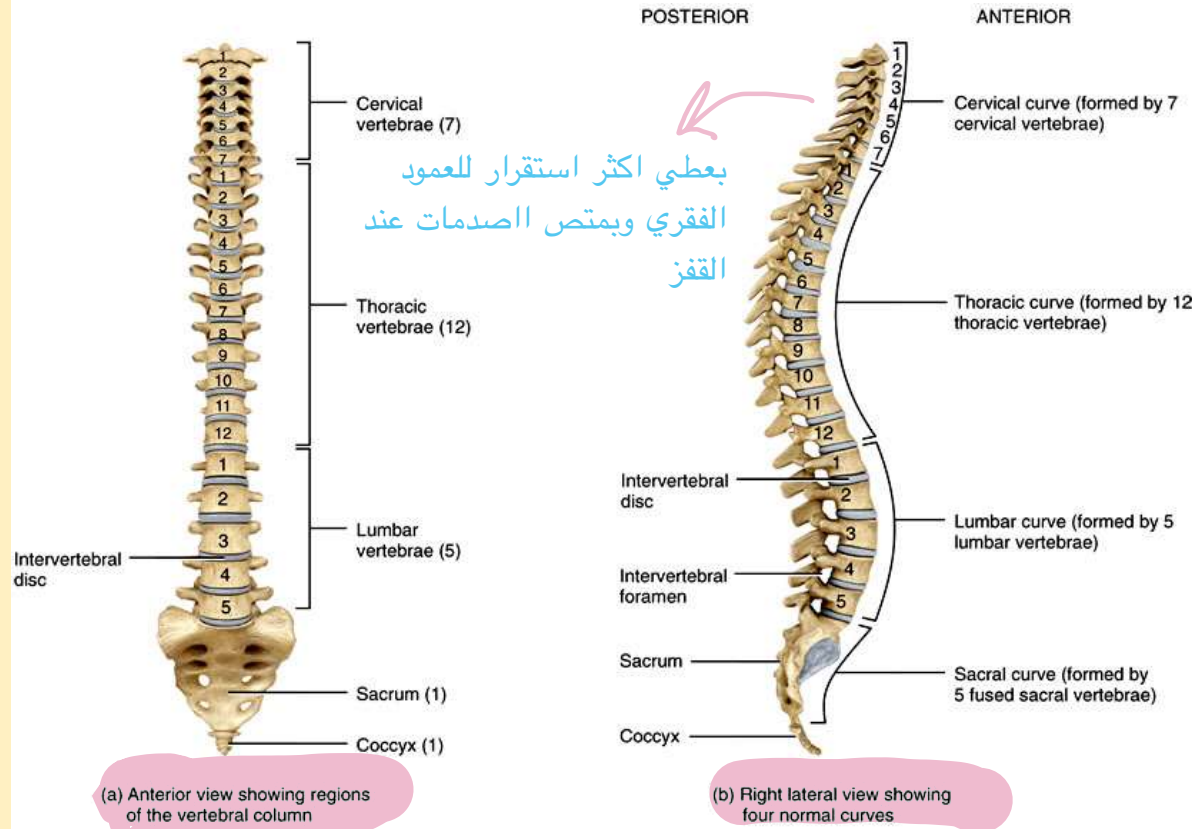
1. Curves increase the column strength
2. Help maintain balance in the upright position
3. Absorb shocks during walking, and help protect the vertebrae from fracture

**These curves are:**

1. Cervical 7
2. Thoracic 12
3. Lumbar 5
4. Sacral

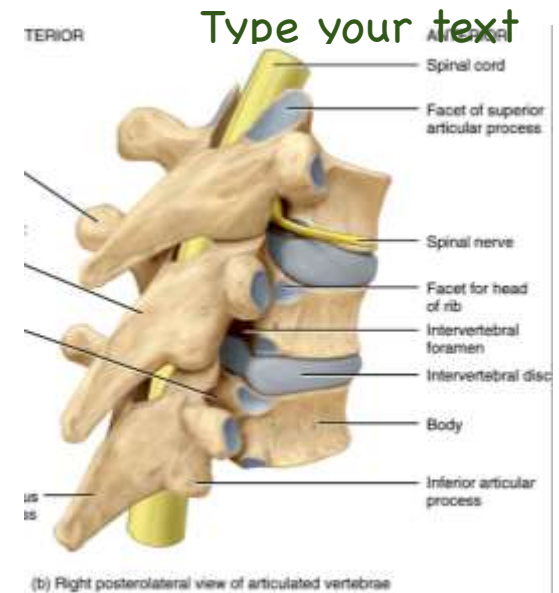
العمود الفقري عند الموليد يكون concave (مقعر الى الامام) بعد الولادة 3-6 اشهر رح يبدأ يثبت راسه بالعضلات وبتزيد قوة العضلات ،ورح يبدأ يتشكل او convex بمنطقة cervical وبعد سنة لما يبلش ينشي رح تتكون convex ثاني بمنطقة lumber

2



# Intervertebral Disc

- It is formed of fibrocartilage- the hardest type of cartilage.
- Found between the bodies of adjacent vertebrae and function in:
  1. Form strong joints Very strong joint between vertebral
  2. Permit various movements of the vertebral column
  3. Absorb vertical shock





# Parts of vertebrae: Vertebrae typically consist of:

1. A Body (weight bearing)
2. A vertebral arch (surrounds the spinal cord)
3. Several processes (points of attachment for muscles +)

Body + vertebral arch = vertebral conal

1- جسم يحمل وزن الجوز  
2- ribs بمساحة فيم ال

POSTERIOR  
lower / upper

ANTERIOR

Spinal cord

Facet of superior articular process

upper

Spinal nerve

Facet for head of rib

Intervertebral foramen

Intervertebral disc

Body

Inferior articular process

lower

Spinous process

Facet of superior articular process

Spinal cord

Spinous process

Transverse process

Vertebral arch:

Lamina

Pedicle

Body

Vertebral foramen

Facet for head of rib

ANTERIOR

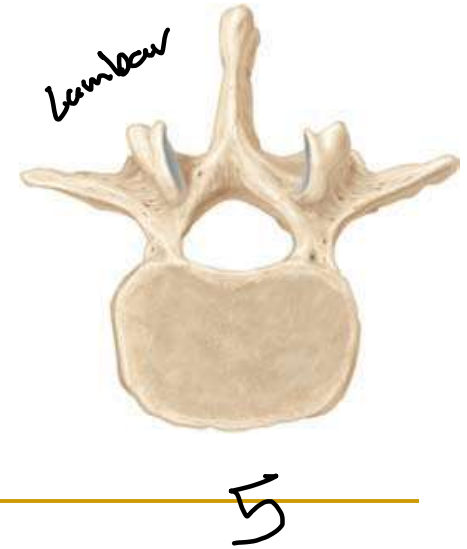
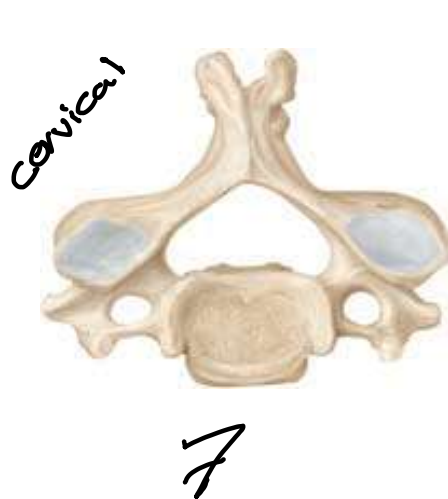
(a) Superior view

(b) Right posterolateral view of articulated vertebrae

الفقرة الوحدة بنسبها vertebral foramen ولا يتحدو مع بعض بنسبهم vertebral conal جواته يكون. spinal cord.

# Differences between the typical vertebrae in the different regions:

	Cervical	Thoracic	Lumbar
Body	Small and rectangular	Large and heart-shaped	Large and kidney-shaped
Transverse Process	Small with foramina	Large with no foramina	Large with no foramina
Spinous Process	Short and bifid (7 <sup>th</sup> )	Long and directed inferiorly	Broad and directed posteriorly



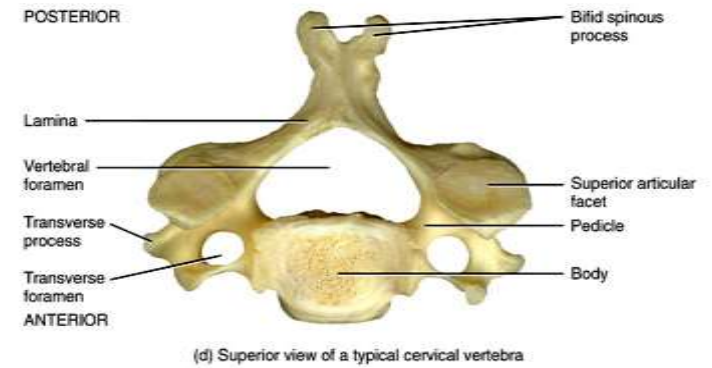
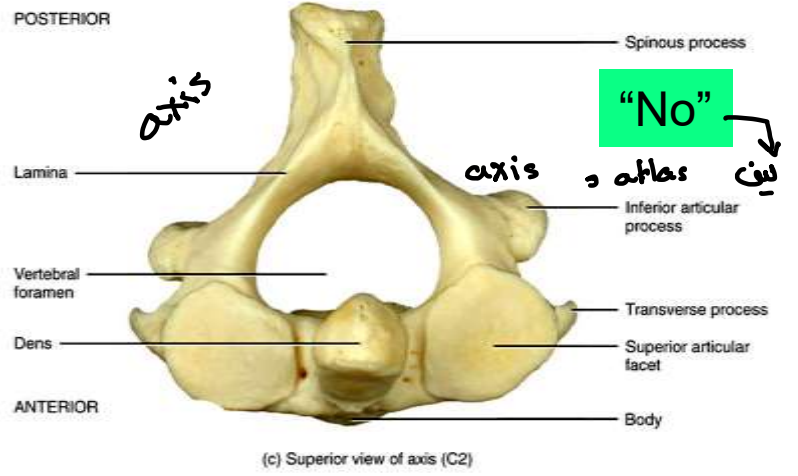
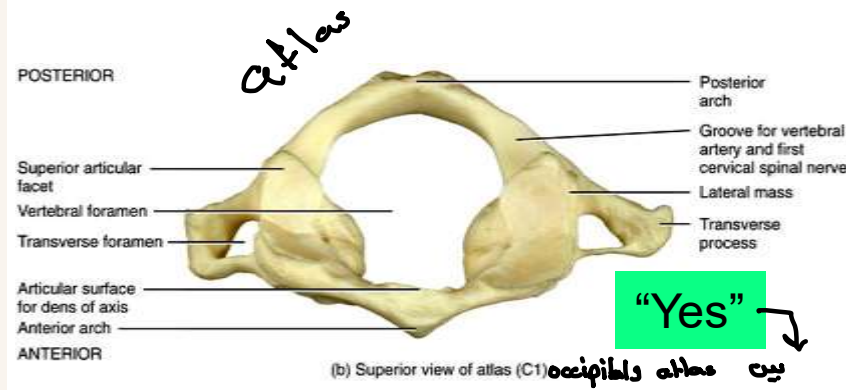
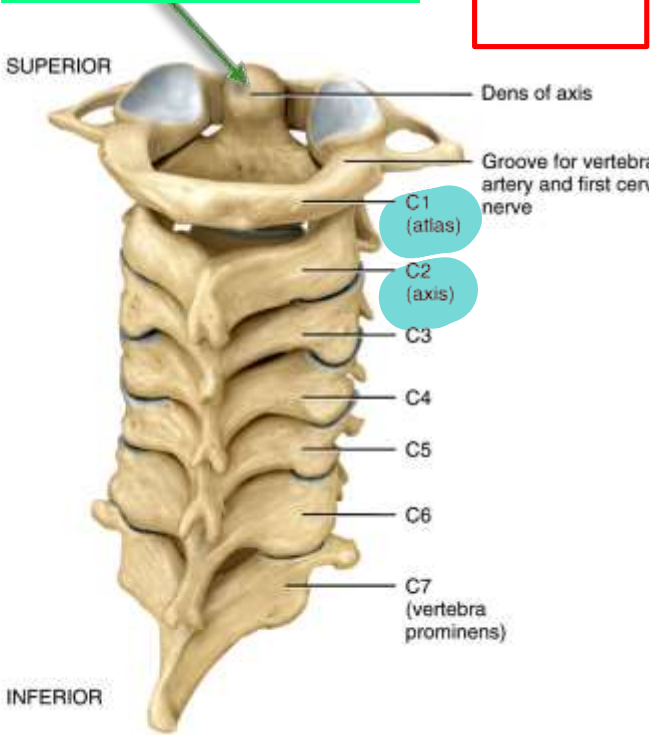
# Cervical Region

## Cervical vertebrae (C1-C7)

The atlas (C1) articulates with the skull (occipital)   
 ← الوحيات المم اصم

The axis (C2) has a vertical process (Odontoid or Dens) that extends superiorly to articulate with atlas

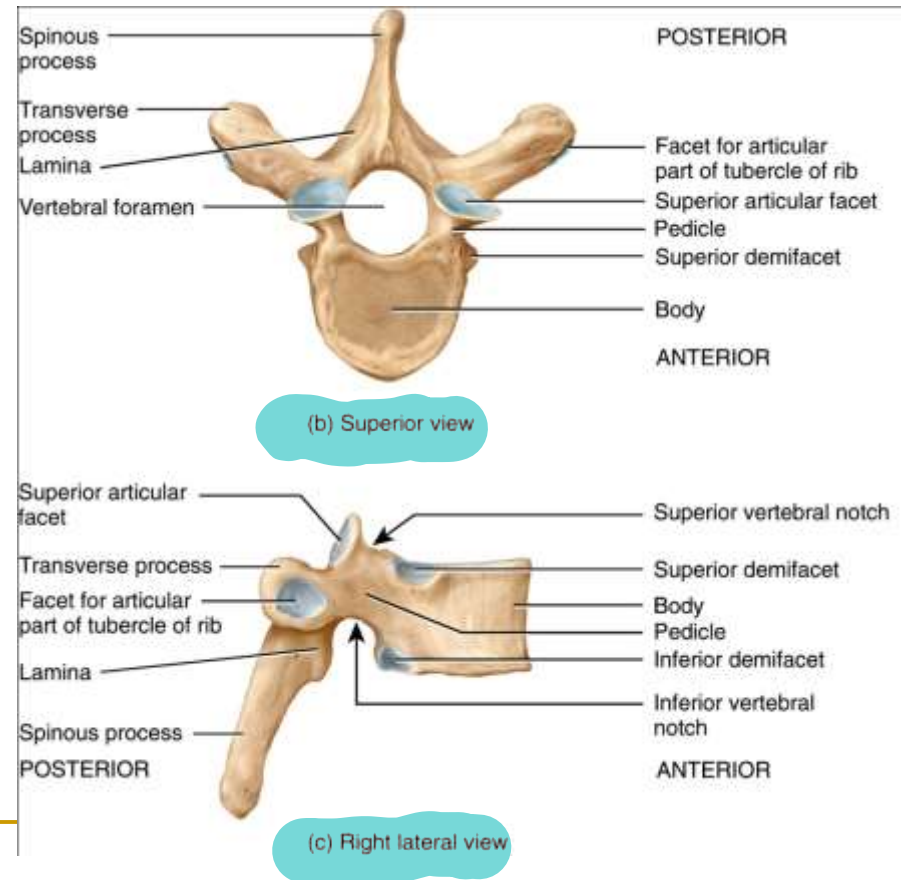
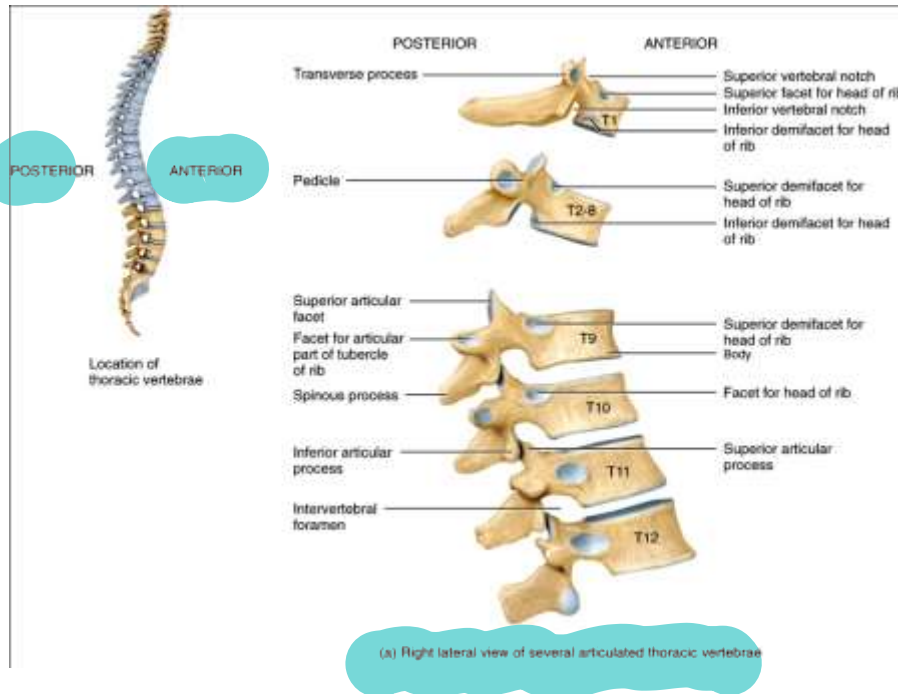
Odontoid process



# Thoracic Region

## Thoracic vertebrae (T1–T12)

### Articulate with the ribs

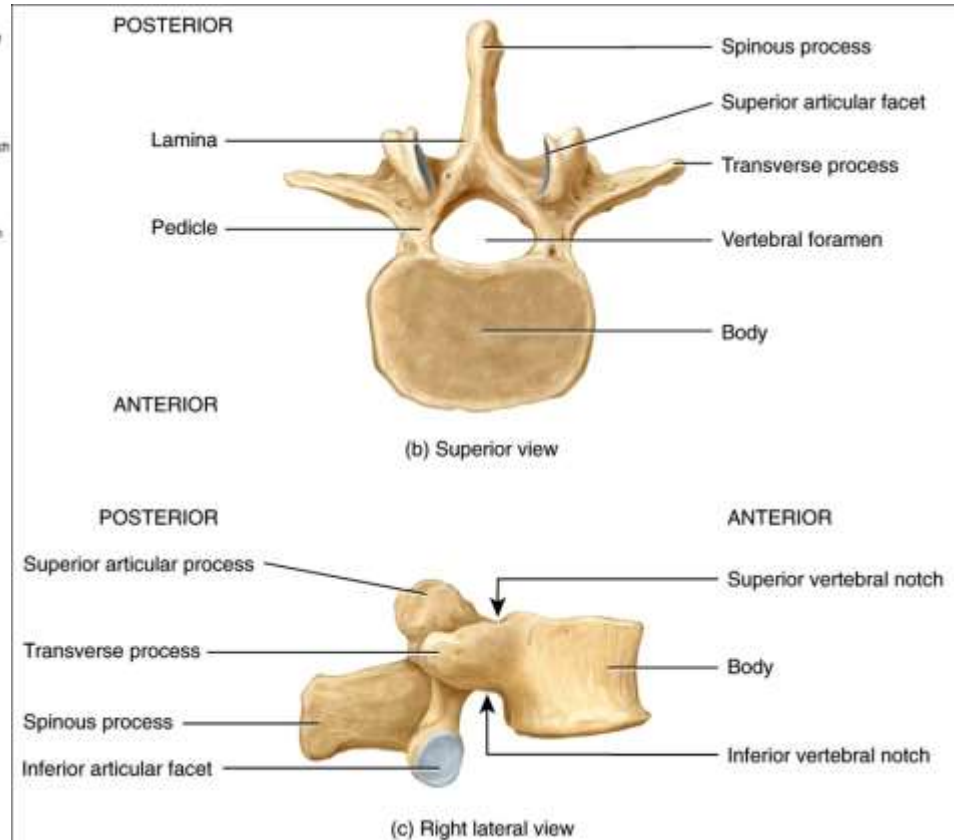
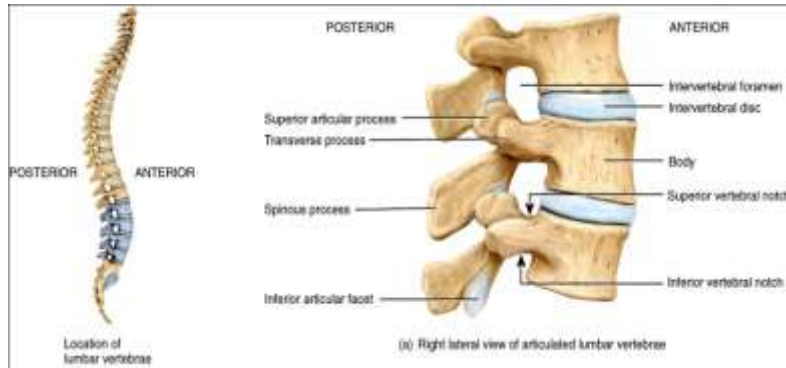




# Lumbar Region

Lumbar vertebrae (L1–L5)

Provide for the attachment of the large back muscles



# Sacrum

very strong

الوزن ينتقل من و L الى sacrum ثم الى hip bone

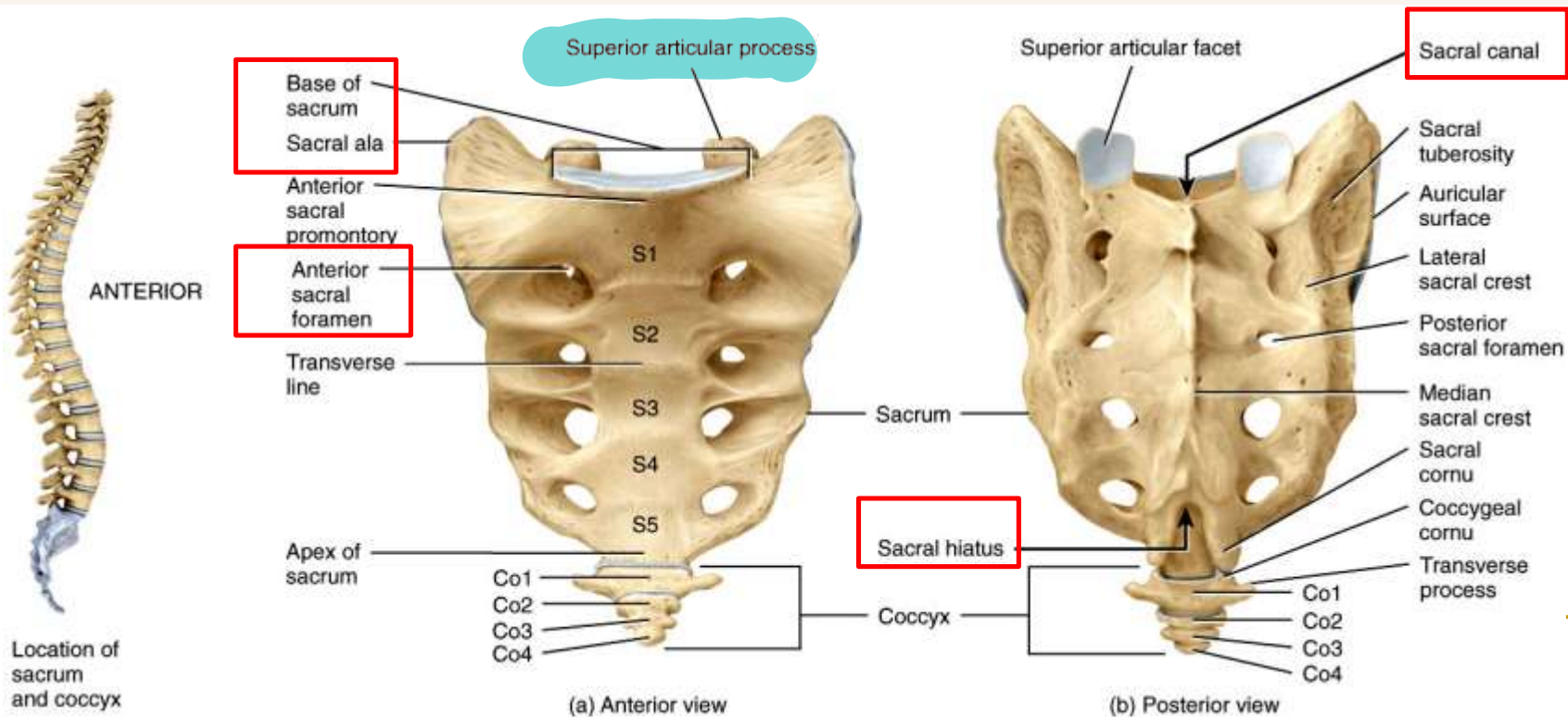
The sacrum is a triangular bone formed by the union of five sacral vertebrae (S1–S5)

Serves as a strong foundation for the **pelvic girdle**

# Coccyx

ارتباط عصبی

The coccyx, like the sacrum, is triangular in shape  
It is formed by the fusion of usually four coccygeal vertebrae



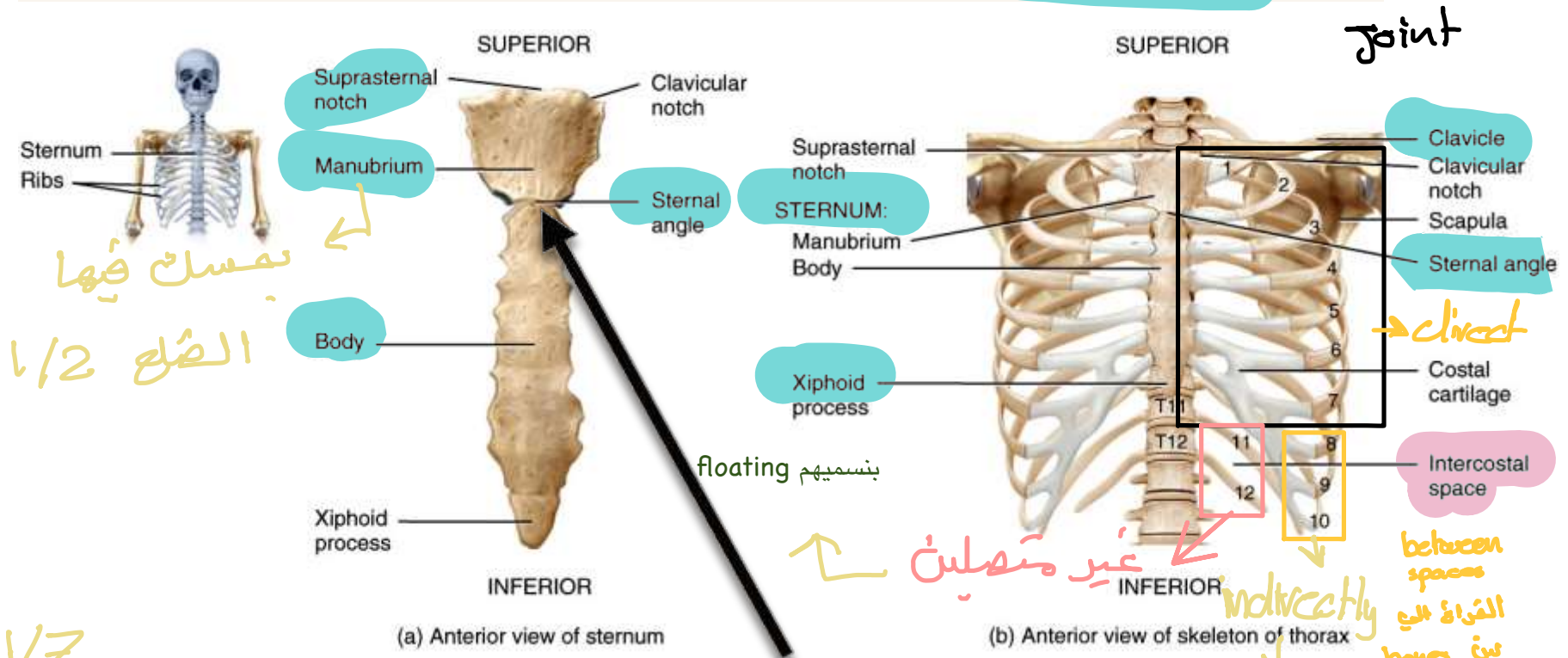
# The Thoracic Cage

- Thoracic cage is formed by the:
  - **Sternum**
  - **Ribs** ( ١٢ Left / ١٢ right )  
الكحلح
  - **Costal cartilages (attach ribs to sternum)**
  - **Thoracic vertebrae**
- Functions to:
  - Enclose and protect the organs in the thoracic and abdominal cavities
  - Provide support for the bones of the upper limbs
  - Play a role in breathing

مهم في عملية التنفس لانه بشكل  
التجويف الصدري

# The Sternum:

- “Breastbone” located in the center of the thoracic wall
- Consists of the manubrium, body, xiphoid process



1/7

True ribs بنسميهم	1-7
بنسميهم	8/9/10

**Angle of Louis**  
**2<sup>nd</sup> rib**  
**Level: T4&T5**  
**Count ribs**

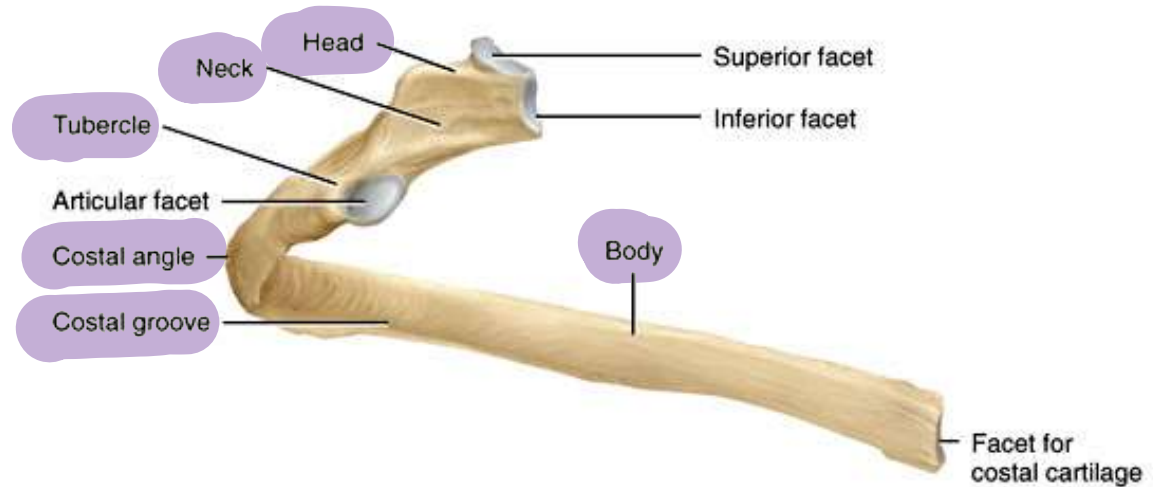
برتبطو مع بعض بعدين يرتبطو مع 7 ثم بروحو لل body



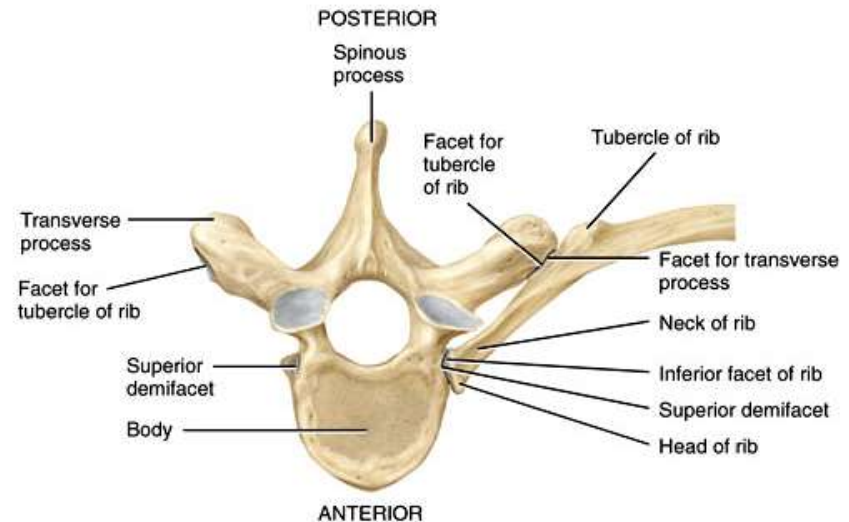
# The Ribs:

Each rib is formed of:

- 1) **Head:** which articulates with the vertebrae.
- 2) **Neck:** a constricted region immediately after the head.
- 3) **Tubercle:** this contains an articular facet for the transverse process.
- 4) **Angle:** area where the shaft bends forwards.
- 5) **Shaft (Body).**
- 6) **Costal groove:** this runs along the inferior border of the inner surface of the shaft.



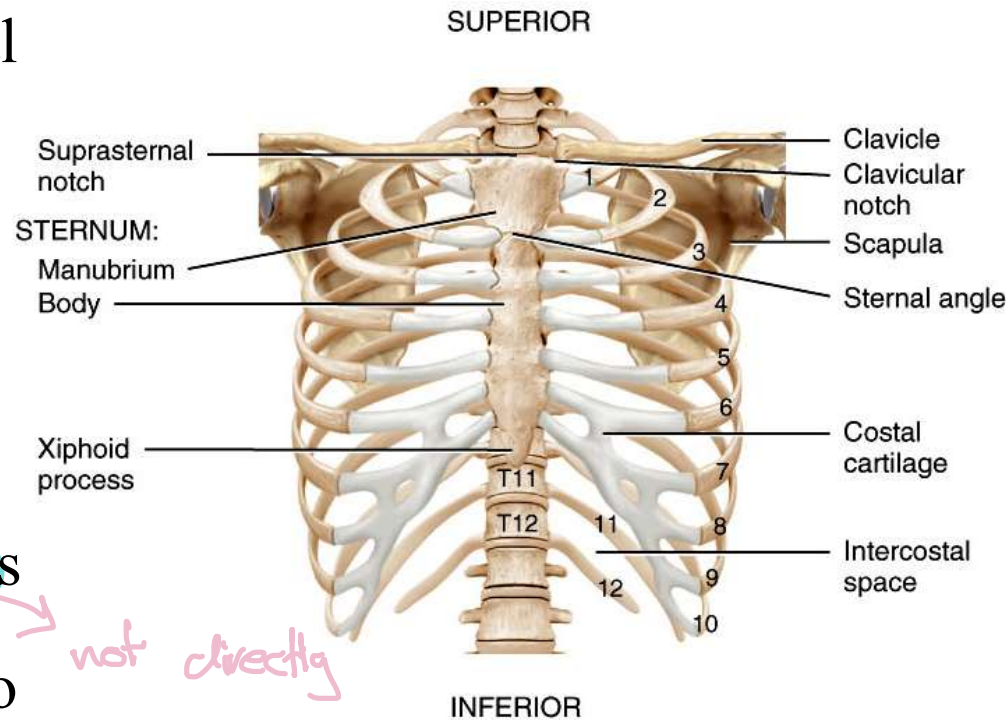
(a) Posterior view of left rib



(c) Superior view of left rib articulated with thoracic vertebra

# The Ribs:

- ❑ 12 pairs of ribs give structural support to the sides of the thoracic cavity
- ❑ The upper 7 pairs are called **true ribs** because they're attached to the sternum through their own costal cartilage.
- ❑ Pairs 8-10 are called **false ribs** because they're attached anteriorly to each other and to the seventh rib by means of their costal cartilages.
- ❑ Pairs 11 and 12 are called **floating ribs** because they have no anterior attachment.



(b) Anterior view of skeleton of thorax