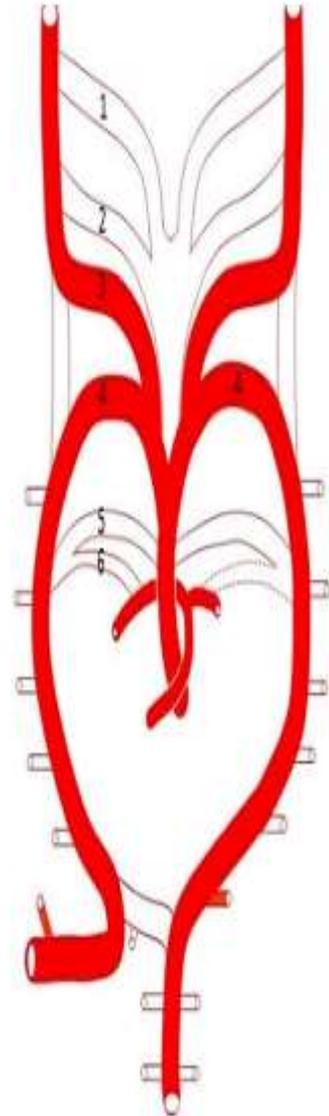
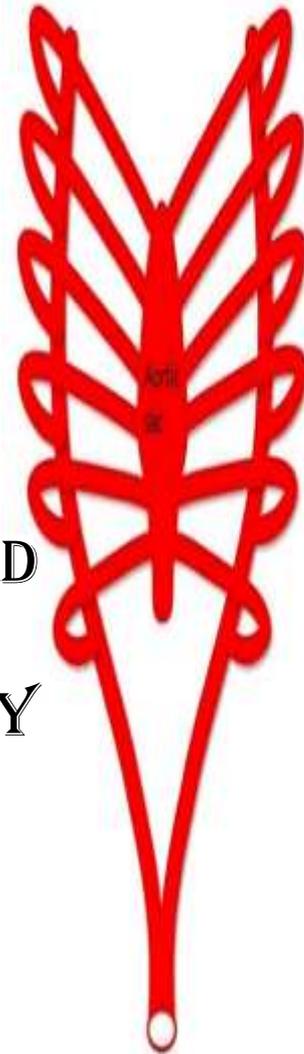


# DEVELOPMENT OF BLOOD VESSELS

BY

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MUTAH UNIVERSITY



# AORTÆ

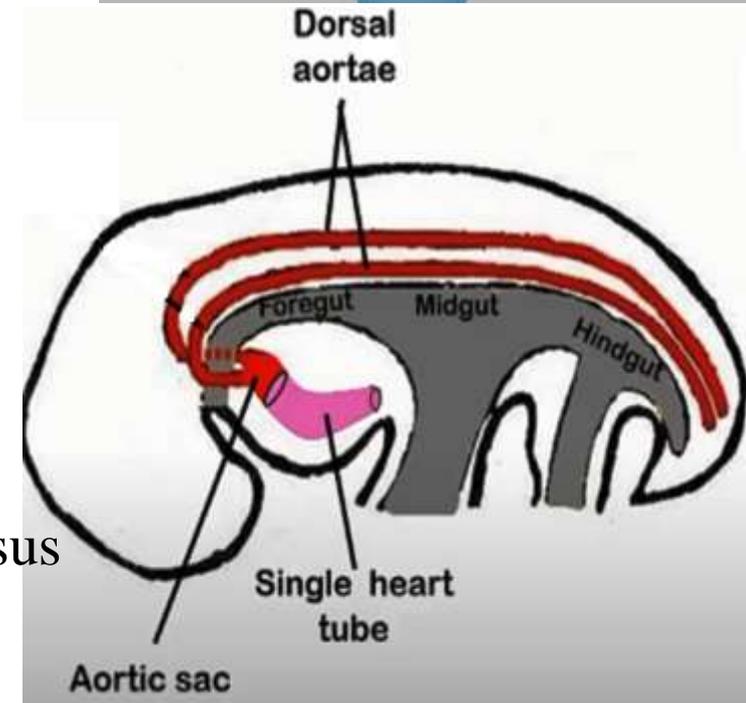
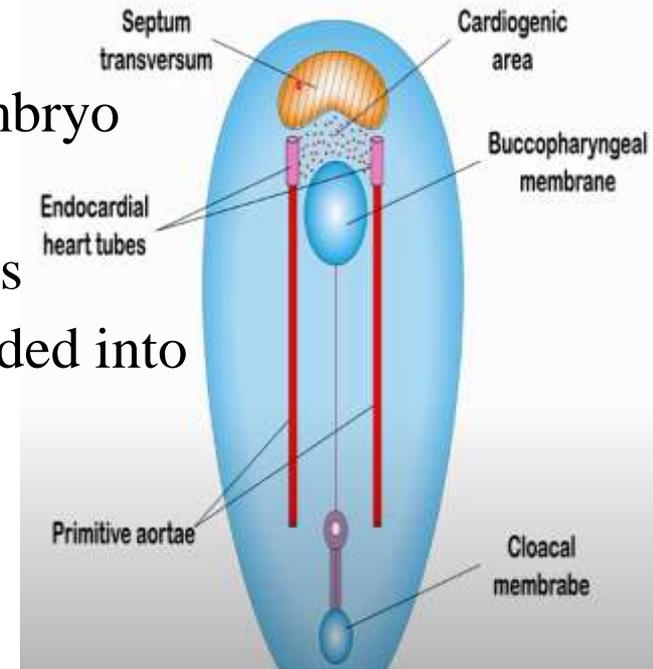
- The earliest arteries that appear in the embryo are the Rt & Lt primitive aortae
- they are continuous with the 2 heart tubes
- After folding each primitive aorta is divided into

## 1- dorsal aorta

- dorsal to foregut
- The 2 dorsal aortae fuse together from the 4<sup>th</sup> thoracic till the 4<sup>th</sup> lumbar somite (segment) to form single dorsal aorta

## 2 -ventral aorta

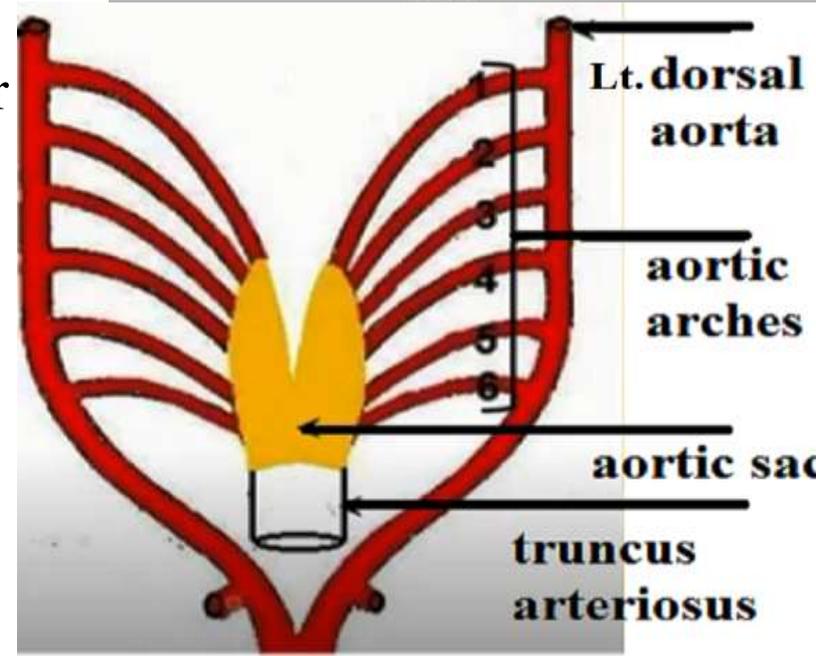
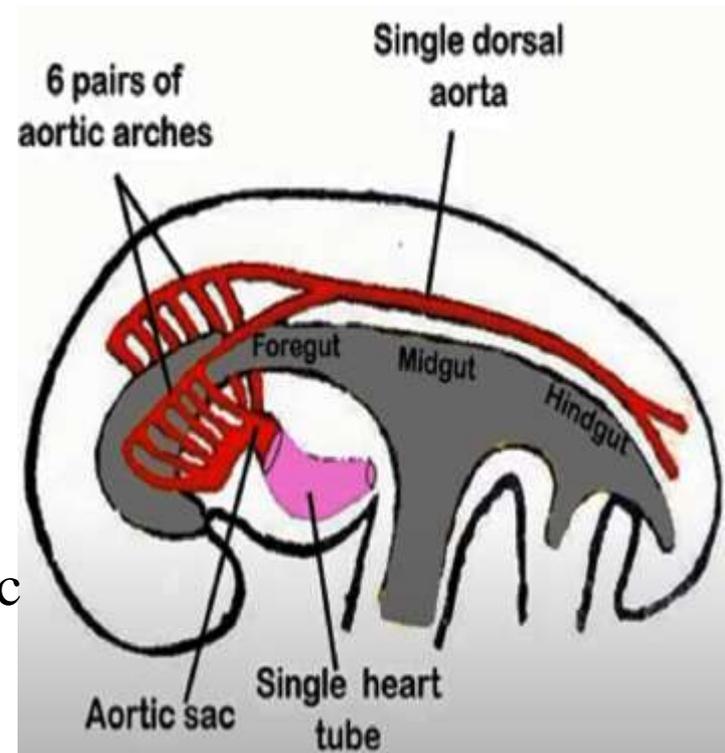
- ventral to foregut
- The 2 ventral aortae fuse together to form aortic sac that has **a stem** continuous with truncus arteriosus & **2 horns**



# AORTIC ARCHES

## Development

- with development of pharyngeal arches each arch receive a cranial n. & an artery, these arteries are called aortic arches
- These arteries arise from the aortic sac & pass through pharyngeal arches to join dorsal aortae.
- 6 pairs develop one after the other cranio-caudally, 1st pair is the 1st to appear & most cranial, 6th pair is the last to appear & is most caudal.

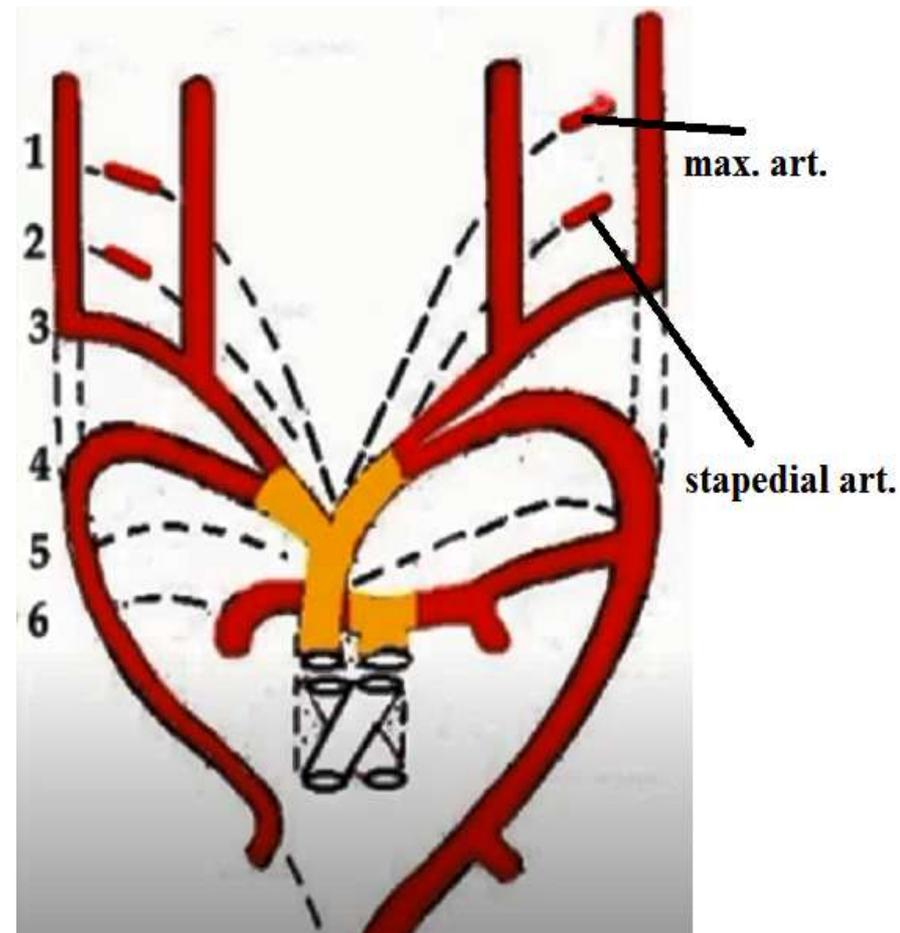


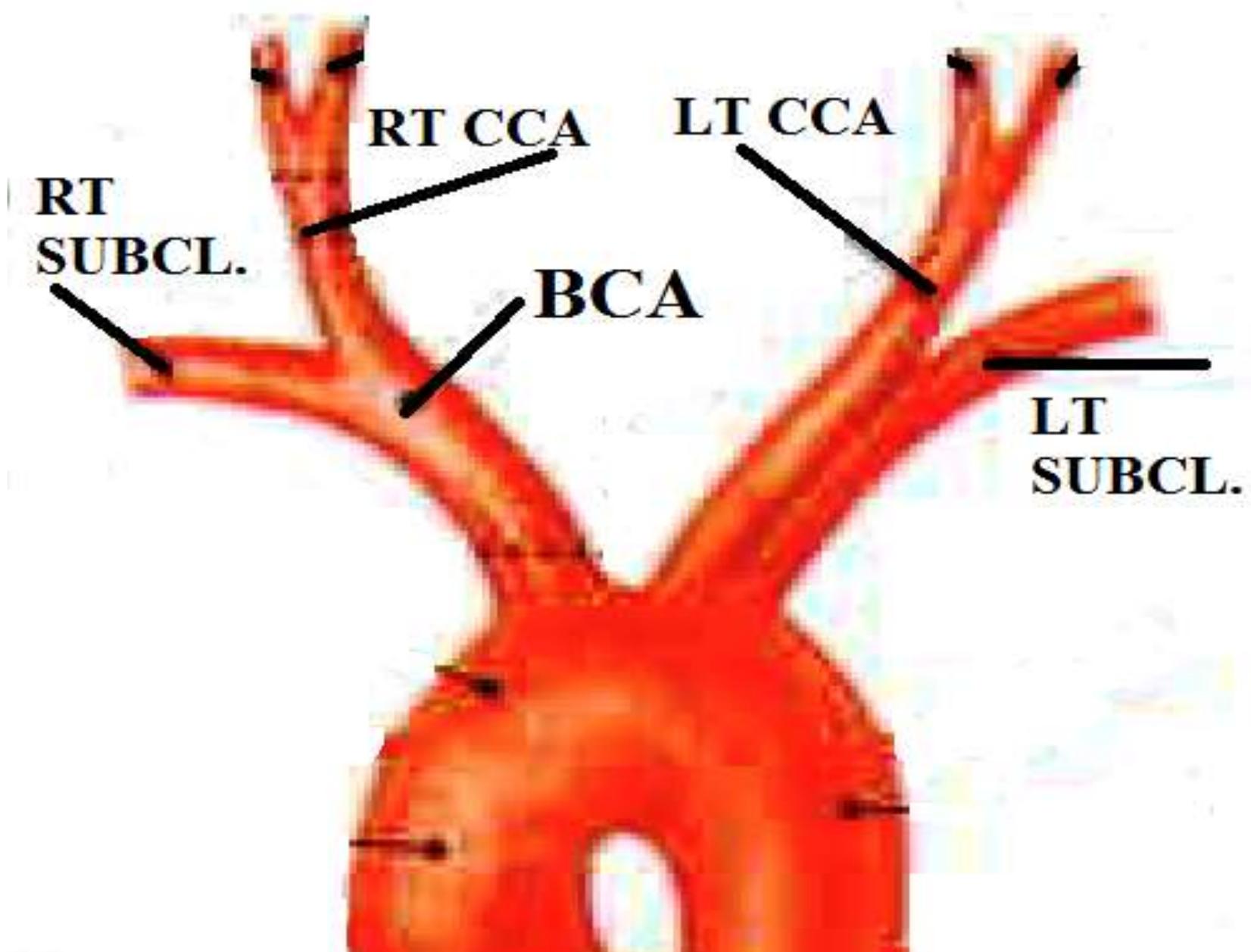
# AORTIC ARCHES

## Fate:

1st arch: disappear except a small part that share in formation of the maxillary artery

2nd arch: disappear except a small part that form the stapedial artery (caroticotympanic artery)





# AORTIC ARCHES

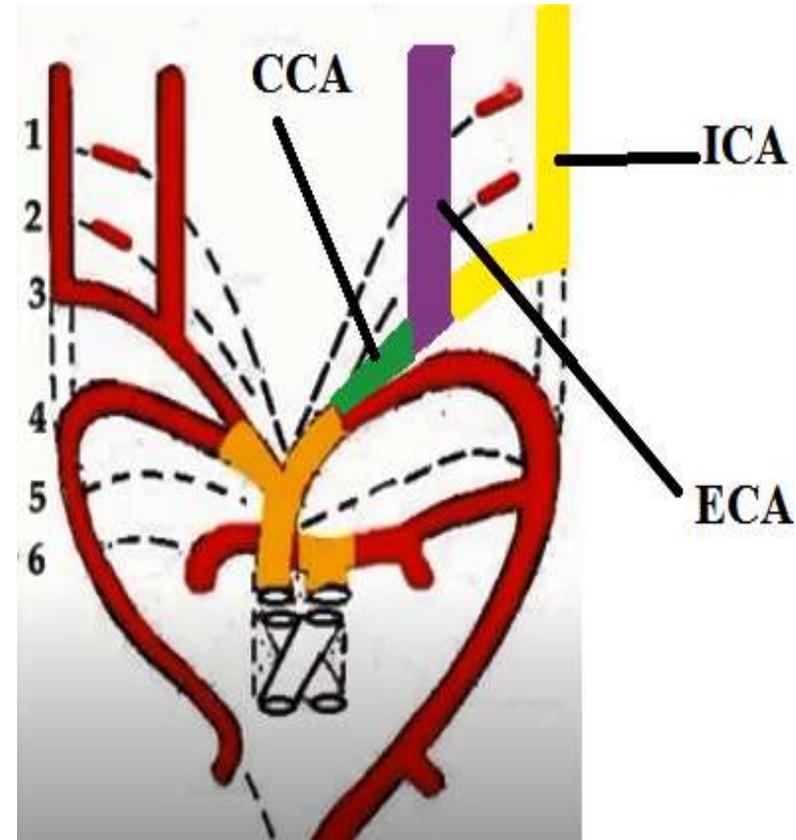
## Fate:

3rd arch: gives the common, ext. & int. carotids

- Ext. carotid arise as branch from middle of 3rd arch.
- Proximal part of the arch gives the common carotid
- Distal part of the arch gives the proximal part of int. carotid

N.B: int. carotid: develop from

- ❑ Distal part of the 3<sup>rd</sup> arch
- ❑ The segment of the dorsal aorta cranial to 3<sup>rd</sup> arch



# AORTIC ARCHES

## Fate:

### 4th arch:

**Rt:** proximal part of the rt. Subclavian

**N.B:** Rt subclavian: develop from

- rt. 4th arch
- rt. dorsal aorta
- rt. 7th cervical inter segmental art.

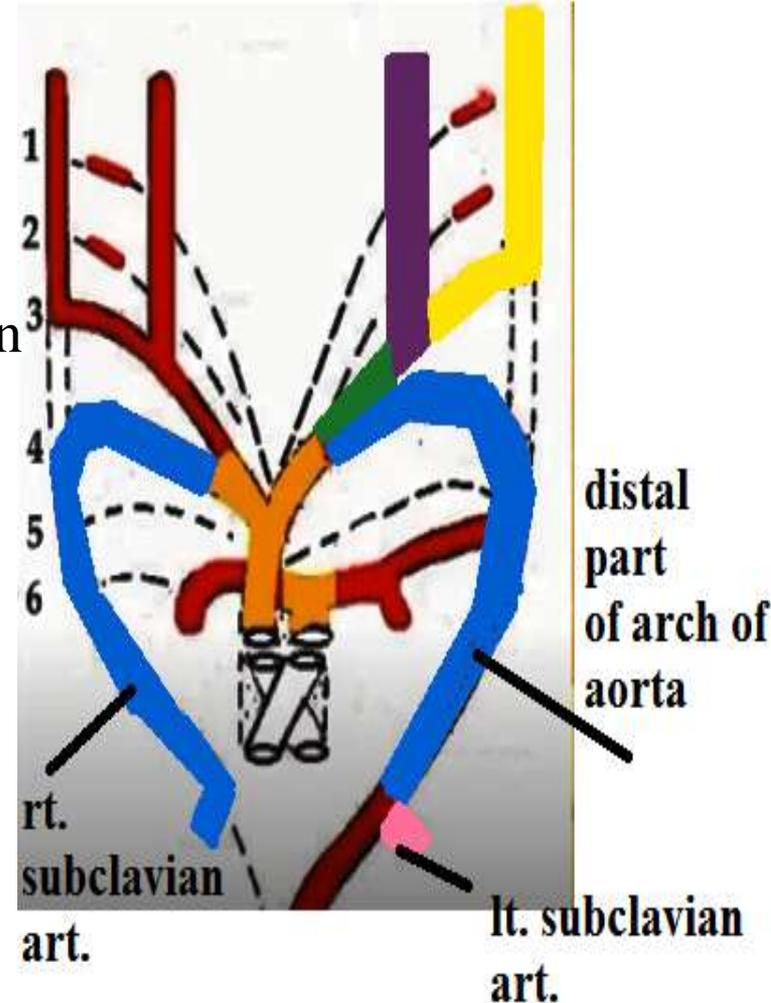
**LT:** share in formation of

Part of arch of aorta from

lt. CCA to lt. subclavian art.

**N.B:** Lt subclavian: develop from

lt 7th cervical inter segmental art.



# AORTIC ARCHES

**N.B.:- the arch of aorta develops from**

The proximal part: from the stem of aortic sac

The middle part: from the Lt horn of aortic sac

The distal part: from the Lt 4th aortic arch

& Lt dorsal aorta

**N.B.:- Fate of the aortic sac**

The stem

gives the proximal part of the aortic arch

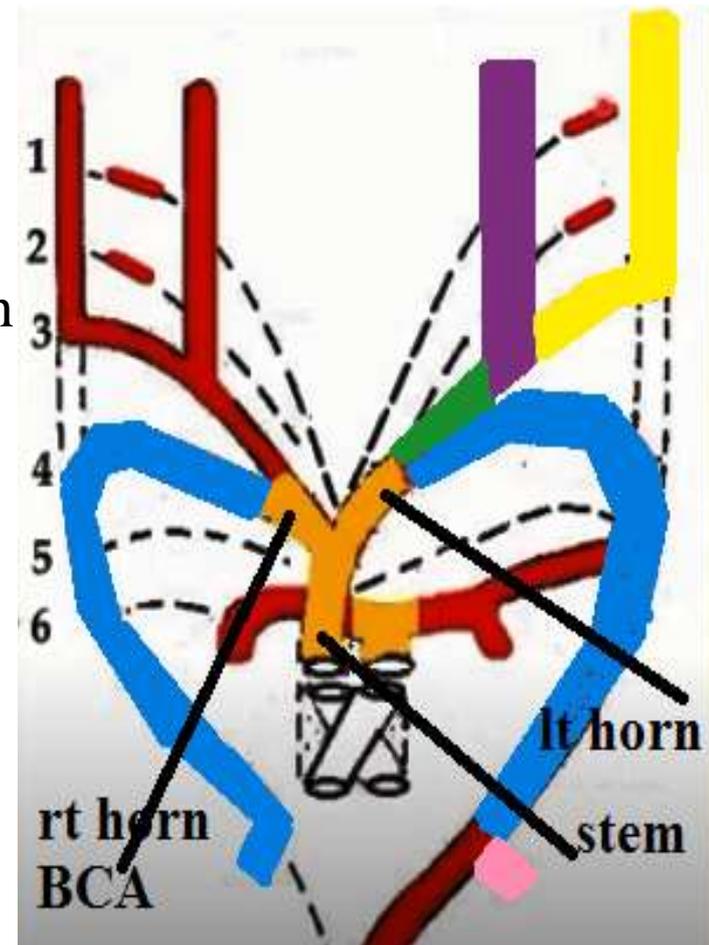
The left horn

gives the middle part of the aortic arch

The right horn

gives the Brachiocephalic artery

5th arch: disappear



# AORTIC ARCHES

## Fate:

### 6<sup>th</sup> arch:

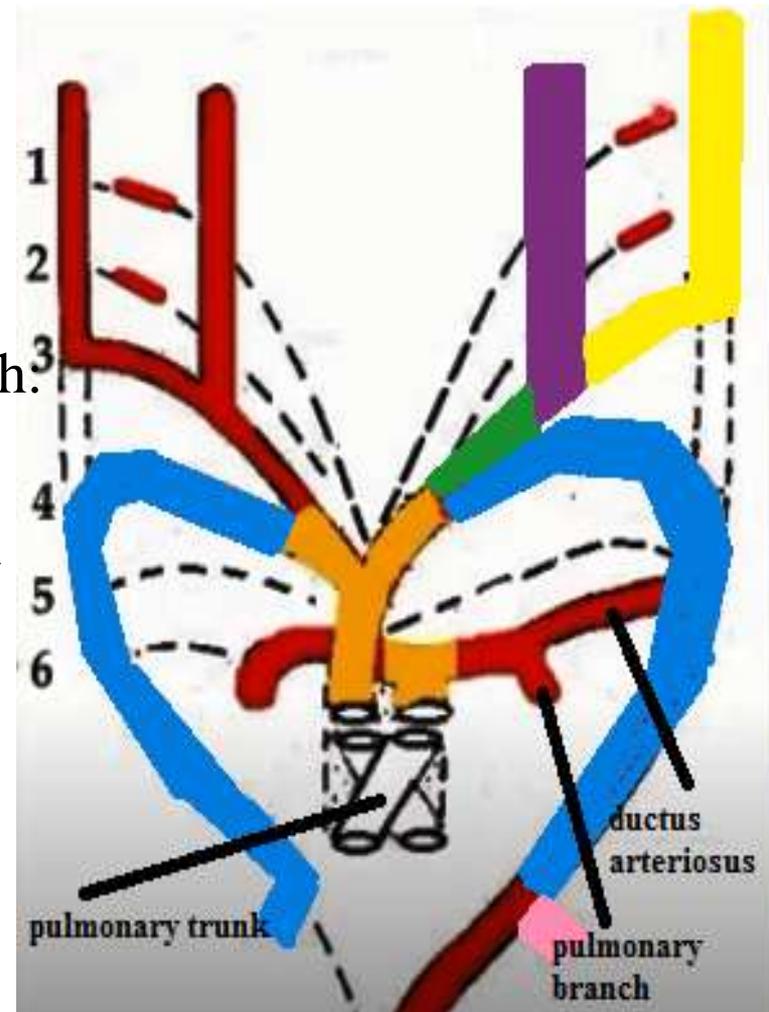
- Pulmonary branch arises from middle of arch to the developing lung bud

N.B: pulmonary art.: develop from

- Proximal part of the 6<sup>th</sup> arch
- pulmonary br.
- Segment distal to pulmonary branch.

**Rt:** disappear

**Lt:** gives the ductus arteriosus which will be fibrosed to be the ligamentum arteriosum



# OTHER CHANGES

## 1- carotid duct:

part of dorsal aorta ( ) 3rd & 4th arches disappear so the carotid arteries become straight

## 2- Rt dorsal aorta

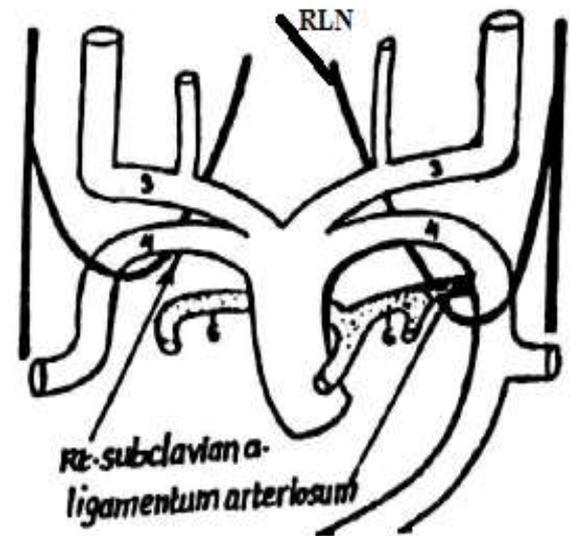
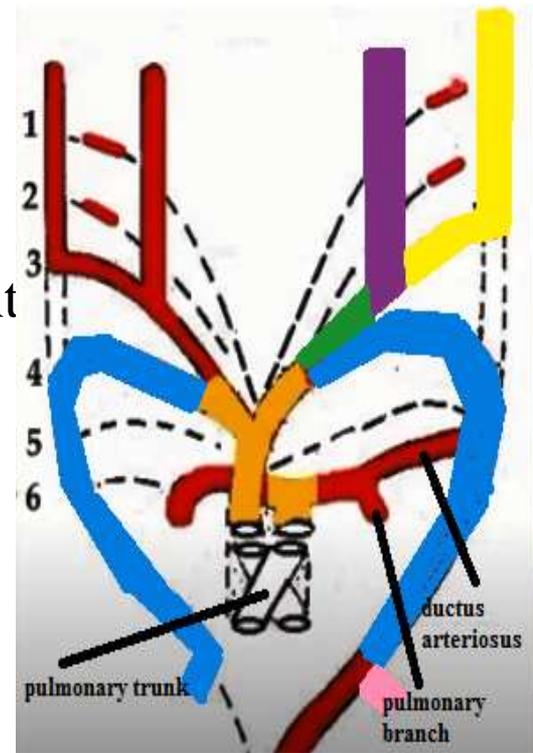
disappear ( ) 7th cervical intersegmental art & junction with Lt dorsal aorta.

## 3- descend of heart from neck to thorax

- elongation of carotid & subclavian arteries
- change in course of recurrent laryngeal N (nerve supply & hook around 6th arch)

**Lt:** hook around ductus arteriosus (ligamentum arteriosum)

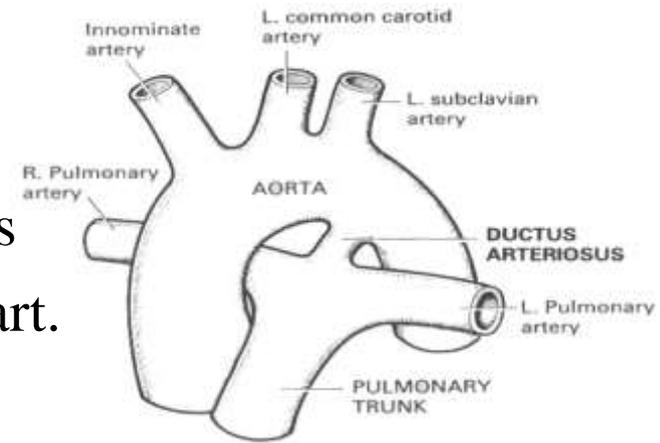
**Rt:** hook around subclavian art due to disappearance of distal segment of 6th arch & 5th arch



# ANOMALIES

## 1- patent ductus arteriosus

- most common anomaly in great vessels
- duct ( ) arch of aorta & Lt pulmonary art.

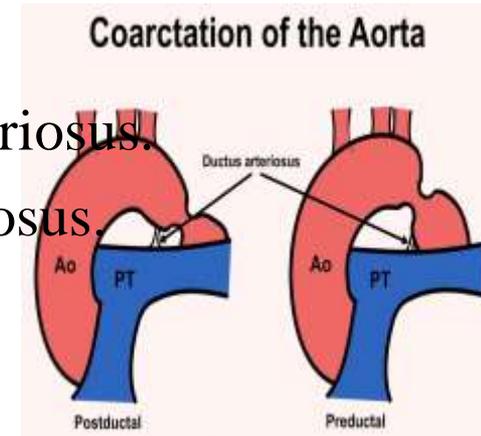


## 2- coarctation of aorta:

- constriction or obliteration of aorta below origin of lt subcl. art.
- Types:

Preductal: proximal to the opening of ductus arteriosus.

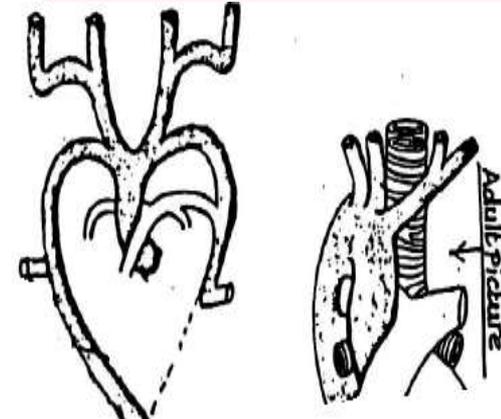
Post ductal: distal to the opening of ductus arteriosus.



## 3- Rt arch of aorta

The distal part of the lt dorsal aorta disappear &

The distal part of rt dorsal aorta persist



# ANOMALIES

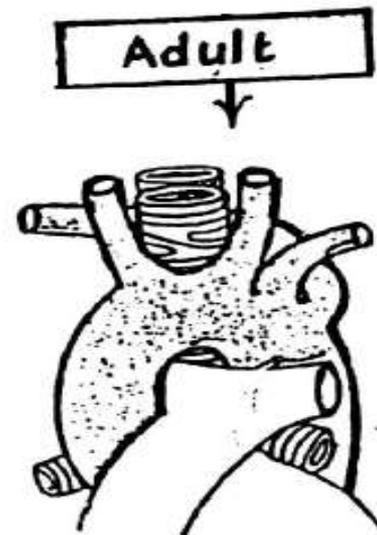
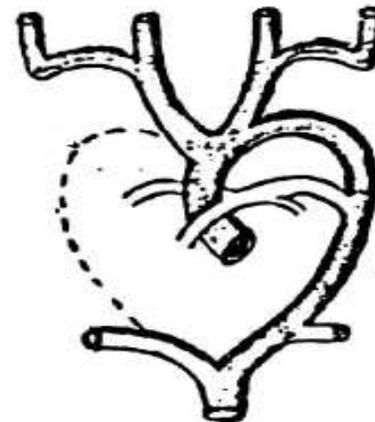
## 4- double arch of aorta

- Rt dorsal aorta persist
- Both arches form a ring around Trachea leading to dyspnea  
Esophagus leading to dysphagia



## 5- abnormal rt subclavian art.

- rt. 4<sup>th</sup> arch & adjoining part of rt dorsal aorta disappear
- rt subclavian develop from rt 7<sup>th</sup> cervical intersegmental art. & distal part of rt dorsal aorta



# COMMON DORSAL AORTA

**Formation:** by fusion The 2 dorsal aortae from the 4th thoracic till the 4th lumbar somite (segment)

## **Branches:-**

### **1- ventral splanchnic arteries**

coeliac trunk

SMA

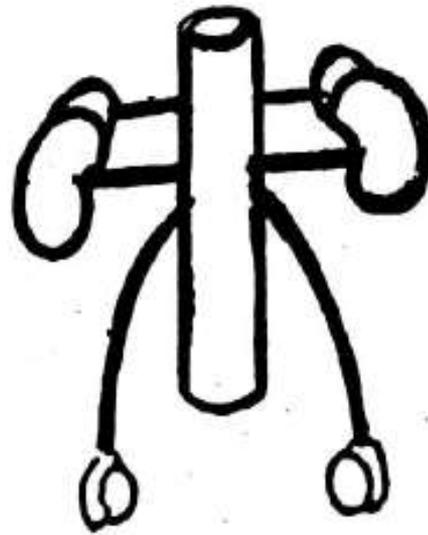
IMA

### **2- lateral splanchnic arteries**

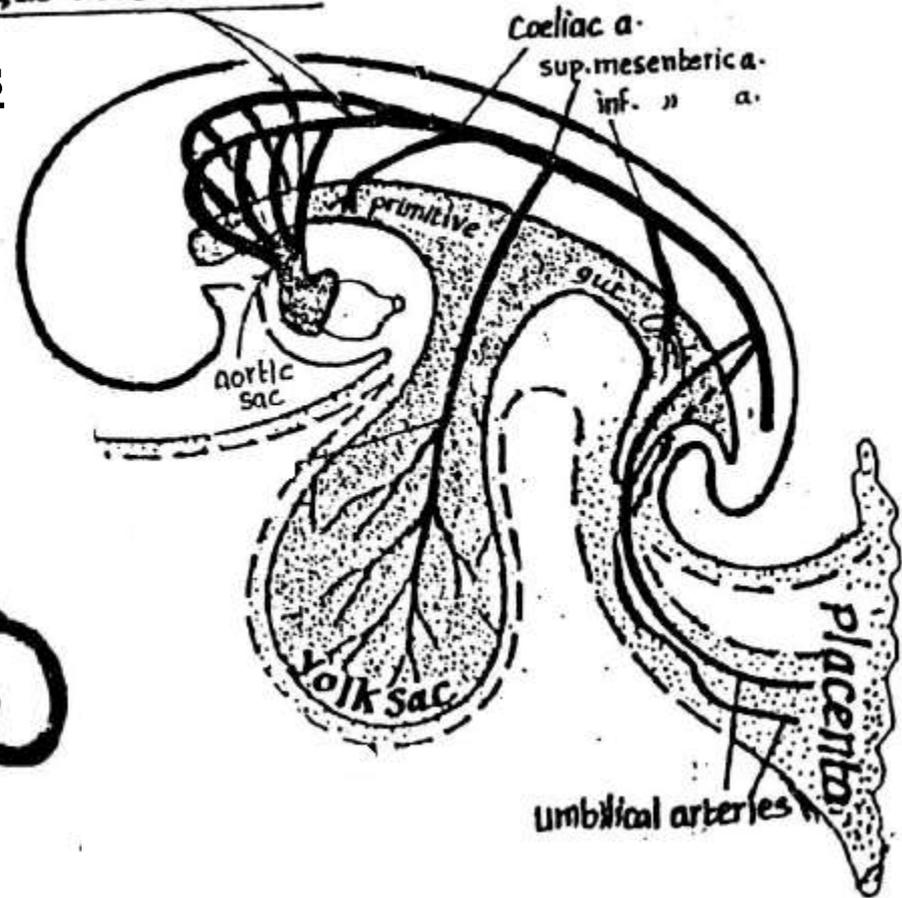
Middle suprarenal

renal

gonadal



Rt. & Lt. dorsal aortae



# COMMON DORSAL AORTA

## Branches:-

### 3- Intersegmental(somatic) arteries

#### **A- Cervical intersegmental arteries: 7 pairs**

i- The upper 6 arteries disappear.

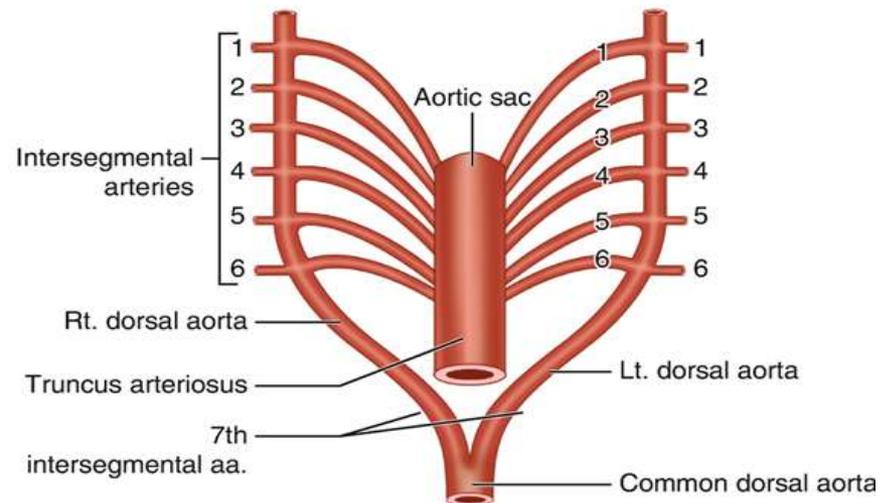
ii- The 7th cervical intersegmental artery: gives subclavian artery

**B- Thoracic intersegmental arteries:** form posterior intercostal and the subcostal arteries.

**C- Lumbar intersegmental arteries** gives lumbar arteries

**D-Sacral intersegmental arteries:** form lateral sacral arteries.

### 4- umbilical arteries



# FETAL CIRCULATION

## Description:

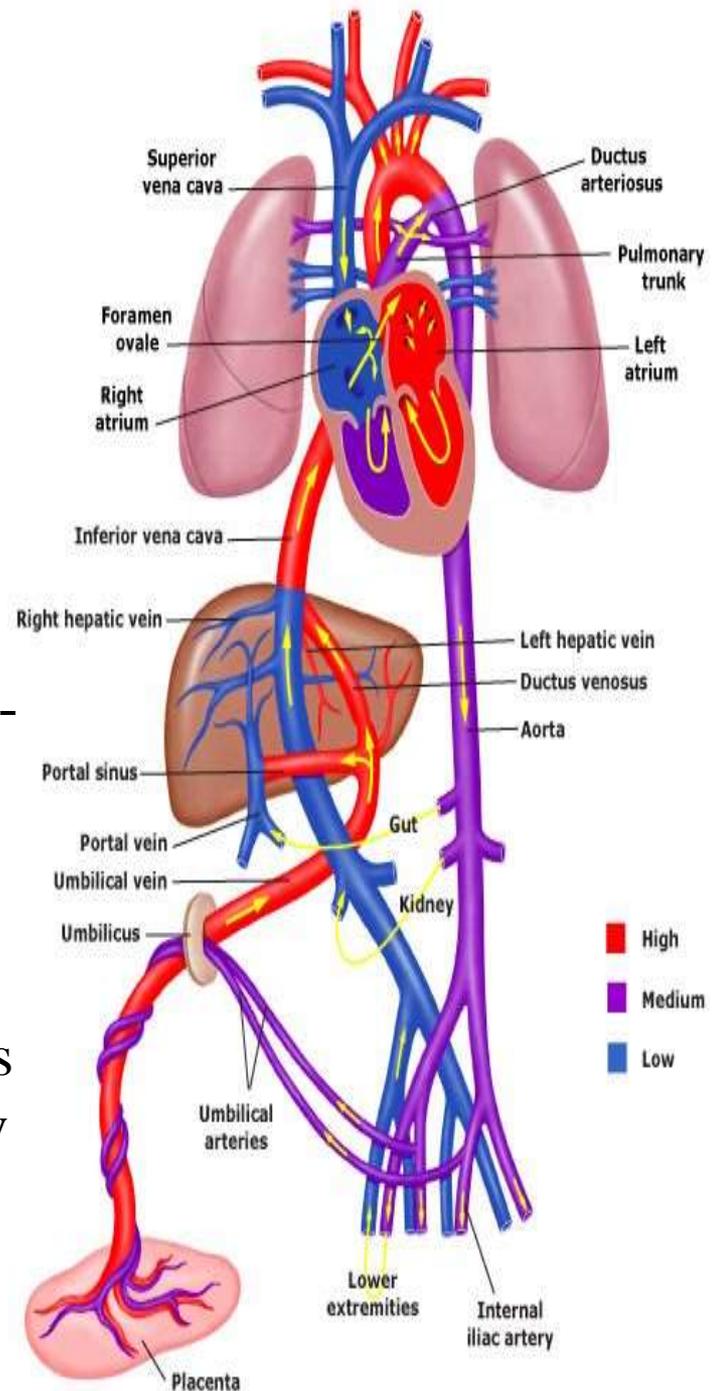
**saturated (oxygenated) blood:**

Placenta---- It umbilical v. bypass liver through ductus venosus

small part enter liver to supply it

(mixed with deoxygenated blood of portal v.) then to IVC (mixed with deoxygenated blood from L.L & trunk)-

---Rt atrium small part persist (mixed with deoxygenated blood from head & neck & ul) guided by valve of I.V.C to foramen ovale ----- Lt atrium ----- Lt ventricle---- ascending aorta---- tissues (coronary & carotid arteries take highly oxygenated blood as they are 1st branches)



# FETAL CIRCULATION

## Description:

**unsaturated (deoxygenated) blood**

head, neck & upper limb----- SVC

----- Rt atrium----- Rt ventricle as opening of  
SVC face tricuspid valve----- pulmonary trunk

----- ductus arteriosus due to high resistance  
in lung -----arch of aorta (mixed with

oxygenated blood from Lt ventricle)

-----descending aorta ----umbilical arteries-----  
placenta

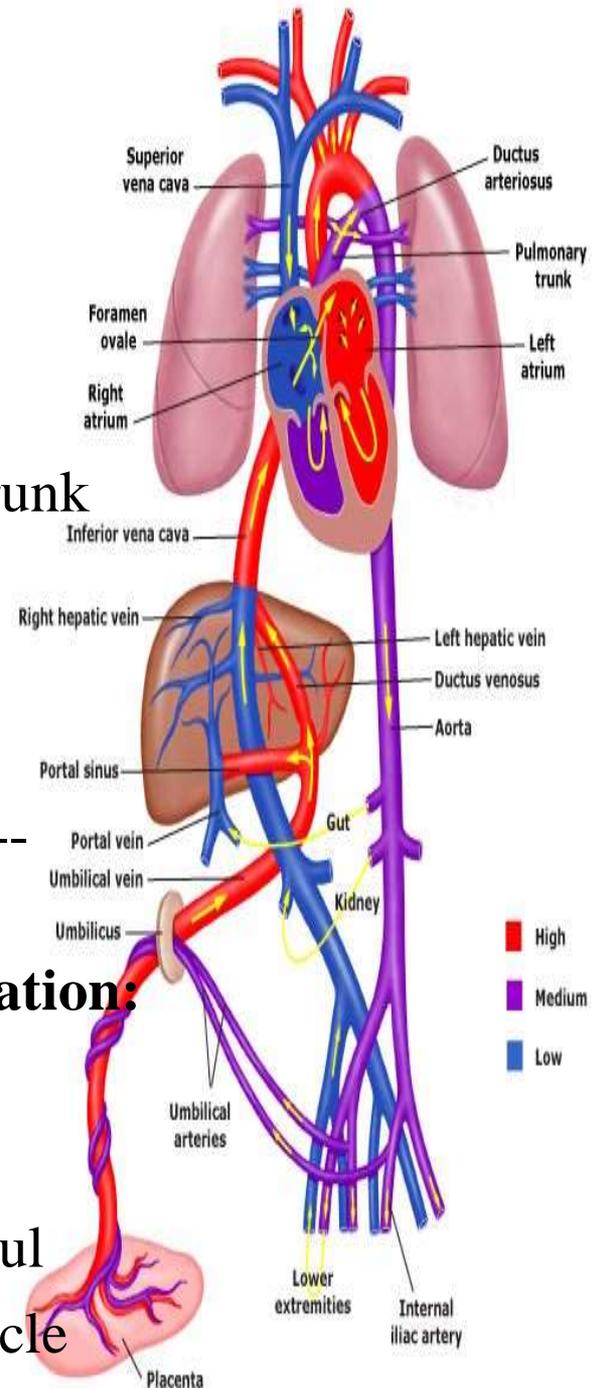
**N.B: site of mixing of blood in fetal circulation:**

1- in liver with blood of portal v.

2- in I.VC with blood from LL & trunk

3- in Rt atrium with blood from head, neck, ul

4- in arch of aorta with blood from Rt ventricle



# FOETAL CIRCULATION

## circulatory changes after birth:

immediate changes due to end of placental flow  
& start of pulmonary flow

### 1- functional closure of umbilical arteries

----- umbilical ligaments fibrosis take 2 months

### 2- functional closure of

**Lt umbilical vein** ----- ligamentum teres of liver

**Ductus venosus** ----- ligamentum venosum

fibrosis take 2 months

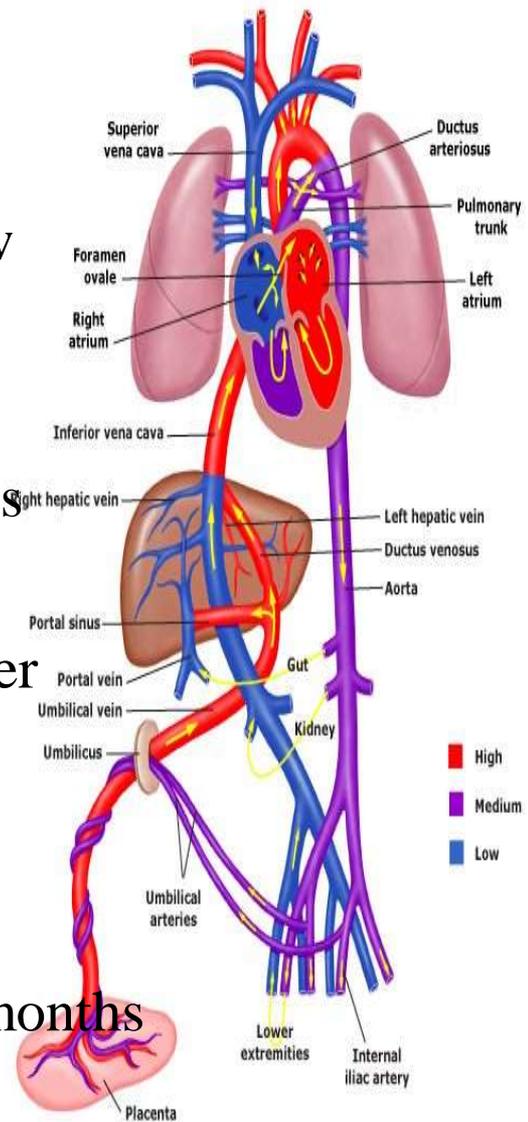
### 3- functional closure of ductus arteriosus

----- ligamentum arteriosum fibrosis take 2 months

### 4- functional closure of foramen ovale by

Increasing pressure in Lt atrium due to pulmonary venous flow.

Fibrosis take 1 year





THANQ