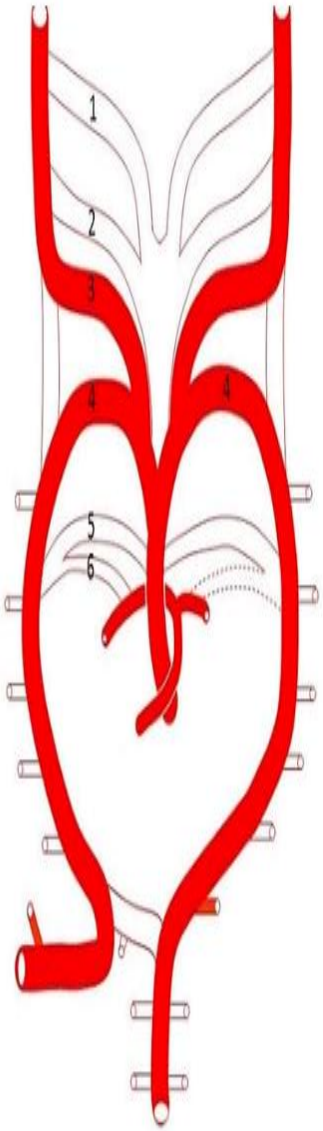
DEVELOPMENT OF BLOOD VESSELS

BY

DR ABULMAATY MOHAMED
ASSISTANT PROFESSOR
ANATOMY & EMBRYOLOGY
MUTAH UNIVERSITY



AORTAE

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

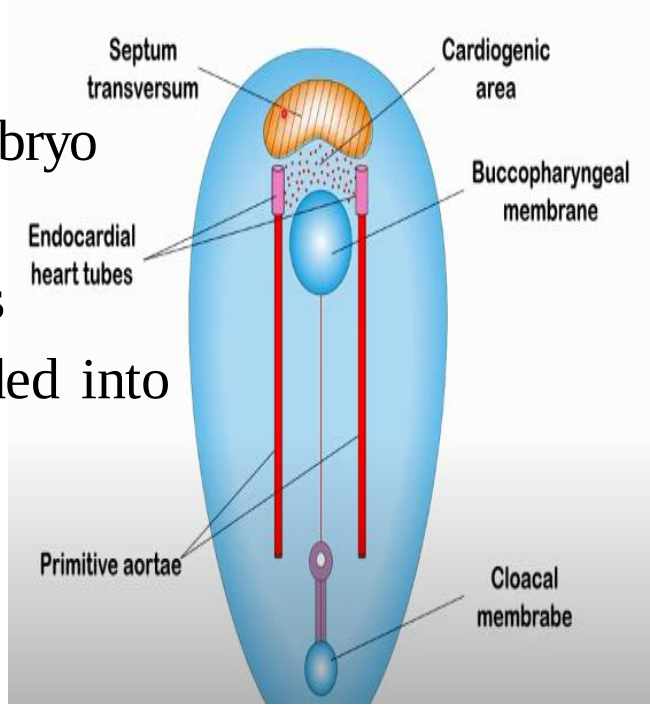
1- dorsal aorta

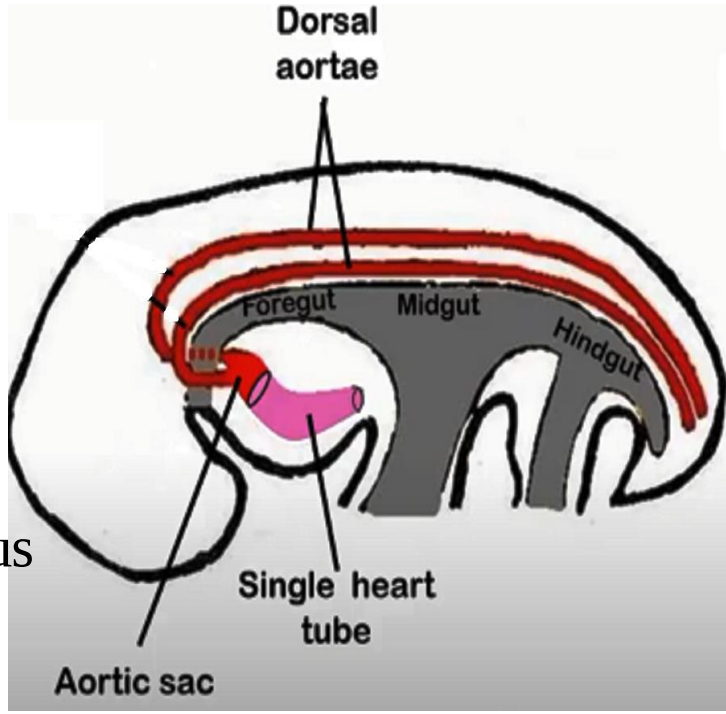
- dorsal to foregut
- The 2 dorsal aortae fuse together from the 4th thoracic till the 4th lumbar somite (segment) to form single dorsal aorta

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**





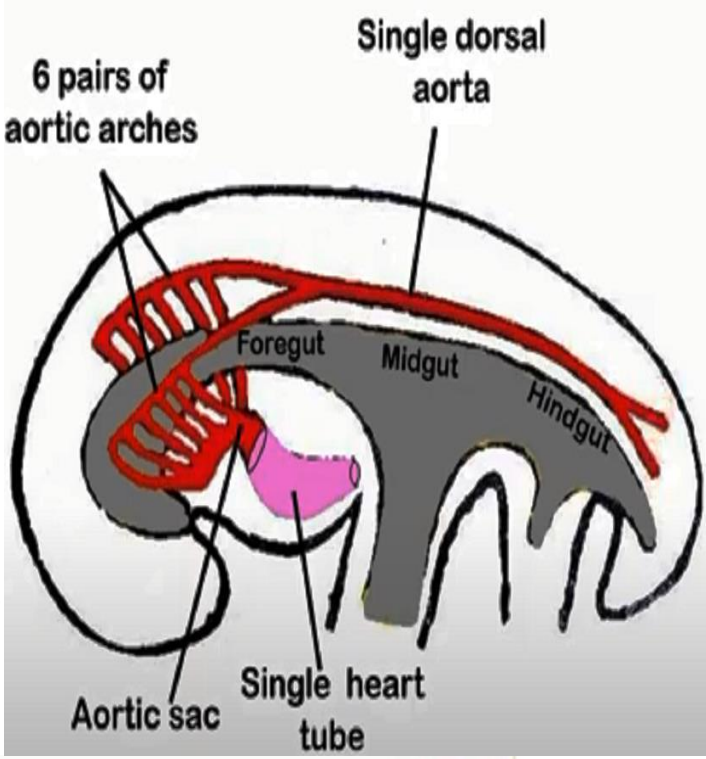
AORTIC ARCHES

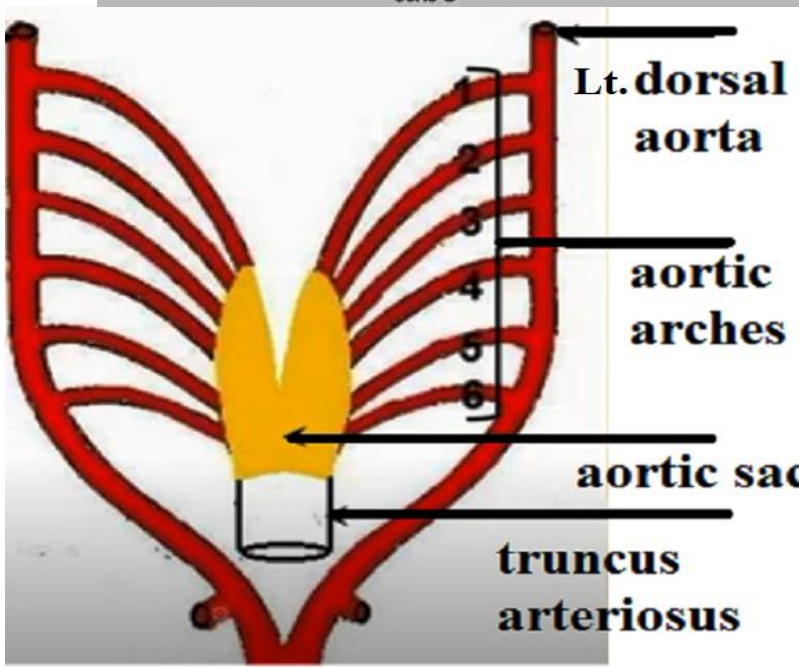
Development

- 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 mot caudal.



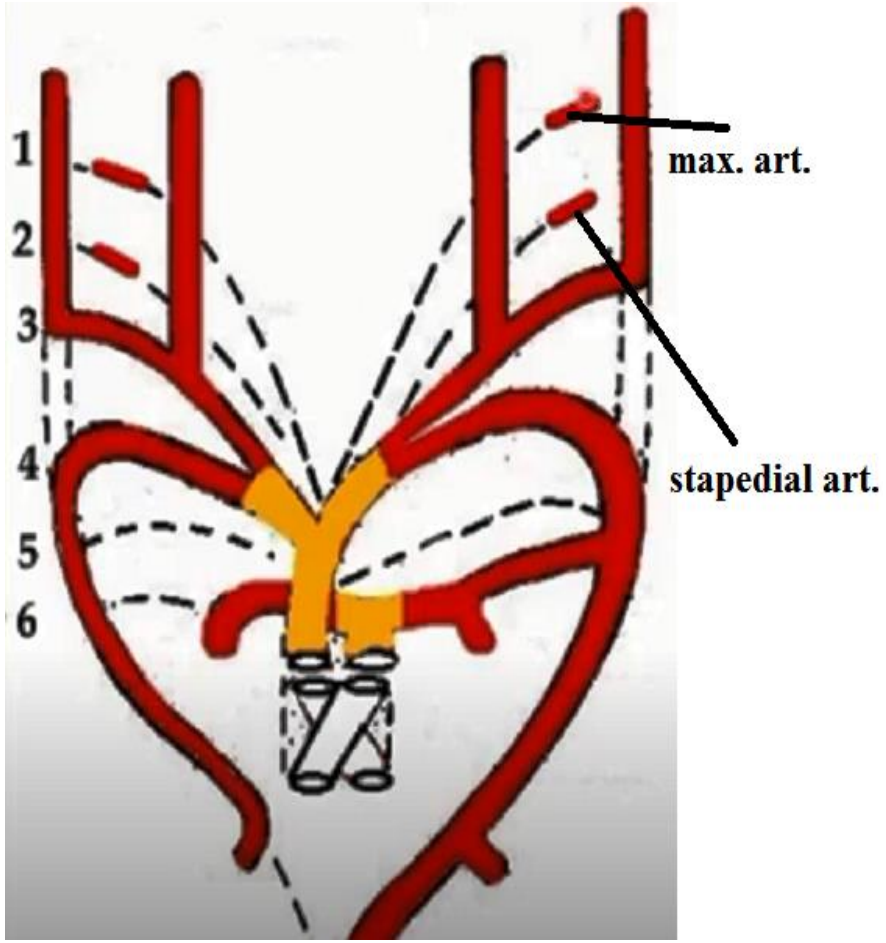


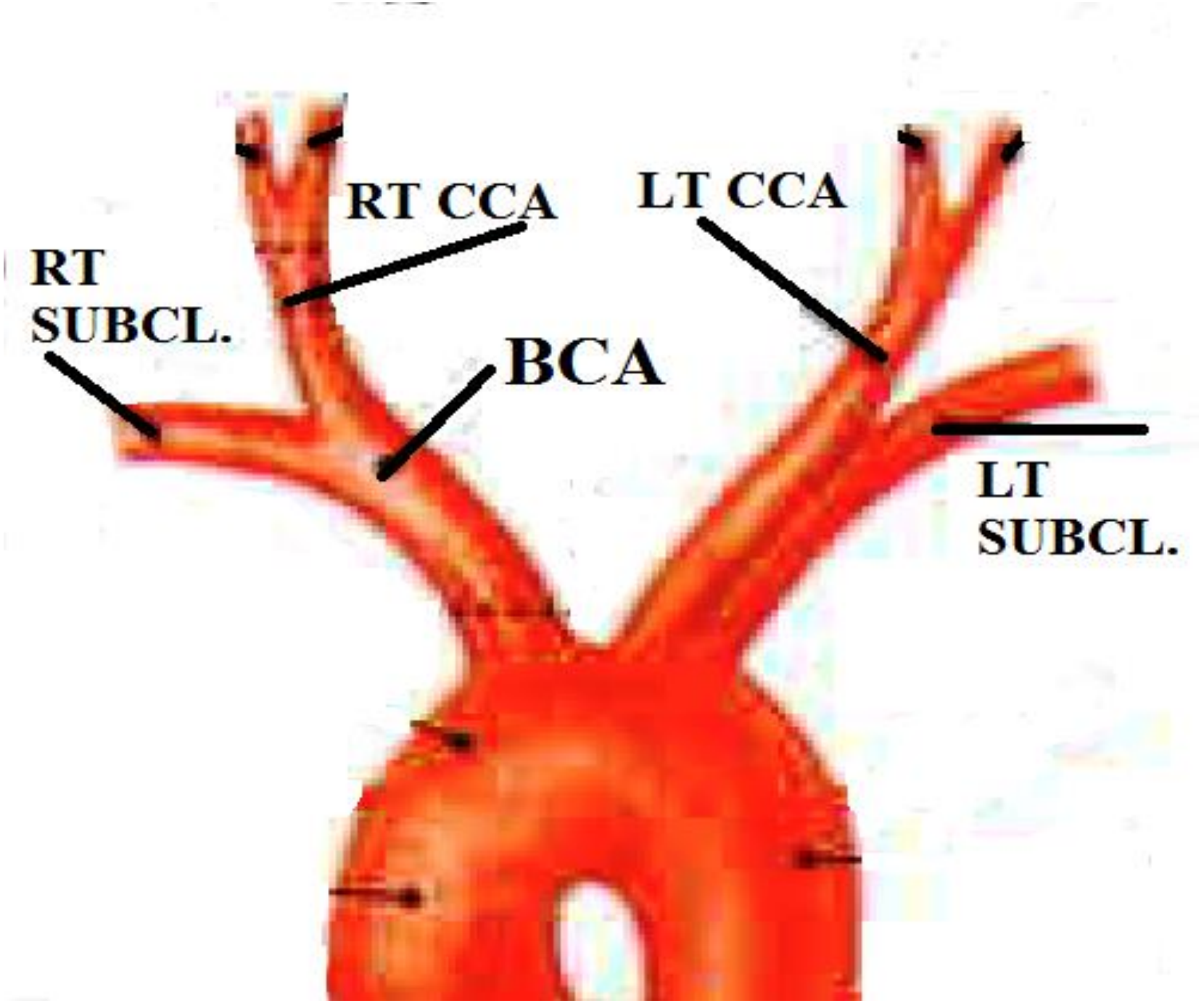
AORTIC ARCHES

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)




RT CCA
LT CCA
RT
SUBCL.
BCA
LT
SUBCL.

AORTIC ARCHES

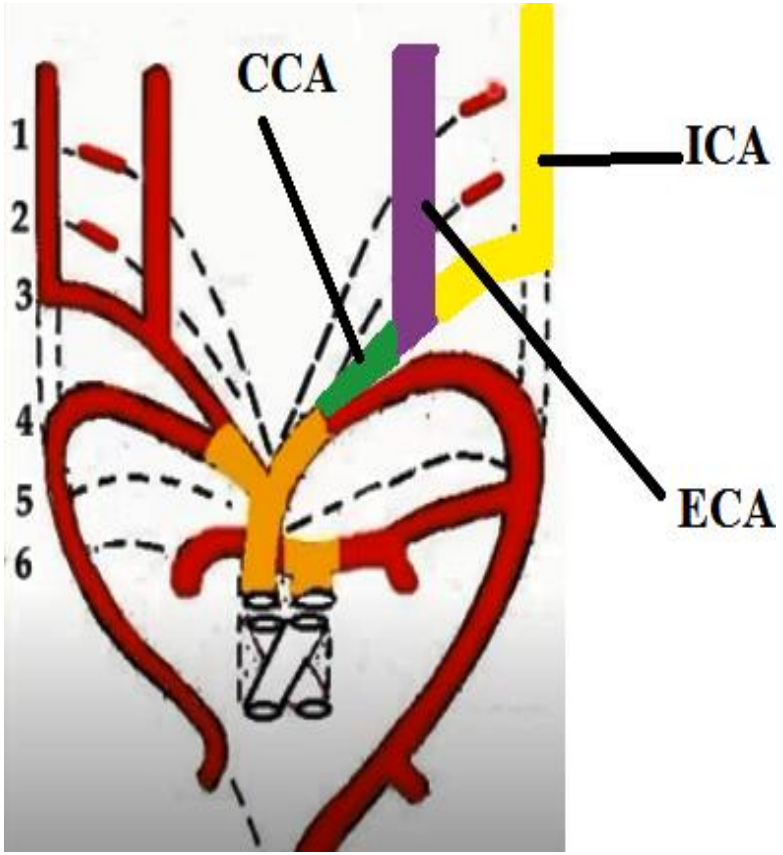
Fate:

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 3rd arch
- The segment of the dorsal aorta cranial to 3rd 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.

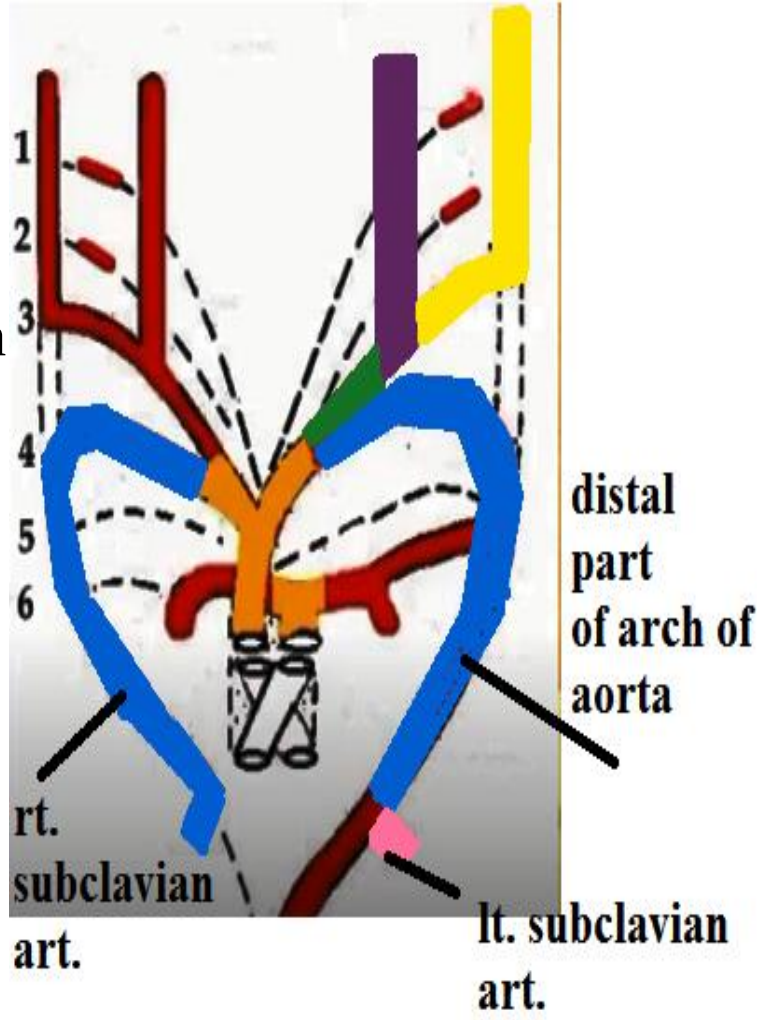
LT: share in formation of

Part of arch of aorta from

lt. CCA to lt. subclavian art.

N.B: Lt subclavian: develop from

It 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

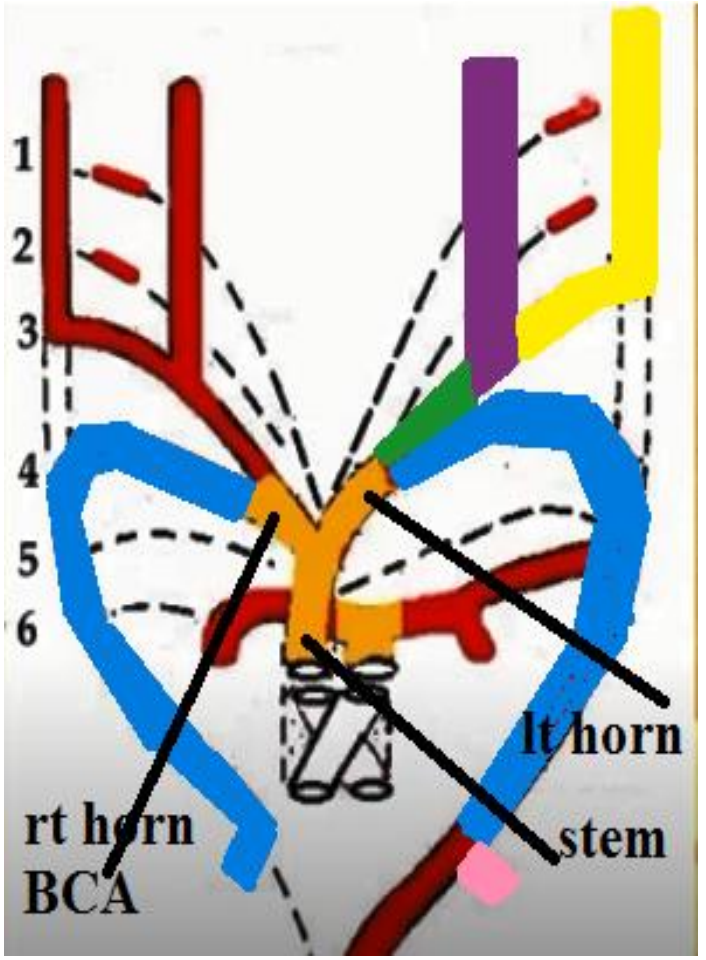
The left horn

gives the middle part of the aortic arch

The right horn

gives the Brachiocephalic artery

5th arch: disappear



AORTIC ARCHES

Fate:

6th arch:

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

N.B: pulmonary art.: develop from

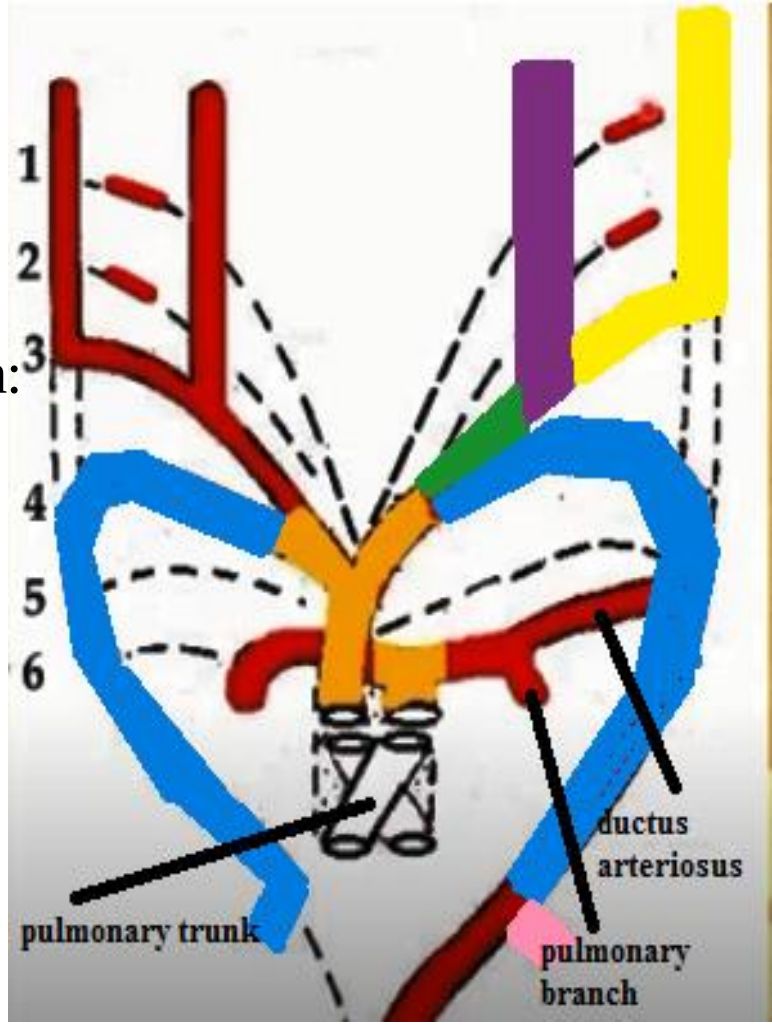
- Proximal part of the 6th arch

- 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

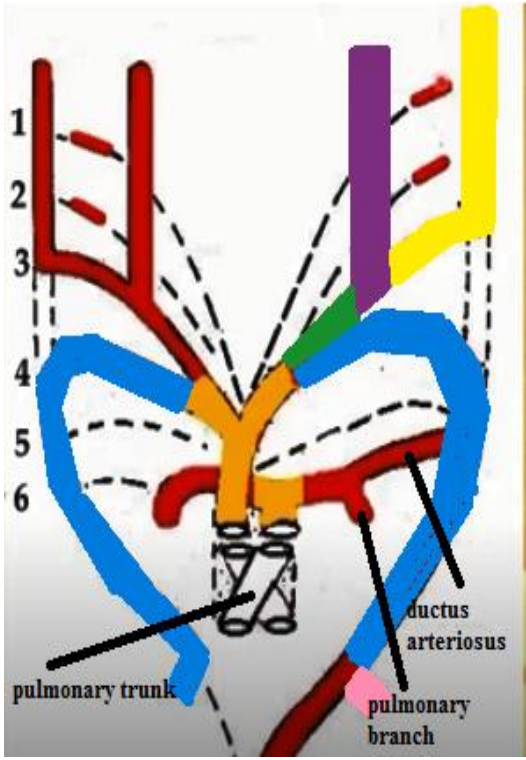
disappear () 7th cervical intersegmental art & junction with Lt dorsal aorta.

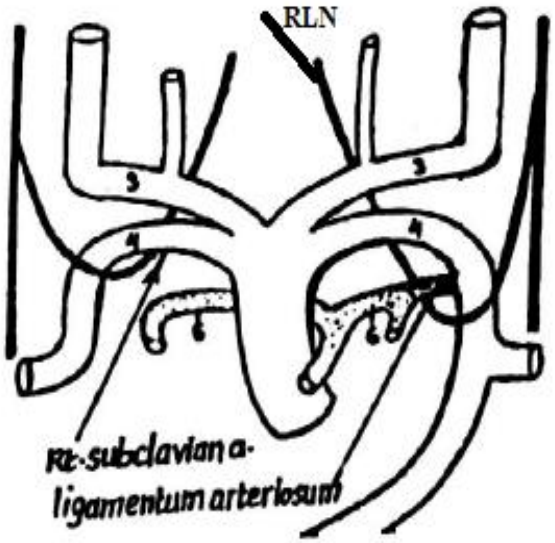
3- descend of heart from neck to thorax

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

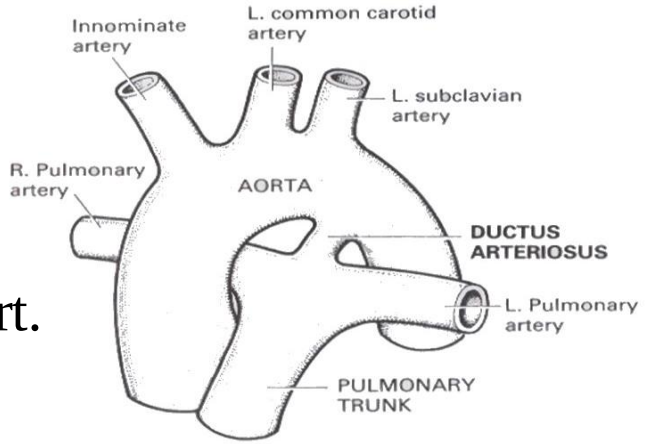
Lt: hook around ductus arteriosus (ligamentum arteriosum)

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





ANOMALIES



1- patent ductus arteriosus

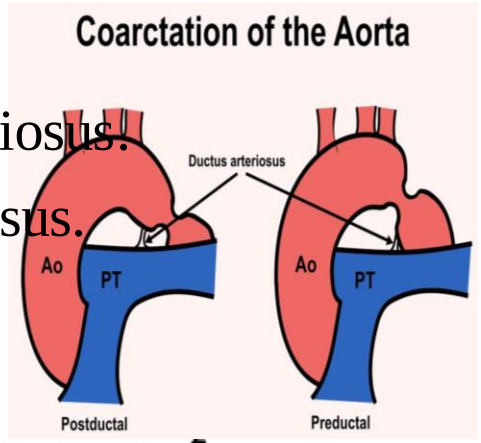
- most common anomaly in great vessels
- duct ( ) arch of aorta & Lt pulmonary art.

2- coarctation of aorta:

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

<u>Preductal:</u> proximal to the opening of ductus arteriosus.

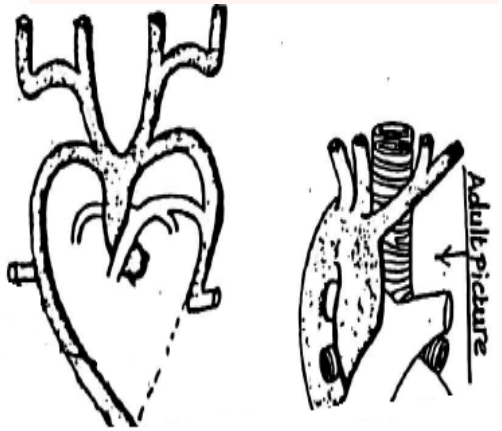
<u>Post ductal:</u> distal to the opening of ductus arteriosus.



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

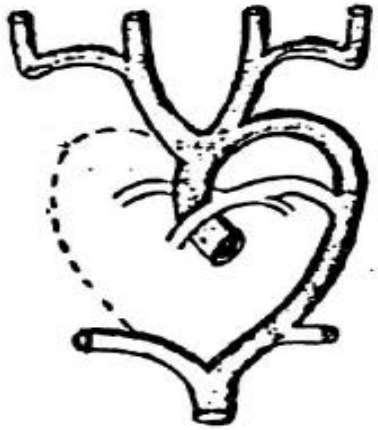
- Rt dorsal aorta persist
- Both arches form a ring around

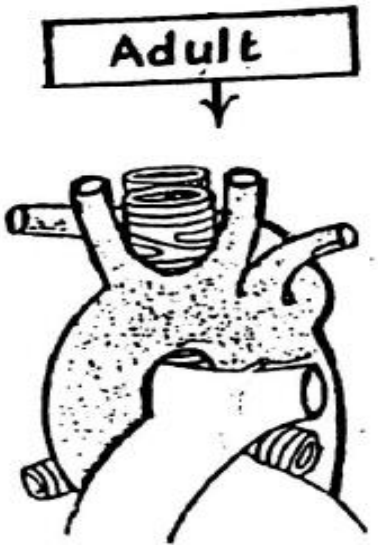
Trachea leading to dyspnea

Esophagus leading to dysphagia

5- abnormal rt subclavian art.

- rt. 4th arch & adjoining part of rt dorsal aorta disappear
- rt subclavian develop from rt 7th 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

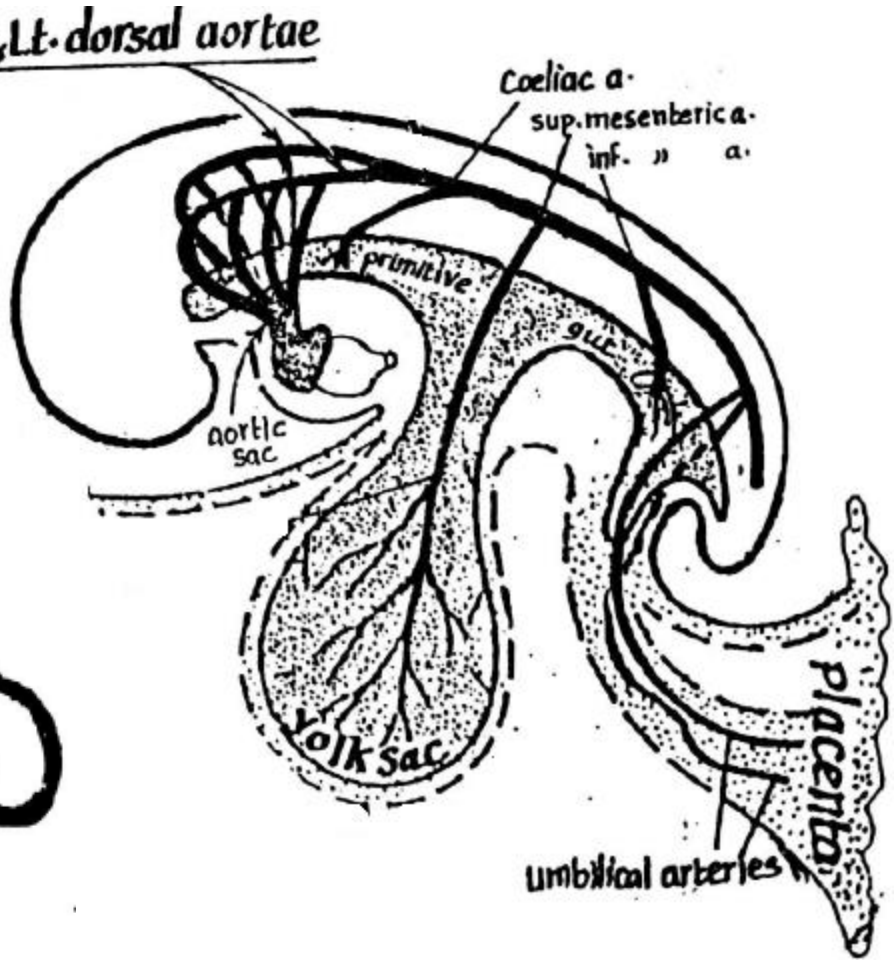
IMA

2- lateral splanchnic arteries

Middle suprarenal

renal

gonadal



COMMON DORSAL AORTA

Branches:-

3- Intersegmental(somatic) arteries

A- Cervical intersegmental arteries: 7 pairs

i- The upper 6 arteries disappear.

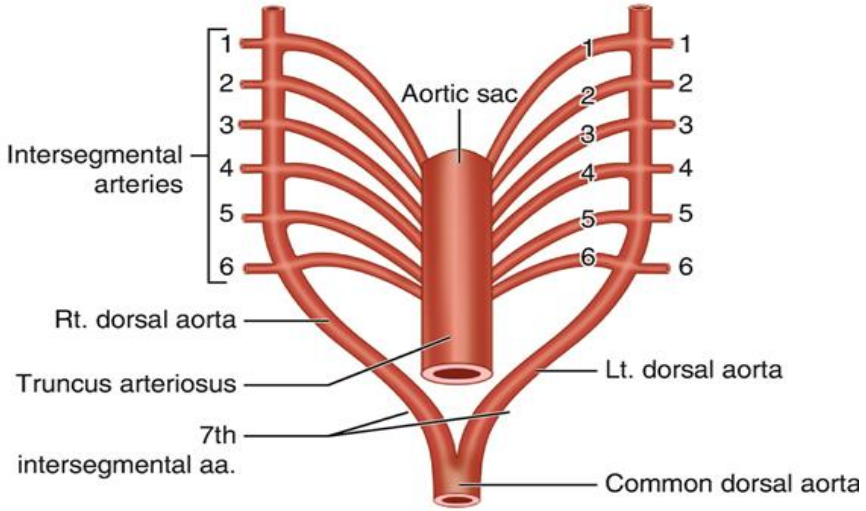
ii- The 7th cervical intersegmental artery: gives subclavian artery

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

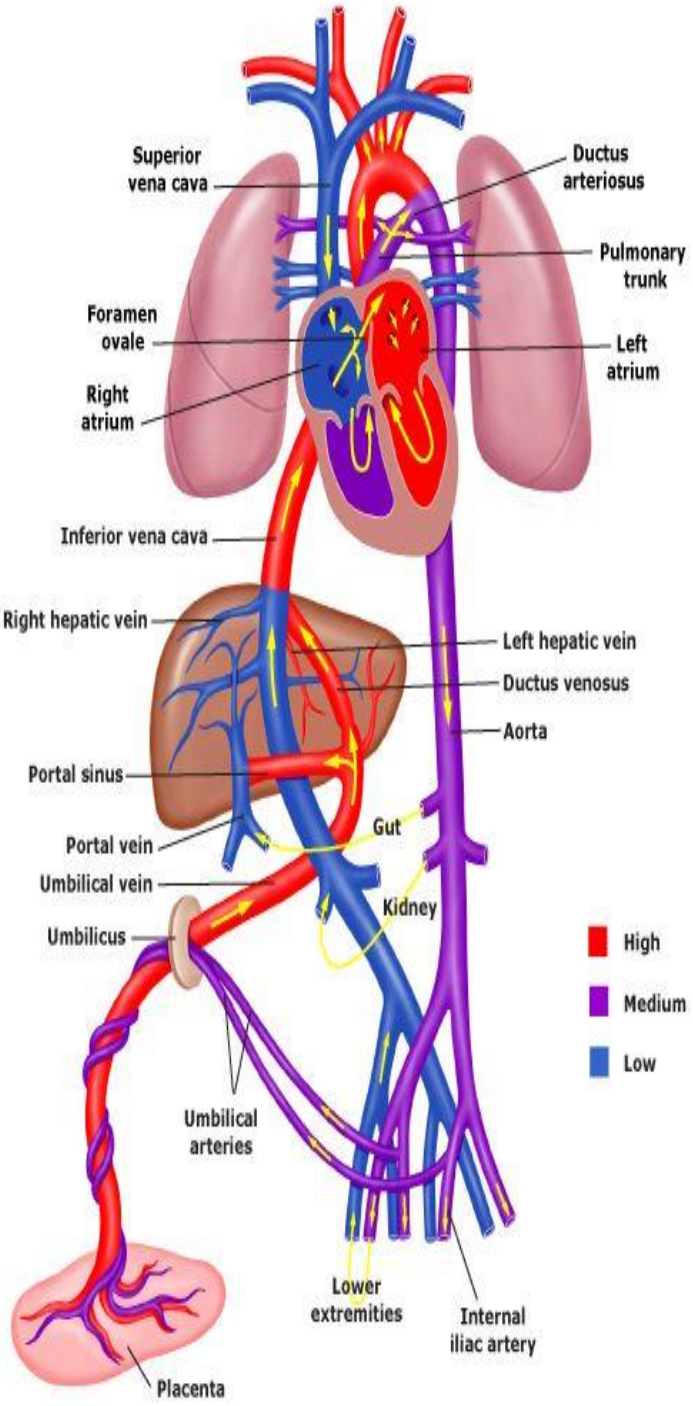
Description:

saturated (oxygenated) blood:

Placenta---- lt 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

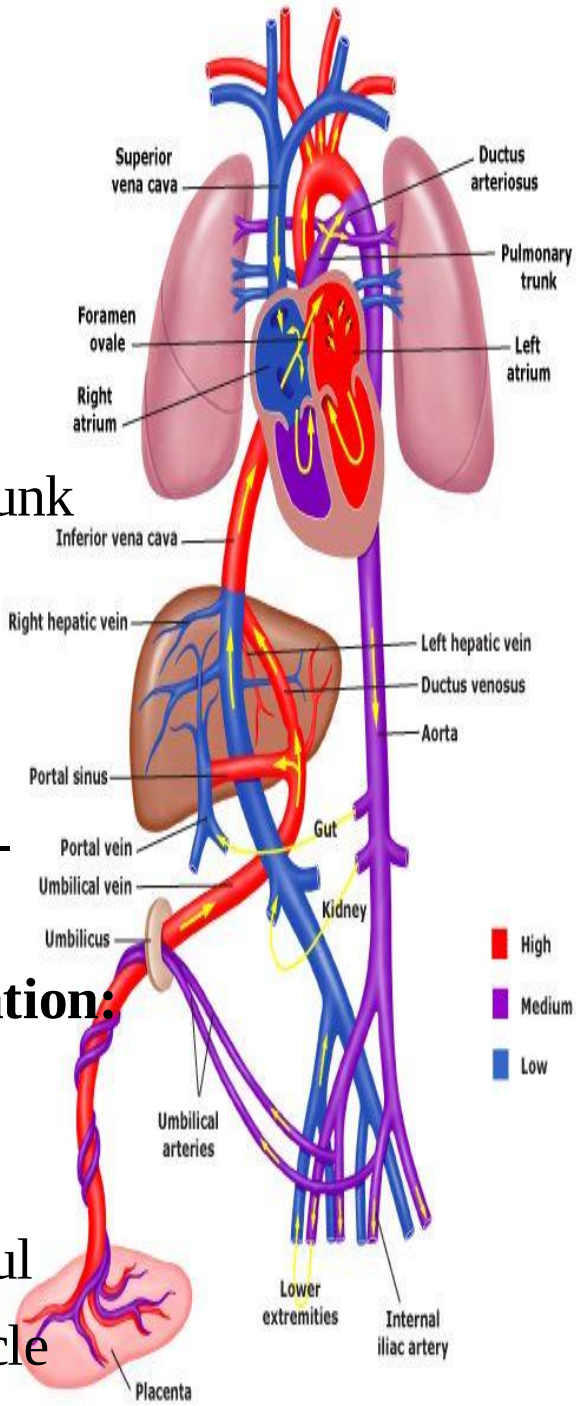
Description:

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

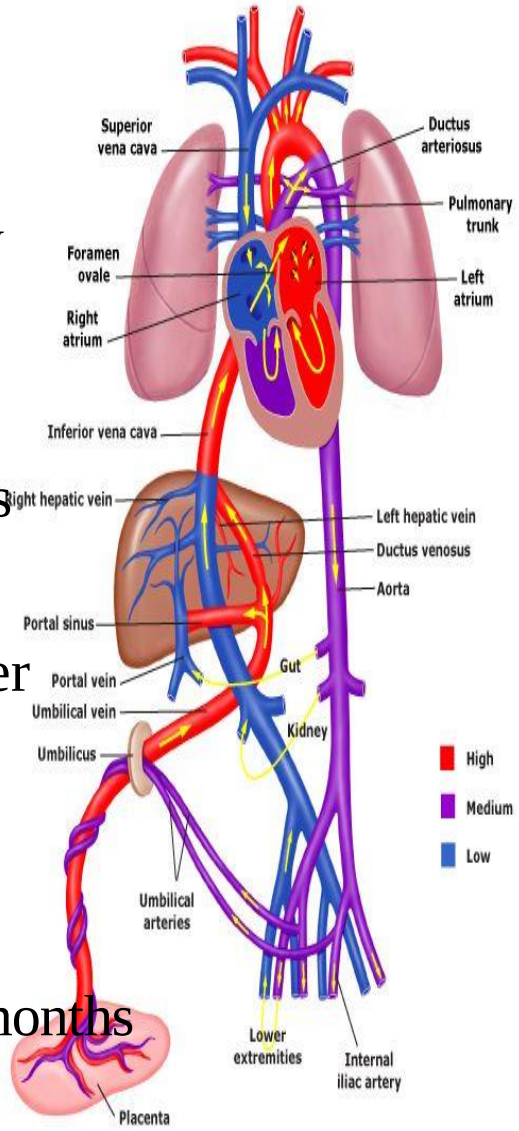
Lt umbilical vein ----- ligamentum teres of liver

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



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