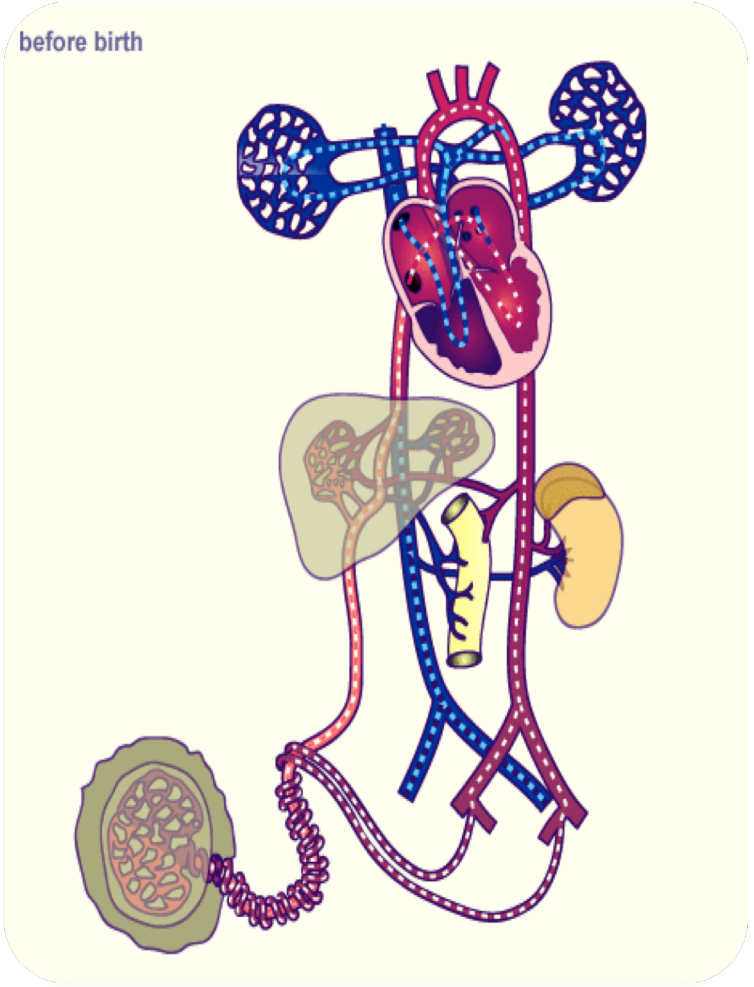
EMBRYOLOGY

FETAL CIRCULATION AND POSTNATEL CHANGES



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Fetal circulation

FETAL CARDIOVASCULAR SYSTEM IS DESIGNED:

1-To serve prenatal needs.	2-To permit modifications at birth, which establish the neonatal circulation

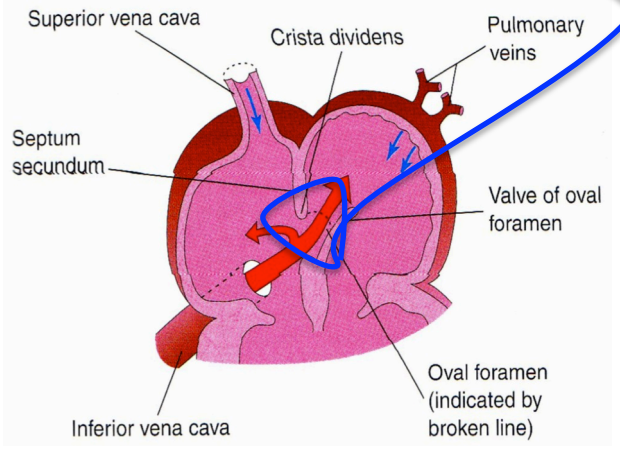
#Remember : Good respiration in the newborn infant is dependent upon normal circulatory changes at birth.

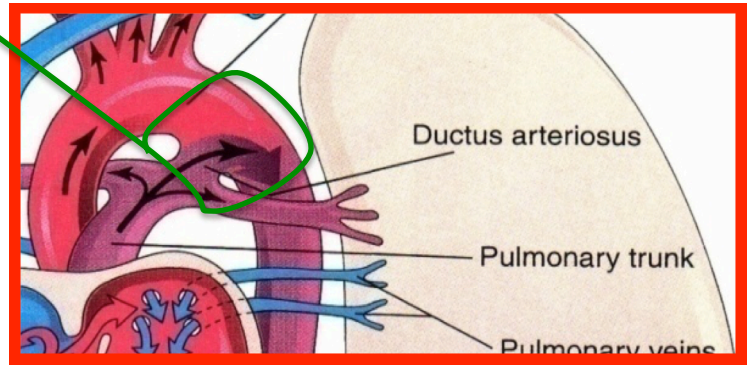
Three structures are very important in the transitional circulation:

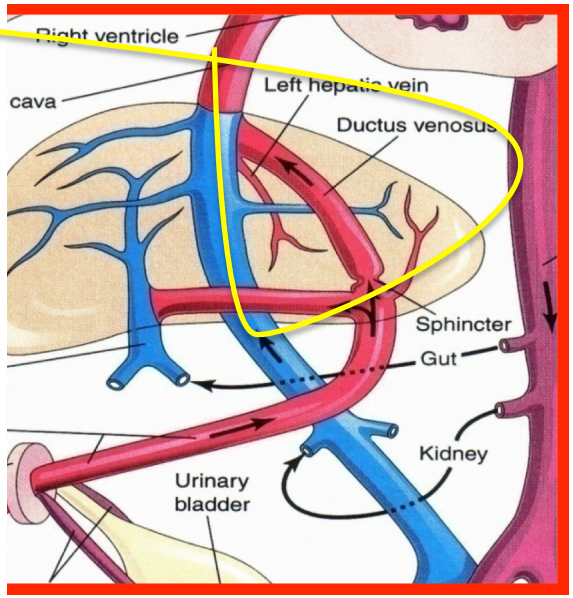
1- Ductus venosus.

2- Ductus arteriosus.

3- Foramen ovale







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#FETAL CIRCULATION :

Blood reaches & leaves the fetus through the umbilical cord and it Contains two arteries and one vein.

1- Highly oxygenated blood passes from the placenta through the umbilical vein.

2-Half of this blood reaches the IVC through the ductus venosus.

3- The other half passes to liver sinusoids then to the IVC.

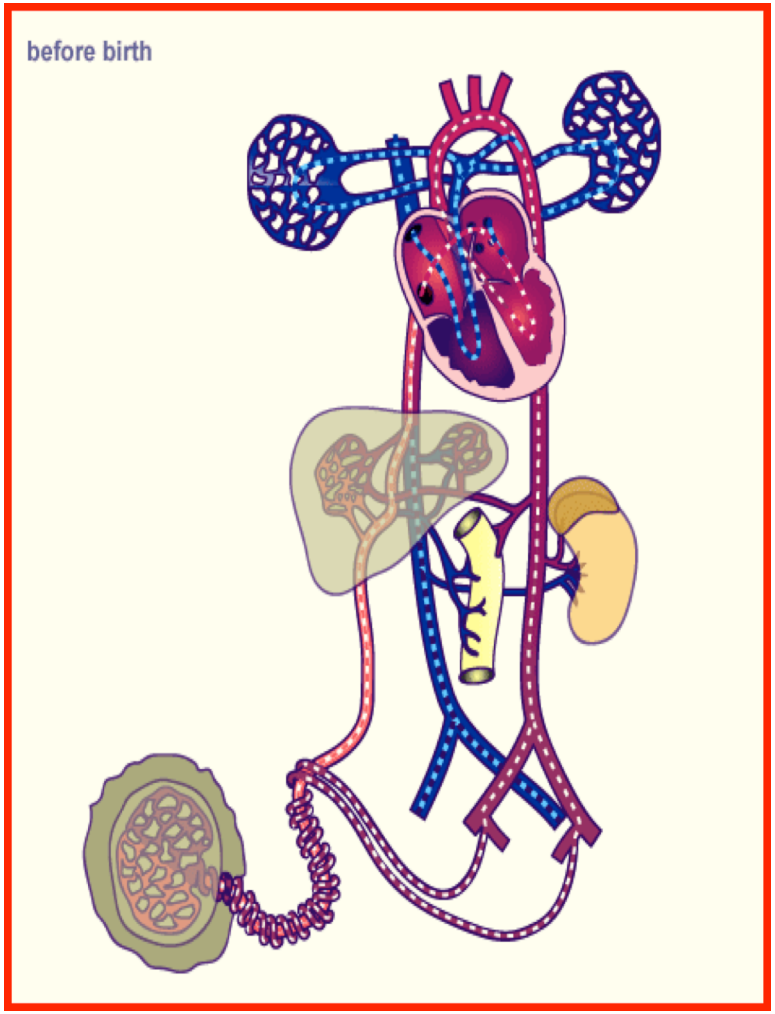
4- Blood of the IVC reaches the right atrium, then left atrium through the Foramen Ovale (an opening between the two atrium).

5- Then to the left ventricle to the ascending aorta, and the aortic arch to supply head & neck brain, cardiac muscle and upper limbs with highly oxygenated blood.

6- Small amount of highly oxygenated blood in right atrium mixes with venous blood of the SVC passes to right ventricle.

7- Then to the pulmonary artery (lungs are not functioning yet) then to ductus arteriosus to the descending aorta, to lower half of fetal body.

8- Then back to placenta via the two umbilical arteries.



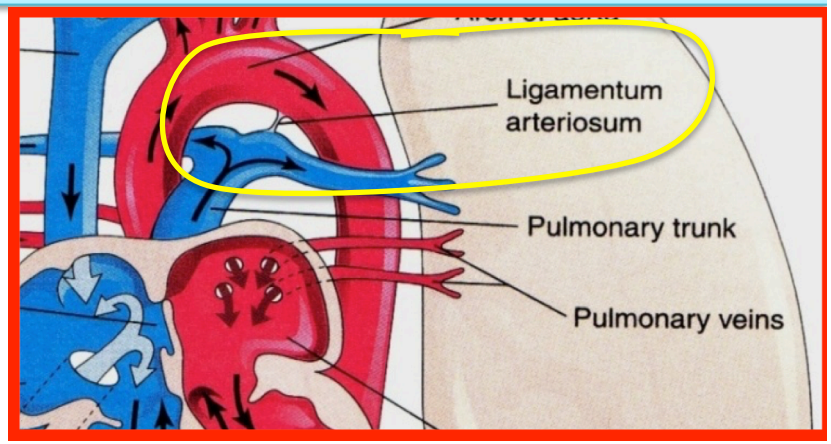
CHANGES AFTER BIRTH:

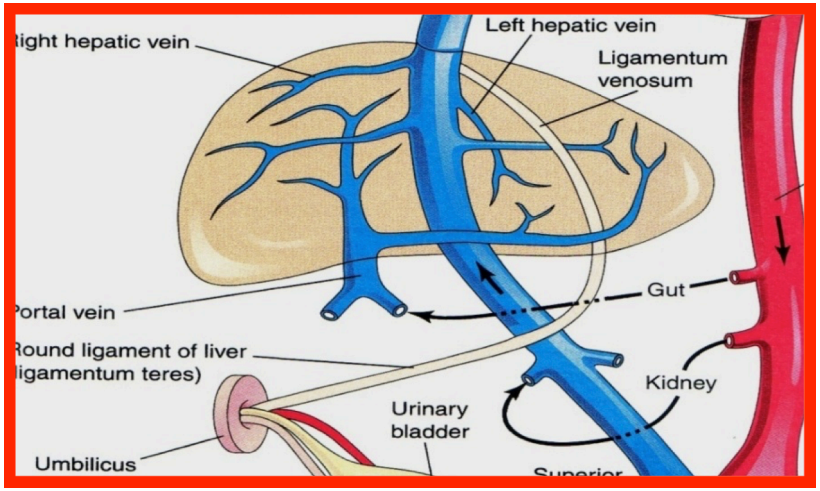
 # After Ligation of the umbilical cord there will be
Sudden fall of blood pressure in the IVC and the right Atrium
Also the valve of the ductus venosus constricts.

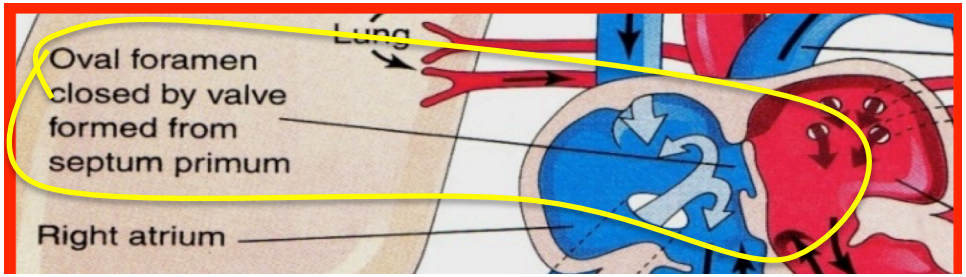
After Aeration (ventilation) of the lungs at birth:
1- Marked increase in the pulmonary blood flow due to functioning of the lungs and increase pressure in left atrium causing physiological colsure.
2- Dramatic fall in pulmonary vascular resistance.
3- Thinning in the wall of the pulmonary arteries.

 # Closure of foramen ovale:
A. Physiological closure (by pressure difference between the tow atriums).
B. Anatomical closure (takes 12 weeks).

 # Constriction of ductus arteriosus.
By the end of the first 24 hours 20% of the lumen of the ductus is closed.
By the end of 48 hours 82% is closed.
By 96 hours (4 days) 100% of the duct is closed







Bradykinin:
***It** is a substance released from fetal lungs during their initial inflation. This substance has a contractile effect on smooth muscles of the ductus arteriosus. The action of this substance appears to be dependant on the high **Oxygen** saturation of the aortic blood.
***When** oxygen tension reaches **50** mmHg in the ductus arteriosus it causes constriction of its smooth muscles.
*During intrauterine fetal life the patency of ductus arteriosus (before birth) is controlled by the *low* concentration of oxygen in the blood passing through it.
*So hypoxia and other ill-defined factors keep the ductus arteriosus patent.

ADULT DERIVATIVES OF FETAL VASCULAR STRUCTURES:

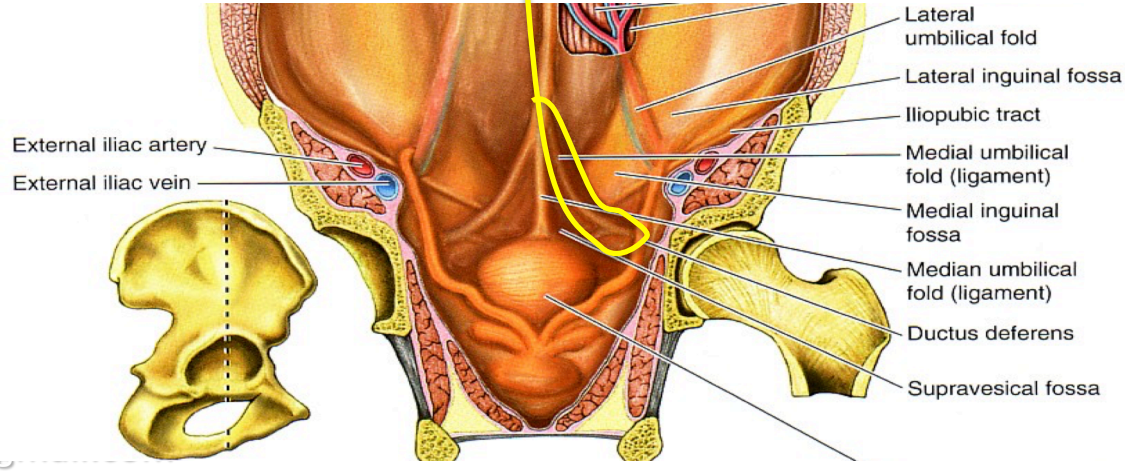
1- Umbilical vein------Ligamentum teres.

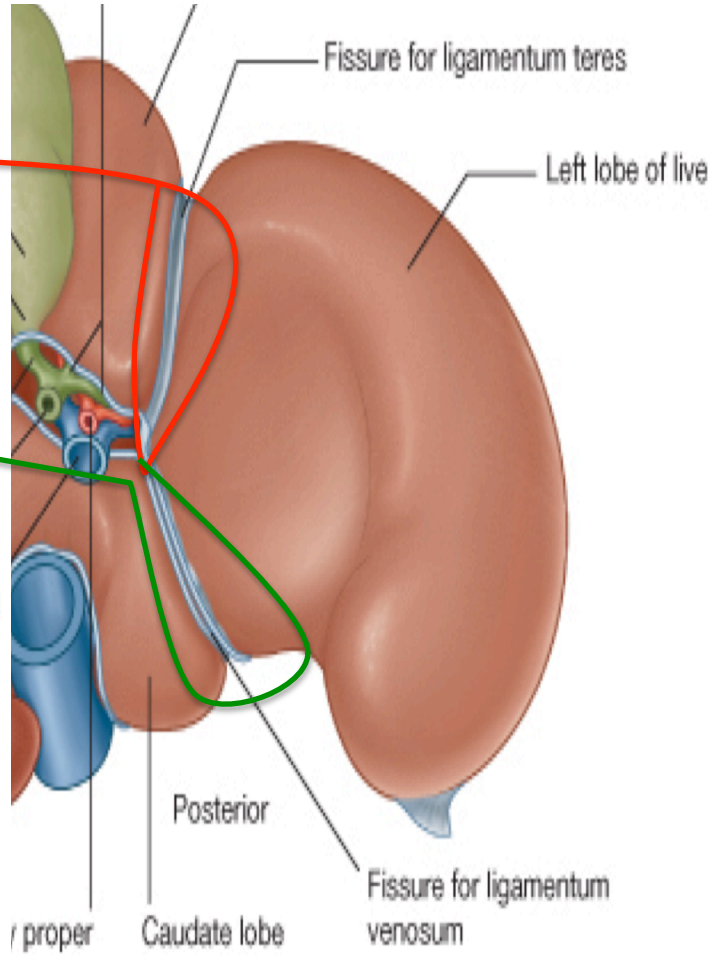
2- Umbilical arteries—medial umbilical ligaments.

3- Ductus venosus-----Ligamentum venosum.

4- Ductus arteriosus---Ligamentum arteriosum

5- Foramen ovale----fossa ovalis.





Remember

#Constriction of ductus arteriosus : by **24 hours 20%** and by **48 hours 82%** and by **96 hours 100%** of the lumen of the ductus is closed.

 # Umbilical vein gives **Ligamentum teres** and Umbilical **arteries** gives **medial umbilical ligaments** and **Ductus venosus** gives **Ligamentum venosum** and **Ductus arteriosus** gives **Ligamentum arteriosum** and **Foramen ovale** gives **fossa ovalis**.

Foramen oval **physiological** closure caused by **pressure difference** and **anatomical** closure **by 12 week** .

 # Good respiration in the newborn infant is dependent upon normal circulatory changes at birth.

Quiz yourself

Q1:After ligation of Umbilical cord there will be pressure decrease in:

A. left atrium
B. Right atrium
C. Left ventricle

Q2: Umbilical arteries gives:

A. Ligamentum venosum
B. Ductus venosus
C. medial umbilical ligaments

Q3: Baby who was born in high attitude he might have:

A. Unconstricted ductus arteriosus
B. Unconstricted ductus venosus
C.Unclosed Foramen ovale.

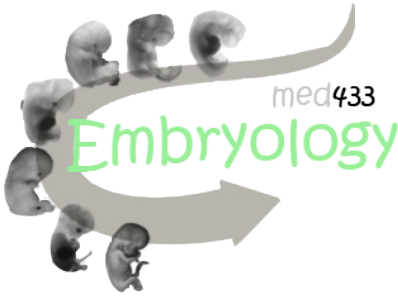
Q1: by the end of 48 hours .....percent of ductus arteriosus will be Constriction .

A.100.
B.20.
C.82.

Ans;
1.B 2.C 3.A 4.C

This was our last embryology lecture we hope it was easy and we wish you all the best in your future ☺.

Embryology team



Done by

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