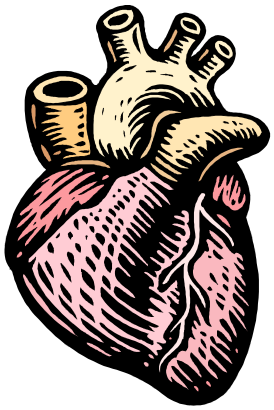
Bio& 242
Unit 3 Lecture 4



FETAL CIRCULATION

Facilitates the exchange of materials between fetus and mother.

The fetus picks up oxygen and nutrients from // eliminates carbon dioxide and wastes through the maternal blood supply by means of the placenta.

Blood passes from the fetus to the placenta via:

Two umbilical arteries

One umbilical vein.

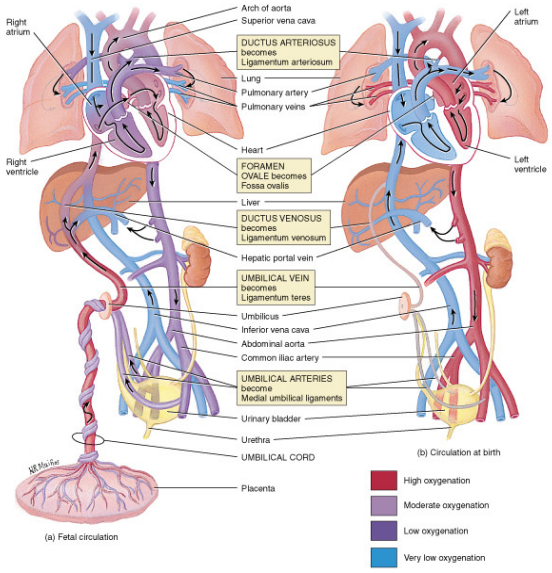
At birth fetal circulation are no longer needed:

The ductus arteriosus becomes the ligamentum arteriosum

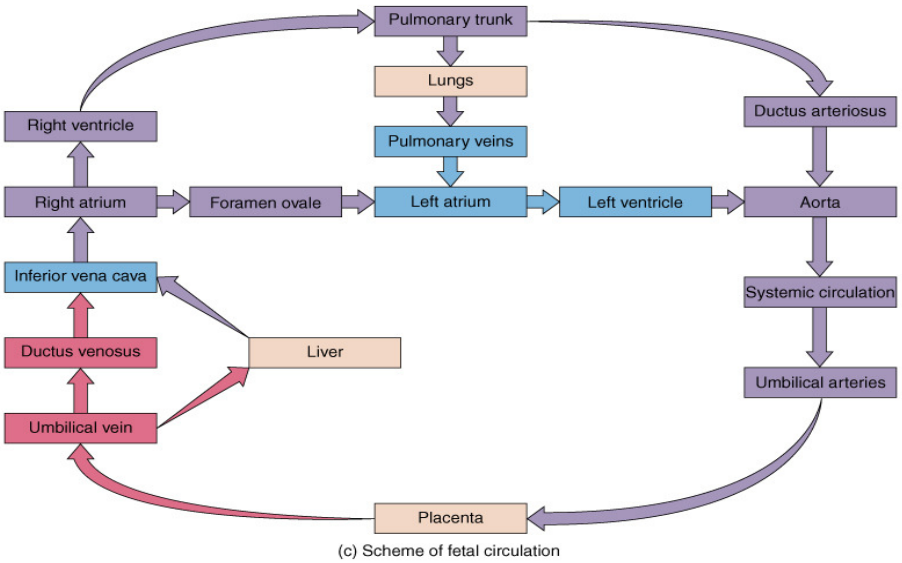
The foramen ovale becomes the fossa ovalis

The umbilical vein becomes the ligamentum teres (round ligament).

Human Fetal Circulation



Flow Chart of Fetal Circulation



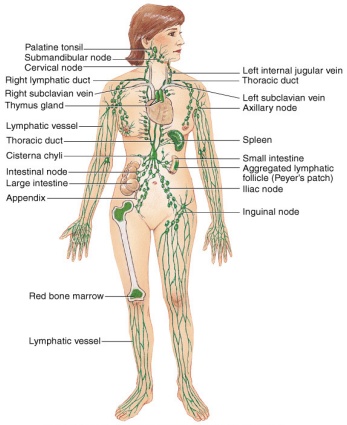
(c) Scheme of fetal circulation

Anatomy of the Lymphatic System

1. Drain interstitial fluid (IF):

   Recall during capillary exchange
   There is a small net gain in "IF"

   20 liters of IF are produced per day.
   17 liters (85%)of IF is reabsorbed into venules.
   3 liters (15%) of IF enter lymph vessels.



Anterior view of principal components of lymphatic system

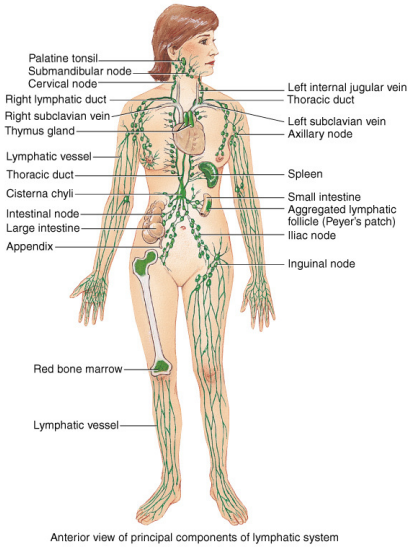
Functions of the Lymphatic System

2. Transport dietary lipids (lacteals)
3. Protect against invasion by bacteria and viruses.

   (macrophages and lymphocytes)

4. Facilitate immune responses

   (B-cells produce specific antibodies).



Anterior view of principal components of lymphatic system

Major Lymphatic Structures

Thoracic duct:

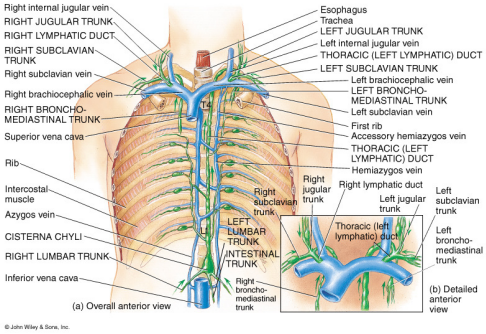
- Receives lymphatic fluid from most of the body and drains it into the left subclavian vein

Right lymphatic duct:

- Drains lymph from the upper right side of the body into the right subclavian vein.

Cisterna chyli:

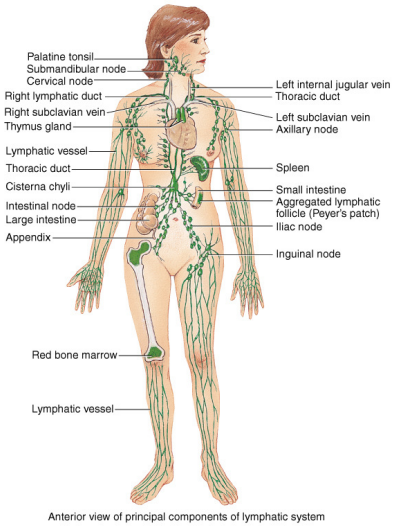
- Terminus of thoracic duct.
- Receives lymph from digestive organs



Major Lymphatic Structures

Thymus:

- Location = in mediastinum, posterior to sternum
- Function = site of T-cell maturation.
- T-cell migrate to other lymphatic organs
- Large (70g) and highly active in infants
- After puberty, tissue is donated by adipose and areolar CT.
- Old age gland atrophies and may weigh only 3g.



Major Lymphatic Structures

Spleen:

Largest mass of lymphatic tissue in the body

Function:

Macrophages remove bacteria, worn out RBC, and platelets

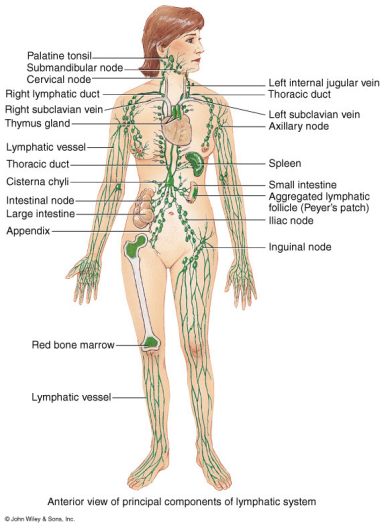
Store platelets (up to 1/3 of bodies supply

hemopoiesis

Lymph nodes:

Location = large groups are found in cervical, axillary, mammary, inguinal, iliac areas.

- Function = protect against invasion of foreign substances and participate in immune response by producing lymphocytes and antibodies.



Anterior view of principal components of lymphatic system

Structure of a Lymph Node

Trabeculae:

Divide node into compartments

Outer Cortex:

Lymphatic nodules: egg-shaped aggregates of B-lymphocytes

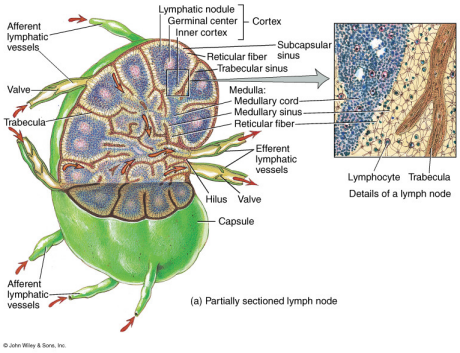
Germinal Centers: where B lymphocytes proliferate

Inner Cortex:

Consists of T cells and dendritic cells

Dendritic cells: Serve as antigen-presenting cells for T-cells

T-cells migrate to other areas of the body.



Structure of a Lymph Node

Medulla:

- contain B lymphocytes, Plasma cells (modified B lymphocytes), and macrophages.

"IF" flow in a node:

- Afferent vessels
- Subcapsular sinuses
- Trabecular sinuses
- Medullary sinuses
- Efferent vessels