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).
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.

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).
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.

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