

# **BLOOD VESSELS TO THE MYOCARDIUM**

## **First branches off of Aorta = R&L coronary arteries**

1. Right coronary artery (RCA)
  - a. (RMA) marginal - right border (margin) of heart
  - b. (PIA) posterior inter-ventricular a.
  
2. Left coronary artery (LCA)
  - a. (AIA) anterior inter-ventricular artery
  - b. circumflex branch - continues around right side
  - c. (LMA) left marginal a. - left margin of heart

## **Venous drainage of myocardium**

1. Anterior side
  - a. great cardiac vein (drains AIA)
  - b. small & anterior cardiac veins (drains RMA)
  
2. Posterior side
  - a. posterior cardiac vein (drains LMA)
  - b. middle cardiac vein (drains PIA)
  
3. Coronary sinus
  - a. all cardiac veins combine to form a sinus
  - b. coronary sinus drains into right Atrium

# Circulation of the Head

## **Arterial supply**

1. skin and muscles supplied by external carotid a.
2. brain tissue supplied by branches of the:
  - a. internal carotid a.'s (carotid canal)
  - b. vertebral a.'s (foramen magnum)- all branches held in place by arachnoid!

## **Cerebral arterial circle**

1. paired vertebral a.s combine to form the basilar a.
2. basilar a. enters **arterial circle** @ pituitary gland
3. paired Internal carotid a.s also enter the **arterial circle**
4. circle = distribution 'hub' for arterial supply to brain
  - important pharmaceutical/physiological properties

## **Venous drainage**

1. dural sinuses eventually drain to internal jugular veins
2. blood from brain stem drains to vertebral veins
3. scalp, skin, muscles drain to external jugular vein
4. vertebral + jugular + subclavian v.s = brachiocephalic v.

## Circulation of GI system

### Arterial supply to gut (3 unpaired arteries)

1. Celiac trunk:
  - a. hepatic a. - liver
  - b. left gastric a. - stomach
  - c. splenic a. - spleen, 1/2 pancreas
  
2. Superior mesenteric:
  - a. intestinal a. - 1/2 pancreas, small Intestine, appendix
  - b. right colic a. - ascending colon
  - c. middle colic a. - transverse colon
  
3. Inferior mesenteric a.
  - a. left colic a. - descending colon
  - b. sigmoidal a. - sigmoid colon, rectum

## **Hepatic portal system**

1. Portal vein = vessel between two capillary beds
2. Liver receives blood from two sources:
  - a) hepatic a. (celiac a.) - oxygenated blood
  - b) hepatic portal vein - nutrient-laden blood from GI tract
3. Liver filters/modifies substances in the blood
4. Liver is drained by hepatic v. to inferior vena cava

## **Veins that contribute to hepatic portal vein:**

1. Splenic v. - from stomach, spleen, & pancreas
2. Superior mesenteric v. - from small intestine & colon
3. Inferior mesenteric v. - from rectum & descending colon

## Fetal circulation

1. Lungs are non-functional
2. Liver is mostly non-functional
3. Kidneys are mostly non-functional
4. Digestive tract has 'nothing' to digest
  - \* These functions performed by maternal systems

## Placenta

1. Extraordinary tissue - mass of capillary beds
2. Capillaries of fetal & maternal are in close proximity
3. Exchange of materials via diffusion
  - \* *NO EXCHANGE OF BLOOD TAKES PLACE!!!*
4. Embryo/fetus attached to placenta via umbilical cord
  - remnant scar on abdominal wall in adults = *umbilicus*

## Unique features: fetal pulmonary circulation

**Problem:** lungs are not operational yet  
= blood must be 'shunted' away from lungs

1. *Foramen ovale* (shunt)
  - a. located in the interatrial septum
  - b. reduces amount of blood passing to RV
  
2. *Ductus arteriosus* (shunt)
  - a. vessel between pulmonary trunk & aorta
  - b. blood in RV shunted (away from lungs) into aorta

## Unique features: fetal systemic circulation

1. blood from internal iliac a.s > umbilical a.s > placenta
2. placenta exchanges gases, nutrients, waste
3. umbilical v. returns oxygenated blood > HPV
4. ductus venosus (shunt) = bypass nonfunctional Liver
5. ductus venosus > Inf. vena cava > **heart**

## **Circulatory changes at birth:**

1. closure of umbilical arteries, veins, *ductus venosus*
2. *ductus arteriosus* closes (isolates pulm./syst. circuits)
3. neonate inhales/expands lungs, pulmonary circuit starts
4. blood flows into left atrium = *foramen ovale* closes
5. takes up to 3-months for shunts to completely close

## **Circulatory problems at birth:**

1. *Foramen ovale* does not close?
  - pulmonary shunt #1 remains intact = 'blue baby'
2. *Ductus arteriosus* does not close?
  - pulmonary shunt #2 remains intact = 'blue baby'
3. Heart defects:
  - a. interatrial septum: (see above)
  - b. atrioventricular septum: variable
  - c. interventricular septum: LV/RV overload pulm. circuit

# **Lymphatic system**

## **Functions of the lymphatic system**

1. production, maintenance, distribution of lymphocytes
2. return interstitial fluid from tissues to the blood
3. maintain osmotic balance in peripheral tissues

## **Lymphopoiesis:** production of lymphocytes

- bone marrow, thymus, peripheral lymphoid tissues

## **What is the lymphatic circulatory system?**

1. lymphatic vessels, lymphatic capillaries
2. lymph: fluid similar to plasma, fewer proteins
3. lymphoid organs: tonsils, spleen, GALT, thymus

## **Lymphatic vessels**

1. slightly larger than vascular capillaries, valves insure one-way flow of lymph
2. lymphatic vessels combine to form large ducts
  - a. right lymphatic duct: right arm, shoulder, head
  - b. left lymphatic duct: left side of body, right leg
3. R&L lymphatic ducts return lymph to R&L subclavian v.s

## **Edema:** abnormal accumulation of fluid in peripheral tissues

## **Lymph nodes**

1. small lymphatic organs (1-25mm in diameter)
2. spread throughout body
3. function as a coarse filter of the lymph
  - a. fixed macrophages (resident monocytes)
  - b. remove 99% antigens before returning lymph to blood

## **Tonsils**

1. tonsils encircle the opening to the resp./dig. systems
2. three distinct tonsillar masses
  - a. pharyngeal (adenoids): roof of nasopharynx
  - b. palatine: back and sides of the mouth
  - c. lingual: at root of tongue
3. removal of pathogens from inspired air/ingested food
4. **tonsillectomy**: surgical removal of (palatine) tonsils
5. **adenoidectomy**: surgical removal of pharyngeal tonsils

## **Spleen**

1. largest lymphoid mass/tissue in body
2. removes abnormal RBC/WBC
3. stores iron from recycled RBC's
4. Initiate immune responses by B and T cells

## **GALT - (immune response within GI tract)**

1. Gut-Associated Lymphoid Tissue
2. Peyer's patches (lymphoid nodules) in lining of S.I.