SPECIAL CIRCULATORY PATHWAYS

Revised 15 Mar 2016

[These were mostly covered during ongoing lectures of circulation system and other organ systems, but are collected here because of their variation from ‘regular’ circulatory pathways.]

CARDIAC BLOOD SUPPLY (p 681) (Note that blood in heart chambers do not support myocardium.)

- **R & L coronary arteries** exit ascending aorta just beyond the aortic semilunar valve (‘first dibs’)
- **circum flex artery** joins R & L coronary arteries at rear of heart
- **anterior interventricular artery** comes off L coronary artery, supplies blood to anterior side of heart (because heart attacks often block it, it is called the ‘heart attack artery’)
- **myocardial capillaries** supply oxygen and nutrients to heart muscle
- **coronary sinus** collects blood which has drained from myocardium
- **right atrium** receives blood from the coronary sinus, returning it to general circulation

PULMONARY CIRCUIT: (p 754)

Nutrients for lungs supplied by pulmonary, bronchial arteries (oxygen poor)

**Blood pressure is low in pulmonary circuit:** 30/10 mm Hg, resistance is low, little regulation of flow.

- **arterioles always open** in pulmonary circuit (in other systems, arteriole constriction directs blood to active tissues)
- **pulmonary capillary systems surround alveoli:** blood to air separated by only two thin layers: alveolar epithelium, capillary endothelium

Depth of respiration: inhalation (lower thoracic pressure) draws in blood; exhalation squeezes it out

Low BP in pulmonary circuit prevents x$s fluid from entering alveoli, tho must be wet

- **pulmonary edema** fluid in the lungs
- **Congestive heart failure (L)** increases pressure in lungs leads to pulmonary edema
- **stenosis of mitral valve** also leads to pulmonary edema, low flow fr L atrium to L ventricle, backs elevated pressure up into the lungs, fluid accumulates

CEREBRAL CIRCUIT: (p 759, 766) KE 53, 54

Brain consumes 15% of resting heart output, little fluctuation, though vessels do dilate with increased CO$_2$

The brain does not store energy, so blood flow must be constant. 5 min interruption: brain damage

Supply: two **vertebral arteries** join at brain stem to form **basilar artery**

two **internal carotids** split into **middle and anterior cerebral art.**

Circle of Willis: each hemisphere is supplied by one of three brain arteries:
- Posterior, middle and anterior cerebral arteries

- **posterior cerebral arteries** formed by branching of basilar artery
- **posterior communicating artery** connects post cerebral to middle cerebral
- **Anterior communicating artery** connects anterior cerebral arteries.

Hypoxia to brain causes general vasoconstriction, increased heart rate

Fainting caused by loss of adequate O$_2$, supply to brain

Stroke most often blockage of small branches of middle cerebral arteries, so called “stroke arteries.”

HEPATIC CIRCULATION: (p 766, 910) KE: 64, 86 (will be covered in GI section)

- **hepatic artery** brings oxygenated blood to liver from celiac trunk
- **hepatic portal vein** brings nutrient absorbed from GI tract for processing
- **liver lobules** blood from above two sources is combined, fed into liver lobules (liver unit)
- **sinusoids** combined blood percolates through liver sinusoids
- **Cords of hepatocytes** process blood
- **central vein of lobules** collect processed blood from sinusoids.
- **hepatic vein** collects processed blood is in, empties into the inferior vena cava.