

SPECIAL CIRCULATORY PATHWAYS

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S&M:567-577, Martini: 750-752, 754-755, 766-767, Martini 10th: 753-779

[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 xs 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) KE53,54

Brain consumes 15% of resting heart output, little fluctuation, though vessels do dilate with increased CO₂

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 O₂ 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.

