I. Announcements Next Tues HR & BP Lab 4 + Required Notebook Check. Turn in today? Next Thurs Blood Chemistry Lab 5. Please read Lab 5 twice < Thurs. Thanks!

II. Cardiovascular System LS 2012 ch 9, Torstar Books 1984, DC 2013 Module 4, Guyton & Hall (G&H) 2011 +...
A. Circulatory vs Cardiovascular (CV)? cf + parts LS pp 229, CV vs Lymphatic, DC pp 23, 31
B. CV Pulmonary & Systemic circuits DC fig 4-1 p 24, LS fig 9-2b p 231
C. Arteries, capillaries, veins G&H + Torstar
D. Varicose veins? Phlebitis? DC
E. ♥ layers, box, chambers, valves, inlets, outlets LS fig 9-4 p 233, fig 9-2a p 231; DC pp 23-6
F. Normal vs abnormal blood flow thru ♥ & CV system Billy has a hole in his ♥ SI Fox 2009 fig 13.16, 13.17

III. Comments on Midterm & Tests Returned?
Cardiovascular (CV) = Heart + Vessels + Blood!
**NB**: Figure-8 loop

Pulmonary Systemic

Diagram of the circulatory system showing the pulmonary and systemic circuits. Key components include:
- Pulmonary arteries
- Pulmonary veins
- Vena cavae
- Aorta and branches
- Right ventricle
- Left ventricle
- Arterioles
- Venules

**Labels**:
- Capillary beds of lungs where gas exchange occurs
- Capillary beds of all body tissues where gas exchange occurs
- Oxygen-poor, CO₂-rich blood
- Oxygen-rich, CO₂-poor blood

D Chiras 2013 fig 4-1b
Dual Pump Action & Parallel Circulation
**Lymphatic System**

1. Lymph Nodes
2. Vessels
3. Lymph

No pump!
Lymphatic System
Alternative System of Circulation or Drainage System

Lymph Vessels || Veins
Lymphatic System Blockage in Elephantiasis from Mosquito-borne Parasitic Filaria Worm
Lymphatics collect run-off & are parallel to venules/small veins!
Microcirculation Exchange: 10 Billion Capillaries!

No cell > 25-50 μ away from a capillary! Like having bus stops @ every other block!

Guyton & Hall 2011 fig 1-2
Harvey Experiments: 1-way system of venous valves!
Skeletal Muscle Pump

Open valve

Closed valve
The Heart

The Living Pump
Human \(\heartsuit = 4\)-chambered box? 2 separate pumps?

Upper = Atria

Lower = Ventricles

Pulmonary | Systemic
---|---
RA | LA
RV | LV

Primer Pumps
Power Pumps
Time-out for Questions!

+ Brief Break!
(a) Location of the heart valves in a longitudinal section of the heart
Heart Valves Ensure Unidirectional Blood Flow!

Mom's valve!

Right AV valve  Left AV valve  Aortic or pulmonary valve

(b) Heart valves in closed position, viewed from above

Right atrium  Right AV valve  Chordae tendineae  Septum

Direction of backflow of blood

Right ventricle  Papillary muscle

(c) Prevention of eversion of AV valves

● FIGURE 9-4 Heart valves.

Valves must be normal & healthy to work well!
Human $\heartsuit = 4$ unique valves?
2 valve sets?

**Semilunar** = *Half-moon shaped*

1. Pulmonic/Pulmonary
2. Aortic

**AV** = *Atrioventricular*

3. R AV = Tricuspid
4. L AV = Mitral/Bicuspid
Heart Valve Orientation & Scaffolding

- Pulmonary ring
- Aortic ring
- Mitral ring
- Tricuspid ring
- Muscle fiber
Figure 9-6
Mitral and aortic valves.
Veins ➔ Atria ➔ Ventricles ➔ Arteries

http://www.nhlbi.nih.gov/health/topics/topics/hhw/contraction.html
Septal defect in atria
Patent or still open!

AO

Ductus arteriosus

PA