I. **Announcements** Tomorrow HR & BP Lab 4 + Required Notebook Check. Turn in today? Thurs Blood Chemistry Lab 5. Please read Lab 5 twice prior to Thursday. 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 or CV System

1. Heart
2. Vessels
3. Blood
**NB:** Figure-8 loop

**Pulmonary**

8

**Systemic**
Dual Pump Action & Parallel Circulation
Lymphatic System

1. Lymph Nodes
2. Vessels
3. Lymph

No pump!

DC 2003
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
The Heart

The Living Pump
Human heart = 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
Direction of backflow of blood
Septum
Right ventricle
Papillary muscle

(c) Prevention of eversion of AV valves

● FIGURE 9-4 Heart valves.
Human 💔 = 4 unique valves? 2 valve sets?

**Semilunar** = Half-moon shaped
1. Pulmonic/Pulmonary
2. Aortic

**AV** = **Atrioventricular**
3. \( \text{R} \) AV = Tricuspid
4. \( \text{L} \) AV = Mitral/Bicuspid
Heart Valve Orientation & Scaffolding

- Pulmonary ring
- Aortic ring
- Mitral ring
- Tricuspid ring
- Muscle fiber
Mitral and aortic valves.
Blood Flow

To systemic circulation (upper body)

Aorta

Right and left pulmonary arteries (to lungs)

Left pulmonary veins (return blood from left lung)

Left atrium

Aortic semilunar valve (shown open)

Left atrioventricular valve (shown open)

Left ventricle

Septum

Superior vena cava (returns blood from head, upper limbs)

Right pulmonary veins (return blood from right lung)

Pulmonary semilunar valve (shown open)

Right atrium

Right atrioventricular valve (shown open)

Right ventricle

Inferior vena cava (returns blood from trunk, legs)

To systemic circulation (lower body)

KEY

- O₂-rich blood
- O₂-poor blood

LS 2012 fig 9-2a p 231
Veins → Atria → Ventricles → Arteries

- Superior vena cava (from head)
- Right atrium
- Inferior vena cava (from body)
- Right ventricle
- Left atrium
- Left ventricle
- Aorta
- Endocardium
- Myocardium
- Pericardium
Patent or still open!

SI Fox 2009 fig 13.17 p 420
WOW!  SUPER 😊

~ TOP 5 - 10 ~

EXCELLENT!!

~ TOP 15 ~

GREAT EFFORT

~ TOP 20 - 25 ~
Class Frequency Distribution Report for BI 121 Midterm U14, Multiple Choice, Part II

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Mean Score: 77.21%