LECTURE # 23 – Friday OCTOBER 25, 2001

Outline

• Heart structure: wall, chambers, valves, vessels
• Circulatory systems

Heart Function

• HEART RATE = beats/minute
  — At rest: 75/min (100,000/day)
• STROKE VOLUME = ml blood/beat
  — At rest: 70ml/beat
• CARDIAC OUTPUT = ml/min
  — At rest: 5.25 l/min (8000 l/day)

Heart Wall

• Pericardium (fibrous & serous)
• Epicardium = visceral pericardium
• Myocardium = involuntary muscle
• Endocardium - inner lining of the heart chambers

Heart Chambers (x4)

• 2 atria - left & right
  — Separated by interatrial septum
  — Thin walls
• 2 ventricles - left & right
  — Separated by interventricular septum
  — Thicker walls (left is thickest)

Great Vessels of the Heart

• Superior & inferior vena cava
- deoxygenated blood
- Left & right pulmonary arteries
  - deoxygenated blood
- Left & right pulmonary veins
  - oxygenated blood
- Aorta carries oxygenated blood

**Remember**
- Arteries carry blood AWAY from heart
- Veins carry blood TO heart

**Valves of the heart (x4)**
- Atrioventricular (AV) valves
  - Tricuspid valve - RIGHT A/V
  - Bicuspid valve/ “mitral valve” - LEFT A/V
  - Prevent BACKFLOW of blood from the ventricles to atria when ventricles CONTRACT

- Semilunar valves
  - Pulmonary SV - between right ventricle & pulmonary artery
  - Aortic SV - between left ventricle and aorta
  - Prevent BACKFLOW from blood vessels back into ventricles

**Valves**
- Open when pressure is greater in the “pre” chamber than the “post” chamber
- Close when the pressure is greater in the “post” chamber than the “pre” chamber

**Valvular Heart Disease**
- Malfunction of a heart valve - causing regurgitation and other problems with blood flow through the heart
- Due to:
—rheumatic fever
—congestive heart failure

• Typically produce heart murmur
• Artificial valves

Circulation of Blood

• Systemic circulation
  - delivers OXYGENATED blood to all cells

• Pulmonary circulation
  - delivers DEOXYGENATED blood to lungs

Coronary circulation

• Blood supply to heart:
  - L & R coronary arteries branch off aorta
  - Coronary sinus drains into RIGHT atrium

Coronary Artery Disease

• Degenerative changes in coronary circulation

• Reduced oxygen supply to cardiac muscle

• Atherosclerosis
  —thickening & toughening of arterial walls

• Coronary ischemia => hypoxia

• Angina pectoris = chest pain

• Myocardial infarction = heart attack

• Diagnosis:
  - ECG = electrocardiogram
  - Coronary angiogram

Treatment options

• Balloon angioplasty

• Laser surgery

• Coronary artery bypass graft