Week 8 Lecture 0

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1 Administrative drivel

- Exams haven't been looked at – still a few makeups to be done
  - Could be a week or 2 before we get grades...

2 Anatomy and Physiology

2.1 Cardiovascular system continued...

2.2 Heart

2.2.1 Blood pressure

- *Blood pressure* is what moves the blood through the blood vessels
  - pressure generated by the heart with ventrical compression
  - ventricles contract, forcing more blood out into the vessels, increasing pressure
- when ventricles contract == **Systolic**
- when ventricles relaxe == **Diastoic**
- BP usually 120 / 80 (in milimeters of mercury) (140 is dangerous!) (120 == systolic pressure, 80 == diastolic)
  - BP = ratio of your blood pressure when ventricles are contracted and when the heart is relaxed.
- at high blood pressure vessels can begin to fail
- The **radial pulse** is felt on the wrist, just under the tumb
  - You can feel the blood pressure changing
- The **carotid pulse** is felt:
  - lateral to the trachea
  - meedial to the sternocleidomastoid muscle
- most pulses are in 65-100 bpm range
- In general, lower HR means a more efficient heart and better cardiovascular fitness
- lots of things effect HR
  - activity level
  - air temp

  - Standing/sitting/laying
  - emotions and stress
  - body size
  - medications
  - diet

2.3 Blood

- Red blood cells carry O_2 (and a small portion of the CO_2)
- white blood cells handle immune function
  - motile
  - if there's an infection, they can leave the blood vessels
- platelets govern blood clotting
  - lots of protiens are involved too
- plasma is the fluid that carries dissolved particles and wastes (carries most of the CO_2)
- blood is a connective tissue
- the arteries pulse too to maintain the pressure on the blood to get it to the capilaries
- Red blood cells:
  - Each cell carries around 200 million hemooglobin molecules
  - Each hemoglobin has a Hem, which is an iron atom that binds the oxygen, and can bind 4 oxygen
  - so each cell can carry about 800 million oxygen
  - no nucleus, so theres a dimple, only in mamals
- Blood clotting:
  - Platelets (small peices of red blood cells)
    - red blood cells get old, and some are recycled into platlets among other things (eg bile)
  - fibrin, fibrinogen (clotting protien)
    - forms a mesh over the injury and catch platlets which fill the holes, making it harder for blood to get through
    - then a scab forms and the capilaries that were broken are rebuilt
  - Hemopheliacs can't clot
- The volume of the blood in humans is about 5 liters (plasma + cells)
  - If this was evenly distributed over the body you would faint
- **Plasma**
  - makes up 55% of the blook
  - water, dissolved prooteins, electrolytes (salt ions), glucose, hormones, CO_2, clotting factors.
- clicker q: What do platelets do? Help blood clot

2.4 Blood vessels

- Arteries, veins, capilaries
- arteris get narrower as they move away from the heart
- Veins get larger as they move toward the heart
- these differences in diameter helps maintain blood pressure
- blood is moving from high to low pressure at all times
- eventualy, thin enough arteris are called artiriols and they reach the capilaries
- the capilaries in total length is massiive
- Artieris:
  - Carry oxygenated blood from the heart to the systemic tissues; deoxygenated (somewhat) blood to the lungs
  - Thicker, more muscle – helps move blood towards capillaries in the tissues
  - touch connective tissue on outside to prevent too much expansion
    - sometimes this fails, and the artery will burst, leading to internal bleeding
  - 2 layers of smooth muscle to maintain blood pressure
  - has an epithelial layer allowing blood to moove through with low friction
- Veins:
  - Carry deoxygenated blood back to the heart from the systemic tissues; oxygenated blood from the lungs
  - don't have much muscle, but they have valves!