Welcome to Class!
Because of the tragic murder of Albert, we now need to find a qualified replacement...

- Emails sent throughout the week
- We have 4 job applicants that are READY
- Lets meet them!
The Lymphatic System and Immunity
Remember this?

- Blood passes through the blood vessels, into the arterioles, and finally into the capillaries...
- The capillary beds surrounding tissues that need oxygen and also need carbon dioxide to be removed
Capillary Exchange

**OUR CELLS**

**Arteriole**
- Receive Oxygen

**Capillary**
- Net Hydrostatic Pressure

**Venule**
- Expell Carbon Dioxide
Leakage...

- Thin layers of blood capillaries can and will leak!
- The leaked fluids total about 3 liters every day!
- That is A LOT considering that the body only has about 5 or 6 liters of total blood fluid!
- These fluids MUST be returned to the blood or terrible things happen.
- Erythrocyes themselves are too large to escape but the plasma leaks out along with many other things!
LYMPH (Interstitial fluid)

- **Interstitial fluid:** The space in between cells where a lot of this escaped fluid collects. Whenever there is a space in between cells in the body, its called interstitial space.
- Lymph capillaries absorb A LOT of this fluid.
  - They are the smallest lymphatic vessels that collect fluid from the capillaries
  - Form a web around the capillaries
  - Unlike blood vessels, they are permeable to A LOT of things
  - Allow viruses, bacteria, and even cancer causing cells to enter in the vessels
What do you think happens when there is a disease that prevents the lymph capillaries from absorbing fluid?
EDEMA or in severe cases... Elephantitis
COULD ALLOWING BACTERIA, VIRUSES, AND CANCER CELLS INTO THE BODY BE A GOOD THING?
Lymph Nodes: The Security Checkpoint for Your Blood

- It is actually a good thing lymphatic capillaries are permeable
- The lymph fluid must pass through the lymph nodes before returning back to the blood
- **Lymph Nodes:**
  - Testing (checkpoint) stations
  - Create lymphocytes that kill the bad guys
  - This constant filtration system makes your blood mostly free from dangerous pathogens!
- The clean fluid is dumped via the left and right subclavian vein back into the heart
So how does lymph travel with no heart to pump it?

- Skeletal Muscles contract as you do your daily activities and push lymph upwards
- Smooth muscles surround the larger lymphatic vessels and contract
- Pressure changes from your thoracic region bring lymph up as well
Lymph Nodes...

- When lymph nodes find a foreign invader, they become inflamed and fight pathogen. This cause them to swell...
- This is why doctors check for swollen lymph nodes as a sign of infection
- The tonsils are a great indication of this.
Mucosa Associated Lymphoid Tissues

- **Tonsils**: Guard and inspect everything that comes into contact with the pharynx.
- **Peyer's Patches**: Guard and inspect the small intestines.
- **Appendix**: Protects the bottom portion of the intestines and destroys invaders.
An evil invader somehow passes the skin and the lymphatic system’s responses... what happens now?
The Immune System

The warrior cells that fight for our health...