Week 10 Lecture 2

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1 Administrative drivel

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2 Defence and repair – immune system

- Allergic reaction
  - **Overactive** inflammatory response
    - Usually an 'innapropriat' response, when no response is really needed.
  - Hay fever == inflamed sinuses
  - Hives == inflamed skin
  - an allergic reaction is a reaction to something that is **not threatening**
  - These are usually treated with an antihistamine, to counteract the histamines that trigger the inflamation response
- Also
  - General responses to viral invasion
- Example – generalized viral defense (innate)
  - Virus-infected cells release *interferons* when they think they're infected by a virus
    - Viruses use the cell's $DNA \rightarrow RNA \rightarrow protein$ machinery to make more viruses.
    - Viruses lack the tools to reproduce without doing this
    - After copying their RNA for a while, the cell will burst
  - Neighboring cells (uninfected) pick up this signal and destroy RNA and reduce protein synthesis
  - Neighboring cells (infected pick up this signal, and kill themselves (called apoptosis)
  - This signal also activates the immuce cells (usually T cells) – at this stage it's a specific response (adaptive)

2.1 Acquired Immunity

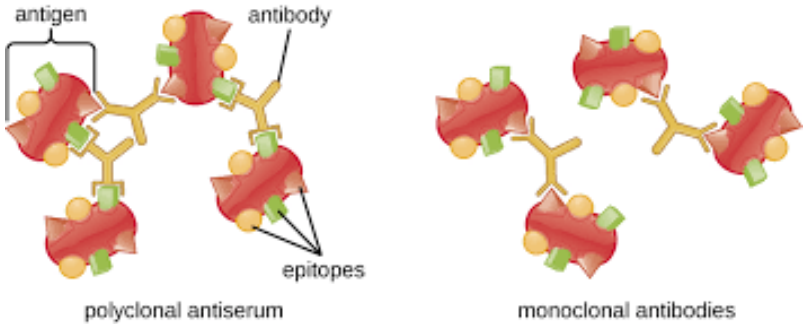
- Specific defence against a specific enemy – 3rd line of defense
  - Recognition of a unique invader
  - Not just which **speecies** of invader, but which *strain*
- Two responses to infection
  - General responses

    - note – macrophages don't care what kind of bacteria they're killing
  - specific – acquired immunity

- Steps:
  - Find, recognize, and deestroy **specific** invaders
  - **memory** of previous invaders
    - allows for faster response to future infections of the same type
  - Gets a **wake up call** from innate/general response

- Specific immune respons:
  - ADA 3rd line of defense
  - AKA Acquired, Adaptive, or Learned immunity
  - Important Terms:
    - **Pathogen** == infectious agent (e.g. bacterium)
    - **Antigen** == surface proteins found on all cells – identifying protien mentioned before
    - **Antibody** == protein produced by immune cell, used to recognize foreign or self antigens
    - **antibiotic** == bacteria-killing drug
      - Only work on prokareotes (bacteria, etc. ring DNA which is silly), not on eukareotes (mamals, trees, etc. thinggs with nuclei)
      - chemicals that kill eukareotes tend to also kill the host – no good

- Antigen/antibodies
  - The antibodies identify antigens by their shape
    - They bind to the antigen and this labels the cell for distruction
  - antibodies can bind to 2+ antigens, allowing them to group cells together



- Where can you be infected?
  - **EXTRAceullarly**
    - inside your body, but outside cells
    - **B-type** white blood cell response
      - produce antibodies
  - **INTRAcellularly**
    - Inside your cells
    - **T-type** white blood cell response (T for Thymus – where T cells are mostly made)
      - Do not produce antibodies
      - also called helper T cells
  - pathogens that are both: bacteria, protozoa

  - parasites are more extra-, rather than intra
  - viruses are almost exclusively intra-

- Extracellular infection:
  - pathogen enters
  - pathogen has antigens – on their surface
  - B-cells have antibodies
  - B-cells check if the antigns are part of **self**
  - When B-cells don't recognize the antigens as self, they mark the pathogen with an antibody for distructionn
  - There are many kinds of B-cells, all with different antigens on their surface – 2 billion or something
  - Membrane bound Ig – imunoglobulin – where the antigens live
  - when the B-cell finds an antigen, and binds it's antibodies, it starts too clone itself
    * once the B-cells have multiplied enough, they turn into plasma cells (same as B-cells, but with antibody inside instead of outside)
    * the plasma cells dump their free antibodies into the blood stream allowing it to label the invading cells throughout the body.
  - Some B-cells stick around, called memory B-cells, allowing for faster response in the future