3.1 notes

October 15, 2019 9:08 AM

Science 8

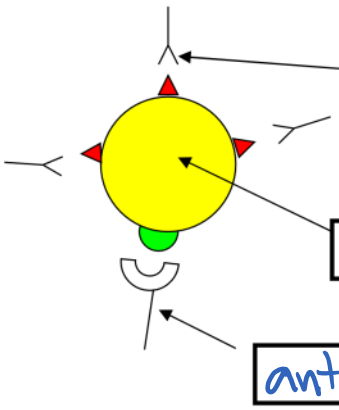
3.1: The Immune System

Pathogens cause disease

The immune system attacks and kills invaders such as pathogens and antigens.

Antigen – any substance the body can't recognize, usually non-living.
ex. viruses

Antibody – A specific particles created by the immune system to destroy specific disease-causing invaders.



Immune System – the body system that defends against disease causing substances ex. - viruses - bacteria - cancer cells.

Pathogen – an organism that cause disease ALIVE!!! ex. Bacteria cancer cells

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White blood cells – Blood cells that fight infection and help prevent the growth of cancer.

↳ Key players!

A scanning electron microscope (SEM) image of normal circulating human blood. Seen are RBC, knobby WBC and platelets.

Ways to transmit diseases:

1. direct contact: Shaking hands or sharing drinking containers or bodily fluids with an infected person.

2. Indirect contact: being near infected people → sneezes can travel up to 5m.

3. Contaminated food/water.: Eating foods, such as eggs and some meats, that are infected with Salmonella bacteria. Drinking water infected with E. coli bacteria can also result in serious illness.

4. Animal Bites: being bitten by an animal carrying a disease. ex. rabies tetanus

❑ Do 3-1 activity "Pass it on" Page 101

To DO:

- 3.1 Review WS Q's # 1-8
  - use textbook starting @ p.100
- Read p.100-106 - do Qs p.106 #1-6

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So How Do Our Immune Systems Respond to Pathogens?

First Line of Defense:

The skin and inner linings of the body systems are the **first line of**

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The Skin and inner linings of the body systems are the **first line of defense:**

- Skin acts as a mechanical barrier – most infectious agents cannot penetrate the skin
- sweat/oil on skin are slightly acidic which prevents pathogens from growing on the skin
- Saliva, tears and urine act to expel pathogens
- Enzymes in saliva and tears are antibacterial
- Gastric Juice in the stomach is also acidic and helps to destroy pathogens
- Coughing/Mucus/Cilia – prevents pathogens from entering respiratory system (or removes ones that have entered)

Second Line of Defense:

- Once a pathogen has entered the body and passed the first line of defense, the second line of defense, your immune system, kicks in.
  - Your immune system recognizes foreign cells or pathogens as invaders.
  - Different people will respond differently to the same pathogen depending on their immune system (i.e. Elderly vs. young person, healthy person vs. person with cancer)

Active Immune System

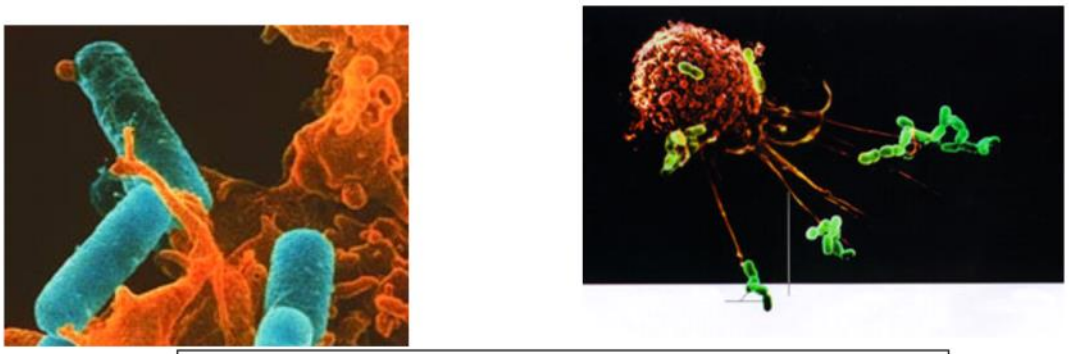
The key players in the active immune system are the white blood cells.
They identify invading pathogens and either

1. engulf them and destroy them — pac man
2. produce antibodies which kill them, or
3. produce antitoxins which neutralize toxins made by the invaders

There are **two** types of immune responses:

1. Innate Immune Response
   - Born with it
   - Quick
   - non-specific - Your body will react the same for any invader, virus or bacteria

1. Flow of fluid, cells and dissolved substances rush to the site of infection through blood
2. fever develops
3. Swelling and redness in the area with the infection – Inflammation
   a. Ex. Inflammed tonsils – infected with bacteria or virus become red and swollen.
4. Increase in White Blood Cells called Phagocytes – Fight the infection by "swallowing" invader cells.



White blood cells or phagocytes engulfing disease-causing bacteria

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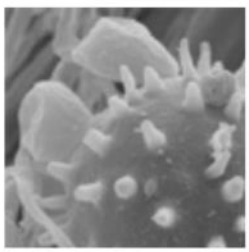
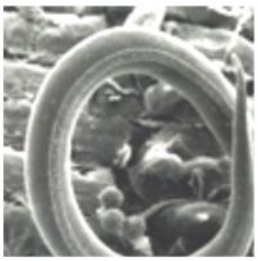
2. Acquired Immune Response

- developed over life (i.e. you acquire it)
- Slow – often takes a week to develop (your body needs time to figure out which response will best defeat the invader.
- Highly Specific to one type of **pathogen** or **antigen.**
  - antigens is a non-living substance that is foreign to your body that triggers an immune response - virus, splinter, pollen, etc.
  - Pathogens is a living disease causing organism or substance – bacteria, etc.





Two different types of plant pathogens

B Cells

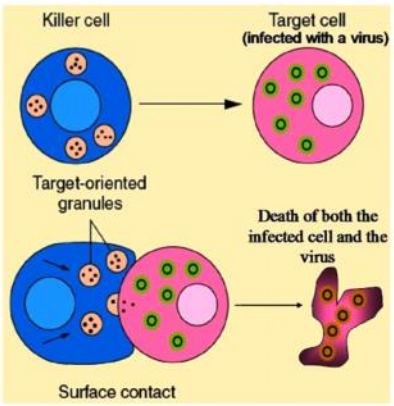
1. B Cells recognize invaders
   - Each type of bacteria, virus or other foreign body has molecular markers which make it unique.
2. B Cells make antibodies to fight the specific antigen.
   - **Antigen** – a marker that triggers the formation of WBC armies
   - **Antibody** – molecules which bind to antigens and are recognized by WBC.
3. Antibodies attach to and destroy the antigens and pathogens carrying antigens.
4. B Cells now recognize the antigen and will produce antibodies that cover the pathogen.
5. **Antibodies** prevent pathogen from infecting the body, or mark it to be destroyed by WBC.
6. Body is continually producing more B Cells to fight other antigens in the body.

T Cells

1. When an antigen or pathogen has invaded a cell, the WBC's recognize this has happened and T Cells are created.

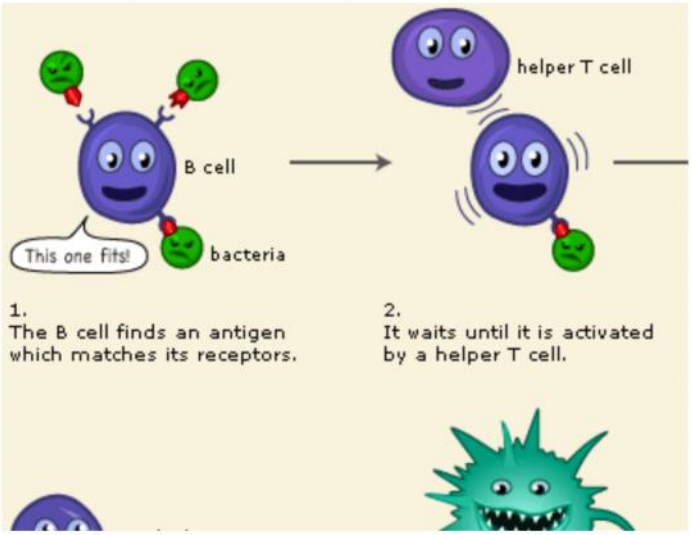
2. Helper T Cells activate B Cells to produce antibodies.
   a. **Antibodies** now recognize this pathogen or antigen and can help against further infection – IMMUNITY

3. Killer T Cells can kill antigens or pathogens directly and on their own.



Ex. Chicken Pox – If you have had chicken pox, your body stores chicken pox antibodies on B cells (memory B Cells – because they remember the pathogen).

Acquired Immune Responses gives you active immunity. Your body now remembers which antibodies to use to kill certain pathogens and antigens that have invaded your body before



Innate vs Acquired Immunity

Innate Immune System	Acquired Immune System
non-specific	very specific
QUICK - almost immediate	SLOW - may take up to 1 week.
no memory	leads to immunity through memory.

- p. 105

Draw Figure 3.8 from the textbook.
Make sure to label the 4 steps of the immune response (Recognition, Mobilization, Disposal, Immunity)

3.1 Review WS: finish it!

1.