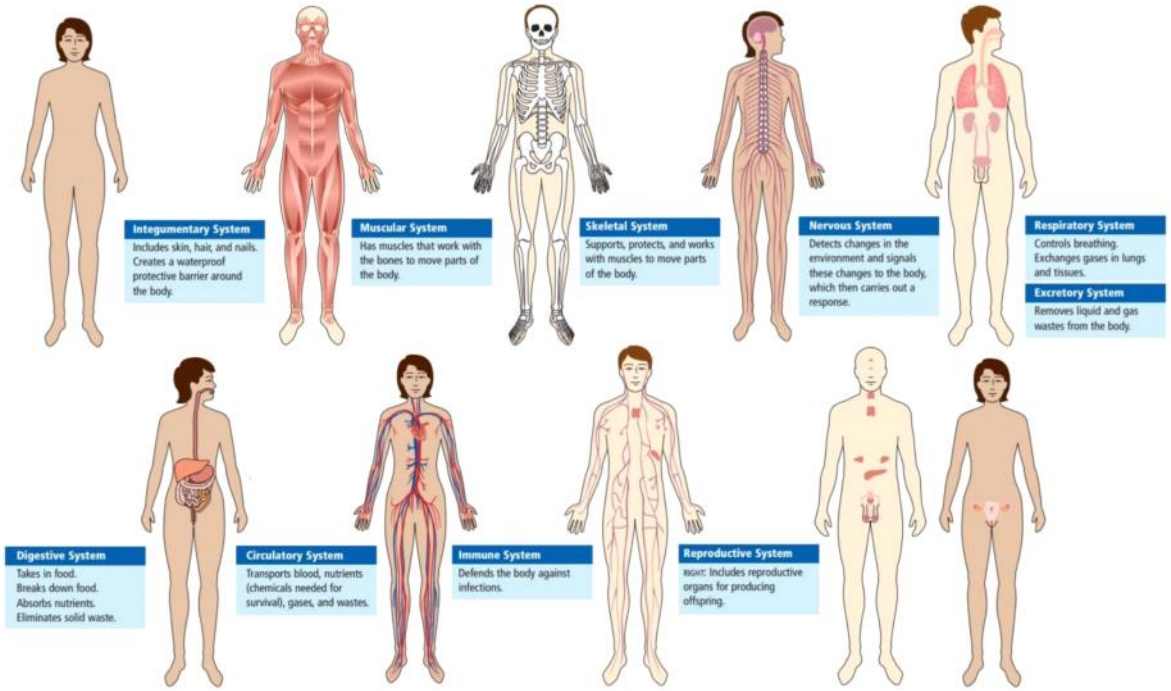
Chapter 1 1.5	The Immune System P. 54-63 & P. 100-119 BC Science 8, P. 48-63 BC Connections

Vocabulary & Concepts

body system	immune system	lines of defense	inflammation
antigen	white blood cell	outbreak	epidemic
pandemic			

The Body Systems

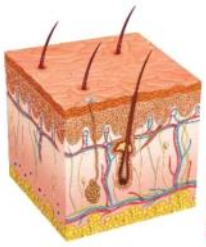


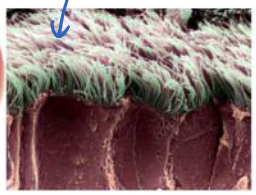
The Immune System

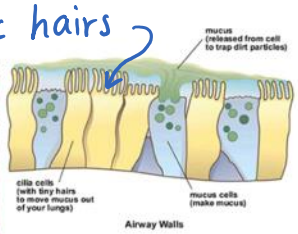
Brainstorm: What do you already know about the immune system? What organs or body parts are involved in the immune system?

The immune system defends the body against infection and disease causing substances such as bacteria, viruses and cancer cells. It contains several lines of defense that help protect us against these pathogens.

The 1st line of defense







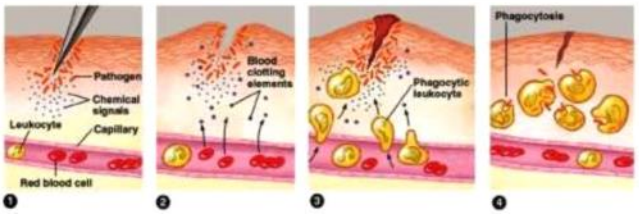
stomach acid

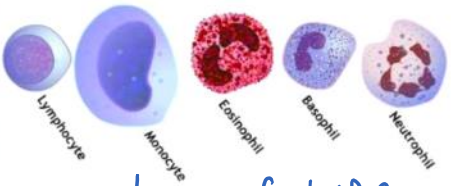
The **first line of defense** includes

physical barriers

- skin, lining of organs
- sweat and natural acids that kill pathogens on the skin's surface
- hairs in the respiratory system to trap and sweep pathogens away (or small hairs, or hair structures, or cilia)
- mucus and phlegm to trap pathogens
- Strong acid in your stomach to kill pathogens

The 2nd line of defense





many types of WBC

show video

The **second line of defense** includes

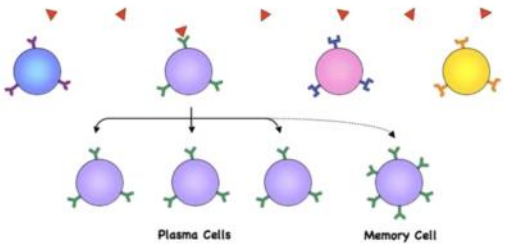
- white blood cells (WBC) which engulf and kill pathogens, release chemicals that aid in this process
- inflammation, the body's response to injury or infection. The affected area receives more blood = swelling to allow more white blood cells to arrive. Area's temperature increases for an antibiotic effect.

↑ connect with fevers

The 3rd line of defense

The **third line of defense** includes

- special memory WBCs that remember what a pathogen looks like so that the immune system is ready for future attacks.



Disease Outbreaks

Brainstorm: What outbreaks can you think of that have happened in history?

Outbreak	Epidemic	Pandemic
A sudden occurrence of a disease in a community where the number of affected individuals is greater than expected. An example is E.coli food poisoning	A disease that spreads to many people rapidly in an area. An example is Polio 1916 in the US later became pandemic	An epidemic that has spread over several countries or continents, or around the world. This is an outbreak on a global scale. An example is Spanish flu 1918, Bubonic plague 1347 } viral

Brainstorm: There is a sudden outbreak of CW virus in West Vancouver. The virus induces severe vomiting and dehydration and has infected 150 individuals over 8 days.

You work for the local health authorities. What steps would you take to insure that the virus doesn't spread further?

- advertise hand washing
- recommend stay home if sick
- alert doctors or train them

etc...

Measures to hinder the spread of the CW virus has failed. You work for Health Canada. What steps would you take to insure that the virus doesn't spread globally?

- fund vaccine research
- limit travel across borders (flights, trains, ships)
- set up quarantine
- work with other countries in prevention / treatment

Chapter 1 1.6	Vaccines & Antibiotics P. 64-79 BC Connections

Vocabulary & Concepts			
vaccine	immune response	immunity	antibiotic
antibiotic resistance	penicillin	superbug	

Vaccines

Vaccine: a substance that causes an immune response that prepares the immune system for future attacks

- Analogy: We respond to a fake fire in a fire drill by evacuating the building. We are then prepared for a real fire because we have practiced the proper response.

Types of Vaccines		
Vaccine Type	How it Works	Examples
Live, attenuated vaccine	• you are injected with live, but weakened microbes, that don't cause disease • your immune system responds and remembers • receive lifelong immunity after 1-2 shots	Measles Mumps Chickenpox Yellow fever
Inactivated vaccines	• you are injected with dead microbes • your immune system responds somewhat and remembers • receive immunity ONLY if booster shots are maintained	Hepatitis A Rabies Whooping cough
Subunit vaccines	• you are injected with specific pieces of microbes • your immune system responds and remembers • receive immunity after several doses	Hepatitis B Flu
Toxoid vaccines	• you are injected with inactivated toxins from microbes that don't cause disease • your immune system responds and remembers • receive immunity ONLY if booster shots are maintained	Diphtheria Tetanus

Review question: what line of defence, or what is responsible for "remembering"?

- 3rd line, special memory cells

Benefits of Vaccines	
Individual immunity	you avoid getting horribly sick all the time.
Population immunity	If everyone is vaccinated, the disease can't spread, even if a few are unvaccinated
Disease eradication	If everyone is vaccinated, the disease has no where to go, so it dies out (like smallpox last case 1977)
Economic savings	Billions of $ saved in the health care system. Treating disease is expensive.

Sometimes people choose not to vaccinate because severe reactions are possible

- high fever
- severe allergic reactions on very rare occasion, permanent damage
- brain infection (meningitis)

However, these reactions are very rare. It is important to remember that the possible side effects for each vaccine is different. Over the last decade, it has been scientifically proven countless times that vaccines do NOT cause two side effects that have been popularized on social media: leukemia and autism.

- Lead a discussion/debate. Should it be mandatory to vaccinate infants?

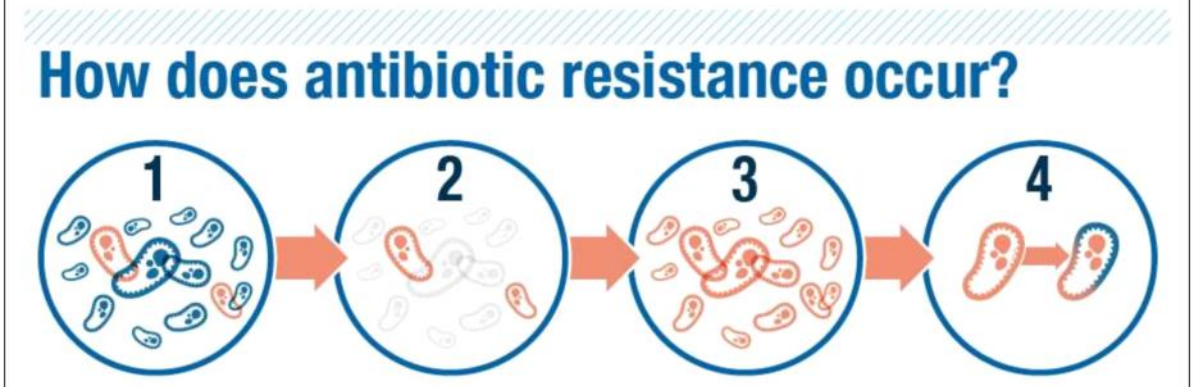
* present facts not opinions this section, be careful

Antibiotics

Antibiotic: chemical that affect bacteria

- kills bacteria (some dissolve cell membranes!)
- prevent bacteria from growing / reproducing
- DOES NOT WORK ON VIRUSES !!

In your own words: Watch *Antibiotic Apocalypse* and use the image below to describe what **antibiotic resistance** is. How does it occur? What is a **superbug**?



1: Very few bacteria are naturally resistant to antibiotics

2: Antibiotics kill non resistant bacteria only

3: Resistant bacteria take over (no competition)

4: Resistant bacteria give resistant DNA to other non-resistant bacteria

superbug = resistant to many antibiotics

* mention many antibiotics were discovered from plants, fungi, algae (which is why habitat loss is bad)
* mention last line of defence antibiotic failed just last year in China - article on my Weebly
* play that video Calindy[6] sent