Objectives

- Describe how bacteria and viruses cause disease.
- Explain the difference between lysogenic and lytic viral infections.
- Explain how to prevent bacterial or viral infections.
- Explain how the body reacts to infections.

Why Do We Get Sick?

- Organisms or substances that cause disease are known as **pathogens**.
- Disease occurs when these pathogens get into our body and cause **conflict**.
- Pathogens can be:
  - Protists
  - Bacteria
  - Viruses
  - Other nonliving particles

Gross!

Bacterial Disease

- Bacteria can **disrupt** equilibrium in the body by interfering with normal functions
- There are two main ways that this happens:
  - **Breaking down** cells and tissues for food
    - Example: *Myobacterium tuberculosis*
  - Release **toxins** that interfere with normal functions
    - Example: *Streptococcus*

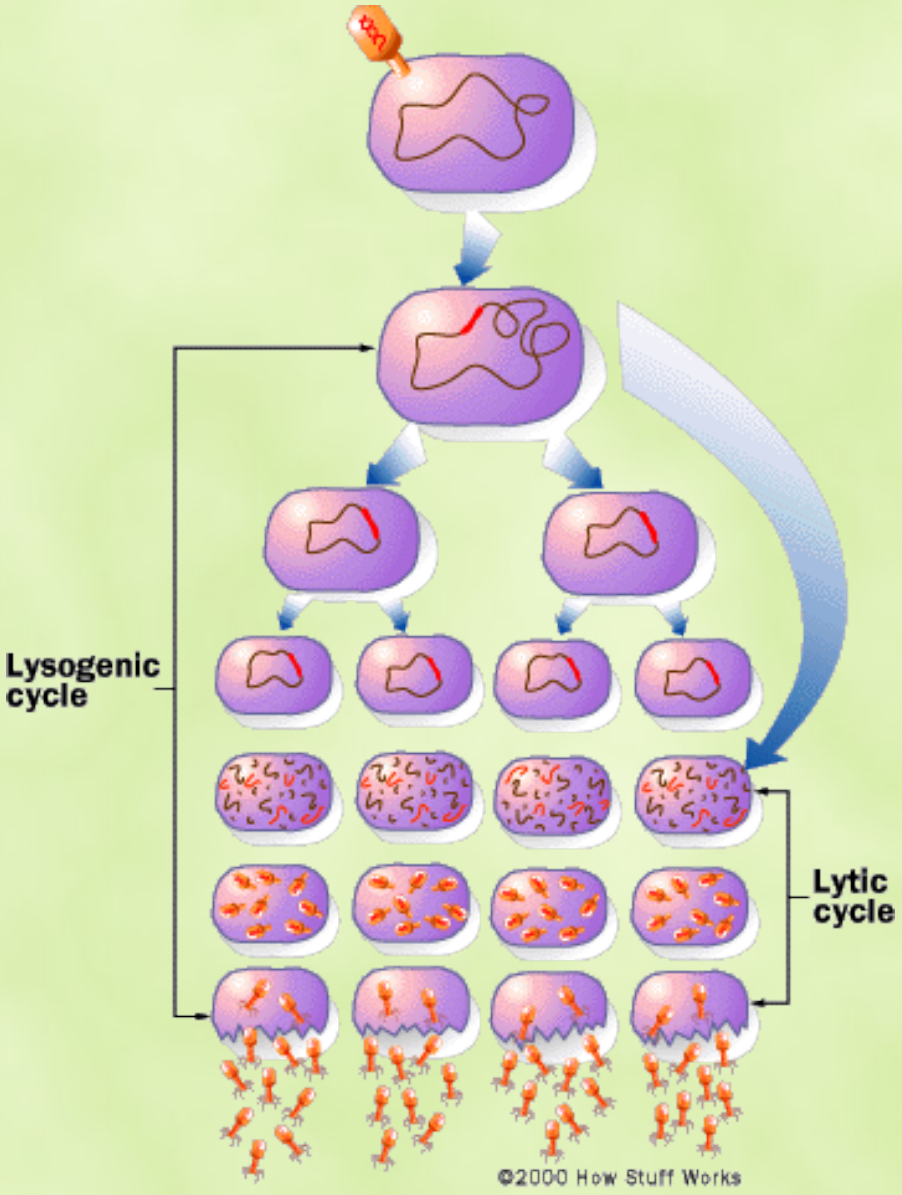
Non-living Pathogens

- Viruses also disrupt the body's equilibrium
- Most times viruses are more specific regarding which cells they attack.
  - Example: Poliovirus attacks nerve cells
- Viruses attack cells by injecting genetic information into the cell.

- Tiny particles that act as pathogens are called prions.
  - May cause disease by forming protein clumps

Viral Infections

- There are two stages that viral infections go through:
  - Lysogenic
  - Lytic
- During the lysogenic stage the viral DNA or RNA replicates indefinitely
- During the lytic stage the infected cell begins to produce more viruses from the genetic information and the cell eventually bursts, or lyses



How do you prevent disease?

- Once infected, bacterial diseases can be treated with **antibiotics,** or compounds that block the growth and reproduction of bacteria.
  - Too many antibiotics can lead to more resistant bacteria
- Viruses cannot be treated in this way.
- Bacterial and viral diseases can be best prevented by **vaccines**
- A vaccine introduces a preparation of **weakened or killed** pathogens to the body allowing the body's immune system to work

The Human Immune System!

- Our bodies come equipped with a defense system against disease
- The immune system has two defenses in place:
  - Primary Defenses
  - Secondary Defenses

Our body, the fortress

- The wall, our **skin**
  - Keep pathogens out because they cannot **penetrate** it
  - **Oils and sweat** creates an acidic environment that kills pathogens
  - **Mucus** traps pathogens that try to slip in through the openings, such as nose or mouth
- The guards, **inflammatory response**
  - When pathogens get through the skin, white blood cells called **phagocytes** leave blood vessels and enter tissues to "eat" the invading bacteria – this is what causes **inflammation**.

Our body's personal army!

- If pathogens get through the primary defenses, they trigger the **immune response**
- Any pathogen that triggers this is called an **antigen**
- Our body's have cells called **B lymphocytes**, or **B cells** that are able to recognize antigens
- When an antigen is detected, the B cells grow and divide rapidly to form plasma cells and memory B cells.

Our body's personal army!

- The plasma cells, then produce **antibodies** which recognize and bind to antigens
- This makes it easier for phagocytes to destroy the antigens
- Antibodies are made specifically for each antigen
- Millions of memory B cells remain in the body once the pathogen is gone
- These memory B cells decrease the response time because they are able to more quickly make antibodies for specific antigens.
- Vaccines introduce weakened antigens, which lead to the creation of memory B cells

- Video on Immune System

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