Overview of the Immune System

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(Immunity)

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Lecture 1.

- **Why aren’t non-specific defenses enough? Why do we also need specific defenses?**

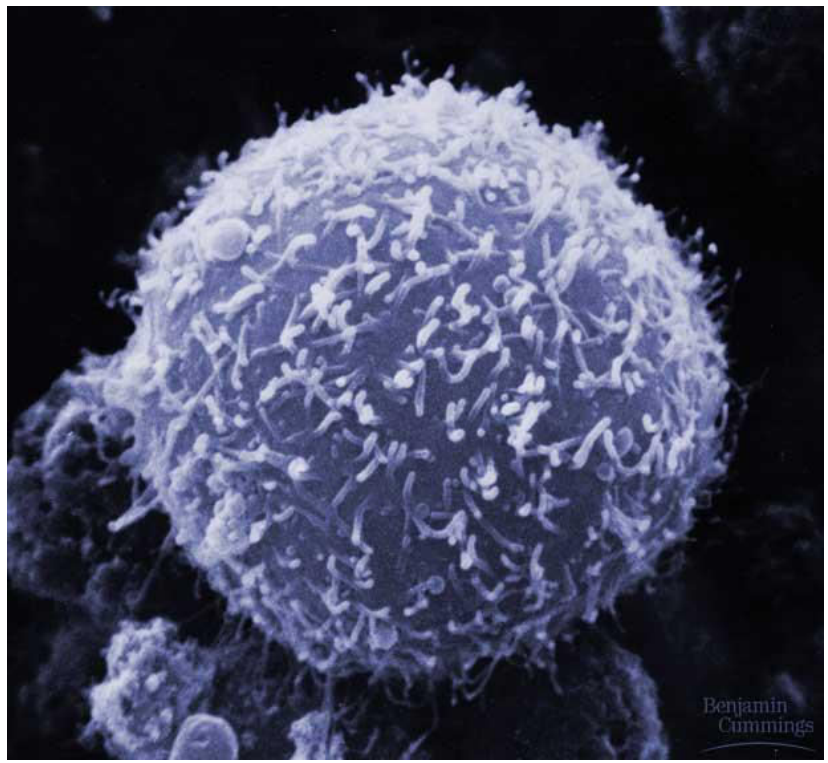
WORK TOGETHER

Specific defenses

- Specific defenses are those that give us immunity to certain diseases.
- In specific defenses, the immune system forms a chemical “memory” of the invading microbe. If the microbe is encountered again, the body reacts so quickly that few or no symptoms are felt.

Acquired Immunity

- **Acquired immunity** is the body's second major kind of defense.
  - Involves the activity of **lymphocytes**.



Major players

- **The major players in the immune system include:**

1. Macrophage
2. T cells (helper, cytotoxic, memory)\
3. B cells (plasma, memory)
4. Antigen presenting cells (APC's)

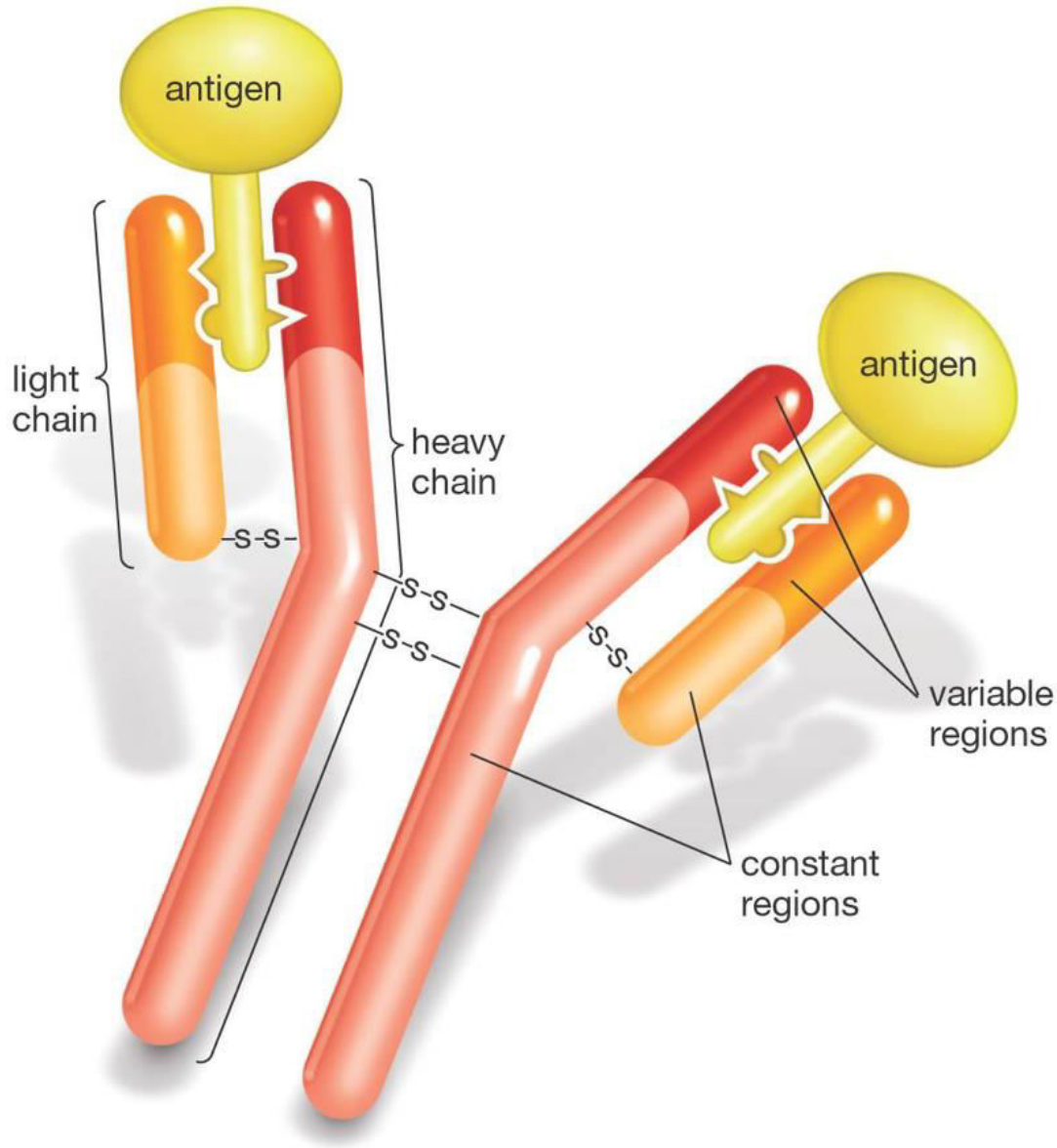
- (-macrophage (MØ,dendritic cells (DC) &B cells
- Antibodies

Some vocabulary:

- Antibody: a protein produced by the human immune system to tag and destroy invasive microbes.
- Antibiotic: various chemicals produced by certain soil microbes that are toxic to many bacteria. Some we use as medicines.
- Antigen: any protein that our immune system uses to recognize "self" vs. "not self."

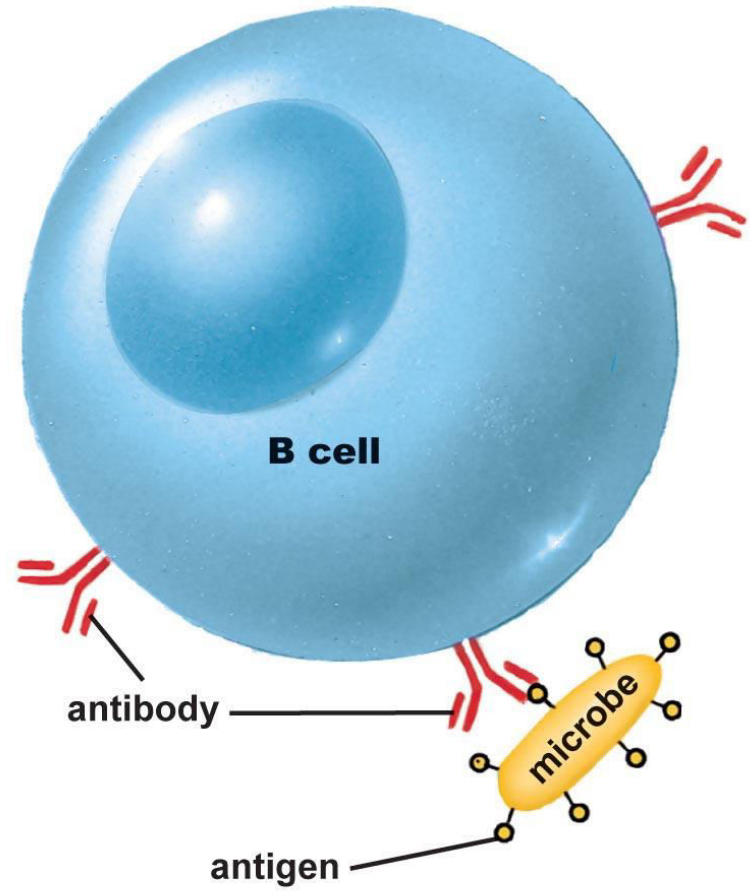
Antibodies

- Antibodies are assembled out of protein chains.
- There are many different chains that the immune system assembles in different ways to make different antibodies.



Antibodies as Receptors

- Antibodies can attach to B cells, and serve to recognize foreign antigens.



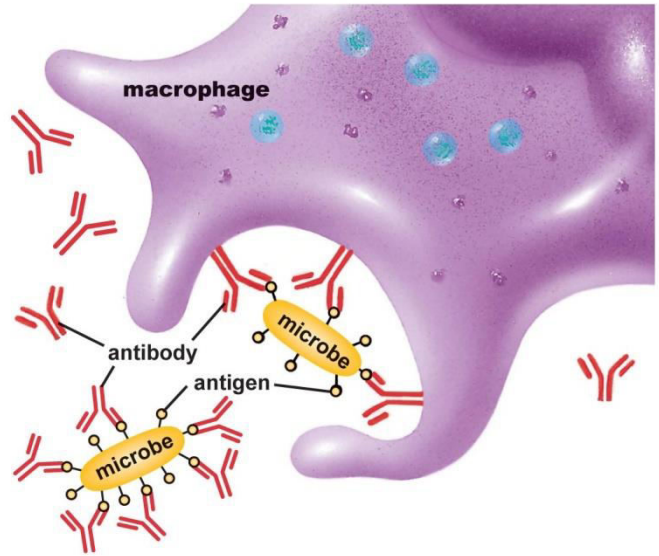
(a) Antibody receptor function

Role of antibodies

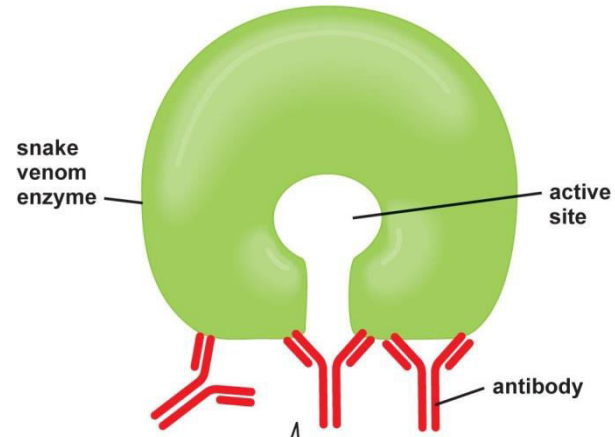
- Antibodies released into the blood stream will bind to the antigens that they are specific for.
- Antibodies may disable some microbes, or cause them to stick together (agglutinate). They “tag” microbes so that the microbes are quickly recognized by various white blood cells.

Antigens as Effectors

- Free antibodies can bind to antigens, which "tags" the antigen for the immune system to attack and destroy.

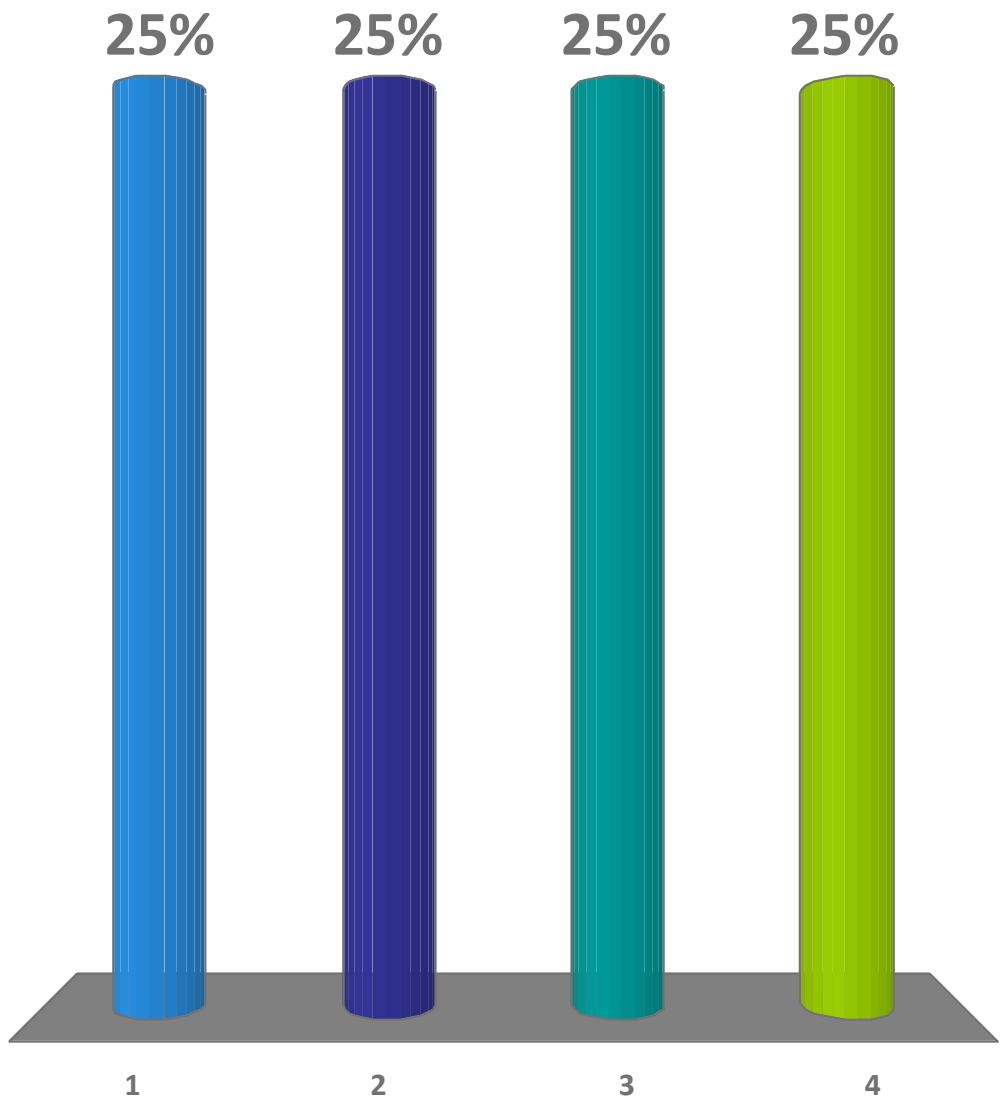


(b) Antibody effector function



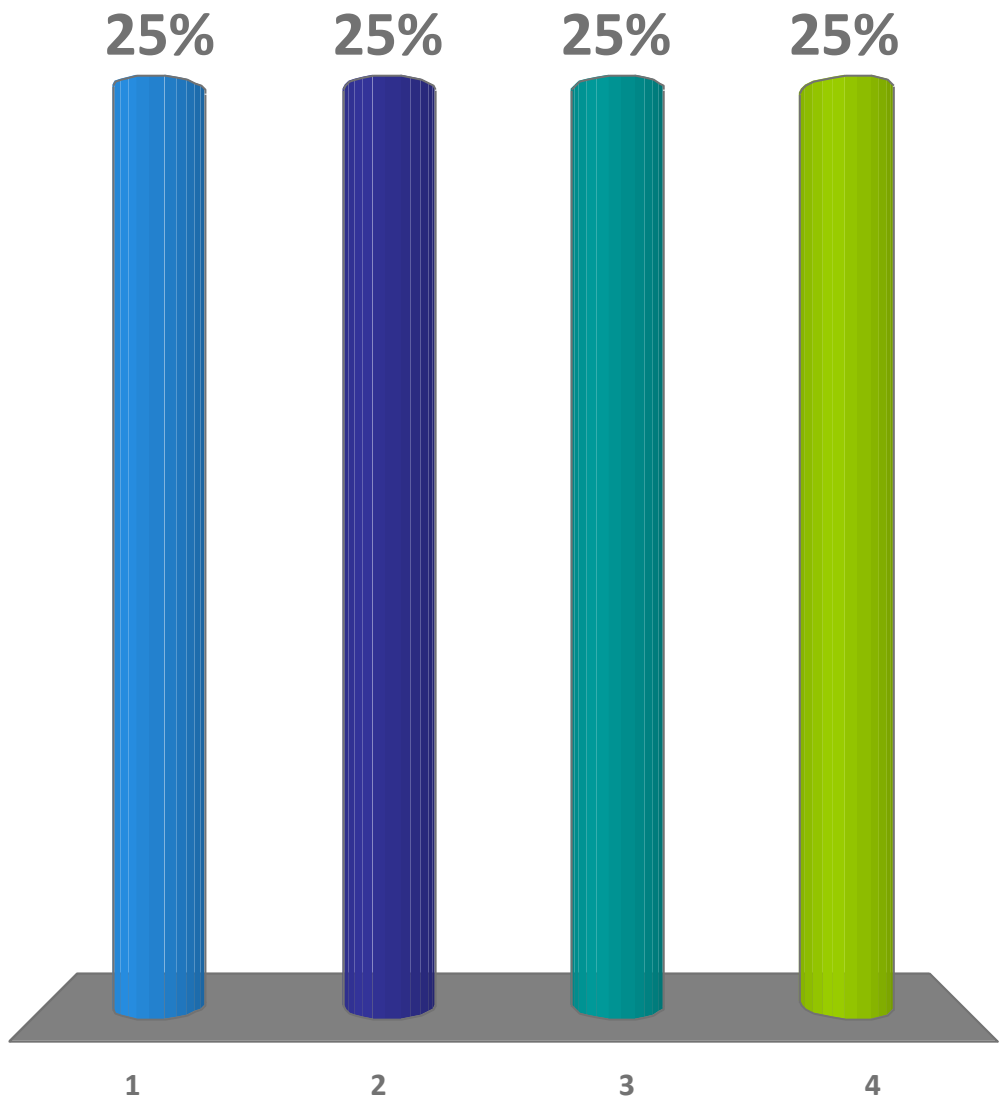
A foreign protein that enters the body is an:

1. antibiotic.
2. antigen. ✓
3. antibody.
4. anti-inflammatory.



The specific immune response is triggered when:

1. A macrophage delivers an antigen to a T-helper cell.
2. Plasma cells begin making antibodies.
3. Pyrogen stimulates a fever.
4. Clonal selection of B-cells occurs.



- Why is it important for the immune system to have a way of stopping the immune response?
- Why not just keep going and fight off everything as it comes?

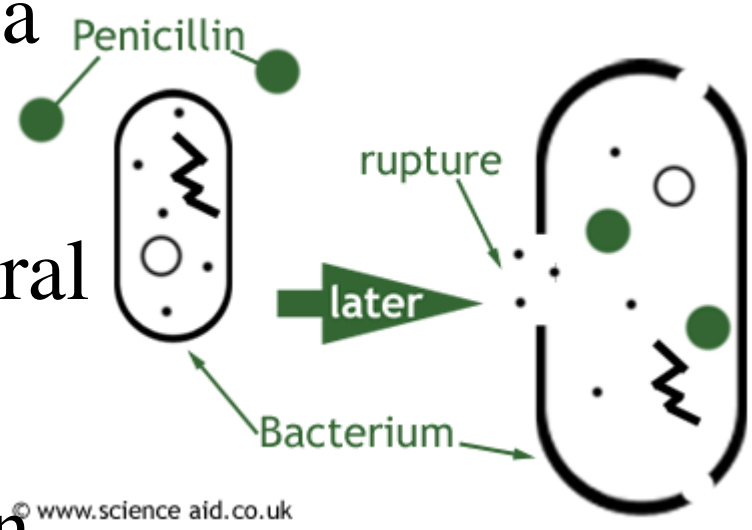
WORK TOGETHER

Helping the immune system

- Medical science has created to systems for augmenting the human immune system:
  - Antibiotics (NOT the same as antibodies)
  - Vaccines

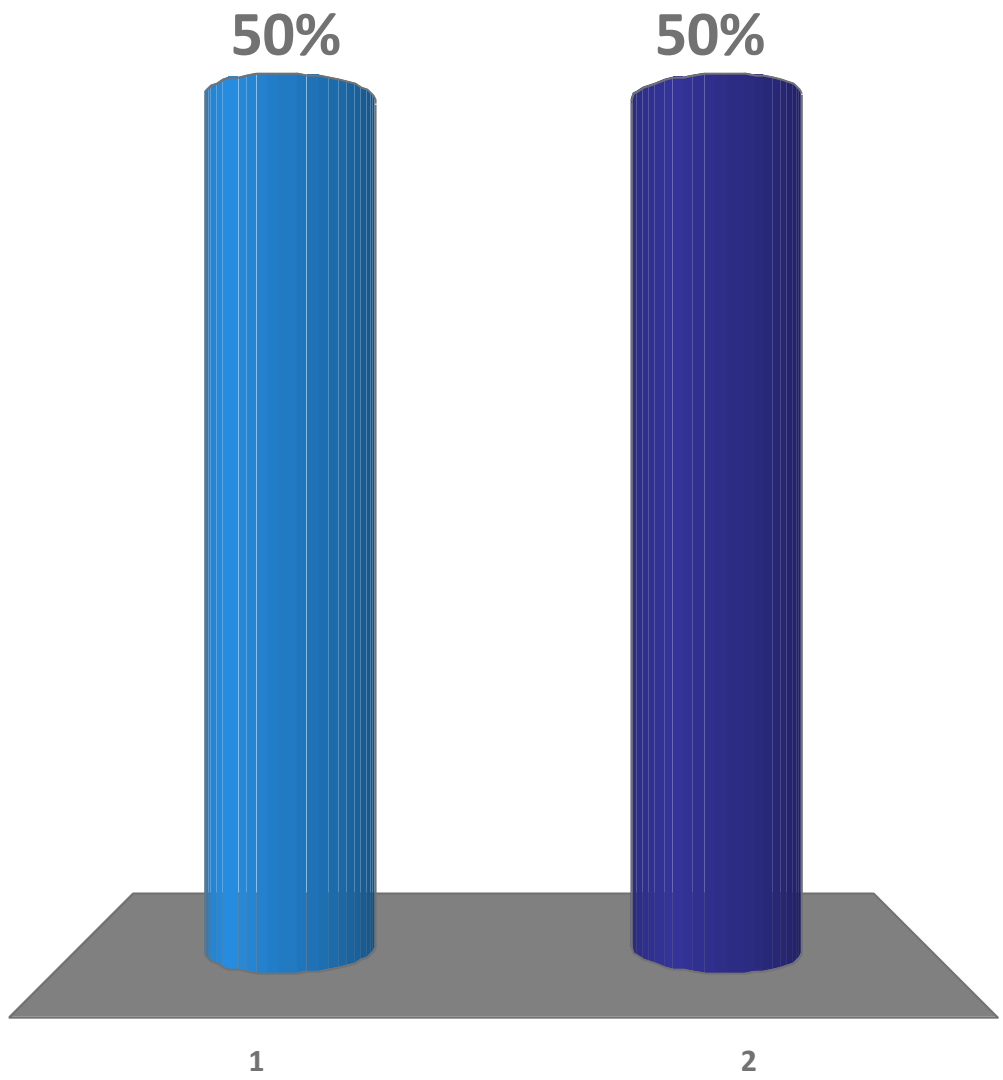
How antibiotics work

- Antibiotics help destroy bacteria (but not viruses).
- Antibiotics work in one of several ways:
  - Slowing bacteria reproduction.
  - Interfering with bacterial cell wall formation.



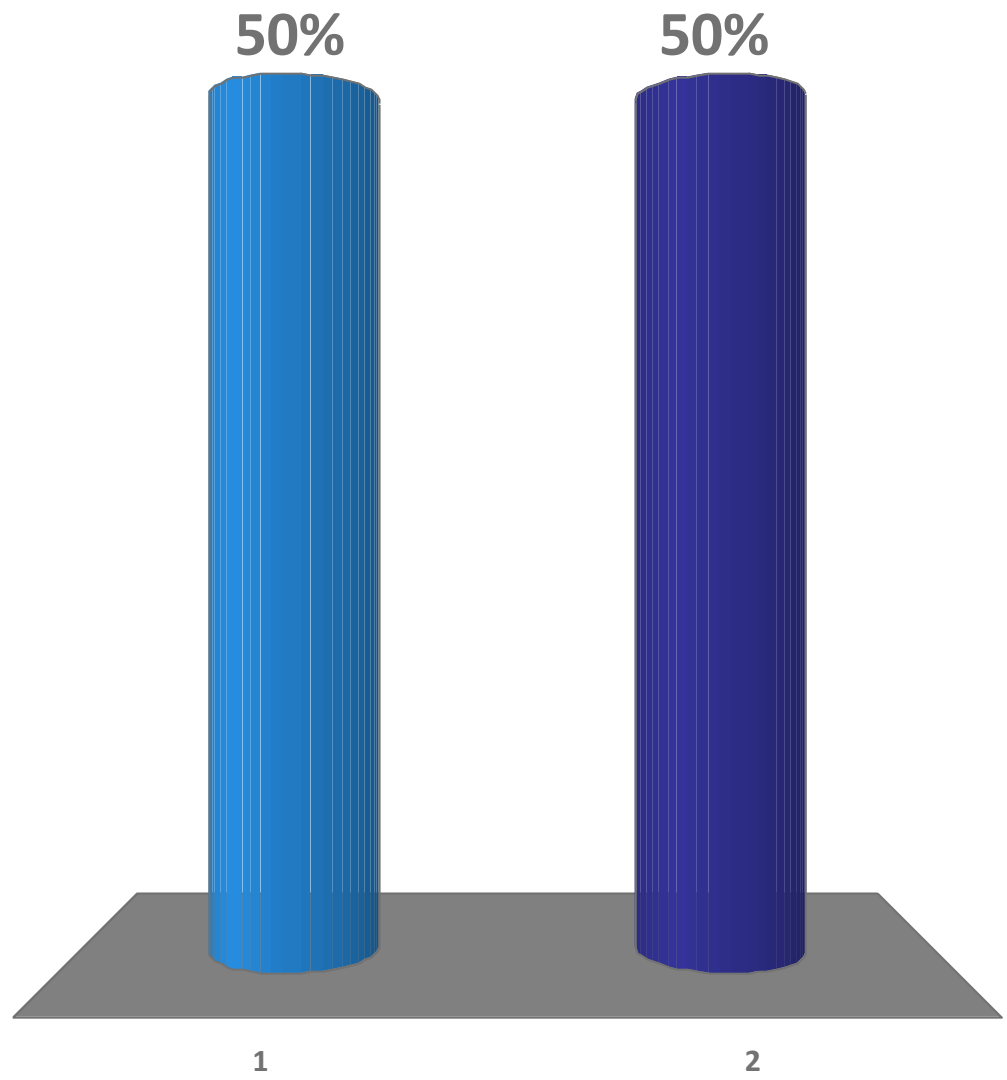
True or false: Antibiotics weaken the immune system because your body doesn't learn to make enough antibodies.

1. True. Antibiotics are a type of antibody.
2. False. Antibiotics are not antibodies.



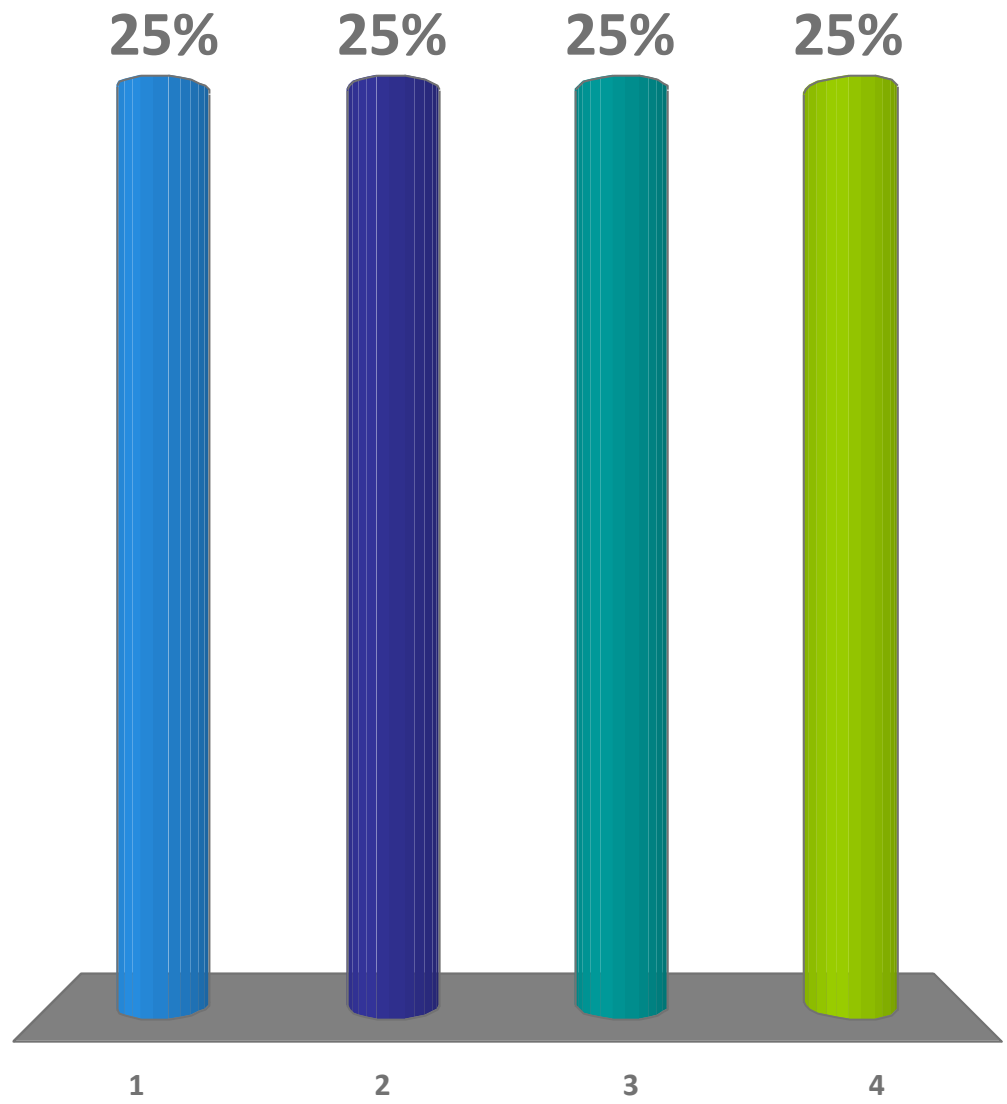
True or false: Vaccines weaken the immune system because the body doesn't learn to defend itself without help.

1. True. The immune system needs to exercise itself or it won't get strong.
2. False. Vaccination causes the body to learn to defend itself.



Vaccines stimulate the production of:

1. Antibodies.
2. Helper T-cells.
3. Antigens.
4. ✓ Memory cells.



- **Why will antibiotics work against bacteria but not viruses?**
- **Why don’t antibiotics kill your own cells?**

WORK TOGETHER

THANK YOU