What are Vaccines and Immunity?

Worksheet

A vaccine stimulates the immune system to produce antibodies and memory cells against a specific pathogen, without causing the actual illness. This creates active immunity: if the real pathogen is encountered later, the immune system responds fast enough to prevent or reduce disease.

Questions

1. What is the main goal of a vaccine?

A) To cure an existing infection
B) To train the immune system to recognize a pathogen without causing disease
C) To kill bacteria directly
D) To replace white blood cells

2. Which type of immunity does a vaccine create?

A) Passive immunity
B) Active immunity
C) Innate immunity only
D) No lasting immunity

3. A newborn's temporary protection from maternal antibodies is an example of...

A) Active immunity
B) Passive immunity
C) Vaccination
D) Herd immunity

4. Why might a vaccine require multiple doses?

A) To weaken immunity intentionally
B) To reinforce memory cells for stronger, longer-lasting protection
C) Because the first dose is always ineffective
D) To cause mild disease on purpose

5. A child receives the MMR (measles, mumps, rubella) vaccine. Explain how it produces immunity.

6. A newborn baby is protected from certain infections for the first few months of life. Why?

7. Someone bitten by a rabies-suspect animal receives rabies immunoglobulin (antibodies) plus the rabies vaccine. Why both?

8. Define: What is a vaccine?

9. Define: What is active immunity?

10. Define: What is passive immunity?

Answer Key

1. B) To train the immune system to recognize a pathogen without causing disease - Vaccines expose the immune system to a safe form of a pathogen's antigens so it can build memory without illness.

2. B) Active immunity - Vaccines prompt the body to make its own antibodies and memory cells - this is active immunity.

3. B) Passive immunity - The baby receives ready-made antibodies rather than producing them, making it passive and temporary.

4. B) To reinforce memory cells for stronger, longer-lasting protection - Booster doses strengthen and extend the memory cell response established by earlier doses.

5. Weakened measles, mumps, and rubella viruses are injected The immune system recognizes viral antigens as foreign B cells produce antibodies; memory B and T cells form over 1-2 weeks If the child is later exposed to real measles, memory cells trigger a rapid antibody response before illness develops

6. During pregnancy, maternal IgG antibodies cross the placenta into the fetus This is passive immunity - the baby did not produce these antibodies itself The antibodies protect the newborn immediately after birth Over several months, maternal antibodies degrade and the baby must build its own active immunity (via infection or vaccination)

7. Rabies immunoglobulin provides immediate passive immunity, neutralizing the virus right away The rabies vaccine takes days to weeks to trigger the person's own active immune response Together, they cover the gap: passive immunity acts fast while active immunity builds up Active immunity from the vaccine then provides longer-lasting protection

8. A preparation that trains the immune system to recognize a pathogen (using a weakened, inactivated, or partial form) without causing disease.

9. Immunity gained when the body produces its own antibodies, either from infection or vaccination - long-lasting.

10. Immunity gained from receiving ready-made antibodies (e.g., from mother to baby, or an antibody injection) - fast but temporary.