What is the Immune System?

Worksheet

The immune system defends the body using innate defenses (skin, inflammation, phagocytes) for immediate, general protection and adaptive defenses (T cells, B cells, antibodies) for targeted, long-lasting immunity.

Questions

1. Which immune response acts within hours and lacks memory?

A) Adaptive immunity
B) Innate immunity
C) Antibody response
D) Vaccination

2. Measles has an R of about 15. What's its herd immunity threshold?

A) 50%
B) 80%
C) 93.3%
D) 100%

3. Which cells produce antibodies?

A) Macrophages
B) T cells
C) B cells
D) Neutrophils

4. Why is the secondary immune response faster than the primary one?

A) The pathogen is weaker
B) Memory B and T cells already exist
C) Innate immunity is disabled
D) Antibodies are inherited

5. Measles has a basic reproduction number (R) of about 15. What percentage of the population needs immunity to reach herd immunity?

6. Seasonal influenza has a lower R of about 1.3. Find its herd immunity threshold.

7. Mumps has an R around 5. How does its herd immunity threshold compare to measles (93.3%)?

8. Define: What are the two main branches of the immune system?

9. Define: What are examples of innate immune defenses?

10. Define: What cells drive adaptive immunity?

Answer Key

1. B) Innate immunity - Innate immunity is the fast, non-specific first line of defense with no memory of prior exposures.

2. C) 93.3% - HIT = 1 1/R = 1 1/15 93.3%.

3. C) B cells - B cells differentiate into plasma cells that produce antibodies specific to a pathogen.

4. B) Memory B and T cells already exist - Memory cells created after the first exposure allow a much faster, stronger response the second time.

5. HIT = 1 1/R = 1 1/15 = 1 0.067 = 0.933 HIT 93.3% of the population needs immunity

6. HIT = 1 1/1.3 = 1 0.769 = 0.231 HIT 23.1% - much lower than measles because flu spreads less easily

7. HIT = 1 1/5 = 1 0.2 = 0.8 80% Compared to measles: 93.3% 80% = 13.3 percentage points lower A lower R means fewer people need to be immune to stop spread

8. Innate immunity (fast, non-specific) and adaptive immunity (slower, highly specific, with memory).

9. Skin, mucous membranes, inflammation, and phagocytic cells like macrophages.

10. B cells (make antibodies) and T cells (kill infected cells, help coordinate the response).