

PhysioQuiz 5 - Concept Review and Applications

1. Sensitivity & Specificity:

Sensitivity = 90%, Specificity = 95%, PPV ~90.95% for 1% prevalence.

Application: Diagnostic test development.

2. Sensitivity/Specificity Testing:

Sensitivity test people with disease. Specificity test people without.

3. Lymphocyte Specificity:

Each clone recognizes only one epitope (high specificity).

4. Antibody Functions:

Opsonization Complement activation Mast cell degranulation Toxin neutralization

Antibodies do not directly activate dendritic cells.

5. Emergency Transfusion (O+):

Safe RBC donors: only O+ and O.

6. Hemoglobin Functions:

Oxygen & CO₂ transport pH buffering Positive cooperativity

No role in glucose/amino acid transport.

7. MHC-I Function:

Presents to cytotoxic T cells (CD8+). Application: tumor immunotherapy.

8. Humoral vs. Cellular Immunity:

Humoral = B cells/antibodies. Cellular = T cells (CD4+, CD8+).

9. Bridge Between Innate & Adaptive:

Macrophages Dendritic cells

10. O₂ Transport & Bohr Effect:

pH O₂ affinity (left shift), pH affinity (right shift).

11. COVID Antibody Test:

Positive test with 98% Se/Sp at 10% prevalence = ~99% chance of true exposure.

12. Ion for Clotting:

Calcium is essential for clotting cascade activation.

13. Interferons in COVID:

Severe COVID linked to innate immune failure, esp. type I IFNs.

14. Hemostasis:

1. Vasoconstriction 2. Platelet plug 3. Coagulation 4. Fibrin formation 5. Clot stabilization.

15. Plasma Compatibility (A+ donor):

Can give to A and AB due to presence of anti-B antibodies.

16. Complement Activation:

Initiated by LPS, immune complexes. Innate immune pathway.

17. Blood Typing & Parentage:

AB father + B mother cannot have O child likely IVF with donor egg.

References:

- Guyton & Hall. Textbook of Medical Physiology.
- Abbas AK. Cellular & Molecular Immunology.
- Janeway's Immunobiology.
- CDC Guidelines on Diagnostic Testing.
- West JB. Respiratory Physiology.
- Hoffman M. Thrombosis and Haemostasis.