Microbiology & Immunology 2500A/B: Immunology Practice Questions

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B-cell Immunity

1. Which of the following is NOT true of B cell immunity?
    a) If a patient's T cells are entirely compromised from an autoimmune disorder, then the patient's B cell immunity is also no longer functional.
    b) B cells use their pattern recognition receptors (PRRs) to recognize pathogen associated molecular patterns (PAMPs), triggering endocytosis.
    c) Somatic hypermutation involves the generation of B cells with higher affinity for their specific epitope.
    d) A high-affinity memory B cell expressing IgG on its surface will have no IgA present.
    e) All of the above are true.

2. Class switching involves…
    a) The generation of B cells with higher affinity for their epitopes.
    b) The activation of a naive B cell by the cytokines from a Tfh cell.
    c) The differentiation of a lymphoid progenitor cell into a B cell.
    d) The rearrangement of the heavy chain constant regions of B cell receptors.
    e) Modification of the variable region of B cell receptors.

Innate Immunity

3. When monocytes move from the circulatory system into connective tissues, what cell do they differentiate into?
    a. Macrophage
    b. T-cell
    c. B-cell
    d. Natural killer cell

4. Which of the following cells does not perform phagocytosis?
    a. Neutrophils
    b. Macrophages
    c. Immature Dendritic Cells
    d. Basophils

Adaptive Immunity

5. What are the primary lymphoid tissues?
    a. Bone Marrow and MALT
    b. Bone Marrow and Thymus
    c. Spleen and Lymph node
    d. Spleen and MALT

6. How does the primary immune response differ from the secondary immune response to the same pathogen?

a. Primary immune response is slower and uses naive B/T cells.
b. Secondary immune response is slower and uses naive B/T cells.
c. Secondary immune response is faster and uses memory B/T cells developed from primary immune response.
d. Primary immune response is faster and uses memory B/T cells.

T-Cell Immunity

7. Which of the following is/are effector function(s) of a T-helper 1 (Th1) cell?

a) Promoting increased fusion of lysosomes to phagosomes by secreting IFN-ɣ
b) Directly phagocytose invading extracellular pathogens
c) Surround infected macrophages, forming a granuloma to contain infection
d) Both a) and c)
e) All of the above

8. A cell infected by a bacteria in the cytoplasm can be killed off by which of the following?

a) A single specific CTL variant looking for one specific epitope only
b) Multiple CTLs variants, specific for different epitopes
c) A single specific CD4+ T-cell variant looking for one specific epitope only
d) Multiple Effector B-cells variants, recognizing epitopes presented on MHCCI

Vaccines

9. Live attenuated vaccines work better on viruses than bacteria. What are some of the following reasons that bacteria are not good candidates for this type of vaccine?

1. Bacteria have more genes than viruses so it can mutate more, making the procedure too complex
2. Results in a risk for altering the genes encoding the surface antigens
3. Results in the risk for altering genes for replication
4. Viruses require another organism to replicate

a) 1, 2 and 3
b) 2 and 4
c) All except for 1
d) 2 and 3

10. Why are adjuvants used in vaccines?

a) Because it only stimulants long-term B cell immunity
b) They do not stimulate T-cell immunity
c) Body is protected from intracellular pathogens
d) Used to stimulate the immune system

Answer Key

1. B

B cells code for B cell receptors, which recognize the epitopes of various antigens. PRRs are found in innate immune cells (i.e: phagocytes), which target general PAMPS.

2. D

Class switching involves the rearrangement of heavy chain constant regions of B cell receptors (leading to the generation of IgG or IgA cells, as opposed to IgD/IgM). This leaves the variable region and overall affinity for the epitope unaffected (epitope affinity is improved in somatic hypermutation).

3. A

Monocytes that have migrated from the bloodstream into tissue are called macrophages.

4. D

Neutrophils, macrophages and immature dendritic cells are all classified as phagocytes and can perform phagocytosis.

5. B

Primary Lymphatic organs are sites of lymphocyte differentiation and production. There are two primary lymphatic organs: Bone marrow and Thymus.

6. C

The secondary immune response is much quicker than the primary immune response as it uses the memory cells developed from the primary immune response to develop more effector and memory immune cells.

7. D

Helper T cells are not professional phagocytes and do not engage in direct phagocytosis. Rather, their effector functions focus on “helping” out other immune cells in order to combat invading pathogens.

8. B

CTLs kill intracellular pathogens, not T-cells or B-cells. AN infected cell will present MANY epitopes on MHC-I derived from the same pathogen, not just a single epitope.

9. D

Complexity of the procedure does not explain why bacteria are not well vaccinated. Bacteria have lots of genes so they cannot mutate and reproduce as fast as viruses, slowing down the attenuating process. Bacteria has its own metabolic machinery, and this results in a risk for altering the gene encoding surface antigens and will alter the genes for replication through changing gene expression. Virus require another organism to replicate, but it does not affect the attenuation of the vaccine

10. A

The adjuvant, alum is used to stimulate the immune system for an unclear reason (still being researched), A and B are true, but do not explain why adjuvants should be used. Because cell mediated immunity is not activated, intracellular pathogens, such as viruses, are not possible.