

Mastery Series: Adaptive Immunity

1. What are two kinds of cells considered APCs?
2. What role do APCs play in adaptive immunity?
3. What type of cell do APCs present antigens to?
4. Why are helper T cells sometimes described as CD4 cells?
5. What type of cells does HIV infect and destroy?
6. Describe how a CD4 cell is activated.
7. Compare the number of CD4 cells a normal antigen may stimulate with the number of CD4 cells a superantigen can stimulate.
 - a. How could this lead to a cytokine storm?
8. What three things does an activated helper T cell do?
9. Why does it make sense for a helper T cell to further stimulate inflammation?
10. Compare TH1 and TH2 cells: which types of antigens are most likely to stimulate each of these type of helper T cells?
11. If a helper T cell were inappropriately activated (which could lead to autoimmunity), which type of cell do you suspect would be able to recognize and destroy it?
12. What does an activated CD8 cell do?
13. What does an activated B cell do?
14. What are the two main roles of Regulatory (Suppressor) T cells?
15. What are memory cells? Which types of cells can make them?
16. Why might adaptive immunity fail to neutralize a pathogen?
17. If someone is "allergic" to something, what does that mean is going wrong with his/her immune response?
18. Why do we only have one helper T cell that recognizes each antigen? If we had 100's, for example, the response would be much faster....so why don't we?
 - a. Some helper T cells we have millions of.....what must have happened for this to occur?
19. Theoretically, why might protecting a child from normal environmental allergens, dirt, grasses, etc., make him or her more likely to have allergies or autoimmunity as an adult?
20. Explain how more than one helper T cell might be activated by the same pathogen.

Mastery Series ANSWERS: Adaptive Immunity

1. Dendritic cells and macrophages
2. Present an antigen to a helper T cell, potentially activating the T cell.
3. Helper T cell (AKA cd4)
4. They connect with the APC via a receptor named cd4
5. Helper T cells
6. It is coded to only recognize one amino acid sequence. If an antigen presented to the CD4 (by an APC cell) cell matches that sequence, the CD4 is activated. If it doesn't match, it remains inactivated.
7. THOUSANDS and THOUSANDS of T cells activate in response to encountering a "superantigen". Their activation is not antigen-specific. Non-specific activation of many helper T cells at once could lead to massive inflammation and the symptoms associated with the "cytokine storm".
8. Stimulates further inflammation; stimulates cytotoxic CD8 cells; stimulates B cells
9. To buy time to complete adaptive immunity
10. TH1 cells are considered to respond primarily to intracellular pathogens; and TH2 more to extracellular antigens
11. NK cell; possibly a CD8 cell
12. Make an army of cells that recognize the same antigen; directly destroy the infected cell or pathogen; make memory cells that can immediately neutralize future invasions by the same pathogen.
13. Make an army of cells that recognize the same antigen; these cells differentiate into plasma (large) cells that make antibodies to the antigen; make memory cells that can immediately neutralize future invasions by the same pathogen.
14. Inhibiting the immune response once the threat is neutralized; and improve tolerance to self-antigens (prevents autoimmunity)
15. Cells that can survive and circulate for a long time until the pathogen is encountered again. T and B cells make them (and possibly other WBCs such as NK cells)
16. The pathogen kills the host before adaptive immunity is full-strength (which might take a week); there aren't helper T cells that activated robustly in response to the pathogen; memory cells have died off
17. WBCs are activating in response to an environmental allergen, or a food. Once the allergy starts, it can possibly increase with future exposures; or be ameliorated as regulatory T cells, NK cells, or other cell types recognize the allergy and stop the response to it.
18. Our body needs to be able to respond to all the variety of antigens that may be encountered. Our blood would be filled with WAY too many WBCs if we had many copies of each antigen-recognizing T cell. Once a response begins, many copies of the T cell are made. Undoubtedly other, less used memory cells die off to balance this out.
19. If the immune system does not "learn" during childhood what are the normal environmental allergens, then inappropriate responses may occur.
20. A pathogen has many different antigens. So, theoretically, many different helper T cells could be activated by the various antigens of one pathogen.