

Chapter 11

1. All CD4 T cells decline in a patient. If there are less than 200 CD4 T cells per microliter of blood, that patient has progressed to AIDS. HIV patients usually die from the immunosuppression, not HIV itself.
2. An autosomal gene is located on any chromosome except the X chromosome. An X-linked gene is located on the X chromosome. For an autosomal trait, the child must be homozygous to inherit the defective gene. For a male, an X-linked trait only needs one defective allele to be expressed.
3. GP 120 and GP 41 are membrane glycoproteins. GP120 is for binding, while GP41 is for fusion.
4. Tat protein increases transcription of RNA. Rev protein delivers the viral RNA to the cytoplasm. Integrase integrates viral DNA into our DNA. Reverse transcriptase transcribes RNA into DNA. Protease is the last to act and cleaves certain proteins (Gag, Pol, and Env)
5. 2 RNA molecules make up the HIV genome. 8 RNA molecules make up the influenza genome.
6. Lymphocyte-tropic HIV binds to the co-receptor CXCR4 and needs a lot of CD4 to enter the cell (primarily lymphocytes). Macrophage-tropic HIV binds to co-receptor CCR5 and needs less CD4 to enter the cell, so it can infect macrophages and dendritic cells as well.
7. The primary reverse transcriptase inhibitor is called AZT or zidovudine. AZT replaces the OH group of a nucleotide with an N₃ group. AZT will block the early stage of viral replication.
8. Nucleotide Analog Reverse Transcriptase Inhibitors inhibit reverse transcriptase and block early stage of replication. Protease inhibitors block the later stage of viral replication and are most potent when used along with NRTIs. A popular protease inhibitor is Saquinivir.
9. Neutropenia is blood deficient in neutrophils because there is a lack of macrophage signaling to neutrophils. This can be caused by Hyper IgM syndrome.
10. GP 160 is the precursor to GP120 and GP 41.
11. Superantigens are antigens that will bind to many different TCRs thus activate up to 20% of the CD4s in a person's body (non-specific).
12. Antigenic drift is associated with epidemics and antigenic shifts are associated with pandemics. A pandemic is a worldwide epidemic.
13. Antibodies confer protective immunity to influenza. Hemagglutinin is what the antibodies bind to on the viral envelope.
14. Most inherited immunodeficiency disorders are caused by mutations in a single gene. The defective gene is usually defective. A dominant defective gene would be the interferon gamma receptor defect.
 - Toxic Shock: massive IL-1, IL-2, TNF-alpha release due to toxin (superantigen)

- X-Linked Hyper IgM: no CD40L on T cells, no isotype switching or SHM
- X-linked agammaglobulinemia: B cell growth and differentiation blocked at the pre-B cell stage because no tyrosine kinase, deficient in antibodies
- Strep-Pneumonia: different serotypes, over 90 strains
- Influenza: 8 RNA strands, epidemics every other year
- Trypanosomes: use gene rearrangement to change surface antigen (over 1000 genes)
- Herpes: stay latent until under stress, lives in nerve cells, no cytotoxic cells here
- Varicella-Zoster: chicken pox, dormancy in dorsal root ganglion
- Treponema Pallidum: Syphilis, coats itself with human protein

Chapter 12

1. Histamine is the major vasoactive molecule stored in mast cell granules.
2. Leukotrienes act like histamine but are much more potent.
3. Allergens can be inhaled, injected, ingested, or contacted.
4. An allergic reaction is an exaggerated immune response to something usually harmless.
5. Check slide 7 and 8.
6. Atopy is having more IgE so you are more likely to have an immune response. Serum sickness is a type 3 immune response to a non-human protein in a injected serum (horse serum as anti-venom). Eczema is inflammation of the skin due to a contacted allergen. Arthus is a type 3 allergic reaction. Angioedema is activation of mast cells deep in the skin. Allergic rhinitis is a runny nose and is type 1 reaction. Acute asthma would be type 1 as well. Chronic asthma would be type 4.
7. Late phase reaction: ~6hrs after the immediate reaction a late phase reaction will take place. The synthesized (ex. leukotrienes) products will mediate this more spread out reaction. This is started by a type 1 reaction.
8. Yes mast cells can express cd40L and produce IL-4 to activate B cells.
9. Yes inhaled allergens are proteins.
10. For mast cell degranulation it needs to IgE bound close together to get cross linking.
11. Sensitization is IgE binding to FC epsilon on the mast cell. A TH2 is activated and secretes IL-4, this tells the B cell to secrete IgE.
12. Allergic rhinitis is a runny nose.
13. Allergens that activate mast cells in the skin cause urticaria, or hives.
14. Chronic asthma is mediated by T cells.
15. Poison Ivy would be a contact allergen and would result in a type 4 response.
16. Mast cells have many different IgE receptors, but they all have a different specificity. They also do not need to be activated.
17. A hapten is any small molecule that when covalently bonded to a protein stimulates an immune response.
18. Inflammatory cytokines are released in a type 4 reaction, and this is mediated by TH1 (memory) cells.
19. Penicillin usually results in a type 2 reaction.

20. Epinephrine will reduce endothelial permeability and dilate the airways.
21. .
22. Blood typing is done. The recipient's serum is mixed with the donor's erythrocytes.
23. There are antigens present on the RBCs that aren't present in your blood = Ab production.
24. Histamine, TNF-alpha, and major basic protein are all pre-packaged in mast cells and leukotrienes are synthesized.
25. Yes basophils and eosinophils can aid in a type 1 reaction by releasing inflammation mediators.