Adaptive Immunity, Immunization, and Immune Disorders
- One of the big things we’ll be talking about interactions between dendritic cells and T-cells/lymphocytes

- Immune response
  - Innate immunity – interaction with pathogens
  - Dendritic cells are mononuclear
    - They create a more specific immune response
    - This is adaptive immunity
    - There are two arms
  - Antigens
    - Molecules that are recognized by antibodies or T-cell receptors
    - TCRs
    - Antigenic determinant or epitope
  - Immunoglobin Superfamily
    - Class I MHC
    - Class II MHC
    - T-cell receptor
    - Immunoglobin
  - Major Histocompatibility Complex
    - Human leukocyte antigen complex
  - MHC Proteins
    - Class I proteins are expressed on all nucleated cells
    - Class I proteins are recognized by T cells
    - Class II proteins are expressed only on antigen-presenting cells
  - MHC-antigen Processing and Presentation
  - TCR Genes and Diversity
    - TCRs bind much more specifically
    - Alpha chain genes and beta chain genes
  - T cell Selection and Tolerance
  - T cell Anergy
  - T cell Activation
  - Cytotoxic T cells (Tc)
  - TH1 T cells (helper cells)
  - TH2 T cells
    - Also helper cells
    - Typically interact with antigens presented via MHC-II on B cells
  - Antibodies are just used to mark the antigens
    - They can thus encumber the infected cell so it can’t do anything
    - Other can also cells recognize the antibodies and phagocytose the infected cell
  - Classes of antibodies
- IgM-mu heavy chain
- IgD-delta heavy chain (the actual function is not well understood)
- IgG-gamma heavy chain
- IgE-epsilon heavy chain (mainly associated with allergies)
- IgA/slgA-alpha heavy chain (a monomer in the blood, but transported as a dimer)
  - Antibody diversity
  - Antibody production and B cell clonal selection
  - Roles of antibodies during infection
    - Opsonization
    - Neutralization
    - Activate complement cascade – read this section in the textbook
    - Prevent breach of epithelial barrier

- Categories of immunity
  - Natural active immunity
  - Passive immunity (in infants)
  - Artificial active immunity (from immunizations)
  - Artificial passive immunity (being given antibodies from another person)

- Immunization
  - History of different vaccines
  - Goal
  - Types of immunizing agents
    - Live, attenuated vaccines are better
  - Attenuated/related organisms
    - Related organisms involves infecting you with an organism similar enough that you won’t get sick but you’ll develop the same immune response
      - Using cowpox to vaccinate for smallpox is an example
    - Cold-adapted influenza virus – it’s genetically modified so it can’t reproduce at body temperature, and thus it can replicate in your nose where you develop immunity to it, but it can’t invade your lungs
  - Viral and bacterial vectors
  - Subunit vaccines
  - Conjugate vaccines
  - Nucleic acid (DNA) Vaccines
  - Edible vaccines (transgenic plants)
  - Mucosal vaccines

- Immune-related Disorders
  - Hypersensitivity
    - Types I, II, III, and IV
    - Allergies, asthma are varieties of Type III
- Poison ivy and the raised rash from a TB test are varieties of Type IV
  - Autoimmunity
    - Autoantibodies
    - Type I diabetes, Multiple Sclerosis