Microbiology (Bio 206) #21:
Cell-Mediated Immunity and Hypersensitivity

Terms you should know:

- cell-mediated immunity
- endogenous antigens
- exogenous antigens
- MHC
- cytotoxic T-cells (T_c)
- perforins
- hypersensitivity
- allergy
- IgE
- autoimmune disease
- hemolytic disease of newborns
- lupus (SLE)
- rheumatoid arthritis

Questions you should be able to answer:

- What are some key differences between the humoral and cell-mediated immune responses?
- Where do endogenous antigens come from?
- How are T-cells activated, and how do they respond?
- How does our immune system known the difference between “self” and “foreign” antigens?
- What kind of hypersensitivity is hayfever? What causes the symptoms?
- Why does a pregnant woman have to be concerned about her blood type?

Lecture outline:

I. Cell-mediated immunity
   - A. Deals with endogenous antigens; response involves T-lymphocytes
      1. Antigen-presenting macrophages can activate T-cells
      2. Virus-infected cells, cells invaded by bacteria, cancer cells and transplanted cells all have endogenous antigens.
      3. T-cells recognize a foreign antigen combined with our own cells’ MHC proteins
   - B. T-helper cells and cytotoxic T-cells are activated
   - C. T_c cells lyse virus-infected or cancer cells, stimulate killing of bacteria by invaded cells

II. Distinguishing “self”
   - A. During development, T- and B-cells that bind antigens are killed by apoptosis
   - B. At this time, only “self” antigens are present, so cells responding to “self” Ag are killed

III. Hypersensitivities
   - A. Type I (anaphylaxis)
      1. Allergens activate B- and T-cells and stimulate production of IgE-type antibody
      2. IgE binds to basophils and mast cells
      3. Allergens binding to these IgE molecules cause release of inflammatory mediators
      4. The inflammatory response produces the symptoms of the allergy
      5. Systemic anaphylaxis can be fatal, due to swelling blocking respiratory passages
   - B. Type II (cytotoxic)
      1. Antibody response to incorrect blood type lyses and agglutinates red blood cells
      2. Hemolytic disease of newborns results from Rh- mother sensitized to Rh+ child
      3. Autoimmune diseases result from Ab attack on our own cells
   - C. Type III (immune complexes)
      1. Antigen-antibody complexes are deposited in joints or elsewhere, causing symptoms
      2. Lupus and rheumatoid arthritis are examples.