In the serum of an immune individual, antibody molecules bind to the surface of virus particles and prevent them from adsorbing to the surface of target cells.

**Antibody-assisted Engulfment / Opsonization**

In the serum of an immune individual, antibody molecules bind to the surface of virus particles (virions) and prevent them from adsorbing to the surface of potential host cells. This process is known as antibody-assisted engulfment or opsonization.

**T cell development**

Helper T cell (T<sub>H</sub> cell)

Cytotoxic T cell (T<sub>C</sub> cell)

Helper T cell (T<sub>H</sub> cell) and cytotoxic T cell (T<sub>C</sub> cell) development involves T cell receptor (TCR) gene rearrangement and expression of CD4 and CD8 molecules.

**Slide 2 - 7.013 - 5/7/07**

**Slide 3 - 7.013 - 5/7/07**

**Slide 4 - 7.013 - 5/7/07**
The T cell receptor (TCR)

The TCR-MHC complex

Infected cells can present internalized proteins: presentation of peptides by MHC
**Slide 9 - 7.013 - 5/7/07**

Adapted from Fig. 19.18

T<sub>H</sub> cell (CD4) activation by an antigen presenting cell (APC)

- **Activation phase**
  - Cytokines
  - Helper T cell
  - Class II MHC protein
  - Pathogen/Antigen

- **Effector phase**
  - Cytokines
  - Plasma cell
  - Endoplasmic reticulum

**Slide 10 - 7.013 - 5/7/07**

Adapted from Fig. 19.18

T<sub>H</sub> cell stimulating B cell activation, proliferation, differentiation

- **Activation phase**
  - Cytokines
  - Pathogen/Antigen

- **Effector phase**
  - Cytokines
  - Plasma cell
  - Endoplasmic reticulum

**Slide 11 - 5/7/07**

Adapted from Fig. 19.18

MHC Class I Protein Complex presents antigens made within the cell to CD8<sup>+</sup> T<sub>C</sub> cells

- **Activation phase**
  - Peptide fragments of pathogen proteins
  - Infection

- **Effector phase**
  - Cytotoxic T cell

**Slide 12 - 7.013 - 5/7/07**

Adapted from Fig. 19.18

T<sub>C</sub> cell activation by a virally-infected cell

- **Activation phase**
  - Infection
  - Class I MHC protein
  - T cell receptor
  - Pathogen protein

- **Effector phase**
  - Cytotoxic T cell
  - CD8
Perforins, Granzyme
Infected cells with holes blown in membrane AND undergoing apoptosis

**Summary of Immune Responses**

- B cell
- CD4+
- CD8+
- mΦ
- killer T cell
- CD8+
- cytokines
- antibodies
- parasites
- bacteria
- virally infected
cancerous

**Autoimmune diseases: Self versus Non-self**

**Diabetes (type I)** is caused when an individual develops CTLs that attack and kill their own beta cells in the islets of the pancreas. Beta cells produce insulin, which is involved in glucose uptake. Their absence leads to diabetes.

**“Bubble Boy” With Severe Combined Immunodeficiency**

LOSS OF BOTH B AND T CELLS

**Slide 13 - 7.013 - 5/7/07**

Adapted from Fig. 19.18