History of Selected Human Diseases

- Tuberculosis
- Measles
- Smallpox
- Malaria
- Plague
- AIDS

Edward Jenner inoculating 8-year-old James Phipps with cow pox (1796)

World Mortality
WHO 2000

Communicable diseases 17,380,000
- Acute lower respiratory 3,963,000
- HIV/AIDS 2,673,000
- Diarrhoeal diseases 2,213,000
- Tuberculosis 1,669,000
- Malaria 1,086,000
- Measles 875,000
- Tetanus 377,000
- Pertussis 295,000
- Meningitis 171,000
- Syphilis 153,000
These infectious diseases have been controlled through large-scale vaccination programs. Vaccination gives long-term immunity against these infectious agents.

Cells of the hematopoietic system

- Red blood cells
- Platelets
- Mast cells
- Monocytes
- Macrophage
- Myelocytes
- Basophils
- Granulocytes
- Neutrophils
- Megakaryocytes
- Plasma cells
- B cells
- T cells

Organs of Hematopoietic System

- Lymph nodes
- Thymus
- Heart
- Thoracic duct
- Spleen
- Bone marrow

Innate Immunity: Skin is a Protective Organ
Innate Immunity: Macrophage Eating Bacteria

Antigen: an Entity that Provokes an Immune Response

An antigenic protein contains multiple epitopes, sites that can be recognized and bound by an antibody molecule.

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Fig. 18.6

Antigen: an Entity that Provokes an Immune Response

This Ebola Virus protein is an antigen. It carries dozens of potential epitopes, each one of which is composed of a set of amino acids and might function to provoke an immune response.

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Fig. 18.6

Antigen: an Entity that Provokes an Immune Response

Immunological Recognition

The T cell receptor (TCR)

Antibody structure

Peptide epitope

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Pathogen Diversity
-vast numbers of viruses and bacteria
-new pathogens emerging

Antibody Diversity: Variable regions

Generation of Immunological Diversity
Each B-cell produces SPECIFIC Antibodies
= the product of a uniquely rearranged heavy chain gene & a uniquely rearranged light chain gene

Each T-cell produces SPECIFIC TCRs
= the product of a uniquely rearranged TCRα gene & a uniquely rearranged TCRβ gene
B Cells Circulate in the Blood and Crank Out Antibodies

Note extensive endoplasmic reticulum for processing proteins destined for secretion.

Immunological Memory

2nd infection: no symptoms/disease = secondary immune response derived from memory B=T cells