

1 Emergent Infections Diseases

Mostly zoonotic (from animals), however the “Big Killers” can be very different

1. Retrovirus (HIV-AIDS)
2. Virus (SARS)
3. Bacterium {Prokaryotic} (Tuberculosis)
4. Protozoan Parasite {Eukaryotic} (Malaria)

2 Infection Vs. Diseases

Pathogens don't ‘want’ to cause sickness

Only cause disease if it helps transmission

Ex: Dengue Virus spread by mosquitos → Asymptomatic

2.1 Levels of Symptoms

1. Death
2. Severe disease
3. Symptomatic
4. Asymptomatic

3 Epidemiology

What causes disease and how are they spread?

Miasma Theory (bad air {mala-aria}) → Germ Theory (1800s)

3.1 Terminology

1. Endemic: An infection that is continually present in a population or geographic arrangement
2. Epidemic: An outbreak of infectious disease above the normal level of infections that then subsides
 - (a) Outbreak: A minor increase in infections
3. Pandemic: Infections that spread over more than 3 continents
4. Innate Immune System
 - Limits the spread of pathogens during infection
 - Activates adaptive immune system

5. Adaptive Immune System

Fully eliminates pathogens

Prepares for a second infection with same pathogen

4 Cell Biology Review

DNA - Genetic code

1. DNA is transcribed to single-stranded RNA

RNA is translated to proteins

Viruses can have both DNA or RNA

Proteases (enzymes) degrade proteins into peptides

1. Peptides act as signals for immune response
2. Peptides degrade into amino acid

Recombinant DNA

1. DNA that has been spliced together
2. For use in research or vaccines

4.1 Animal Cell Structure

Plasma Membrane

1. Separates interior and exterior of cell
2. Made of phospholipid bilayer

Cytoplasm

1. Gelatinous fluid filling a cell
2. Made primarily of water and salts

Ribosome

1. Site of protein synthesis
2. Reads messenger RNA (mRNA) and translates code into a string of amino acids
3. Made of RNA and protein

Mitochondria

1. Source of chemical energy in cell
Forms adenosine triphosphate (ATP)

Golgi Body / Golgi Apparatus

1. Vesicles and folded membranes involved in secretion and transport
2. Receives proteins from ER
3. Delivers proteins and lipids

Endosome (Membrane-bound vesicle)

1. Sort and transport components within the cell
2. Hold things inside membranes

Lysosome

1. Breaks down excess or used cell parts
2. Example of an endosome

Endoplasmic Reticulum (ER)

1. Smooth
Produces phospholipids
Useful for cell membranes and metabolism of carbohydrates
Transports products of rough ER to golgi apparatus
2. Rough
Covered in ribosomes
Prominent part of protein synthesis

Centriole

1. Organelle in cytoplasm which aid in cell division
2. Determines the position of the nucleus and arrangement of the cell

Nuclear Envelope

1. Separates nucleus from cytoplasm
2. 2 lipid bilayer membranes

Nucleus

1. Contains genetic material
2. Stores and replicates DNA
3. Uses DNA transcription to form RNA
4. Defining characteristic of eukaryotic cells

Nucleolus

1. Within cell nucleus
2. Transcribe ribosomal RNA and assemble ribosomes (ribosome biogenesis)

4.2 Processes and Properties**Phagocytosis (Cell Eating Process)**

Form of endocytosis that

1. uses pseudopodia to engulf particles and results in the formation of phagosomes
2. which can fuse with lysosomes containing enzymes
3. to break down into smaller pieces

Carried out by specialized immune cells in humans

Ex: Neutrophils, macrophages, and dendritic cells

Receptors and Ligands

1. Receptors on surface of cells bind to soluble or (another) cell-surface ligand
Activates an action for the cell
2. Signal transduction - signal sent through cell to trigger response
Often new protein production or other change

Cytokines

1. Molecular messengers that control and regulate the immune system
“Immune Hormones”
2. Secreted ligands recognized by receptors on cell surfaces
Autocrine action
3. Released by one cell to affect another cell
Paracrine action (nearby cell)
Endocrine action (distant cell through blood)