Source: [KBBiologyMasterIndex]

# 1 | Overview of Human Diseases

A lecture by Paul.

#flo #disorganized

**Disease** is an abnormal condition that causes impairment in/loss of function of an organism (a.k.a. decreased fitness) that is not due to immediate external injury.

- · What causes human disease?
  - · Infectious agents
  - · Deficiency disorders
  - Heritable factors
  - Physiological disorders (immunodeficiency, autoimmune disorders, allergies, etc.)

## 1.1 | Congenital vs. Acquired disease

Congenital diseases => diseases present at birth due to DNA abnormalities / pregnancy pathological issues Acquired diseases => diseases that begin during lifetime, including...

- Microrganism invasion => "infectios diseases"
- Autoimmune reaction
- Nutrient deficiency
- · Mechanical wear
- · Ingestion of noxious chemicals

### Infectious diseases actually smaller on the causes of death in the US

- Heart disease => wear + deficiency
- · Cancer => heritable + DNA
- Unintentional injuries => not a disease
- Chronic respitory disease => wear
- Stroke => not a disease
- Alhetimer disease => wear
- Diabetes => autoimmune, nutrient, wear
- Influenca <= here, finally, an infections disease.</li>

### 1.2 Disease causing agents

- Protozoan => single-celled eukaryotes
- Fungal => single/multi-celled eukarotyes
- **Bacteria** => single-celled prokaryotes
- Viral => acellular parasitic infectious agent
- **Helminuthus** => multicellular worms
- **Prions** => acellular misfolded proteins
- Viroids => infections nucleic acids w/o protein coat to make virus

# 1.3 | Pathogenicity + Virulence

Pathoginecity => relative capacity to cause disease

- Non-pathogenic agents => no diesease
- Primary pathogens => yes disease
- Opportunistic pathogens => yes disease only when it can, for instance, in immunocompromised individuals

**Virulence** => numerical measures for pathonicity

Measured experimentally with LD50 + ED50

## 1.4 | Overview of various diseases

This video

## 1.4.1 | Protozoan

- **Protozoan factors** => direction pathogenisis leading to tissue damage
- Host-mediated factors => immune evation + escape mechnisms + immunalsupression

Adaptable!!

## 1.4.2 | Fungal

- Fungal factors => many shapes and very adaptable, colud produced specialized enzymes to take root in body
- Host-mediated factors => cause immunocomprimzation, acquired though inhalation, etc.

## 1.4.3 | Bacteria

- Bacterial-induced toxicity => produces toxins + has hard capsule cell
- Host-mediated factors => may develop host resistance, could compete for resources, and could be grown introcellularly

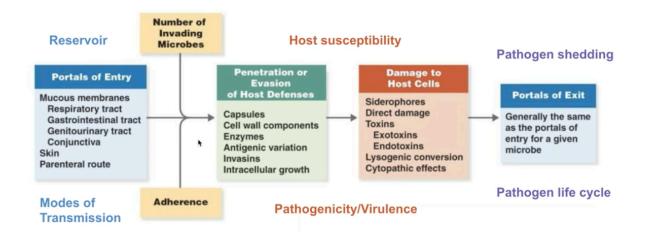


Figure 1: Screen Shot 2020-10-12 at 3.08.53 PM.png

# 1.5 | Bacteria causing diseases

#### **Biofilm formation**

- · Communities of bacteria could work together by adhering and exchanging information
- Bacterial could perform quorum sensing => exchange of information with each other + recognize various members of their group

# 1.5.1 | Fighting bacterial infections

**Antibiotics** => drugs with selective toxicity for specific bacterial types Act by...

- Disrupting membrane + cell wall integrity
- Selectively target + impair bacterial ribosomes
- · Block bacterial DNA replication/transcription
- · Inhibit bacterial metabolism

## 1.6 Viruses causing diseases

- Viruses => acellular macromolecular assemblies
  - · Contain protein coat called capsid
  - DNA or RNA, but not both
  - · Are obligate parasites that could only replicate within host
- Assembled and mature viral particles => virions, which contain...
  - Capsid
  - Genetic material
  - · Occationally outside lipid layer
- · Viruses exist on the nanometre scale, but they are difference in share and size

#### · Structure of viruses

#### · All contain

- Capsid => structural protein coat
- Genome => RNA/DNA; but not both

#### Some contain

- Membraneous-enclosed capsid => envelope
- Externally-facisg host-cell fusion proteins => spikes
- Viral genome replication enzymes => prlymerases
- Other proteins for fun => enzymes, motor proteins, transcription factors, host-cell interacting proteins, etc.

#### · Two types of virus

- · Prokaryotic-infecting viruses
  - · Variety of shapes
  - Complex and prolate shapes
  - · Has, sometimes complex shapes! a la this image
- · Eukarotic-infecting viruses
  - · Much more "boring" in terms of shape
  - · Icosahedral/spherecial outside
  - Enveloped constructions => envelope protein layer outside, spherical inside

.