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.**

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

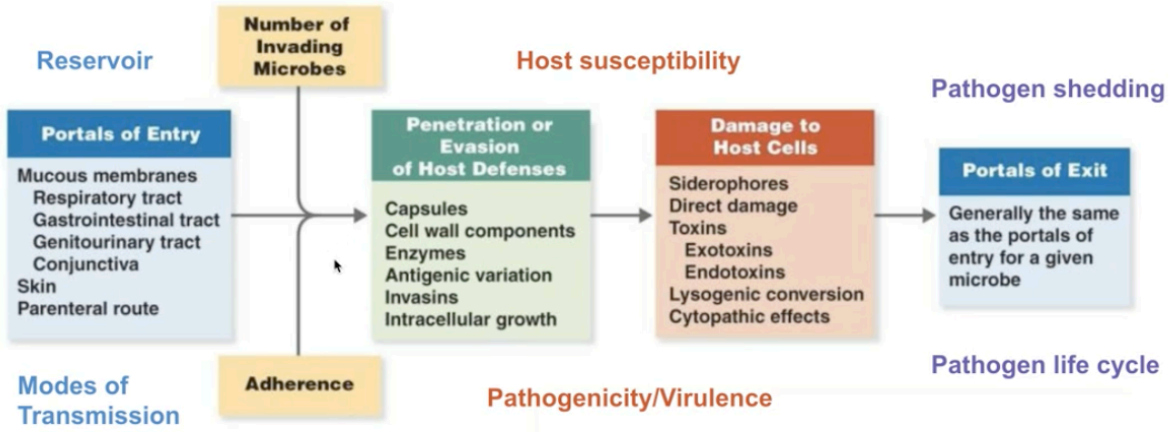

Figure 1: Screen Shot 2020-10-12 at 3.08.53 PM.png

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
        - Helical/Cylindrical/Bullet shapes, too!
        - Often single patterns assemble together to create symmetric shape that creates the whole of the virus