

12/2/22 from the past to the future (last lecture)

- Ecological imperialism
 - Disease determined winners
- Guns, germs, and steel
 - Cultural exchange favored europeans
- Spanish inquisition (cortez and 500 men)
 - Brought diseases with them
 - Wiped out native populations
 - Smallpox, tb, influenza, bubonic plague, cholera, measles etc
 - Plant and animal domestication: argues that domestic animals are probably the original source of a vast majority of specialized infectious diseases
 - Way more contact with domestic animals than wild ones
- Selection pressure on the people that survived from disease
 - Built up tolerance
- North america: absence of large cities
- Domestication:
 - Old world has a lot more domesticated animals
 - Potent mix for diseases
 - Include unsanitary cities
 - New world: the alpaca
- Continental axis: influences spread of agriculture and domestication of animals
- Holocene: starting line of all societies
- Double burden of disease:

11/30/22 spanish flu, bird flu, swine flu

- Morbidity = case rate
- Mortality = death rate
- Spanish flu: 20% of world infected 2% case fatality rate(10x seasonal flu)
 - Killed 25 million people in 25 weeks (very fast)
 - High morbidity, high death rate
- Asian Flu and hong kong flu: mortality rate lower than seasonal flu but higher morbidity causing more deaths than normal
- Bird flu: very high mortality/very low morbidity
 - Hasn't caused a human pandemic
- Swine flu: high morbidity and very low mortality rate
 - H1N1 strain
 - Easily transmittable
 - No excess strain on healthcare facilities
- Tend to see highly infectious strains that cause a higher morbidity or we see highly virulent that cause high mortality — typically we don't see both in nature

- Start of global campaign
- Only around 600 cases worldwide as of 2022
- Pakistan
 - Attacking vaccination teams
- 2015
 - Nigeria no longer has polio
 - Africa continent eradicated polio
- 2019: surging cases in afghanistan
 - Agreement with taliban for vaccines
- Two polio vaccines
 - Salk vaccine
 - Live polio vaccine
 - Change the virus mutates and infects the individual
- Guinea worm
 - Rod of asclepius
 - From 3,500,000 to 9 cases
 - Primary issue in chad —affecting domestic dogs
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11/16/22 malaria control + eradication

- Discovered to be a parasite in 1880
- Panama canal
 - Walter reed
 - Malaria and yellow fever was a big issue
 - 1905: US military declared war on mosquitoes
 - Fumigation: sulfur candles (very toxic to everything)
 - Oiling: covered water with a thin layer of oil to stop them from breathing
 - Quarantine: locking people up if you got sick with malaria or yellow fever
 - Trial run for eliminating malaria?
- Malaria is a tropical disease since it had been eradicated from other areas
 - USA, Europe, etc
- USA malaria eradication
 - 1942: MC WA: aimed at controlling the spread of malaria
 - Techniques:
 - drained alot of swamps
 - Poisons — paris green (very bad for you)
 - DDT — insecticide — non toxic to humans
- **Residual spraying:** application of small amounts of insecticide to the interior walls of houses to kill and repel malaria transmitting mosquitoes
- Biomagnification:
 - Build up of toxic materials within the environment and animals
- CDC was established in 1946
 - Changed their name a couple of times
 - First tasked with preventing and controlling malaria

- Variolation — smallpox left visible scars
 - 50% of people would have small pox scars
 - Techniques to give you small pox to avoid more severe strains
- Different but related pathogens eg cowpox/small pox
- Death pathogens eg inactivated polio vaccine
- Weakened pathogens ex polio vaccine
- Recombinant pathogens ex ebola
- T cell — adaptive immune system
 - Killer t cell: know which cells are infected

10/24/22 measles & vaccination

- Viral diseases
- Vaccinations third major advancement
 - Control and eliminate viral diseases
- Vaccines → herd immunity
- More infectious the more people need to be vaccinated
- Measles eradicated in the U.S. By 2000
- Imported cases around 40 to a couple hundred a year
- Vaccines become victims of their own success
 - If disease isnt around people may stop vaccinating for that disease
 - Imported cases can spread more easily
- 2019 around 1000 cases of measles
- Global decline in measles cases ---- “race to eradication”
 - Need over 90% to have global herd immunity
- Measles is the leading cause of vaccine preventable death
- Measles eradication will probably be not as difficult to achieve as polio eradication
- Biology of measles:
 - Mode of action
 - 1. Enter host
 - Viruses are instructions (rna or dna) in a protein coat
 - The code and surface proteins allow it to enter your cells
 - 2. Infect macrophages
 - White blood cells infected
 - Natural killer cell: look for and cell virus infected cells
 - 3. Escape via dendritic cells (loses battle in the lungs)
 - Go to lymph nodes
 - 4. Multiply in B and T cells
 - 5. Infect many organs / bloodstream
- Innate immune system: call for help when needed
 - Macrophage
 - Natural killer cell: kill cells that are acting wonky
 - Dendritic cell
- Adaptive immune system
 - T cell

- 1870s
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- 1880s
- **Pasteurization**
 - Raising the temperature just below that of chemically changes the structure of the substance
 - Kills most bacteria
- **Definitions:**
 - Vaccine
 - Preparation of killed microorganism , living attenuated organism, or living fully virulent organisms administered to produce or artificially increase immunity to a particular disease
 - Vaccination
 - Administering weakened or dead pathogens to a healthy person or animal with the intent of conferring immunity against a targeted from of a related disease agent
 - BCG(bacille calmette guerin)
 - Vaccine against tb that is prepared from a strain of the weakened live bovine tb bacteria
 - Lasts roughly 15 years
 - Attenuated
 - Reduced the virulence of an organism, usually a virus while keeping it viable
- Testing for tb
 - If you have been exposed to tb (active or latent case) your immune system has memory of tb and its proteins
 - Your body reacts to the protein
 - If you have the BCG vaccine your test will show up positive
- Cities provided great breeding grounds for tb
 - Debtor prisons
- Britain exported tb around the world
 - During its empire
 - Immigrants migrated back to england bring tb with them
 - Similarly happened in New york
- Xenophobic response
 - TB being brought by foreigners
 - Can cross line to being 'racist'
- Robert koch
 - Paired TB with its microbacteria
 - Given nobel prize

10/3/22 section

- Endemic