

## Topic 1: Intro & History

- Our longer life expectancy is related to us changing the philosophical way we view the world, switching from “magic” to science
- Back in the day you were basically always sick in some way, either with a cold or infection or things like that
- Lice and fleas were very common almost every person had them
- It was very common for people to have worms and carry them around their entire life
- Our quantity of life has increased but also our quality of life
- In 1900 the main cause of death were infectious diseases (Pneumonia, TB, Influenza), now it is serious health issues like heart disease or cancer
- Main Reasons for Improved Health:
  - Improved sanitation
    - We now separate our waste from us, once it is expelled we do not come into contact with it
    - You were more exposed to the dead and dying, like dead animals or humans where the bodies would just be left where they died, or people would often die in their homes and the family would have to take care of the body
  - Clean drinking water
    - Natural water is not safe, if ingested the things living in the water will begin to live in you ex: Guinea worm (see slide 40)
      - The worm secretes chemicals that amplify pain when it is exiting the body, this helps ensure we will put the area in water so the worm can re-enter another body of water
    - Our tap water is cleaned for us
  - Refrigeration
    - Before refrigerating it was common for people to eat spoiled food because they had no choice it was eat the spoiled food or don't eat at all
    - Seasonal foods can be offered year round using refrigeration and preservatives
    - This also ensures we have a balanced diet all year long
  - Vaccination
    - Greatest achievement in modern medicine
    - Very successful for viral diseases
    - Using this we have been able to completely eliminate the disease of smallpox (only exists as samples in labs)
    - Have almost eliminated polio
  - Antibiotics
    - Before penicillin it was very likely you would die from childbirth from getting infections in any rips or tears that occurred during the birth
- The industry of pharmaceuticals is not bias, at least not the scientists who create the drugs are not, perhaps the sales people because it is their job to sell the product
- The industry is heavily regulated by the government, this is why most are very trustworthy because there are so many rules and regulations

- Ancient medications were made up cures, you most likely would have been better/richer without, if you felt any better this is likely the placebo effect
- There are a few that actually worked and we still use them today, the only difference is that it has actually been scientifically proven that they work
- Plants are a major source of drugs
  - They use chemicals and stuff to protect themselves, they have no physical defense
  - They produce lots of poisonous substances and these were the basis for ancient drugs, and still are today
- DRUGS ARE POISONS (dose makes the poison)
  - The only difference is the dose
- Usually low dose is good high dose is bad
  - An exception is insulin to a diabetic
  - And salt, we need a certain amount to survive, so if we don't get enough we are in trouble
- How drugs were discovered:
  - Observation (not very common)
    - Someone ate something by accident and you noticed that it caused a reaction
    - Often what was discovered was a strong poison, which was then used in a small dose as medication
      - Strong Poisons were easily found
      - Weak poisons were harder to identify ex: caffeine
    - "Doctors" would record these observations and what low doses of these poisons could be used to treat (hundreds of years ago)
    - Examples
      - Coca leaves are chewed by indigenous people who live at a high altitude as a stimulant to compensate for their low energy from lower oxygen levels (cocaine is derived from these leaves)
      - Quinine as a malaria treatment discovered by indigenous people
        - Was mixed with Gin to cover the bitter taste, this is where we get the term Gin and Tonic, there is quinine in Tonic water
    - Problems:
      - Observation can be misleading
        - We could create patterns that aren't really there,
          - our brains are hard wired to create these patterns (apophenia)
          - Pareidolia: perceiving sounds or images as something else (ex: seeing a face in the shape of a puddle of water)
        - They used anecdotal experiences (one off experiences) as proof that plants were curative to diseases
        - The placebo effect
        - Only experimental evidence is reliable
          - The evidence must be measured properly



- using walnuts to treat brain issues cause they look like brains
  - Boneset stems used to treat bone issues cause the stem grows directly through the leave, similar to a bone
  - Sharks don't get cancer (they do but people thought for some reason that they didnt), so we must be able to use them to treat cancer
    - They don't have bones, but they have cartilage and so do we so this must be able to treat our cancers
  - Chlorophyll treats bad breath
    - Farmers used to chew parsley and it gave them better breath, the chlorophyll is what makes the parsley green
  - Mandrake roots look like people, so it must be able to treat demonic possession
  - Rhino horn look like a dick so can be used to treat sex related diseases (like low sex drive, impotence, etc)
  - Mercury as a purgative, it is a neurotoxin in real life
  - Avocados, eggplants and pears are shaped like a pregnant women, hens help prevent cervical cancer
- Not all things can be treated with drugs, some conditions need surgery
- Surgery has only become safe in recent years, it used to be performed without anesthetic
- Amputation was the most common one, people became really quick so the patient did not spend too much time in shock, however they were done incorrectly with no skin flap available to cover the open wound
- In the mid 1800s Sir Humphry Davy discovered that nitrous oxide causes people to forget what happened to them while they were high off it
- In 1846 William TG Morton discovered ether will knock someone out while surgery was performed on them
- Anesthetics make modern surgery possible
- Before you only had a 70% chance of surviving surgery due to post surgery infection
  - Nothing was sterial, the surgeries were not performed in clean environments
- Joseph Lister discovered antiseptics (phenol) in 1867
  - Bacteria had just been discovered and proven as the cause of the high death rate following surgery
  - People got fewer infections and less server infections
  - However the phenol was very toxic to the doctors, due to them using it all day every day
    - Caused breathing problems
  - So Lister came up with the idea of washing and glove use during surgery to help prevent infections
  - Thomas Roddick brought these ideas back to Canada in 1877

- Linterine came from Lister as a household product (was not just used for mouth) contained phenol, which you don't really wanna be exposed to a lot of, so it does not contain it anymore
- The drug industry came from the discovery of synthetic dye, William Perkin discovered this
  - He converted a petroleum waste product into a purple dye
  - A bunch of companies began creating these dyes in different colours
  - And these companies discovered how to make organic compounds while creating these dyes
  - With this technology they discovered they could make medicinal ingredients (which are made of organic compounds)
  - The first artificial drug was aspirin developed in 1897 (artificial means it can only be created by humans in a lab can't be found in nature)
    - Artificial drugs were cheaper and better than the natural stuff
    - Most drugs today are artificial
    - Natural materials often have to be tweaked for them to work well on humans since nature makes them for itself not for us
    - Must be manufactured from oil
- Rules and Regulations
  - Super important to make sure the drugs work and are safe
  - Give you freedom from corruption
  - Did not exist in the 1800s, everyone just trusted that all the products would work
    - This gave a lot of opportunity for fraud
  - Patented medications were believed to be higher quality but that is not true
    - Became common in the 1800s but people caught on and then they earned the reputation as not being good
    - Would often add heroin and opium to get people to believe that they were getting better cause it would make them feel good and create repeat customers
- Have only had rules and regulations for the last 100 years
  - The most heavily regulated industry in the world today
- They would but addictive drugs that give you a good high in the medication
  - Since people feel better after taking it they will think they are being cured
- Eben M Byers drank radioactive water everyday for 2 years and had to have his lower jaw removed due to bone deterioration
- Board of Food and Drug Inspection Formed in 1907
  - First government regulations for medicines
  - Labeling only
  - No regulation of therapeutic claims
  - No safety testing
    - A list of ingredients had to be on the label that was the only rule
- 20 years later a company was selling sulfanilamide
  - It was the first antibiotic
  - Sold as a powder which you dissolved in water

- This compound was very bad tasting so people had a hard time taking it, especially children who were the main target group
- They came up with a liquid form, but they had to mix with ethylene glycol, which is extremely toxic
- Within days people began getting sick and dying from it, and the company contacted the American Medical Association for an antidote
- The government asked them to take it off the shelf but they refused because according to the law they were doing nothing wrong
- The government discovered that the product was mislabeled (as an elixir which it was not) so they were forced to take the product off the shelves
- The product was only available for sale for 2 months
- This led to the creation of the FDA
  - Food, Drug and Cosmetic Act 1938
  - Ensure the safety of drugs
  - Animal testing was now required (safety only)
  - Clinical trials were done to follow safety in humans
  - Directions for proper use were required on the label
- Thalidomide
  - Prescribed to pregnant women to help ease their morning sickness
  - Cause phocomelia in the infants
  - This effect was not discovered in the animal testing because testing was done on rats whom do not give birth to deformed pups
    - The mother's uterus will reabsorb the deformed pup
- Modern safety standards:
  - Safety testing done in at least 2 species
  - At least one must be a primate
  - Must show that the drug is bioavailable
    - Our body will actually absorb the medication and it will have an actual effect
    - Must show that it gets into the animal's body that it was tested on, otherwise it will look extremely safe
  - Must use relevant doses
- Modern Drugs Work:
  - Each starts with a scientific idea
  - Each is optimized using scientific methods
  - Each is tested scientifically
  - Manufacturing is standardized
  - Drug industry is tightly regulated
    - Must provide scientific proof