**Infectious Disease**

1. **Disease**
   1. Infection
      1. Defined as: WHEN THE BODY IS SUCCESSFULLY INVATED BY A PATHOGEN
      2. The number of micro-organisms around us is so LARGE that infection is a DAILY EVENT
   2. Disease
      1. Defined as: A DISORDER OF STRUCTURE OR FUNCTION THAT AFFECTS PART OR ALL OF AN ORGANISM
      2. INFECTION results in DISEASE when: THE GROWTH OF THE PATHOGEN INJURES CELLS AND TISSUE
   3. Pathogen
      1. Defined as: A DISEASE PRODUCING AGENT
      2. Study of the causes of DISEASE is called PATHOLOGY
2. **Spread of disease**
   1. A few micro-organisms find the human body an INVITING environment
      1. Some form a MUTUALISTIC relationship
      2. Some can cause ILLNESS by MULTIPLYING and SPREADING
   2. Pathogens require only the OPPORTUNITY to enter the body
      1. Some enter through a PUNCTURE in the SKIN
      2. Some spread through COUGHING or SNEEZING
      3. Some spread through CONTAMINATED water
      4. Some spread through FOOD handled by an INFECTED person
      5. Some spread by infected animals, e.g. TICKS and MOSQUITO
      6. Some spread through SEXUAL contact
3. **Viral disease**
   1. Examples:
      1. SMALL POX
      2. RABIES
      3. AIDS
      4. INFLUENZA
      5. COMMON COLD
   2. As the virus reproduces it destroys the CELLS that it infects, causing the SYMPTOMS of the disease
   3. Prevention
      1. Only successful protection is the PREVENTION of the infection
      2. To do this, the body’s IMMUNE system must be STIMULATED to prevent infection
      3. Vaccine
         1. Defined as: A SUBSTANCE CONTAINING WEAKENED/KILLED VIRUS INJECTED TO PROVIDE IMMUNITY
         2. Only protect if used BEFORE the INFECTION
         3. Body produces ANTIBODIES that are defined as: PROTEINS THAT HELP DESTROY PATHOGENS
   4. Interferon
      1. Defined as: PROTEINS PRODUCED BY BODY’S CELLS WHEN INFECTED BY A VIRUS
      2. Function by: INTERFERING WITH THE GROWTH OF A VIRUS
4. **Bacterial disease**
   1. Louis Pasteur was the first person show that BACTERIA can cause DISEASE
   2. Only a FEW types cause disease, some examples:
      1. DIPTHERIA
      2. TYPHOID FEVER
      3. CHOLERA
      4. TUBERCULOSIS
      5. TETANUS
      6. SYPHILIS
      7. BUBONIC PLAGUE
   3. Bacteria can cause disease in two ways:
      1. DAMAGE CELLS AND TISSUES DIRECTLY (CONSUME)
      2. RELEASE TOXINS THAT TRAVEL THROUGHOUT THE BODY, INTERFERING WITH FUNCTION
   4. Methods to fight bacterial disease
      1. Stimulate the IMMUNE system through VACCINATIONS
      2. Antibiotics: COMPOUNDS THAT ATTACK AND DESTROY BACTERIA
   5. Methods to control bacterial infection
      1. Sterilization:
         1. Heat: most bacteria can be killed in BOILING water
         2. Disinfectant: CHEMICAL solution that KILLS bacteria
      2. Food processing
         1. When bacteria “EAT” our food, they cause it to SPOIL
         2. Preventing spoilage:
            1. Refrigeration: slows the SLOWS of bacteria
            2. Sterilization by HEAT
            3. Canning: STERILIZED food is sealed into METAL or GLASS containers
            4. Chemical treatments that inhibit bacterial growth in food:

VINEGAR

SUGAR

SALT

1. **Antibiotic resistance**
   1. Antibiotics function by INTERFERING with processes essential for bacterial GROWTH and REPRODUCTION
      1. Prevent building or repairing CELL WALLS and MEMBRANES
      2. Prevent making RNA or DNA
   2. Whether the bacteria are GRAM-NEGATIVE or GRAM-POSITIVE effects antibiotic CHOICE
      1. Gram staining studies the CHEMICAL nature of the bacterial cell wall
      2. Gram-positive bacteria are coloured VIOLET
         1. Their cell walls are made of: ONE THICK CARBOHYDRATE LAYER AND PROTEINS
      3. Gram-Negative bacteria are coloured RED
         1. There cell walls are made of: SECOND LAYER OF LIPID AND CARBOHYDRATE LAYER (MORE RESISTANT)
   3. Antibiotic resistance arises from RANDOM MUTATION lowering the antibiotics EFFECTIVENESS by:
      1. Reducing drugs ability to ENTER the cell
      2. Changing the TARGET site of the DRUG within the cell
   4. The spread of resistance is accelerated by HORIZONTAL gene transfer through CONJUGATION
   5. Why should you always finish your antibiotics?

THE “WEAKEST” CELLS KILLED OFF FIRST, LEAVING JUST THE “STRONGEST” CELLS, IF THE ANTIBIOTICS ARE NOT FINISHED JUST THE STRONG CELLS REMAIN AND BEGIN TO REPRODUCE

1. **Bacteriaphage**
   1. Bacteriophage:
      1. Definition: VIRUSES THAT ARE PARASITIC ON BACTERIAL CELLS
      2. Sketch:

[**https://www.youtube.com/watch?v=d-v8uSG2ewk**](https://www.youtube.com/watch?v=d-v8uSG2ewk)