Unit 5 - What Factors Affect Human Health:

Health:

In biological terms, "healthy" refers to the state of an organism's body and mind functioning optimally without any signs of disease or dysfunction. It encompasses various factors such as physical fitness, proper nutrition, efficient organ function, and mental well-being.

Biologically, being healthy means maintaining homeostasis, which is the body's ability to regulate internal conditions within a narrow range despite external changes. This includes maintaining stable body temperature, pH levels, blood sugar levels, and hormonal balance.

A healthy organism has a robust immune system to defend against pathogens and infections, as well as the ability to repair and regenerate tissues. Additionally, biological health is influenced by genetic factors, environmental factors, lifestyle choices, and access to healthcare.

In Brief, being Healthy refers to the status of maintaining perfect mental and physical health.

WHO (World Health Organization):

The World Health Organization (WHO) is a specialized agency of the United Nations responsible for international public health. Established in 1948, WHO works to promote health, keep the world safe, and serve the vulnerable. Here are some of their Contributions:

1. **Eradication of Smallpox**:
    - WHO led the global effort to eradicate smallpox, one of the deadliest diseases in human history.
    - Through vaccination campaigns and surveillance efforts, WHO declared smallpox eradicated in 1980, marking one of the greatest achievements in public health.
2. **Global Polio Eradication Initiative**:
    - WHO is a key partner in the Global Polio Eradication Initiative, which aims to eradicate polio worldwide.

- Since the initiative began in 1988, global cases of polio have decreased by over 99%, bringing the world closer to achieving polio eradication.

3. **Control of Infectious Diseases**:
    - WHO plays a central role in controlling infectious diseases such as HIV/AIDS, tuberculosis, and malaria.
    - Through its programs and partnerships, WHO has contributed to significant reductions in the burden of these diseases and improved access to prevention, treatment, and care.

Principles of WHO:

1. **Universal Access to Healthcare**: WHO advocates for ensuring that everyone, regardless of their socio-economic status or location, has access to essential healthcare services without facing financial hardship. This includes access to preventive, curative, and palliative healthcare services, as well as essential medicines and vaccines.
2. **Health Equity**: WHO aims to reduce health disparities and promote health equity, meaning that everyone has the opportunity to attain their highest level of health. This involves addressing social determinants of health, such as poverty, education, and access to clean water and sanitation, to ensure that health outcomes are fair and just across different population groups.
3. **Collaboration and Partnership**: WHO recognizes that addressing complex global health challenges requires collaboration and partnership among governments, international organizations, civil society, academia, and the private sector. WHO fosters partnerships and networks to leverage collective expertise, resources, and capacities to tackle health issues collaboratively.
4. **Emergency Preparedness and Response**: WHO plays a critical role in global health security by preparing for and responding to health emergencies, including outbreaks, epidemics, natural disasters, and humanitarian crises. This involves strengthening countries' capacities for early detection, rapid response, and effective management of health emergencies to protect public health and save lives.

5. **Health Promotion and Disease Prevention**: WHO emphasizes the importance of promoting healthy behaviors and lifestyles, preventing diseases, and addressing risk factors to improve overall population health. This includes developing evidence-based strategies and interventions for promoting healthy diets, physical activity, tobacco control, alcohol and substance abuse prevention, and mental well-being.
6. **Capacity Building**: WHO supports countries in building and strengthening their healthcare systems, workforce, infrastructure, and capacities to address health challenges effectively. This includes enhancing healthcare delivery systems, improving health governance and leadership, strengthening health information systems, and building workforce capacity through training and education. By investing in capacity building, WHO helps countries achieve universal health coverage and respond to health emergencies.

Governments and their Role in Maintaining Health:

A government is a system or group of people responsible for governing and managing a community, region, or country. It establishes laws, regulations, and policies to maintain order, provide public services, protect citizens' rights, and promote the well-being of society as a whole.

Their Role in Maintaining Health:

1. Establishing Public Health Infrastructure: Governments create and maintain public health infrastructure, including healthcare facilities, sanitation systems, and disease surveillance mechanisms, which are essential for preventing and controlling diseases and promoting health.
2. Enacting Health Legislation and Regulation: Governments enact laws and regulations to protect public health and safety, such as regulations on food safety, environmental quality, workplace safety, and healthcare standards, ensuring that businesses and individuals adhere to health regulations to minimize risks to public health.
3. Providing Healthcare Services: Many governments provide or subsidize healthcare services to ensure that all citizens have access to essential

healthcare regardless of their ability to pay. This can include primary care, preventive services, emergency care, and treatment for chronic and acute illnesses.

4. Promoting Health and Wellness: Governments engage in health promotion activities, including public health campaigns, education programs, and policies addressing social determinants of health, to encourage healthy behaviors and lifestyles, prevent diseases, and improve overall population health.

Pathogens:

Pathogens are microorganisms, such as bacteria, viruses, fungi, protozoa, and parasites, that can cause disease in humans, animals, and plants. These organisms have evolved various mechanisms to invade and infect their hosts, leading to illness and sometimes death.

The way pathogens work can vary depending on their type and the specific disease they cause. However, pathogens generally follow a few common steps in the infection process:

1. **Entry into the Host**: Pathogens enter the host's body through various routes, such as the respiratory tract, gastrointestinal tract, skin, or mucous membranes. They can be transmitted through air droplets, contaminated food or water, bodily fluids, or direct contact with infected individuals.
2. **Attachment and Colonization**: Once inside the host, pathogens attach to host cells or tissues using specific receptors or surface molecules. They may then multiply and colonize the host's tissues, often evading or suppressing the host's immune response.
3. **Invasion and Damage**: Pathogens may invade host cells or tissues, causing damage directly by destroying cells, disrupting cellular functions, or releasing toxins. Some pathogens can also manipulate host cell signaling pathways or immune responses to facilitate their survival and replication.
4. **Multiplication and Spread**: Pathogens replicate within the host's body, producing large numbers of progeny. They may spread to other tissues or organs through the bloodstream, lymphatic system, or direct extension, causing systemic infection and further tissue damage.

5. **Evasion of Host Defenses**: Pathogens employ various strategies to evade or subvert the host's immune defenses, such as masking their surface antigens, inhibiting immune cell activation or function, or inducing immunosuppression. This allows them to establish chronic infections or evade immune clearance.

Key Terms/Definitions:

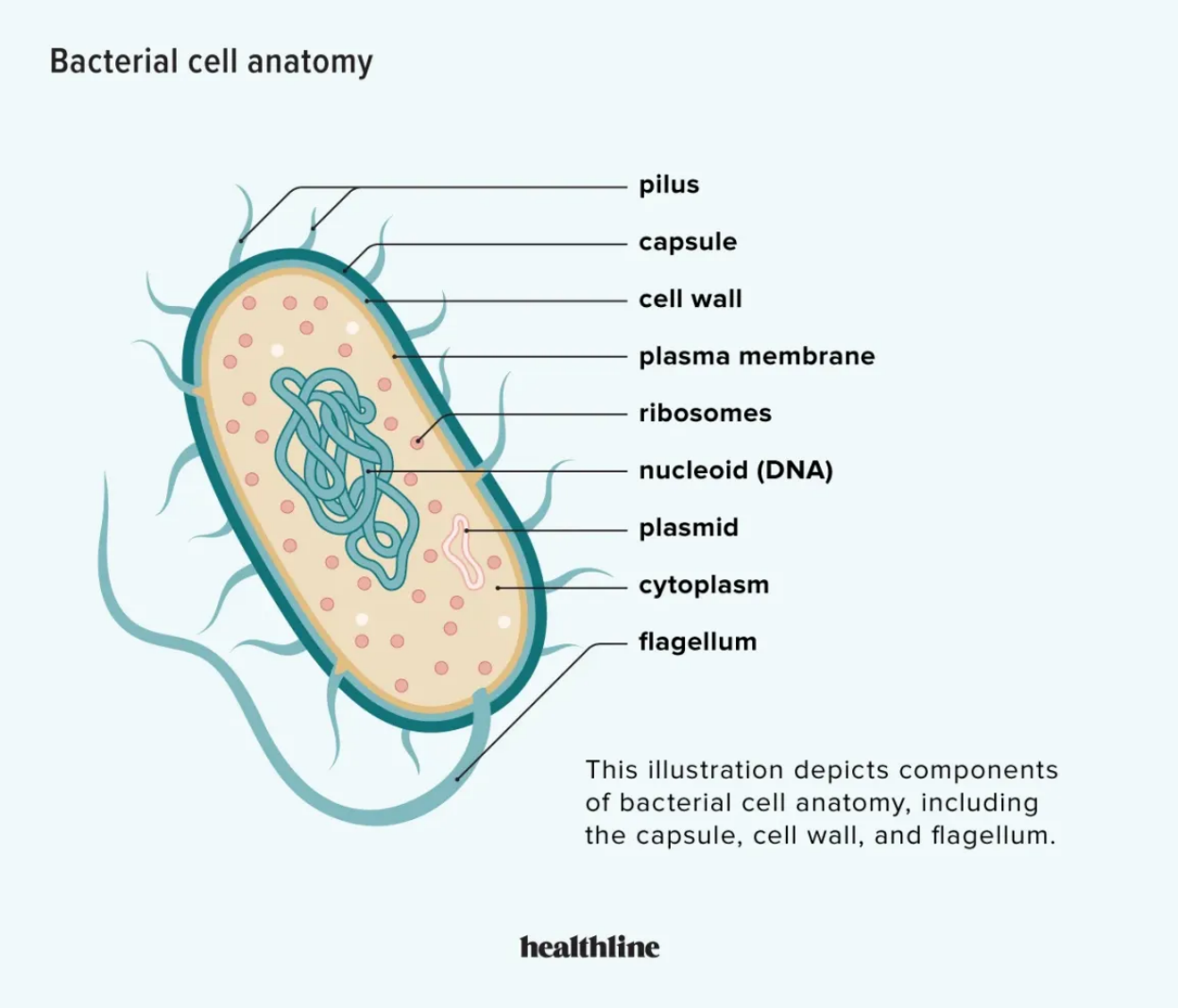
1. **Parasite**: A parasite is an organism that lives in or on another organism (called the host) and benefits at the expense of the host. Parasites derive nutrients and resources from the host, often causing harm or disease in the process. Parasites can be unicellular (like protozoa) or multicellular (like worms), and they have various strategies for exploiting their hosts.
2. **Host**: A host is an organism that harbors another organism (the parasite) and provides it with a habitat and resources for survival. Hosts can be plants, animals, or even other microorganisms. Parasites rely on hosts for food, shelter, and reproduction, and their interactions with hosts can range from mutualistic to parasitic.
3. **Budding**: Budding is a form of asexual reproduction in which a new organism develops as an outgrowth or bud from the parent organism. The bud grows and eventually detaches from the parent to become an independent organism. Budding is common in some simple multicellular organisms (such as yeast) and some colonial organisms (such as hydra).
4. **Asexual Reproduction**: Asexual reproduction is a type of reproduction that involves the production of offspring from a single parent without the involvement of gametes (sex cells) or the fusion of genetic material from two parents. Asexual reproduction can occur through various mechanisms, including binary fission, budding, fragmentation, and spore formation. It is common in many unicellular organisms, as well as some plants and animals. Asexual reproduction produces genetically identical offspring (clones) to the parent organism.

Types of Pathogens:

1. **Bacteria**:

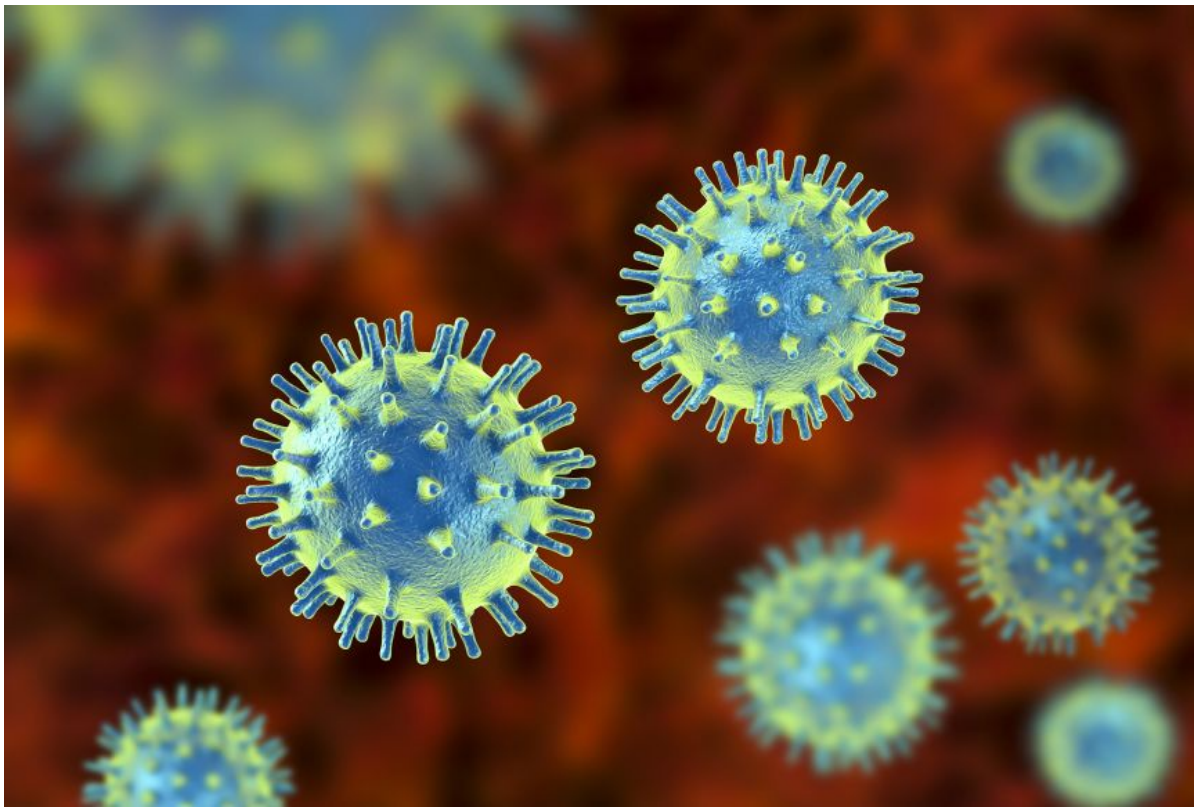
Bacteria are single-celled microorganisms that can cause various infectious diseases in humans, animals, and plants. Examples include:

- Escherichia coli (E. coli)
- Streptococcus pyogenes (causes strep throat)
- Mycobacterium tuberculosis (causes tuberculosis)



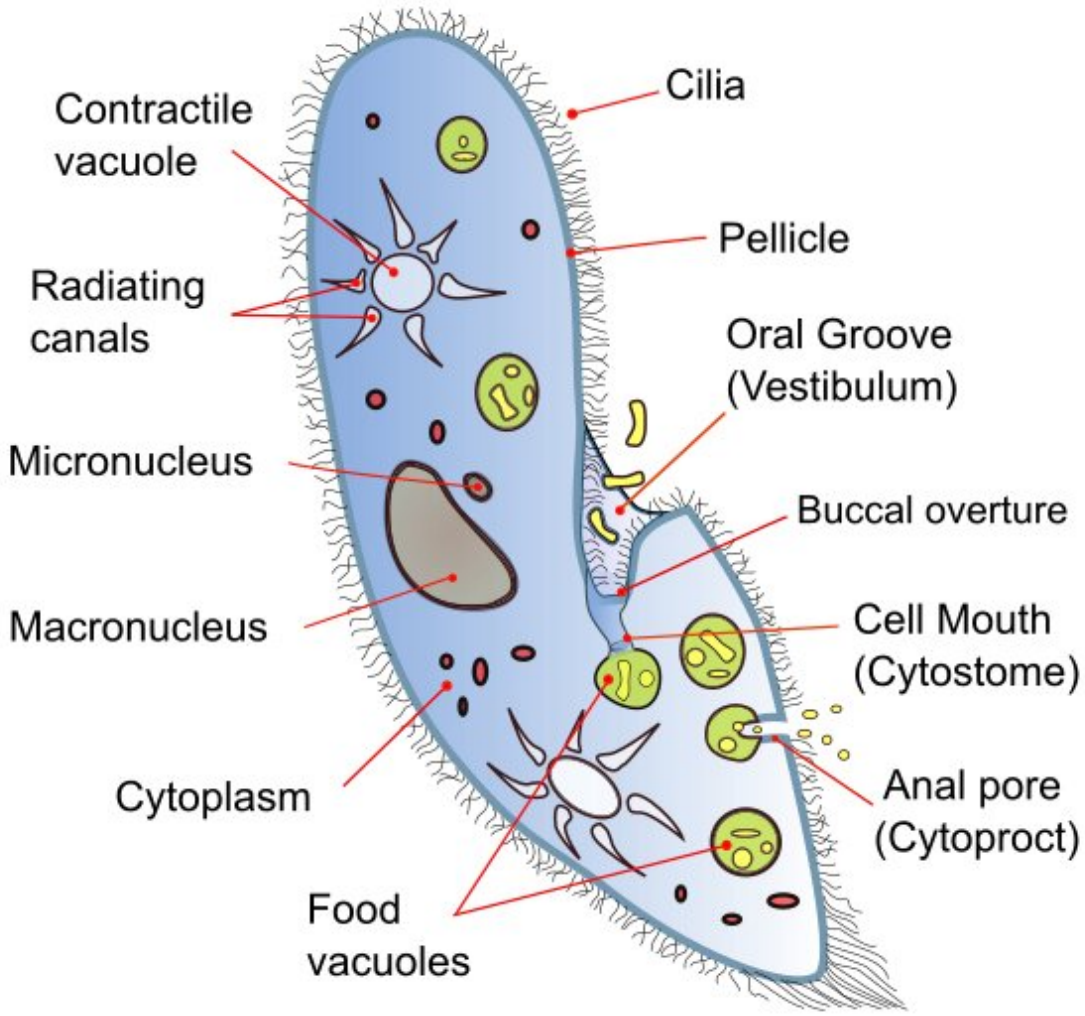
2. **Viruses**: Viruses are tiny infectious agents that require a host cell to replicate and cause diseases. Examples include:
    - Influenza virus (causes flu)
    - Human immunodeficiency virus (HIV)

- Hepatitis B virus (HBV)



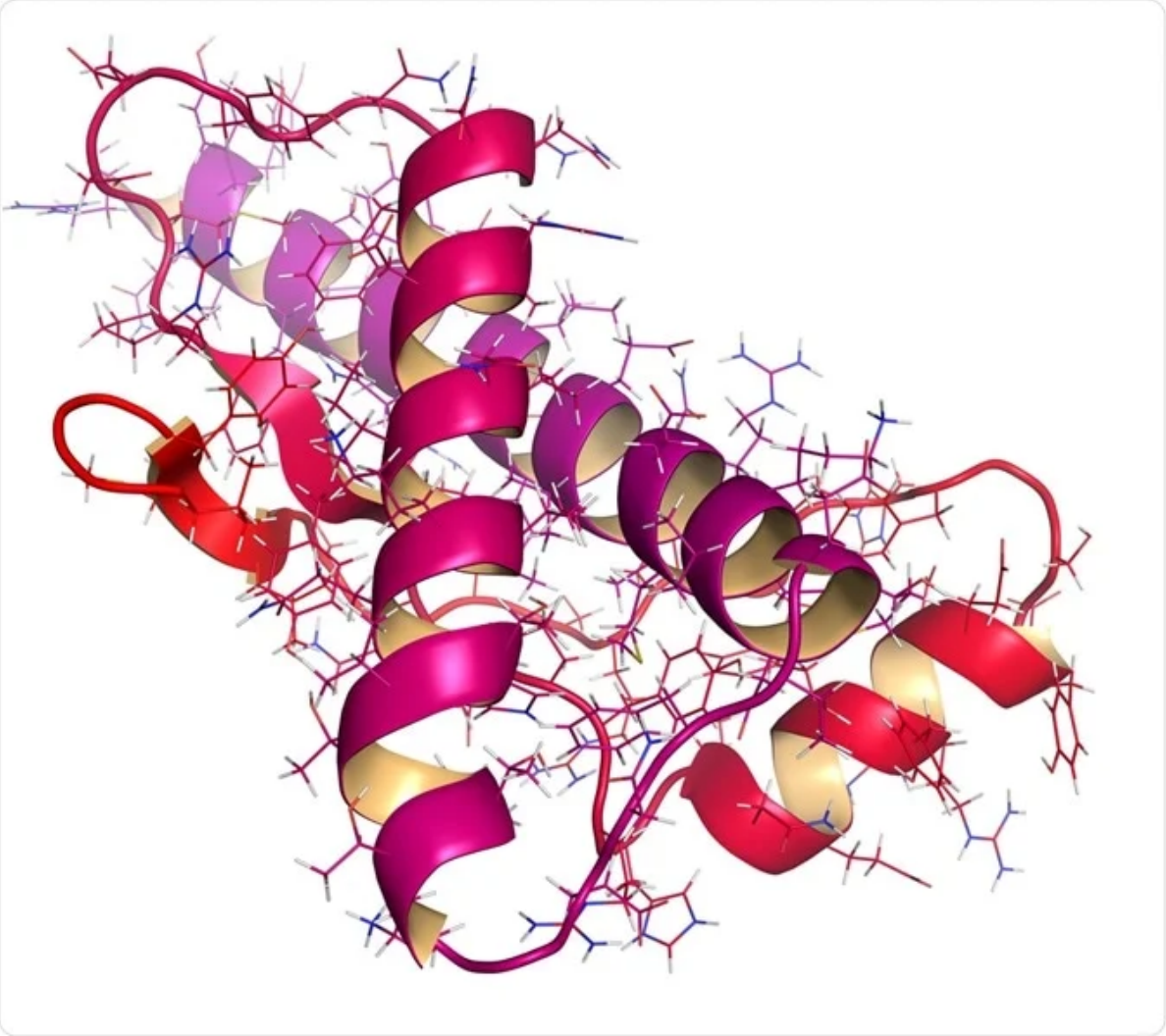
3. **Fungi**: Fungi are eukaryotic microorganisms that can cause fungal infections in humans and animals. Examples include:
    - Candida albicans (causes yeast infections)
    - Aspergillus fumigatus (causes aspergillosis)
    - Trichophyton species (causes athlete's foot and ringworm)

4. **Protozoa**: Protozoa are single-celled eukaryotic organisms that can cause parasitic infections in humans and animals. Examples include:
    - Plasmodium species (causes malaria)
    - Giardia lamblia (causes giardiasis)
    - Entamoeba histolytica (causes amoebiasis)



5. **Helminths**: Helminths are parasitic worms that can infect humans and animals, causing helminthiasis. Examples include:
    - Ascaris lumbricoides (roundworm)
    - Taenia solium (tapeworm)
    - Schistosoma species (causes schistosomiasis)

6. **Prions**: Prions are infectious agents composed of misfolded proteins that can cause neurodegenerative diseases in humans and animals. Examples include:
    - Creutzfeldt-Jakob disease (CJD)
    - Bovine spongiform encephalopathy (BSE or "mad cow disease")
    - Scrapie (in sheep)



These are some of the main types of pathogens that can cause diseases in humans, animals, and plants. Each type has its own unique characteristics, modes of transmission, and mechanisms of causing illness.

How do Pathogens Enter our Body:

1. **Respiratory Tract**: Airborne pathogens, such as viruses and bacteria, can be inhaled into our respiratory tract when we breathe. They can infect the lining of the nose, throat, or lungs, leading to respiratory illnesses like the common cold, flu, or pneumonia.
2. **Digestive Tract**: Pathogens can enter our body through the digestive tract when we consume contaminated food or water. Once ingested, they can infect

the lining of the stomach or intestines, causing gastrointestinal infections such as food poisoning or diarrhea.

3. **Skin**: Pathogens can penetrate the skin through cuts, abrasions, or puncture wounds. They can then invade the underlying tissues, leading to skin infections like cellulitis or abscesses.
4. **Mucous Membranes**: Mucous membranes lining the eyes, nose, mouth, and genital tract provide entry points for pathogens. Germs can enter through these moist membranes, causing infections such as conjunctivitis (pink eye), sinusitis, or sexually transmitted infections (STIs).
5. **Vector-Borne Transmission**: Some pathogens are transmitted by vectors, such as mosquitoes, ticks, or fleas. When these vectors bite humans, they can inject pathogens directly into the bloodstream, leading to diseases like malaria, Lyme disease, or dengue fever.

How do our Bodies Prevent this:

1. **Physical Barriers**: The skin serves as a physical barrier that prevents pathogens from entering the body. Additionally, mucous membranes lining the respiratory, digestive, and urogenital tracts produce mucus, which traps pathogens and prevents them from reaching underlying tissues.
2. **Mucus and Cilia**: Mucus produced by mucous membranes traps pathogens, while cilia (hair-like structures) in the respiratory tract sweep mucus and trapped particles away from the lungs toward the throat, where they can be swallowed or expelled through coughing.
3. **Acidic Environment**: Stomach acid creates an acidic environment that kills many ingested pathogens. Similarly, vaginal acidity helps prevent the growth of harmful bacteria and fungi in the reproductive tract.
4. **Immune System**: The immune system plays a crucial role in recognizing and eliminating pathogens. Innate immune cells, such as macrophages and neutrophils, patrol the body and engulf or destroy pathogens upon detection. Additionally, specialized cells called lymphocytes produce antibodies and coordinate immune responses to pathogens.

5. **Inflammatory Response**: In response to tissue damage or infection, the body initiates an inflammatory response characterized by redness, swelling, heat, and pain. Inflammation helps contain pathogens at the site of infection and recruits immune cells to fight the infection.

Replication of Viruses:

Viruses replicate by hijacking host cells and using their machinery to produce new virus particles. The process typically involves the following steps:

1. **Attachment**: The virus attaches to specific receptors on the surface of a host cell, allowing it to enter the cell.
2. **Entry**: The virus enters the host cell, either by direct fusion with the cell membrane or by being engulfed into a vesicle through endocytosis.
3. **Uncoating**: Once inside the host cell, the virus sheds its protein coat (capsid) to release its genetic material (DNA or RNA) into the cell's cytoplasm.
4. **Replication**: The virus's genetic material takes over the host cell's machinery to replicate its genome and produce viral proteins.
5. **Assembly**: Newly synthesized viral components, including viral genome and proteins, are assembled into new virus particles (virions) within the host cell.
6. **Release**: Newly assembled virions are released from the host cell either by budding, where the virus acquires a portion of the host cell membrane as it exits, or by cell lysis, where the host cell is destroyed, releasing virions into the surrounding tissue.

This process repeats, leading to the production of multiple virus particles that can infect neighboring cells or be transmitted to other hosts, facilitating the spread of infection.

Cell Damage:

When pathogenic bacteria produce toxins, these substances can disrupt normal cellular functions and lead to illness. The toxins may directly damage cell membranes, interfere with cellular processes, or trigger inflammatory responses in the body. For example, toxins produced by certain strains of bacteria can cause tissue damage in the intestines, leading to symptoms like diarrhea and abdominal

pain. Additionally, bacterial toxins can affect organs and systems throughout the body, contributing to systemic illnesses such as sepsis or toxic shock syndrome. Understanding how bacterial toxins cause cellular damage is crucial for developing effective treatments and preventive measures against bacterial infections.

Immunity:

Immunity refers to the body's ability to defend itself against harmful pathogens, such as bacteria, viruses, fungi, and parasites, as well as against foreign substances like toxins and allergens. It is a complex system involving various organs, cells, proteins, and processes that work together to recognize and eliminate harmful invaders while maintaining tolerance to the body's own cells and tissues.

There are two main types of immunity:

1. **Innate Immunity**: Also known as nonspecific immunity, innate immunity provides immediate, general protection against a wide range of pathogens. It includes physical barriers like the skin and mucous membranes, as well as cellular and molecular components such as neutrophils, macrophages, natural killer cells, and antimicrobial proteins. Innate immunity is the first line of defense against infections and operates continuously to prevent pathogens from entering or spreading in the body.
2. **Adaptive Immunity**: Also known as acquired immunity, adaptive immunity is a more specialized and targeted response to specific pathogens. It develops over time as the immune system encounters and responds to pathogens, vaccines, or other foreign substances. Adaptive immunity involves highly specialized cells called lymphocytes (B cells and T cells) that produce antibodies and mount targeted immune responses against specific pathogens. Adaptive immunity provides long-lasting protection against reinfection and is responsible for the immune memory that underlies vaccination.

Symptoms:

Symptoms are physical or mental indications of an illness or condition that an individual experiences.

Symptoms caused by pathogens can vary widely depending on the type of pathogen, the site of infection, and the individual's immune response. However, common symptoms of infection may include:

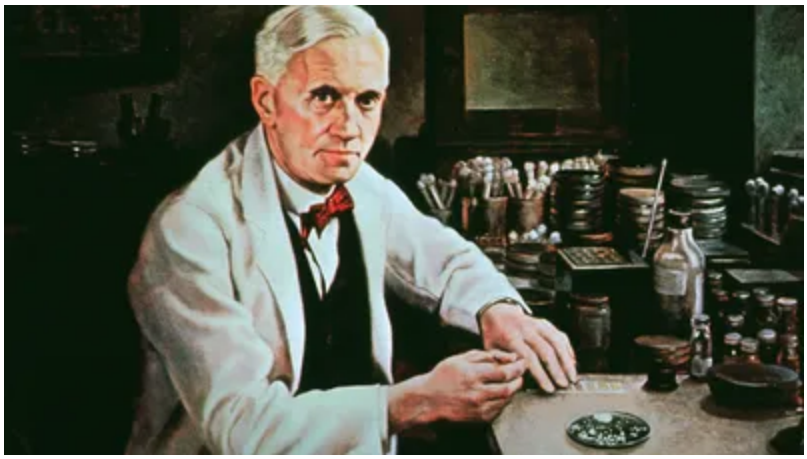
1. **Fever**: Elevated body temperature is a common response to infection and is often accompanied by chills or sweats.
2. **Fatigue**: Feeling tired or lethargic is a typical symptom of infection as the body expends energy to fight off the invading pathogen.
3. **Pain or Discomfort**: Pain, aches, or discomfort may occur at the site of infection or throughout the body.
4. **Swelling and Inflammation**: Inflammation is a natural response to infection and can cause swelling, redness, and tenderness in affected tissues.
5. **Coughing and Sneezing**: Respiratory infections often cause coughing, sneezing, and congestion as the body tries to expel pathogens from the respiratory tract.

Key Terms:

1. **Antibodies**: Antibodies are proteins produced by the immune system in response to the presence of foreign substances called antigens. They help the immune system recognize and neutralize pathogens, such as bacteria or viruses.
2. **Antigens**: Antigens are molecules or substances that stimulate an immune response. They can be found on the surface of pathogens or other foreign substances, triggering the production of antibodies by the immune system.
3. **Antibiotics**: Antibiotics are medications used to treat bacterial infections. They work by killing bacteria or inhibiting their growth, helping the body to fight off the infection.
4. **Vaccinations (Vaccines)**: Vaccinations are preventive measures that stimulate the immune system to develop immunity against specific pathogens. They contain weakened or killed forms of the pathogen or parts of the pathogen, helping the body recognize and defend against future infections.

5. **Herd Immunity**: Herd immunity, also known as community immunity, occurs when a significant portion of the population becomes immune to a disease, either through vaccination or previous infection. When a large proportion of individuals in a community are immune, the spread of the disease is inhibited, protecting even those who are not immune.
6. **Epidemic**: An epidemic refers to the occurrence of a disease in a community or region at a higher-than-normal rate. It typically involves a sudden increase in the number of cases of a particular disease within a specific population or geographic area. Epidemics can vary in size and severity, ranging from localized outbreaks to widespread public health crises.

Alexander Fleming and the first Antibiotic:



Alexander Fleming was a Scottish bacteriologist and pharmacologist who is best known for his discovery of the antibiotic substance penicillin in 1928. Born on August 6, 1881, in Lochfield, Scotland, Fleming studied medicine at St. Mary's Hospital Medical School in London and later joined the faculty at St. Mary's Hospital as a researcher.

Alexander Fleming discovered antibiotics accidentally in 1928 while working at St. Mary's Hospital in London. He was researching the influenza virus when he noticed that a mold called Penicillium notatum had contaminated one of his Petri dishes. He observed that the mold produced a substance that inhibited the growth of bacteria around it. Fleming identified this substance as penicillin, the first antibiotic.

Realizing the potential of penicillin to treat bacterial infections, Fleming conducted further experiments to isolate and purify the antibiotic. However, he encountered challenges in producing penicillin in large quantities, and his initial discovery did not immediately lead to the widespread use of antibiotics.

It was not until the 1940s, during World War II, that scientists Howard Florey and Ernst Chain, along with others, successfully purified penicillin and demonstrated its effectiveness in treating bacterial infections. This breakthrough paved the way for the mass production and widespread use of antibiotics, revolutionizing medicine and saving countless lives. Fleming's accidental discovery of penicillin remains one of the most significant contributions to modern medicine.

Edward Jenner’s and Vaccine Development:

- Jenner's observation of milkmaids led him to hypothesize that cowpox provided protection against smallpox.

- He tested his hypothesis by inoculating James Phipps, an 8-year-old boy, with material from a cowpox lesion.
- After the boy developed mild symptoms of cowpox, Jenner exposed him to smallpox, but the boy did not contract the disease.
- Jenner coined the term "vaccination" from the Latin word "vacca" meaning cow, to describe his method.
- The success of Jenner's experiment paved the way for the widespread adoption of vaccination as a preventive measure against infectious diseases.
- Jenner's work laid the foundation for the development of vaccines against numerous other diseases, leading to significant advancements in public health and disease prevention.

Adaptations of Bacteria to combat Antibiotics:

1. **Mutation**: Bacteria can undergo spontaneous mutations in their genetic material, which may confer resistance to antibiotics. Mutations can occur randomly, and bacteria with mutations that provide resistance to antibiotics are more likely to survive and reproduce in the presence of antibiotics.
2. **Horizontal Gene Transfer**: Bacteria can acquire antibiotic-resistance genes from other bacteria through processes such as conjugation, transformation, and transduction. This horizontal transfer of genetic material allows bacteria to rapidly spread antibiotic resistance within and between species.
3. **Efflux Pumps**: Some bacteria have specialized proteins called efflux pumps that actively pump antibiotics out of the bacterial cell, reducing their concentration inside the cell and limiting their effectiveness.
4. **Enzymatic Degradation**: Certain bacteria produce enzymes that can chemically modify or degrade antibiotics, rendering them inactive. For example, beta-lactamase enzymes can break down beta-lactam antibiotics like penicillin, making them ineffective against the bacteria.
5. **Target Modification**: Bacteria can alter the target site of antibiotics, such as the bacterial cell wall or protein synthesis machinery, to prevent the antibiotics from binding and exerting their antimicrobial effects.

Disease Transmission:

Transmission of Pathogens:

1. **Direct Contact**: Transmission occurs when an infected person or animal comes into direct contact with a susceptible individual. This can include touching, kissing, or sexual contact.
2. **Indirect Contact**: Transmission occurs through contact with contaminated objects or surfaces that have been contaminated by an infected person or animal. This can include touching contaminated surfaces, sharing utensils or personal items, or handling contaminated objects.
3. **Airborne Transmission**: Transmission occurs through the inhalation of respiratory droplets or aerosols containing infectious agents. This can happen when an infected person coughs, sneezes, talks, or breathes, releasing respiratory droplets into the air that can be inhaled by others.
4. **Waterborne Transmission**: Transmission occurs through the ingestion of water contaminated with pathogens, such as bacteria, viruses, or parasites. This can happen through drinking contaminated water or consuming food prepared with contaminated water.
5. **Foodborne Transmission**: Transmission occurs through the ingestion of food contaminated with pathogens. This can happen when food is improperly handled, stored, or cooked, allowing pathogens to multiply and cause illness when consumed.
6. **Vector-borne Transmission**: Transmission occurs through the bite of an infected arthropod vector, such as mosquitoes, ticks, fleas, or flies. These vectors can carry and transmit pathogens from one host to another during feeding.

Inherited Diseases vs. Transmitted Diseases:

Inherited Diseases:

Inherited diseases, also known as genetic disorders, are conditions that are passed down from parents to their offspring through genes. These diseases are

caused by abnormalities or mutations in the DNA sequence of an individual's genes.

- Inherited diseases can be dominant, meaning they only require one copy of the abnormal gene to be expressed, or recessive, requiring two copies of the abnormal gene. Examples of inherited diseases include cystic fibrosis, sickle cell anemia, Huntington's disease, and hemophilia.

Transmitted Diseases:

Transmitted diseases, also known as communicable or infectious diseases, are illnesses caused by pathogenic microorganisms such as bacteria, viruses, fungi, or parasites that can be transmitted from one person to another or from animals to humans.

- Transmission can occur through direct or indirect contact, airborne droplets, contaminated food or water, insect vectors, or vertical transmission from mother to child during childbirth or breastfeeding. Examples of transmitted diseases include influenza, tuberculosis, HIV/AIDS, malaria, and sexually transmitted infections like gonorrhea and chlamydia.

Autoimmune Disease:

An autoimmune disease is when the body's immune system mistakenly attacks its tissues, causing inflammation and damage to organs and tissues. The immune system is normally responsible for defending the body against harmful substances such as viruses, bacteria, and other pathogens.

However, in autoimmune diseases, the immune system fails to distinguish between foreign invaders and the body's cells, leading to an immune response against healthy tissues.

Effect of Autoimmune Diseases on Daily Lives:

1. **Dietary Restrictions**: Many autoimmune diseases, including Crohn's disease, require dietary modifications to manage symptoms and reduce inflammation. Individuals with Crohn's may need to avoid certain foods that trigger flare-ups, such as high-fiber foods, dairy, spicy foods, and gluten-containing grains.

This can lead to dietary restrictions and challenges in meal planning and social situations.

2. **Medication Management**: Treatment for autoimmune diseases often involves long-term use of medications such as immunosuppressants, corticosteroids, biologics, or anti-inflammatory drugs. Managing medications, dealing with potential side effects, and adhering to treatment regimens can impact daily routines and activities.
3. **Symptom Flare-ups**: Autoimmune diseases like Crohn's can have unpredictable flare-ups characterized by symptoms such as abdominal pain, diarrhea, fatigue, and weight loss. Flare-ups can disrupt work, school, social activities, and travel plans, leading to decreased productivity and quality of life.
4. **Physical Limitations**: Severe symptoms of autoimmune diseases can result in physical limitations and decreased mobility. Individuals may experience fatigue, joint pain, muscle weakness, or other symptoms that affect their ability to perform daily activities, exercise, or engage in hobbies and recreational activities.
5. **Emotional and Psychological Impact**: Living with a chronic autoimmune disease can take a toll on mental health and emotional well-being. Anxiety, depression, stress, and feelings of isolation are common among individuals with autoimmune diseases, particularly during periods of flare-ups or when coping with the challenges of managing a chronic illness.

Prevalence of Disease:

Trend of Diseases around the Globe:

1. **Malaria**: Malaria is a significant health concern in many sub-Saharan African countries, including Nigeria, Democratic Republic of the Congo, and Mozambique. It is transmitted by mosquitoes and can lead to severe illness and death if not promptly treated.
2. **Tuberculosis (TB)**: TB is prevalent in countries with high population density and limited access to healthcare, such as India, Indonesia, and China. It is

caused by bacteria and primarily affects the lungs but can also affect other parts of the body.

3. **HIV/AIDS**: HIV/AIDS remains a major public health issue in sub-Saharan Africa, with countries like South Africa, Nigeria, and Uganda having high prevalence rates. Access to antiretroviral therapy and prevention programs are crucial for reducing the spread of the virus and improving outcomes for those living with HIV/AIDS.
4. **Chronic Respiratory Diseases**: Chronic respiratory diseases, including chronic obstructive pulmonary disease (COPD) and asthma, are prevalent in countries with high levels of air pollution and tobacco use, such as China, India, and Bangladesh.
5. **Diabetes**: Diabetes is becoming increasingly prevalent in countries undergoing rapid urbanization and lifestyle changes, such as Mexico, Egypt, and Saudi Arabia. Factors such as unhealthy diets, sedentary lifestyles, and genetic predisposition contribute to the rising incidence of diabetes in these regions.
6. **Cardiovascular Diseases**: Cardiovascular diseases, including heart disease and stroke, are leading causes of death worldwide. They are prevalent in both high-income countries, such as the United States, Canada, and Western European countries, as well as in low- and middle-income countries experiencing epidemiological transitions and urbanization.

Diseases and their Trend in Certain Genders:

1. **Breast Cancer**: Breast cancer is more prevalent in females, with women accounting for the vast majority of cases. Genetic factors, hormonal influences, and reproductive history contribute to the higher incidence of breast cancer in women.
2. **Prostate Cancer**: Prostate cancer is more prevalent in males, with men having a significantly higher risk of developing the disease compared to women. Age, genetics, and hormonal factors play a role in the development of prostate cancer.
3. **Osteoporosis**: Osteoporosis, a condition characterized by weakened bones, is more prevalent in females, particularly postmenopausal women. Estrogen

deficiency following menopause contributes to bone loss and increases the risk of osteoporosis in women.

4. **Autoimmune Diseases**: Autoimmune diseases, such as rheumatoid arthritis, systemic lupus erythematosus (lupus), and multiple sclerosis, are more common in females. Hormonal factors, genetic predisposition, and immune system differences between genders contribute to the higher prevalence of autoimmune diseases in women.
5. **Depression and Anxiety Disorders**: Depression and anxiety disorders are more prevalent in females compared to males. Biological factors, such as hormonal fluctuations, and psychosocial factors, such as gender roles and social expectations, may contribute to the gender disparity in the prevalence of these mental health conditions.