

## WHY DO WE FALL ILL? CLASS 9

**WHO definition of Health:** Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Components of food / Nutrients:

**Food is a necessity for cell and tissue functions. Anything that prevents proper functioning of cells and tissues will lead to a lack of proper activity of the body:**

Cells are the basic units of living beings. Cells are made of a variety of Chemical substances – proteins, carbohydrates, fats or lipids. The living cell is a dynamic place. All the life activities are interconnected.. For all these interconnected life activities, energy and raw material are needed from outside the body.

**Relation between Health, personal Hygiene, Community Hygiene and Economic condition:** Health cannot be achieved entirely on our own. The health of all organisms depend on their surroundings or their environment. The environment includes the physical environment.

Human beings live in societies. Our social environment is an important factor in our individual health. Our physical environment is decided by our social environment. If there is a great deal of garbage thrown in our streets, or if there is open drain water lying stagnant around our houses, the possibility of poor health increases. Therefore, **public cleanliness is important for individual health.**

Good economic conditions and jobs are needed for individual health.

Social equality and harmony are also necessary for individual health.

### **Distinction between Healthy and Diseased**

Disease, means being uncomfortable.	Simply not being diseased is not the same as being healthy. We can be in poor health without there being a identifiable disease
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**Disease, Symptoms and Tests:** When we suffer from a disease, the functioning or the appearance of one or more systems of the body will change. These changes give rise to symptoms and signs of diseases. Symptoms indicate the presence of a disease, but not the confirmation of a disease. Doctors do diagnostic, laboratory tests to confirm a disease.

### **Acute and Chronic diseases:**

Diseases last for only very short periods of time, are called acute diseases.  Example: Common cold	Diseases that last for a long time, are called chronic diseases.  Example. Elephantiasis
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**Chronic disease and poor health:** Any disease that causes poor functioning of some part of the body will affect our general health. This is because all functions of the body are necessary for general health. A chronic disease will cause major effects on general health leading to poor health. We may have prolonged general poor health if we have a chronic disease. Therefore chronic diseases have very drastic long-term effects on people's health as compared to acute diseases.

### **What causes diseases?**

First level cause: (immediate cause) a causative organism (bacteria, virus, fungus, insect etc)

Second level cause: (contributory cause) lack of good nourishment

Third level cause: (contributory cause) poverty or lack of public services

## **INFECTIOUS DISEASE AND NONINFECTIOUS DISEASE**

Diseases caused by external causes like microorganisms, that spread from infected person to healthy persons are called Infectious disease	Disease caused by internal causes, and do not spread from one person to another person are called Non infectious disease
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### **PEPTIC ULCER**

Common Belief: Ulcer is caused by acidity and bleeding in the stomach and duodenum, because of lifestyle reasons. Everybody thought that a stressful life led to a lot of acid secretion in the stomach, and eventually caused peptic ulcers.

Actual cause: a bacterium, *Helicobacter pylori*, is responsible for peptic ulcers.

Discovered by: Robin Warren and Barry Marshall from Australia.

### **INFECTIOUS DISEASES:**

Organisms which cause diseases: Viruses, Bacteria, Fungi, Protozoa, worms

Leishmania is a protozoa and is the parasite responsible for the disease leishmaniasis (Kalaazar). It is spread through sandflies of the genus Phlebotomus

Staphylococcus: the bacteria which can cause acne.

Trypanosoma: the protozoan organism responsible for sleeping sickness.

**Round worm:** *Ascaris lumbricoides* is the giant roundworm of humans, belonging to the phylum Nematoda. An ascarid nematode, it is responsible for the disease ascariasis in humans, and it is the largest and most common parasitic worm in humans. One-sixth of the human population is estimated to be infected by *Ascaris lumbricoides*

**Diseases caused by Viruses:** Common cold (Influenza), Dengue fever, AIDS

**Disease caused by Bacteria:** Typhoid, Tuberculosis, Cholera Anthrax

**Disease caused by Fungi:** Ring worm,

**Diseases caused by Protozoa:** Malaria., Kala azar

**Diseases caused by worms:** Ascariasis, Elephantiasis

**Drugs that block one of the life processes in one member of the microbial group is likely to be effective against many other members of the group. But the same drug will not work against a microbe belonging to a different group:**

All viruses live inside host cells, whereas bacteria very rarely live inside the cells. Viruses, bacteria and fungi multiply very quickly, while worms multiply very slowly. All bacteria are closely related. But viruses and bacteria are not related to each other. This means that many important life processes are similar in the bacteria group but these life processes may not be present in viruses

### **Antibiotics do not work against viruses (3 mark)**

**Antibiotics:** Medicines obtained from microorganisms which can stop or prevent the growth of other microorganisms are called Antibiotics.

**Penicillin:** obtained from a fungus *Penicillium notatum*, discovered by Alexander Fleming

**Mode of action of Antibiotics:** Antibiotics block biochemical pathways important for bacteria. Many bacteria make cell wall to protect them. Antibiotics (Penicillin) prevent the making of cell wall. So the bacteria become unable to make cell walls. So they die easily. The penicillin do not affect the human cells because, human cells do not have a cell wall. Penicillin can work against any bacterium that forms cell wall.

But viruses do not use these pathways at all. Therefore antibiotics do not work against viral infections.

### **Means of Spread:**

**Communicable diseases:** Diseases caused by microbes which are transmitted from infected person to healthy person through some agents (air, water, physical contact, contaminated food etc) are called communicable diseases.

#### **Through air:** Example, Commocold. Pneumonia. Tuberculosis

The little droplets are thrown out by an infected person who sneezes or coughs. Someone standing close by can breathe in these droplets, and the microbes get a chance to start a new infection

#### **Through water:** Example, Jaundice, Typhoid, Cholera

The excreta from patient suffering from an infectious gut disease, get mixed with the drinking water used by people living nearby. The disease causing microbes will enter new hosts through the water they drink and cause disease in them. Such diseases are much more likely to spread in the absence of safe supplies of drinking water

#### **Though sexual contact:** example Syphilis caused by Bacteria, AIDS caused by Virus)

AIDS- Acquired Immuno -deficiency Syndrome (Caused by HIV)

HIV- Human Immuno- deficiency Virus

Mode of Transmission of HIV:

1. Through sexual contact
2. Blood transfusion
3. From an infected mother to child
4. Used syringes and needles

**Carriers and Vectors:** Organism which carry microorganisms responsible for diseases from a infected person to a healthy person is called Carrier. Housefly is a carrier for many diseases.

Organism which carries microbes responsible for a particular disease from an infected person to a healthy person is called Vector. For every disease causing microbes there will be a specific vector.

Eg: Aedes mosquito is the vector for Dengue fever (Dengue Virus)

Anopheles mosquito is the vector for Malaria (Plasmodium)

Culex mosquito is the vector for Filariasis (Filarial worm)

### **The signs and symptoms of a disease depend on the tissue or organ which the microbe targets. Explain (3 Marks)**

The disease causing organisms enter our body through different agents and attacks different body parts.

If they enter from the air via the nose, they are likely to go to the lungs.

If they enter through the mouth, they can stay in the gut lining or they can go to the liver.

When HIV, comes into the body via the sexual organs, will spread to lymph nodes all over the body.

Malaria-causing microbes, entering through a mosquito bite, will go to the liver, and then to the red blood cells.

The virus causing Japanese encephalitis, or brain fever, enter through a mosquito bite and it goes on to infect the brain.

After entering the body the pathogens affect the functioning of specific parts which they attack. Thus the signs and symptoms of a disease depend on the tissue or organ which the microbe target.

**Inflammation:** Inflammation is a common response of body's immune system against an infection. An active immune system brings many cells to the affected tissue to kill off the disease-causing microbes. This process is called inflammation. Due to inflammation, there may be swelling, pain and fever.

**AIDS and Immune system:** in HIV infection, the virus goes to the immune system and Damages its function. Thus, HIV-AIDS patients are unable to fight back the infection. It is these other infections that kill people suffering from HIV-AIDS.

**Number of microbes.** If the number of microbes is very small, the disease effect may be minor or unnoticed. But if the number is of the same microbe large, the disease can be severe enough to be life-threatening. The immune system is a major factor that determines the number of microbes surviving in the body.

**The two ways to treat an infectious disease. :**

1) **One** would be to reduce the effects of the disease and the other to kill the cause of the disease. For the first, we can provide treatment that will reduce the symptoms. The symptoms are usually because of inflammation. We can take medicines that bring down fever, reduce pain or loose motions.

2) **Second** way is to use medicines that kill microbes. (using antibiotics)

Drugs that kill protozoa are called

Drugs used to kill malarial parasites are known as

**Making anti-viral medicines is harder than making antibacterial: Explain**

Viruses have no biochemical mechanisms of their own. They enter our cells and use our machinery for their life processes. This means that there are relatively few virus-specific targets to aim at.

**Anti-viral drugs:** drugs used to control diseases caused by viruses. (that keep HIV infection under control).

**Prevention of diseases:**

**There are three limitations to deal with infectious disease: or Why do we say that Prevention is better than Cure: Explain (3 marks)**

- 1) The first is that once someone has a disease, their body functions are damaged and may never recover completely.
- 2) The second is that treatment will take time, which means that someone suffering from a disease is likely to be bedridden for some time even if we can give proper treatment.
- 3) The third is that the person suffering from an infectious disease can serve as the source from where the infection may spread to other people. This leads to the multiplication of the above difficulties.

**How can we prevent diseases? (5 marks)**

**Two ways      1) General Ways      2) Specific ways**

**General ways to prevent infections: Prevent exposure to infectious microbes:**

- 1) We can prevent exposure by providing living conditions that are not overcrowded.
- 2) For water-borne microbes, we can prevent exposure by providing safe drinking water. This can be done by treating the water to kill any microbial contamination.
- 3) For vector-borne infections, we can provide clean environments. This would not allow mosquito breeding. So Public hygiene is one basic key to the prevention of infectious diseases
- 4) By providing proper and sufficient food for everyone.  
Proper food ensures proper functioning of immune system. If the immune system functions well, many diseases can be under control

**Specific ways to prevent diseases:**

- 1) **Vaccination:** The process of injecting vaccines to a healthy person in order to develop immunity against a particular disease is called Vaccination
- 2) **Vaccines:** Vaccines are small, inactive dose of disease causing pathogen injected into the body of a healthy person to develop immunity against that disease. Edward Jenner developed the first Vaccine against Small pox
- 3) **Small Pox:** is a disease eradicated from India By vaccination
- 4) **Vaccine –** Preventable diseases: Tetanus, Measles, Polio, Whooping Cough ( Pertussis) , Diphtheria
- 5) **Immunisation:** vaccination done in large scale in people to develop immunity among the society
- 6) **Hepatitis A vaccine:** To prevent hepatitis a (jaundice) children should be given hepatitis A Vaccine.
- 7) **Rabies Vaccine:** In case of all animal bites Rabies vaccine should be taken from nearest Hospitals. Pet animals should be taken Anti rabies vaccine.
- 8) **Vaccines are not medicines**

**Mode of Working of Vaccine:** Vaccines are weak dose of pathogens. When injected **into the body** they start functioning creating antigens or toxins which can cause diseases. But the body prepares to fight against the disease by producing chemicals called antibodies against antigens. Thus the body is saved from disease. Also the body keeps the copy of the antibody molecule once prepared.

When the same pathogen enters the body second time, it takes no time to recognize the pathogen, and many copies of the antibodies, thereby preventing the disease.