Why do We Fall Ill

Why Do We Fall ill?

The human body can be compared to a car. Both have different parts and some problem or other keeps erupting. The human body is a complex machine.

We have seen that cells are the basic units of living beings. Cells are made of a variety of chemical substances — proteins, carbohydrates, fats or lipids, and so on. A living cell is a dynamic place. Something or the other is always happening. Cells move from place to place, even in cells that do not move, there is the repair going on, new cells are being made. In our organs or tissues, there are various specialized activities going on — the heart is beating, the lungs are breathing, the kidney is filtering urine, the brain is thinking. All these activities are interconnected. Any disturbance in the functioning of cells in one part disturbs the proper functioning of the body as a whole.

'Heath' is a state of being well enough to function well physically, mentally and socially. Not merely an absence of any disease.

Good health constitutes a healthy box will a healthy mind and a healthy attitude.

If health means a state of physical, mental and social well-being, it cannot be something that each one of us can achieve entirely on our own. The health of all organisms will depend on their surroundings or their environment.

The health of an individual depends on:

1. Physical environment – By physical environment we mean the physical characteristics of the place we live in. for example, health is at risk in a cyclone in many ways.

2. Social environment – Human beings live in societies. Our social environment, therefore, is an important factor in our individual health. We live in villages, towns or cities. In such places, even our physical environment is decided by our social environment. e.g., if there is a great deal of garbage thrown in our streets, or if there is open drain water lying stagnant around where we live, the possibility of poor health increases. Therefore, public cleanliness is important for individual health

3. Mental state of the individual – For good health we have to be happy, social equality and harmony are essential.

4. Economic conditions – We need food for health, and this food will have to be earned by doing work, for this, the opportunity to do work has to be available. Good economic conditions and jobs are therefore needed for individual health,

5. Social equality and harmony are therefore necessary for individual health.

Both personal as well as the **community in which Individual** lives **directly affect** the health of an individual.

(a) Personal– Issues that we can do as an individual. E.g., good hygiene, clean toilets, washing hands regularly, nutritious diet.

(b) Community – Issues that can be handled when we work as a society. e.g., garbage on streets, cleaning of drains on roads, good job must be available so that people can afford good food, harmony around us.

Therefore, our health depends not only on our own habits but also on the environment around us.

DISTINCTION BETWEEN 'HEALTHY' AND 'DISEASE-FREE'

Disease – Anything which interferes with the normal functioning of the body and impairs the health is called disease.

Disease means *disturbed ease*. Disease, in other words, literally means being uncomfortable. We talk of disease when we can find a specific and particular cause for discomfort. This does not mean that we have to know the absolute final cause; we can say that someone is suffering from diarrhea without knowing exactly what has caused the loose motions.

It is possible to be in poor health without actually suffering from a particular disease. Having poor health actually increases the risk that the person may suffer from some disease, Simply not being diseased is not the same as being healthy, So, we can be in poor health without there being a simple cause in the form of an identifiable disease, This is the reason why, when we think about health, we think about societies and communities. On the other hand, when we think about disease, we think about individual sufferers.

WHAT DOES DISEASE LOOK LIKE?

When a person is affected by a disease, either the normal functioning or the appearance of one or more systems of the body changes for the worse, these changes give rise to symptoms and signs of the disease.

Symptoms of disease are the things we feel as being 'wrong'. So we have a headache, we have cough, we have loose motions, we have a wound with pus; these are all symptoms. These indicate that there may be a disease, but they don't indicate what the disease is.

Sign of disease are what physicians will look for on the basis of the symptoms. Signs will give a little more definite indication of the presence of a particular disease. Physicians will also get laboratory tests done to pinpoint the disease further.

Cause of disease:

Cause of a disease can be divided into two types namely-

(a) External cause
(b) Internal cause

External Cause – Diseases caused due to external factors like microbes e.g., bacteria, protozoa, worms etc present outside our body.

Internal Cause – Disease caused due to internal factors like lack of exercise (high Blood pressure), Obesity(overeating}, Genetic diseases, since birth (blindness), Failure of some organs(heart, kidney Etc)

Diseases can also be categorized based on level of causes.

Immediate cause of the disease: The agent that causes the disease is called the immediate cause. For e.g., if a baby suffering from loose motions, we can say that the cause of the loose motions is an infection with a virus. So the immediate cause of the disease is a virus.

Contaminated water is the source of the baby's infection.

The baby is not well nourished and does not get enough food. So, lack of good nourishment becomes a second level cause of the disease the baby is suffering from.

Poverty or lack of public services become third—level causes of the baby's disease

It is also possible that the baby has some genetic difference that makes it more likely to suffer from loose motions when exposed to such a virus. Without the virus, the genetic difference or the poor nourishment alone would not lead to loose motions. But they do become contributory causes of the disease

Contributory causes include causes that contribute to the immediate cause to be able to cause the disease, e.g. Genetic difference or poor nourishment.

Types of diseases:
Classification is based on duration:

(i) Acute disease are the diseases that last only for a short duration of time without posing adverse effects on the health. E.g. cough and cold, typhoid, malaria, cholera.

(ii) Chronic diseases are the diseases that last for prolonged period of time with drastic effects on health. **E.g. *Diabetes, tuberculosis, elephantiasis, arthritis and cancer etc***

Diseases are also classified Based on cause:

Infectious diseases – Infectious diseases are diseases that are caused by some living organisms. A disease is called infectious if its immediate cause is microbes. These diseases spread to people coming in contact with a sick person because the microbes can spread in the community, and the diseases they cause will spread with them. E.g., Tuberculosis

Non-infectious diseases or non-communicable diseases– Non-infectious are diseases that are not caused by infectious agents. Their causes vary, but they are not external causes like microbes that can spread in the community. Instead, these are mostly internal, non-infectious causes. They do not spread to people coming in contact with a sick person. For example, some cancers are caused by genetic abnormalities. High blood pressure can be caused by excessive weight and lack of exercise.

Agents of infectious diseases:

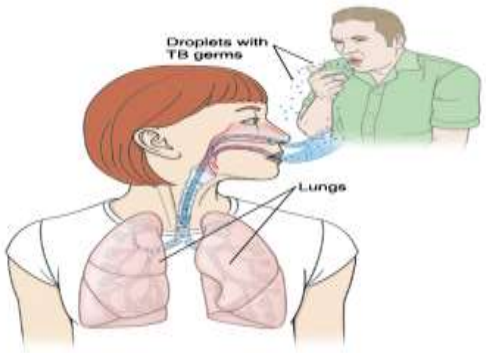
There are a vast category of infectious agents that cause infectious diseases. The unicellular infectious agents include bacteria, virus and protozoa. The multi cellular infectious agents are fungi and worms. These microbes enter our body through natural openings such as the mouth, eyes, or genital openings, or through wounds that breach the skin barrier to pathogens and disturb our body functions/systems.

Group of organisms	Diseases Caused
Bacteria	Typhoid, Cholera, Asthma, peptic ulcer, Tuberculosis
Fungi	Skin diseases
Protozoan	Malaria, Kala azar, sleeping Sickness
Virus	Common cold, influenza, fever, AIDS
Worms	Elephantiasis, stomach infections

Means of spread of agents

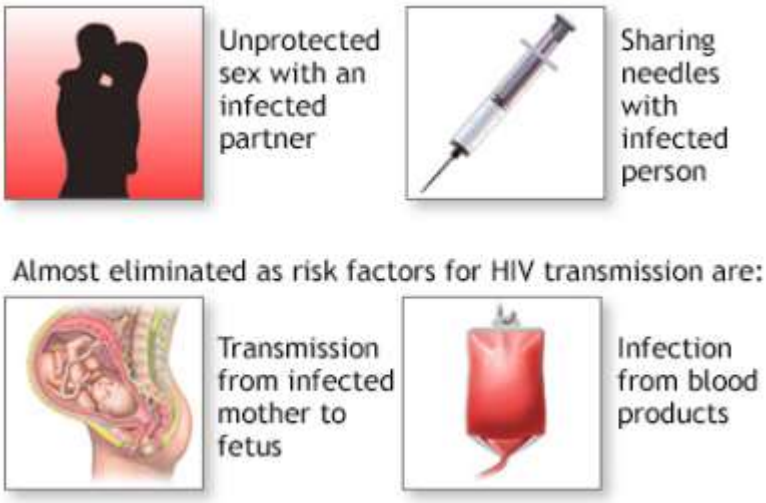
Many microbial agents can commonly move from an affected person to someone else in a variety of ways,

1. **(i) Through air –** e.g., common cold is caused by virus. Infectious disease-causing microbes can spread through the air. This occurs through the little droplets 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. Such types of diseases are called air- borne diseases. The more crowded our living conditions are, the more likely it is that such airborne diseases will spread. Examples of such diseases spread through the air are the common cold, pneumonia and tuberculosis,



(ii) Through water – Diseases can also be spread through water. This occurs if the excreta from someone suffering from an infectious gut disease, such as cholera. get mixed with the drinking water used by people living nearby. The cholera causing microbes will enter new hosts through the water they drink and cause disease in them. Such types of diseases are called water- borne diseases. Water-borne diseases are much more likely to spread in the absence of safe supplies of drinking water E.g. Typhoid.

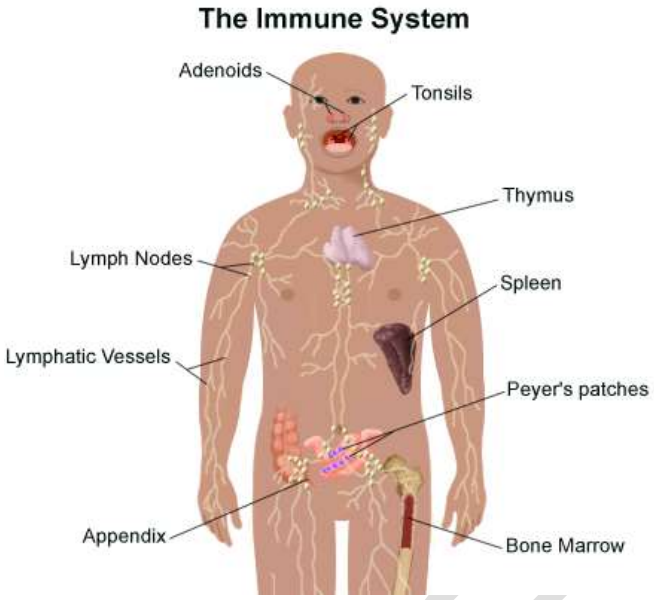
(iii) Through Sexual contact – The sexual act is one of the closest physical contact two people can have with each other. Other than the sexual contact, the AIDS virus can also spread through blood-to-blood contact with infected people or from an infected mother to her baby during pregnancy or through breast feeding. However, sexually transmitted diseases are not spread by casual physical contact. Casual physical contacts include handshakes or hugs or sports, like wrestling, or by any of the other ways in which we touch each other Socially. E.g. Microbial diseases such as syphilis or AIDS that are transmitted by sexual contact from one partner to the other.



(iv) Through other creatures – Many diseases are be transmitted by other animals. These animals carry the infecting agents from a sick person to another potential host, These animals are thus the intermediaries and are called vectors, A vector in any organism that carries and transmits an infectious agent into another organisms. The commonest vectors we all know are mosquitoes. In many species of mosquitoes, the females need highly nutritious food in the form of blood in order to be able to lay mature eggs. Mosquitoes feed on many warm-blooded animals, including us. In this way, they can transfer diseases from person to person. E.g., malaria, dengue, Japanese encephalitis. Other vectors are Rats (plague), flies (Cholera, dysentery etc).

Protection against agents: Immune system

Multi cellular animals have dedicated cells or tissues to deal with the threat of infection. Some of these responses happen immediately so that an infecting agent can be quickly contained. Other responses are slower hut are more tailored to the infecting agent. Collectively, these protections are known as the **Immune system**.



Immune system is a system that is present in our body that protects us from disease. Immune system in our body is activated in response to an infection. Infection occurs when a pathogen invades body cells and reproduces. The immune system functions to attack the foreign invaders and protect the body. An active immune system recruits many cells to the affected tissue to kill off the disease-causing microbes. This recruitment process is called **inflammation.** Inflammation is the protective attempt of the immune system to protect us from a disease. As a part of inflammation, there are local effects such as swelling and pain, and general effects such as fever.

If the response is quick and effective, the infection will be eliminated or contained so quickly that the disease will not occur. Sometimes infection leads to disease. Disease can occur when immunity is low or impaired, when virulence of the pathogen (its ability to damage host cells) is high, and when the number of pathogens in the body is great,

The severity of disease manifestations depend on the number of microbes in the body. If the number of microbes is very small, the disease manifestations 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.

If a person or an animal has a defective immune system, then the person or animal Can even die from the infection of even harmless bacteria. For example, in HIV infection, the virus goes to the immune system and damages its function. Thus, many of the effects of HIV-AIDS are because the body can no longer fight off the many minor infections that we confront in our day today life. Instead, even a simple disease like common cold can
worsen and become pneumonia. Similarly, a minor gut infection can produce major diarrhea with blood loss. Ultimately, it is these other infections that kill people suffering from HIV-AIDS. It is not the minis that kills the patient,

Sign of Inflammation:

As a part of inflammation, there are local effects such as swelling, redness and pain, and general effects such as fever.

Depending on the infectious disease, symptoms can vary greatly. Fever is a common response to infection: a higher body temperature can heighten the immune response and provide a hostile environment for pathogens. Inflammation, or swelling caused by an increase in fluid in the infected area, is a sign that white blood cells are on the attack and releasing substances involved in the immune response. So a person with a disease is sick for a while. When the immune system has killed the germs, a person gets better.

Disease-organs-symptoms:

In order to cause disease, pathogens must be able to enter the host body, adhere to specific host cells, invade and colonize host tissues, and inflict damage on those tissues. Entrance to the host typically occurs through natural openings such as the mouth, eyes, pr genital openings, or through wounds that breach the skin barrier to pathogens. Different species of microbes seem to have evolved to home in on different parts of the body.

In part, this selection is connected to their point of entry. If they enter from the air via the nose, they are likely to go to the lungs. This is seen in the bacteria causing tuberculosis. If they enter through the mouth, they can stay in the gut lining like typhoid causing bacteria of they can go to the liver, like the viruses that cause jaundice.

But this needn't always be the case. An infection like HIV, which comes into the body via the sexual organs, will spread to lymph nodes present 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, will similarly enter through a mosquito bite. But it goes on to infect the brain. The signs and symptoms of a disease will thus depend on the tissue or organ which the microbe targets.

The signs and symptoms of the disease depend on the tissue or organs where the microbes invade and attack

Disease	***Entry point***	***Site of infection***	***Symptoms***
Tuberculosis	Nose	Lungs	Cough and breathlessness
Typhoid	Mouth	Gut lining	Fever
Hepatitis	Mouth	Liver	Damage to liver, jaundice
AIDS	Sex organs, Skin	Lymph nodes, Lymph vessels	Immune system fails
Japanese Encephalitis	Skin	Brain(CNS)	Fever, headache, Fits of unconsciousness
Malaria	Skin	RBC and liver cells	fever and shivering, cold, body ache

Principles of Treatment:

(i) Cure the disease- Killing the micro-organisms of infectious agents by taking proper medicines. For example, for treating bacterial diseases, take antibiotics or other medicine that block the bacterial synthesis without affecting the human cells.

(ii) Take rest- On taking rest, most of the energy in the body works towards healing.

(iii) Taking medicines to reduce the effect of the disease-Taking medicines depending upon the symptoms for the fever or body pain etc.

Properties of Medicines:

(i) They should kill the disease-causing microbes. Medicines stop some vital processes needed for the survival of microbes. E.g., Penicillin (antibiotic) kills the bacteria and cures diseases caused by them.

(ii) Medicines should not kill cells of the human body. Bacteria make cell wall for their protection. Such a process does not happen in human cells. So, when we take antibiotics, they stop the formation of cell wall of the bacteria and thus kill the bacteria without harming the human cells. Medicines should stop the processes that are important for the survival of microbes but not for human survival.

(iii) Same medicine may work for a group of microbes. As life processes of microbes of same group (e.g. bacteria} are similar. Therefore, one single medicine can work for many of them. As microbes of different groups (bacteria and virus) have different life processes, same medicine will not work for all of them.

How do we kill microbes?

Microbes can be classified into different categories. They are viruses, bacteria, fungi or protozoa. Each of these groups of organisms will have some essential biochemical life process which is peculiar to that group and not shared with the other groups. These processes may be pathways for the synthesis of new substances or respiration. These pathways will not be used by us either. For example, our cells may make new substances by a mechanism different from that need by bacteria. We have to find a drug that blocks the bacterial synthesis pathway without affecting our own, This is what is achieved by the antibiotics that we are all familiar with, Similarly, there are drugs that kill protozoa such as the malarial parasite.

Why making anti-viral medicines is harder than making antibacterial medicine?

Viruses do not have cellular organizations. They enter our cells and use our cellular machinery for their life processes. As they have few biochemical mechanism of their own, it is therefore, difficult to make anti-viral medicines.

The term antibiotic was coined by Waksman. The first antibiotic penicillin was extracted form fungi **Penicillium notatum by Alexander Flemming 1944**.

How antibiotics work:

Before the 20th century, there were no effective treatments for infections caused by bacteria, including pneumonia, tuberculosis, gonorrhea, rheumatic Never and urinary tract infections. But in 1929, bacteriologist **Alexander Fleming** discovered the first true antibiotic, **penicillin.**

Antibiotics work against the life processes of bacteria. They commonly block the biochemical pathways that are necessary for the bacteria. Many antibiotics, including penicillin, work by attacking the cell wall of bacteria. Antibiotic penicillin blocks the bacterial processes that build the cell wall. The bacteria therefore fail to build the cell wall and they stop multiplying and gradually die out,

Why Prevention is better than Cure?

Prevention is better than cure because

(i) Even if the disease is cured, its signs will last forever. E.g., If a person who is suffering from chicken pox gets cured, the scars left by the boils will last forever

(ii) Prevention literally prevents the discomfort that the person otherwise has to suffer if he contracts a disease.

(iii) Disease may get transferred from one person to another.

(iv) There are many disease for which there is no cure. Moreover, there are some chronic diseases which do not have get cured completely and in turn causes some disabilities to the person suffering from it e.g., stroke, congestive heart failure, chronic renal failure etc,

Why to prevent disease:

1. *Prevent the spread of microbes*.

To prevent air-borne microbes:

a) Cover nose and mouth during coughing and sneezing.
b) Avoid crowded places.

To prevent water-borne microbes:

a) Drink purified or boiled water.

To prevent sexual disease:

a) Avoid sex with an infected /unknown person.
b) Practice safe sex.

Prevent the spread of disease through vectors

a) Avoid stagnated water bodies

2. *Make the immune system stronger by taking well balanced. Nourished food*

3. *Get vaccinated-* Immunization can drastically reduce your chances of contracting many diseases.

Suffering from a disease once is a means of preventing subsequent attacks by the same pathogen. In case of any infection for the first time our immune system responds against it specifically. Next time when the same microbe enters our body the immune system responds with greater vigour which eliminates the infection more quickly than the first time. So, immunization is done to prevent diseases, The process of the immune system becoming stronger towards an agent is called *immunization*.

Definition of immunization:

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease.

Before vaccines, people became immune only by actually getting a disease and surviving it. E.g., Smallpox is an acute contagious disease and one of the most devastating diseases known to humanity. The good part is that the person will never suffer from smallpox again—if he or she survives. That's a way of achieving natural immunization towards the disease. Naturally acquired immunity occurs when the person is exposed to a live pathogen, develops the disease, and becomes immune as a result of the primary immune response. These days, there is no smallpox anywhere in the world. But as recently as a hundred years ago, smallpox epidemics were not at all uncommon.

Epidemics are the diseases based on prevalence that attack many people at the same time. This is the occurrence of disease cases at a frequency that is higher than the normal for the population in a given period of time. e.g. smallpox, plague.

Principle behind vaccination:

By providing vaccination, we can 'fool' the immune system into developing a memory for a particular infection by putting something that mimics the microbe we want to vaccinate against, into the body. This does not actually cause the disease but this would prevent any subsequent exposure to the infecting microbe from turning into actual disease.

What is a vaccine?

Vaccine: Vaccines are suspensions of disease-producing micro-organisms which is modified by killing or weakening so that the suspension will not cause disease. When given to a healthy person, the vaccine triggers the immune system to respond and thus build immunity.

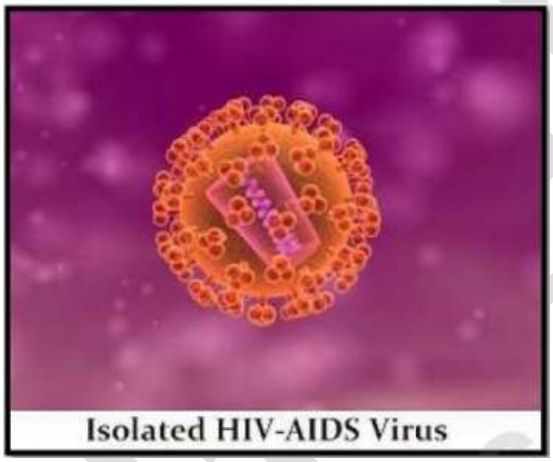
A modified form of microbes (vaccine) is intentionally injected into the body. This makes the immune system of the person stronger against that microbe. This process is called **vaccination**.

Vaccines to prevent many diseases are now available for a whole range of diseases of the public health program of childhood immunization for preventing infectious diseases is run by the government, Children are vaccinated against tetanus, diphtheria, whooping cough, measles, polio, etc.
Some hepatitis viruses, which cause jaundice, are transmitted through water. There is a vaccine for one of them namely hepatitis A. But the majority of children in many parts of India are already immune to hepatitis A by the time they are five years old. This is because they are exposed to the virus through the water they drink.

Origin of the word 'Vaccine'

Famously, two centuries ago, an English physician named Edward Jenner, realized that milkmaids who had cowpox did not catch smallpox even during epidemics. Cowpox is a very mild disease. Jenner tried deliberately giving cowpox to people and found that they were now resistant to smallpox. This was because the smallpox virus is closely related to the cowpox virus. 'Cow' is 'Vacca' in Latin, and cowpox is 'vaccinia'. From these roots, the word 'vaccination' has come into our usage.

AIDS


Isolated HIV-AIDS Virus

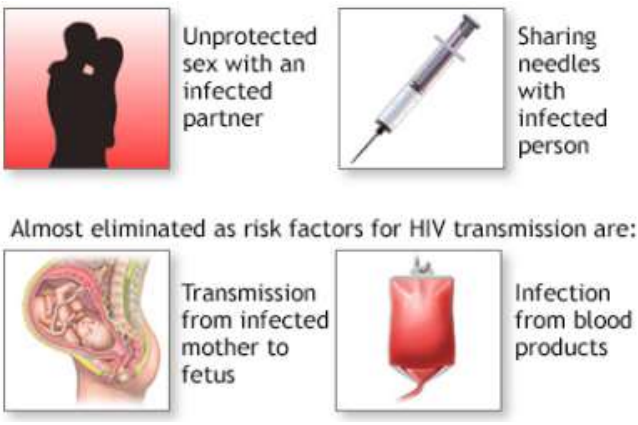
AIDS (Acquired immune deficiency syndrome or acquired immunodeficiency syndrome) is a syndrome caused by a virus called HIV (Human Immunodeficiency Virus). Once someone is infected with HIV the virus will remain in their body for the rest of their life. HIV attacks the immune system of an individual and hence he cannot fight back many diseases, HIV finally causes death, There is currently no cure for HIV and no vaccine to prevent people from becoming infected. However, treatment can help most people with HIV to live much longer and feel well.

How is Aids Spread

i) Infected mother to child- Infected pregnant women can pass HIV to their babies during pregnancy, delivering the baby during childbirth, and through breastfeeding.

ii) Blood transfusion- Transmission of infected blood or sharing needles with infected persons.

iii) Unprotected sex with an infected partner.



A person cannot become HIV positive from hugging, saliva, kissing. sneezes, coughs, sharing baths or towels, from swimming pools, toilet seats, or from sharing cups, plates, or cutlery.

A person cannot get HIV from any animals or insects, including mosquitoes. HIV is not passed on through biting.

Signs and symptoms:

Many people do not develop symptoms after they are first infected with HIV. Others will have signs and symptoms in the early stage of HIV infection referred to as primary of acute HIV infection. The most common symptoms are similar to a flu-like illness within several days to weeks after exposure to the virus. Early HIV symptoms include fever, headache, fatigue, rash, sore throat, and swollen lymph nodes in the neck. A characteristic feature of primary HIV infection is open sores or ulcers in the mouth. These symptoms usually disappear within a few weeks.

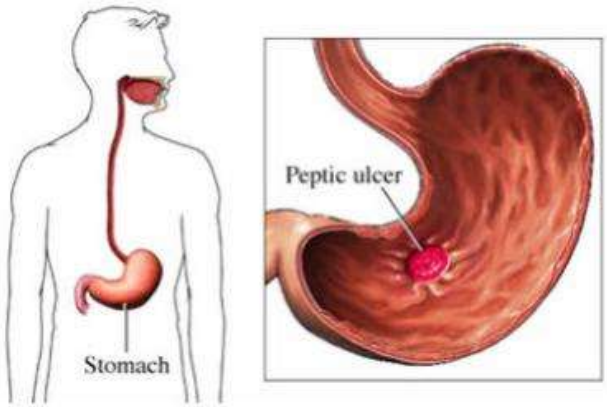
What happens when HIV infects a person:

It affects the WBC and also makes the immune system very weak. The body begins losing its ability to fight infections and the body becomes prone to various diseases. Therefore, even a minor infection can become a life taking disease. HIV doesn't kill us directly, it weakens our immune system and our body fails to fight with some other attacking microbes. E.g. Even a simple disease like the common cold can worsen and become pneumonia. Similarly, a minor gut infection can produce major diarrhea with blood loss. Ultimately, it is these other infections that kill people suffering from HIV-AIDS. It is not the virus that kills the patient.

Treatment:

At the moment there is no cure for HIV or late-stage HIV infection, but there are drugs (antivirus) that reduce the level of HIV in the blood and prevent or delay the development of late-stage HIV infection

Peptic ulcer:



Symptoms– Peptic ulcers cause acidity— related pain and bleeding in the stomach and duodenum.

Everybody thought that a stressful life led to a lot of acid secretion in the stomach and eventually caused peptic ulcers.

But, later it was discovered that the cause of peptic ulcer was the bacterium, Helicobacter pylori. Robin Warren (born 1937), a pathologist from Penh, Australia, saw these small curved bacteria in the lower part of the stomach in many patients, He noticed that signs of inflammation were always present around these bacteria. Barry Marshall (born 1951}, a young clinical fellow, became interested in Warren's findings and succeeded in cultivating the bacteria from these sources.

Treatment: In treatment studies, Marshall and Warren showed that patients could be cured of peptic ulcer only when the bacteria were killed off from the stomach. Peptic ulcer disease is no longer a chronic disease but a disease that can be cured by a short period of treatment with antibiotics.

Rabies:

Rabies is a viral illness spread via the saliva of an infected animal. This occurs usually through biting a human or another animal. Transmission can also occur through saliva touching an open wound or touching mucous membranes.

What causes rabies?

Rabies is caused by the rabies virus. The virus infects the brain and ultimately leads to death. Any mammal can spread rabies. Stray dogs are the most likely animal to transmit rabies. The virus has also been found in cows, cats, and horses.

Symptoms: The early symptoms of rabies are very generalized and include weakness, fever, and headaches.

As the disease progresses, more specific symptoms appear and may include o Anxiety and confusion (The patient is often overly active.)

- hypersalivation
- **hydrophobic (fear and** avoidance of water)
- Difficulty in swallowing.
- slight or partial paralysis
- sleeplessness(insomnia)

Death usually occurs within days of the onset of these symptoms.

Precaution:

1. Getting yourself vaccinated
2. Vaccinate pets and keep them away from wild and outdoor animals.
3. Stay away from stray animals
4. Keep bats out of the home, and stay away from areas with bats

Treatment:

1) A series of injections is given