Ratna Sagar

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Education, Our Mission

As per the latest ICSE syllabus

Rama Sagar
Education, Our Mission!

Revised and Updated

LIVING SCIENCE BIOLOGY

D K Rao • J J Kaur

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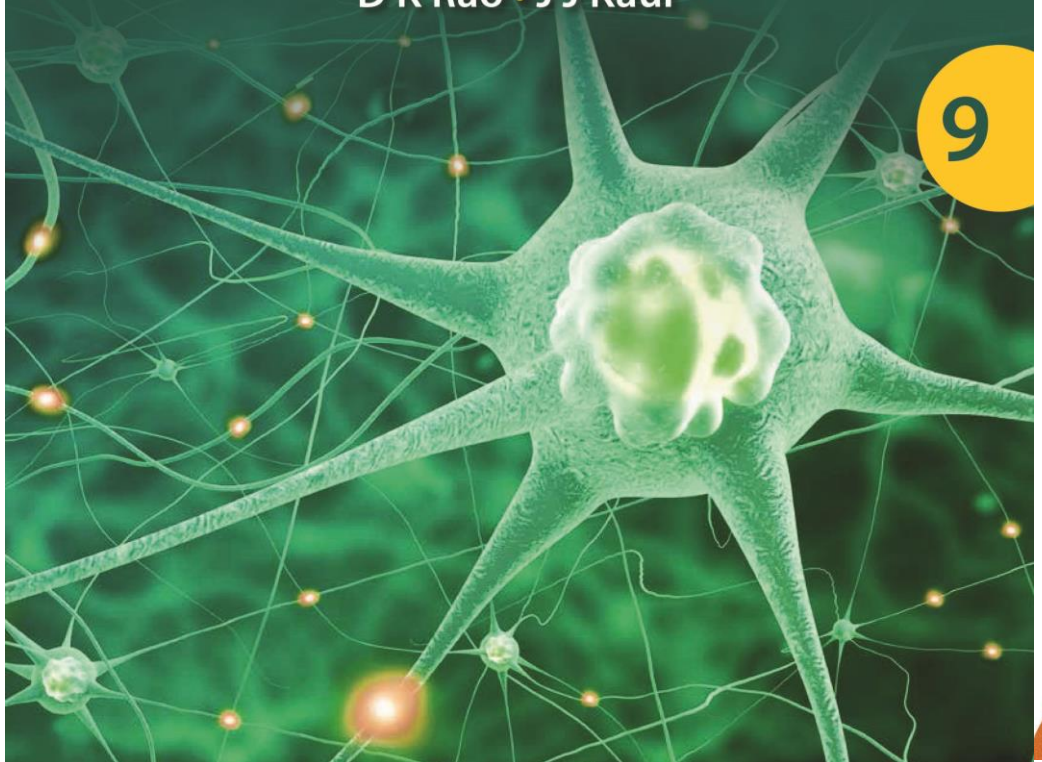


ICSE
Living Science
Biology

Class 9

Chapter 16 Disease – Causes and Control

LEARNING OBJECTIVES

Symptoms of a disease

- **Agents of a disease**

Diseases caused by Bacteria

- **Bacteria as agents of disease**
- **Control of bacteria**

Diseases caused by viruses

- **Viruses as agents of disease**
- **Acquired immune deficiency syndrome (AIDS)**

Protozoans as agents of disease

- **Helminthic Worms as agents of disease**
- **What is a host organism?**

What is a disease?

Any physical or functional change from the normal state of the body which causes discomfort, disability or disturbs the health of a person is a disease. In other words, a disease is a departure from normal health causing discomfort.

Symptoms of a disease

The symptoms may include headache, cough, loose motions, etc. Symptoms indicate that there is something wrong in the body but they do not always indicate what disease it may be. On the basis of symptom, signs of disease can be found out by physicians. Laboratory tests are also done to diagnose a disease.

Agents of a disease

Infectious diseases are caused by a variety of microorganisms (called athogens) such as bacteria, fungi, viruses, protozoa and worms. Some diseases caused by various pathogens, namely bacteria, viruses, protozoa and worms. Proper knowledge of the category of microorganism causing a disease is necessary for the prevention and treatment of that disease.

Diseases caused by Bacteria

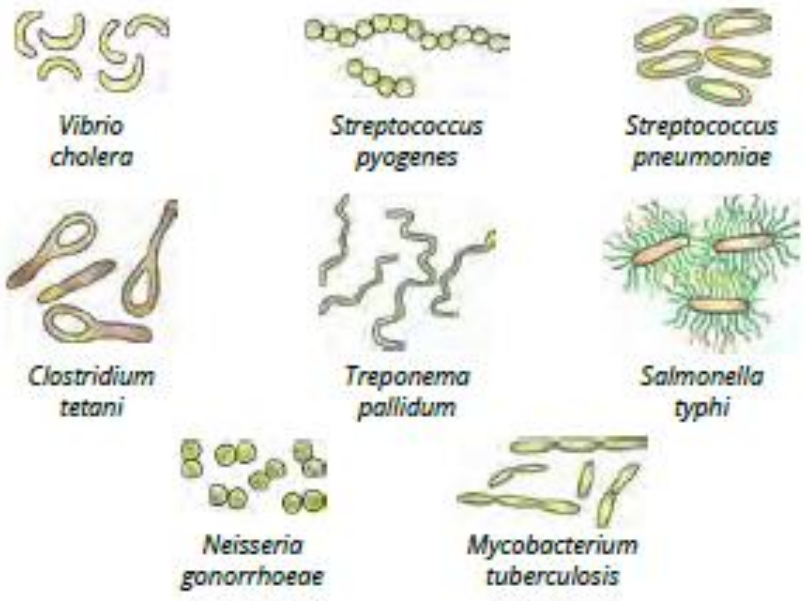
Bacteria are unicellular organisms between 0.0005 to 0.005 mm long. However, they occur together in vast numbers, either as separate cells or clumped together. They are found everywhere, in air, soil and water, on every surface around us, on our bodies and even within our bodies.

a. Cocci

b. Bacilli

Bacteria as agents of disease

Some common diseases caused by bacteria, the causative agent.



Control of bacteria

Prevention methods

- ❖ Food must be stored at low temperatures to prevent the growth of bacteria.
- ❖ Most frozen food can be cooked immediately, except meat. The frozen meat needs to be thawed before cooking.
- ❖ Kitchen utensils used for uncooked food (especially meat) must be cleaned before using them for cooking.
- ❖ All clothes and utensils should be thoroughly and regularly washed and disinfected.

Role of antibiotics

Antibiotic is a metabolic product of certain microbes that kills or inhibits the growth of other microbes, for example, penicillin and streptomycin. Antibiotics that are effective against a wide range of pathogenic bacteria are called **broad-spectrum antibiotics**, for example, chloramphenicol and tetracycline.

Role of vaccines

A **vaccine** is a preparation containing a small amount of killed or living but harmless (weakened) pathogens or the toxins released from pathogens. When a vaccine is swallowed or injected, it produces immunity in the body against the pathogen and helps to fight their action in the body.

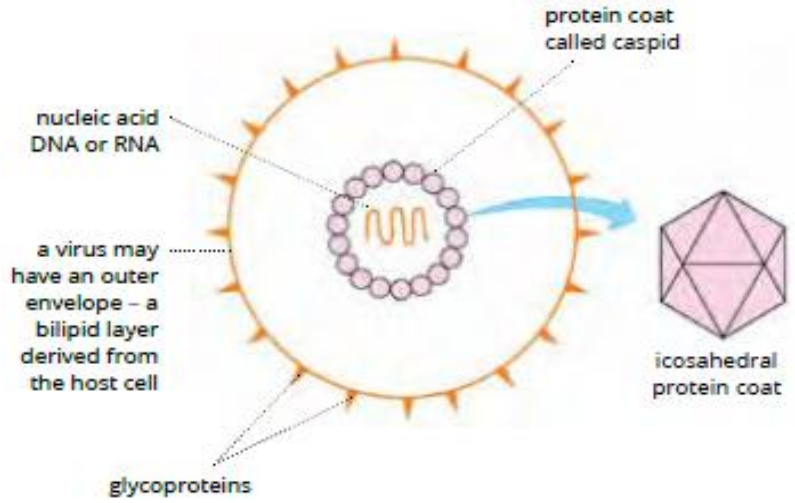
❖ BCG, that stands for 'Bacille Calmette-Guerin', is an effective vaccine against tuberculosis. It is given to children after 1 month of birth as a preventive measure against tuberculosis.

Diseases caused by viruses

❖ Viruses are the smallest living organisms about 20–300 nm. On an average they are about 50 times smaller than bacteria.

❖Viruses can be seen only under an electron microscope. They do not have a cellular structure.

They do not have any cell membrane or cell organelles. They are simply made of nucleic acids surrounded by a coat of proteins and sometimes fats also.



❖ Viruses can reproduce only when they are inside the host cell. After as little as 30 minutes the host cell bursts open releasing hundreds of new viruses.

❖ Viruses can be highly specific to their hosts. Each type of virus recognizes and infects only certain types of cells. Certain viruses attack bacteria for their multiplication. Such viruses are called **bacteriophages**

Structure of bacteriophage

Viruses as agents of disease

Viruses cause a wide range of diseases among living organisms. Diseases caused by viruses in humans include poliomyelitis, mumps, rabies, influenza, measles, chickenpox, common cold and AIDS.

Acquired immune deficiency syndrome (AIDS)

Acquired immune deficiency syndrome commonly known as AIDS is probably the most fatal disease in humans. It is a sexually transmitted disease as it can pass from one person to another during sexual intercourse. This disease can also be transmitted if blood from an infected person comes in contact with that of a healthy person through a cut or a scratch or by means of blood transfusion. AIDS is a pandemic disease, i.e. it is found all over the world. The word 'immunodeficiency' means that the immune system of the affected person becomes deficient or weak. It is a disorder of the immune system.

Causative organism

The pathogen which causes AIDS is the **human immunodeficiency virus (HIV)** The human immunodeficiency virus (HIV) is too small to be seen with the naked eye. Once the virus enters the body it lives and grows in the body fluids and blood cells of the infected person.

Structure of HIV

Mode of transmission

HIV may be transmitted in many ways:

❖ Sexual contact with the infected person through semen or vaginal fluid or through blood during the intercourse.

❖ Exposure to infected blood by using the same syringe already used by an infected person, and infected blood during blood transfusion.
❖ Organ transplant from an infected person to a healthy person.
❖ During pregnancy, from an infected mother's blood to her baby's blood.

Incubation period

The average incubation period of HIV virus is about 28 months (range 15–57 months).

Symptoms

A person infected with AIDS may show one or all of the following symptoms:
❖ The person feels fatigued or tired, suffers from loss of weight and fever, and sweats profusely.
❖ Persistent dry cough, oral rash and shortness of breath.
❖ Gastrointestinal problems like mild diarrhoea.
❖ Skin blotches, eczema, fungal infection and sometimes skin cancer.
❖ A type of lung disease known as *Pneumocystis carinii* pneumonia develops.
❖ Nervous system may be affected, the brain may be badly damaged leading to a loss of memory, ability to speak and to think.

A completely infected AIDS patient may die within three years of infection.

Prevention and control

Although there is no cure for AIDS, the HIV infection can be prevented by taking certain precautions.

- ❖ Responsible sexual behaviour and avoiding multiple sex partners
- ❖ Using a condom or other barrier methods of contraception which prevent direct contact between body fluids of two persons
- ❖ Avoiding prostitution and homosexuality
- ❖ Screening of blood before transfusion
- ❖ Treatment of blood and other products used in transfusion to destroy the HIV
- ❖ Avoiding sharing of needles by use of disposable syringes and needles
- ❖ Avoiding pregnancy if the mother is HIV positive
- ❖ Educating people and having knowledge of the ways by which AIDS can be spread and the precautions that should be taken to avoid HIV infection

Protozoans as agents of disease

Protozoa are complex unicellular organisms. Few of these cause diseases in human beings. Malaria , sleeping sickness and amoebic dysentery are common protozoan diseases.

Anopheles mosquito spreads malaria.

Helminthic worms as agents of disease

Roundworms, tapeworms and pinworms are some common disease-causing worms.

They usually live in the intestine where they have access to already digested food. Such worms do not have a well-developed digestive system as there is no need to digest food before it is taken. They are already lying in a soup of pre-digested food.

Also, their locomotory organs are underdeveloped since the worm does not need to move about in search of food. Therefore, life cycle of parasitic worms involves different hosts.

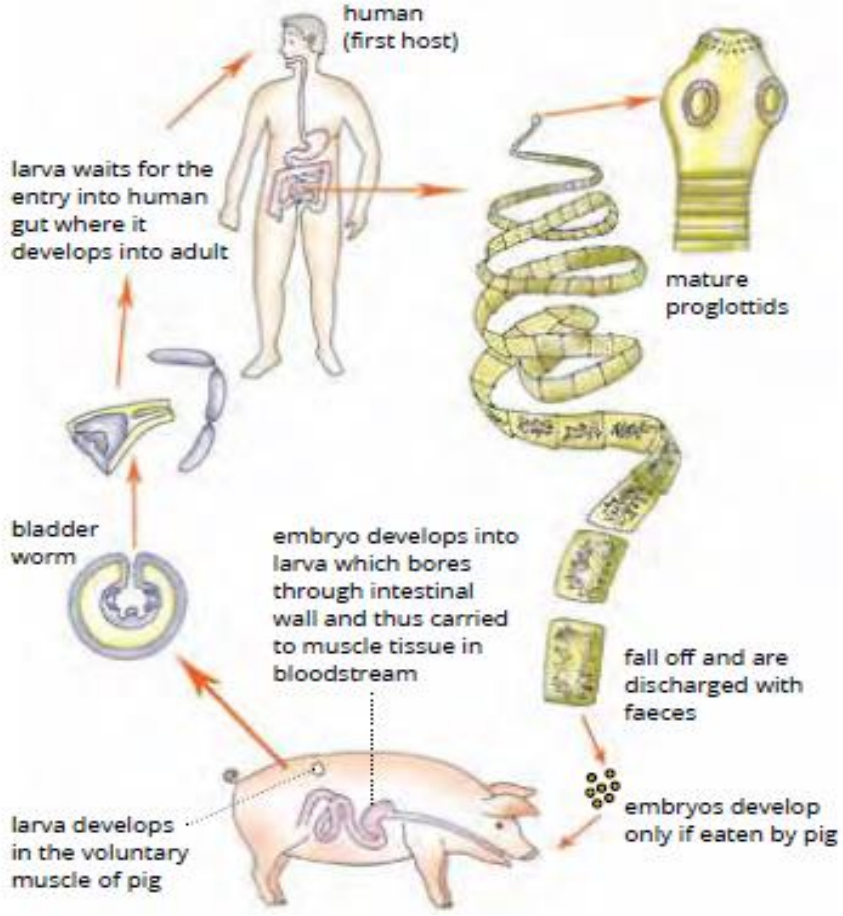
Roundworms cause ascariasis

Elephantiasis of limb is caused *Wuchereria* infection

What is a host organism?

An organism which harbours the parasite and provides nourishment and shelter to it is called the host. Hosts may be of different types.

- **Definitive host** which harbours the adult stage of parasite and the parasite reproduces sexually within this host.
- **Intermediate host** which harbours the larval or immature stages of the parasite and allows it to reproduce asexually in large numbers.



❖ **Reservoir host** which harbours the parasite and serves as an important source of infection to other hosts.

❖ **Vector** is a host (mainly an insect) which transmits parasites to man and animals.

SUMMARY...

❖ Disease is the state of the body when any of its functions are disturbed or when its structure is altered.

❖ Proper knowledge of the category of microorganism carrying a disease is necessary for prevention and treatment of a disease.

❖ Bacterial pathogens cause many diseases in human beings such as tuberculosis, diphtheria, tetanus, cholera and typhoid. They can be controlled by following preventive methods or use of antibiotics or vaccines.

❖ Bacteria are also responsible for the occurrence of certain venereal diseases that are transmitted from one person to another during sexual intercourse, for example, syphilis and gonorrhoea.

❖ Viruses are on the boundary between living and nonliving. They cause a wide range of diseases in human beings including poliomyelitis, mumps, rabies, influenza, measles, chickenpox, hepatitis and AIDS.

❖ Protozoa act as agents of various diseases like malaria, sleeping sickness and amoebic dysentery.

❖ Worms cause ascariasis, taeniasis and elephantiasis in human beings.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