CHAPTER 8

HUMAN HEALTH AND DISEASE

Topics Discussed

- Introduction
- Definitions of Disease, Health etc.
- The Immune System and its Disorders
- Vaccination
- Tissue Grafting
- Disorders of the Immune System
- Immunotherapy
- Acquired and Congenital Diseases
- Special Focus on Cancer and AIDS
- General Preventive Measures
- Adolescence, Mental Health, Addictions etc.

1. Introduction

1.1 Health

- Health is a state of complete physical, mental and social well-being, and not merely an absence of disease or infirmity (W.H.O – 1948).
- Being in a healthy condition is of great importance in the life of very individual.
- A healthy person will always be in a position to exhibit optimum performance in whatever activities he/she does.
- Balanced diet, exercise and some appropriate precautions are essential for maintaining good health.

Objectives

At the end of the chapter, you will be able to:

- Learn about the definitions of health and disease.
- Learn about the immune system, its working and disorders.
- Understand the principles of vaccination.
- Know more about diseases.
- Understand the problem of addictions and discuss remedies related to the same.

1.2 Disease

- It is a structural or functional abnormality in an organism which impairs the normal functioning of its mind and/or body.
- Diseases can be caused due to various factors like infection by harmful micro-organisms, injury, drug abuse or genetic effects.
- Diseases may be communicable or non-communicable.
- Study of diseases is called epidemiology.

1.3 Pathogens

- **Pathogens** are disease causing organisms. E.g. *Mycobacterium tuberculosis* which causes TB.
- Their ability to cause disease is called pathogenicity.
- **Virulence** is the degree of pathogenicity of an organism.
- Parasite is an organism that leaves in or on an organism (the host) and derives nutrition at the expense of the host. E.g. *Plasmodium* which causes malaria.
- **Infection** is the invasion of an organism by the pathogen, the multiplication of the pathogen in the organism and the resultant reactions of the organism's cell/s.

KNOWLEDGE BUILDER

- A physical or psychological trait exhibited by an organism which can indicate the presence of diseases is called a **symptom**.
- **Incubation period** is the time interval between the entry of pathogen and appearance of symptoms.
- **Window period** is the time between infection to the point of time when it can be detected.
- **Chemotherapy** is treatment with chemicals.
- **Antibiotics** are substances which are produced by organisms that inhibit the growth of or destroy some other organisms. E.g. Penicillin.

Knowledge Builder

- **Analgesic** is a substance that relieves pain (Pain killer). E.g. Morphine.
- **Antipyretics** are substances that help to reduce the body temperature/fever.E.g. Aspirin (Acetyl salicylic acid).
- **Disinfectant** is an agent that inhibits or kills microbes on contact. Agents used on living surfaces may be called antiseptics while those used for inanimate objects may be called disinfectants.

Did You Know

• Arthro	-	Joint (Arthritis)
• Aesthesia	-	Sensation
• Anesthesia	-	Lack of sensation)
• Bracy	-	Short
• Brady	-	Slow
• Coronary or Cardia	-	Heart
• Encephalon	-	Brain
• Enteron	-	Intestine
• ……emia	-	Related to blood (Anemia, Protenemia, Hyperglycemia)
• Gastric	-	Stomach
• Hepatic	-	Liver
• ……itis	-	Infection or inflammation
• Myo	-	Muscles
• Metastasis another	-	Cancer cells or tissue spread from one part to
• Nephric/Renal	-	Kidney
• Pulmonary	-	Lungs
• Patho	-	Disease
• ……Penia	-	Decrease (Neutropenia, Leucopenia)
• ……Philia or Cytosis	-	Increase (Neutrophilia, Lymphocytosis)

DID YOU KNOW

• Phobia	-	Fear Acrophobia, Hydrophobia, Agoraphobia
• Plegia	-	Paralysis, (Hemiplegia, Paraplegia, Quadriplegia)
• Phrenic	-	Diaphragm
• Rhine	-	Nose
• Tachy	-	Fast (Tachycardia-fast heart rate)
• ……uria	-	Concerning urine (Haematuria)

Important persons-

Father of Medicine – Hippocrates.

Father of Surgery – Susruta.

Father of Ayurveda – Charaka.

Father of Modern Pathology – Rudolf Virchow.

Father of Immunity – Edward Jenner (Small pox vaccine)

Father of Blood grouping – C. Landstainer.

Father of Modern Bacteriology – Robert Koch (Koch Postulates, TB).

Important dates-

30 January	-	Leprosy day
24 March	-	Tuberculosis day
07 April	-	World Health day
26 June	-	International day against drug abuse and illicit trafficting
01 July	-	Doctor's day
11 July	-	World population day
01 Dec	-	AIDS day

2. The Immune System

- Humans are constantly exposed to disease causing agents. Yet the occurrence of diseases is relatively vey very low. This is because we possess a very complex and evolved 'immune system'.
- Immunity is the ability of an organism to fight disease causing agents.

- Immunology is the study of the immune system.
- The immune system involves tissues like the bone marrow and thymus, cells like T-lymphocytes and B lymphocytes, proteins like immunoglobulins and also many other compounds.
- Vaccination is a method that harnesses the immune system in a specific manner to protect an organism from a disease.

Some terms related to immunity

- **Antigen/Agglutinogen** - A substance which stimulates the production of antibodies.
- **Antibody/Agglutinin** - It is a complex glycoprotein secreted by B-lymphocytes in response to an antigen.
- **Antiserum** - Serum of any animal which contains the antibody for a specific antigen.
- **Agglutination** - The reaction of antigen and antibody.
- **Toxoid** - A chemically modified toxin incapable of harming but capable of stimulating an immune response is a toxoid.
- **Interleukin (IL)** - They are protein based signals that stimulate the growth of and activate certain WBCs.

There are two types of immunity

- Innate Immunity/Non-specific immunity/Congenital immunity
- Acquired immunity/Specific/Adaptive immunity

2.1 Innate immunity

- It is present since birth.
- It is first line of defense of body.
- Its response is not specific to the pathogen.
- It plays an important role in preventing the entry of pathogens.
- It is very important from the point of view of containing the infection till the adaptive immune system responds. Otherwise the pathogen load in the body would be extremely high till an adaptive immune response occurs. This may at time be fatal.

It consists of the following-

Anatomical/Physical Barriers

- **Skin-**
    - Outermost layer of skin prevents the entry of organisms in the body.
    - Sebum and sweat, the secretions of the skin also have some antibacterial properties. Secretions of the sebaceous glands create an acidic environment on the skin.

- **Mucosal surface-**
  - Food and air passages lined by mucosa.
  - Mucosa contains mucus secreting cells and cilia. Mucus entraps the micro-organism and the cilia 'sweep' the trapped organism out.
- **Physiological Barrier-**

  Many physiological aspects of the body make the environment unfavourable for the growth of microbes-
  - Fever- High temperature inhibits/slows down the growth of microbes.
  - pH- Acidic pH of the stomach, vagina etc. inhibits the growth of microbes.
  - Secretions- Secretions of body like tears, saliva, and sebum contain lysozyme. It is an enzyme that destroys the cell wall of the microbes (its target is peptidoglycan).
  - Interferons-They are proteins secreted by virus infected cells which stimulate the neighboring cells heighten anti-viral defenses.

    Types of interferons- INF α, INF β and INF γ.
- **Phagocytosis-**
  - In response infection, the total count of WBCs in the blood increases. Some of them are phagocytic.
  - Most important phagocytes are the **Macrophages** and **Neutrophils**.
  - Monocytes are liberated at the site of infection. They are later converted into macrophages.
  - Macrophages are large irregular shaped cells that engulf microbes, virus, cellular debris etc.

There are 5 stages of **extravasation** (coming out from blood vessels) and subsequent **phagocytosis**-

1. **Vasodilation-**

   Increased diameter of blood vessels at the affected site.
2. **Adhesion-**

   The leucocytes localise at the site of infection.
3. **Migration (Diapedesis)-**

   The leucocytes migrate out of the blood vessels.
4. **Chemotaxis-**

   The leucocytes move towards the pathogens following chemical signals.
5. **Phagocytosis-**

   The pathogen is ingested by the phagocytic cell.

Steps in phagocytosis-

- Attachment of the target to the phagocyte.
- Ingestion by engulfment and formation of a vacuole called phagosome.
- Lysis by the merging of the phagosome with a lysosome. The lytic enzymes in the lysosome are responsible for the destruction of the microbe.
- A residual body is formed and later disposed off as wastes by the cell.

Inflammation-

- It is a defense mechanism in the body that helps to reduce the spread/multiplication of infectious agents.
- Inflammation peculiarly includes pain, swelling, redness, and increased temperature in the local area.
- The redness and increase in temperature is due to increased metabolism and vasodilation in the affected area.
- **Histamine** and **prostaglandin** secretion from mast cells is chiefly responsible for the pain.

NK-Cells (Natural killer cells)-

- They are large granular lymphocytes. It should be noted that they are different from the Killer T cells.
- They kill virus infected cells and tumor cells of body.
- They use a protein called **perforin** to create pores in the plasma membrane of their target cells. Excess water enters through these pores causing swelling and bursting of the target cells.

Complement system-

- It is a part of the innate immune system which can be activated by the adaptive immune system. It consists of complement proteins.
- They are proteins synthesized by the liver.
- They can serve as opsonins for phagocytosis. The literal meaning of 'opsonein' is 'to make tasty reading for eating'.
- They also lead to the formation of a MAC or membrane attack complex.

TRY IT YOURSELF

1. Why are infants more prone to gastric infections?
2. Can interferons be used in medicine?

2.2 Acquired immunity

- This type of immunity is founds only in vertebrates.
- Its response varies on the basis of the pathogen/challenge.

- This immunity recognizes the specific pathogen and works on eliminating it.

Special features of adaptive immune system-

- **Specificity-**

  This response is specific for different pathogens.

- **Diversity-**

  This system can recognize a very vast variety of micro-organisms.

- **Self and non-self distinction-**

  It can distinguish self-tissues from non-self cells. In normal cases no immune response is mounted against the self cells.

- **Memory-**

  In case of the first time a specific pathogen enters the body the adaptive immune system takes a longer times to recognise and respond to it. This is called **primary immune response**. Some memory cells are formed during such pathogenic challenges. If and when a second time the same pathogen enters the body, the adaptive immune system responds very quickly. This type of response is called a **secondary immune response**.

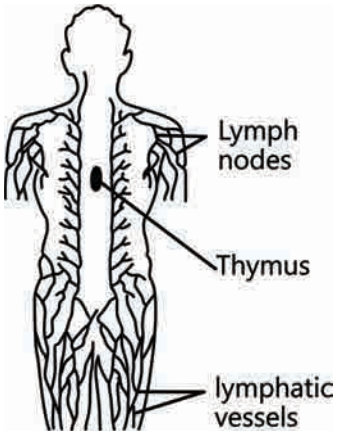


Figure 8.1: Lymphatic system

The cells of the adaptive immune system -

- **T lymphocytes** and **B lymphocytes** are the major cells of the adaptive immune system.
- They are subsets of the leukocytes.
- They perform different roles in the adaptive immune response.

Based on these two type of lymphocytes involved the responses can be of two types-

- Cell mediated immunity
- Antibody mediated/ humoral immunity

2.2.1 Cell mediated immunity

- It is based on T-cells.
- There are four type of T-cells-
    - Helper T-cells
    - Killer/Cytotoxic T-cells
    - Suppressor T-cells
    - Memory T-cells
- In the initial stages macrophage interact with pathogens and activates T_H (T helper) cell by releasing cytokines or ILs or monokines.
- The activated helper T-cells stimulate the killer T-cells and the B-cells which start dividing.
- Helper T cells produce lymphokines (a type of messenger molecules). Immune system cells can detect the lymphokines and follow a path to the location of their production which is the site where there presence is required. The lymphokines also aid B-cells to produce antibodies.
- Killer T-cells/$T_C$cells destroy the virus infected/tumor cells.

  Suppressor Cells (T_s cells) suppress the functions of T_C and T_H cells. B-cells are also affected by T_S cells.
- Memory T-cells are not involved in killing the pathogen but are involved in retaining the memory and aiding the secondary immune response.

Antigen Presenting Cells-

- Antigen molecules are processed by antigen presenting cells like macrophages, B-lymphocytes etc.
- These processed antigens are presented on surface of these cells. A T-helper cell may recognize the antigen and become activated. T-helper cells activate the B-cells and Killer T cells. These cells in turn develop clones by frequent divisions in themselves.

2.2.2 Antibody mediated/humoral immunity

It is based on B-lymphocytes which secret the antibodies.

Antibody-

- An antibody (Ab) is a large, Y-shape protein produced by B-cells. It is used by the immune system to identify and neutralize pathogens such as bacteria and viruses.
- Antibodies have 2 heavy and 2 light chains (based on the number of amino acids present in the chain).
- Each chain has some ‘constant region’. The amino acid sequence of this region is the same for a particular type of antibody.
- Each chain has a ‘variable region’ at one end. This region is responsible for the antigen recognition diversity.

- Each tip of the upper tips of the "Y" of an antibody contains a paratope (analogous to a lock) that is specific for a particular epitope (analogous to a key) on an antigen, allowing these two structures to bind together with precision.
- This binding mechanism, is used to tag a microbe or an infected cell for attack by other parts of the immune system.
- Alternatively, this can also neutralize its target directly by blocking a part of a microbe that is essential for its invasion and/or survival.
- The antibody also has an Fc receptor at the ends opposite to the variable region (located at the base of the "Y"). It contains a glycosylated site. This region is involved in interaction of the antibody with other components of the immune system.

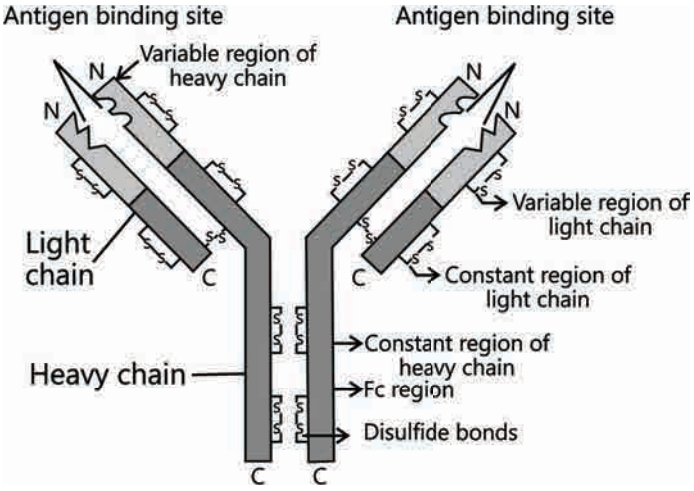


Figure 8.2: Structure of antibody

Gist of actions of an antibody-

- **Agglutination-** Antibodies attach with the antigen which is present on the surface of pathogen.
- **Opsonisation-** Attachment of bacteria (Ag) with opsonins (IgG and IgM) promotes phagocytosis.
- **Neutralization-** Antibodies neutralize the toxin of bacteria by attaching with them.

Types of Antibodies-

Type	Main characters and occurrence	Functions
IgA	• Present in mucus membranes, gut, urogenital tract and colostrum (breast milk during the initial stages of feeding). • M.W. 1,70,000 Daltons.	Protection of mucous membranes and outer surface of body. Protection from inhaled or ingested pathogens.

IgD	• Present on the surface of naive (or unexposed) B cells. • They are known to activate mast cells and basophils. • M.W. 1,85,000 Daltons.	Activation of B-lymphocytes. Development and maturation of immune reactions.
IgE	• Present in very small quantities. • Binds to allergens. • Involved in tackling parasite infections. • M.W. 1,88,000 Daltons.	Stimulation of mast cells, related to allergic reactions and protection from parasites.
IgG	• Most abundantly found. • Main immunoglobulin of the blood and intestinal fluid. • Can cross the placental barrier and thereby provide protection to the fetus. • M.W 1,46,000 Daltons (lightest).	To stimulate the complementary system. To provide protection to embryo. Linkage with phagocytic cells for phagocytosis.
IgM	• First antibody secreted in response to antigens. • Largest sized immunoglobulin. • Pentameric form. • M.W. 9,60,000 Daltons (heaviest).	Strong agglutination Related to complement system

(One may also remember the types as- MADGE)

2.2.3 Active and Passive Immunity

- When an organism is exposed to antigens which may be in the form of living or dead microbes or proteins, antibodies are produced in the host body. This type of immunity is called active immunity.
- Active immunity takes time to mount a response.
- Injecting the microbes deliberately during immunization or infectious agents gaining access to the body during natural infection induces active immunity.
- When ready made antibodies are directly provided to protect the body against foreign agents, the type is called passive immunity.
- The yellowish fluid termed as ‘colostrum’ secreted by the mother during the initial days of lactation is abundant in antibodies (IgA). They serve to protect the infant. The fetus also receives some antibodies from the mother, through the placenta during pregnancy. If a person is infected with some deadly microbes to which quick immune response is required example tetanus, the performed antibodies,

or antitoxin is directly injected. Even in cases of snakebites, preformed antibodies against the snake venom are administered. This type of immunization is called passive immunization.

Table 8.2: Difference between Active and Passive immunity

Active immunity	Passive immunity
Produced actively by the immune system of host.	Received passively by the host and the host's immune system does not participate.
Induced by infection or by contact with immunogen, e.g. vaccines.	Conferred by introduction of ready-made antibodies.
Immune response is not short-lived and is effective.	Immune response-short lived and less effective.
Immunity develops only after a lag period.	Immunity effective immediately.
Immunological memory present. Subsequent challenge with booster dose more effective.	NO immunological memory. Subsequent administration of antibody less effective due to immune elimination**.
Serves no purpose in immunodeficient host.	Applicable in immunodeficient host.
Used for prophylaxis to increase body resistance.	Used for treatment of acute infection.

** If a certain type of non self antibodies are administered in the body, they themselves serve as antigens and elicit an immune response (may be very weak). The next time these antibodies are administered, they are promptly neutralised as a result of 'secondary immune response'.

Try It Yourself

1. Describe the structure of an antibody.
2. IgG is pentameric. (True/False)
3. B cells secrete antibodies. (True/False)
4. Write a short note on the innate immune system.

3. Vaccination

A vaccine is a biological preparation which provided active acquired immunity to individual upon administration.

3.1 Scientists

- It is said that 'inoculation' a practice corresponding to vaccination was performed in ancient China.
- Edward Jenner's work with small pox is regarded as a pioneering work in the field of vaccination.

- Louis Pasteur introduced the process of heat inactivating the pathogens and prepared vaccines for anthrax, rabies etc.
- Emil Von Behring discovered the process of passive immunization. He is known as father of passive immunization.

3.2 Principle of Vaccination

- When an antigen is introduced in a healthy person, it induces production of antibodies and memory cells as a primary immune response. When the actual active pathogen enters the body of a vaccinated person,due to the presence of memory cells it is rapidly recognized and eliminated.
- Thus the person does not suffer from the disease and becomes resistant to infection by the particular type of pathogen.

3.3 Types of Vaccines

First generation vaccines-

These vaccines are prepared by inactivating the whole pathogen. They may have side effects.

- **Live attenuated** (E.g. BCG, Small pox, Influenza etc.)

  The pathogen is grown under conditions that make it lose its pathogenicity but not its antigenic identity which is of importance pertaining to the immune system.

- **Inactivated** (E.g. Typhoid, Salk polio, Cholera, Rabies, Plague etc.)

  As the name suggests, a killed pathogen is used for administration.

- **Toxoid** (E.g. Diphtheria, Tetanus)

  The inactivated form of a pathogen's toxin is administered. They are very effective.

Combinations of various pathogens can be integrated into a single vaccine and used to generate immunity against them. Such vaccines are called combination vaccines.

Second generation vaccines-

- Antigenic polypeptides of pathogens are produced (or isolated) and administered. These are incapable of causing disease but elicit immune response. E.g. plague.
- Polysaccharides (which are poorly immunogenic) of the pathogens conjugated with proteins (which are fairly immunogenic) may also be used in place of protein subunits. E.g. Pneumococcal vaccines.

Third generation vaccines-

E.g. DNA vaccines, Dendritic cell vaccines etc. They are in experimental stages.

TRY IT YOURSELF

1. Which of the following disease is not transmitted through contaminated water?
   (A) Typhoid (B) Diphtheria (C) Hepatitis A (D) Amoeblesis
2. Manton test is for
   (A) Scarlet fever (B) Diphtheria (C) Rheumatoid fever (D) Tuberculosis

4. Tissue Grafting

4.1 HLA

- The **human leukocyte antigens** are proteins on the surface of cells that are responsible for regulation of the immune system in humans.
- This group of genes are present on chromosome 6 (with some exceptions) and encodes antigen-presenting proteins.
- HLA in humans correspond to **MHC** (major histocompatibility complex) in vertebrates.
- Any cell bearing HLA of non-self type is marked for elimination by immune response.

4.2 Tissue Grafting

- Grafting refers to a surgical procedure used for moving a tissue from one site to another. This term is not specific to within the same body or not.
- HLA typing has to be carried out to check the compatibility of the donor cells inside the body of the receiver.
- The pecking order for graft selection should be-

  Identical twins > Siblings > Parents > Unrelated donor.
- Cyclosporine may be used as an immune-suppressant drug during/after tissue grafting.
- It can be understood that all this is of high significance from the point of view of transplantations.

4.3 Types of Tissue Grafting

- **Autograft-** (most successful) Transplantation of tissue from one part of the body to another within the same individual.
- **Isograft-** Transplantation of tissue in between the individual of same genetic constitution. E.g. graft between identical twins
- **Homograft or allograft-** Tissue grafting in between genetically dissimilar individual of the same species. E.g. Family members.
- **Heterograft or Xenograft-** Tissue grafting between organisms of different species.

TRY IT YOURSELF

1. Anthrax is caused by
   (A) Virus (B) *Vibrio* (C) *Bacillus* (D) *Saimorrehra*
2. A common disease of domesticated animals
   (A) Anthrax (B) Syphilis (C) Cholera (D) Diphtheria

5. Disorders of the Immune System

5.1 Hyper Sensitive Disorder or Allergy

- The phenomenon of a person exhibits a highly above average response or hyper sensitiveness for a common antigen or agent is called allergy.
- The agents which cause allergies are called allergens.
- Pollen grains, some food preparations (egg, fish), medicines (penicillin) etc. are common allergens.
- The antibodies produced to these are of IgE type.
- Symptoms include sneezing, watery eyes, running nose and difficulty in breathing.
- It is due to the release of chemicals like histamine and serotonin, from the mast cells.
- For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens, and the reactions studied.
- The use of drugs steroid based and other anti-histaminic drugs quickly alleviates (makes less severe) the symptoms of allergy.
- It is said that modern lifestyle which leads to a highly protected environment in early stages of life leads to development of allergies.

Bronchial Asthma-

Mode of entry of the pathogen is via inhalation. It is characterized by the spasm of the smooth muscles present in the walls of the bronchiole. It is caused due to the hypersensitivity to the foreign substances present in the air passing through it. The mucous membranes on the wall of the air passage start secreting excess amount of mucous.

Symptoms-

Coughing and difficulty in breathing mainly during expiration (Wheezing).

Prevention and cure-

Avoiding exposure to allergens.

Hypo-sensitisation by small doses of the specific allergen.

Antibiotic therapy for removing the infection if any and use of bronchodilator drugs, inhalers for symptomatic relief.

Hay fever-

Mucosa of eyes and upper respiratory passage become hyper secretory in response to the allergen (pollen grain).

Eczema (Dermatitis)-

Symptoms include reddening of skin, scales formation.

Anaphylactic shock-

This is a severe form of allergy. If an allergen enters into the blood, it stimulates the secretion of histamines from the mast cells of the whole body causing vasodilation and increasing the permeability of the blood vessels. Resultantly a large amount of fluid is leaked out form blood vessel into extra cellular space. Excess fall in the blood pressure may be fatal.

5.2 Autoimmune Disorder

- When the immune system is unable to discriminate between self and non-self antigens, antibodies are formed against the self-antigen also.
- These antibodies destroy the self-antigen bearing cells.
- Thus the antibody formation against self antigens is called auto immunity.
- This occurs due to the failure of the body to eliminate the immune cells with an ability to target self cells.

Examples-

- **Myasthenia gravis-**

  Antibodies are formed against acetylcholine receptors resulting in their destruction. This leads to reduced efficiency of impulse conduction by the nervous tissue.

- **Pernicious anemia-**

  Antibodies are formed against some cells of the digestive system due to which vitamin B12 is not absorbed in intestine and blood formation is decreased. This deficiency of blood is called pernicious anemia.

- **Hashimoto disease-**

  Antibodies are formed against the thyroid gland. These antibodies destroy the thyroid gland and cause a deficiency of thyroid hormone.

- **Rheumatoid arthritis-**

  In simple terms, the disease results due to the immune system attacking the joints. There is swelling of the synovial membrane. The causes of this disease are not perfectly determined. Some genetic factors are known to play a role.

Treatment-

Pain and inflammation can be alleviated by heat treatment and physiotherapy. Joint replacement surgery may be carried out in extreme cases.

- **Insulin dependent diabetes mellitus-**

  Antibodies are formed against some cells of the pancreas. This causes deficiency of insulin in body. Symptoms are hyperglycemia, glycosuria, polyuria, polydipsia (excessive thirst), polyphagia (increased food intake).

- **Multiple sclerosis-**

  Antibodies are formed against the myelin sheath of nerve cells leading to destruction of myelin sheath causing neurological dysfunction.

5.3 Immunodeficiency Disorders

- The body is unable to mount a proper immune response.
- May be due to genetic mutation, absence of some genes, infection, malnutrition and accidents.

Examples-

S.C.I.D or Severe Combined Immuno-Deficiency–

This disorder is due to genetic mutations or deficiency of enzyme adenosine deaminase due to genetic reasons. This enzyme involved in formation of T and B lymphocytes. SCID characterized by very low number of circulating thymocytes. Affected individual die at a very early age.

Treatment – Gene therapy

A.I.D.S. (Acquired Immuno-Deficiency Syndrome)–

Human Immunodeficiency Virusleads to destruction of T-helper cells. This causes the decrease count of T-helper cells from normal 950/mm^3 to less than 200/mm^3.

TRY IT YOURSELF

1. Cholera is accompanied by
   (A) Rapid loss of fluid from the intestine (B) Infection of heart muscles
   (C) Peptic ulcers (D) Rose spots

2. Select a diarrhoeal disease from the tolfowing
   (A) Cholera (B) Tetanus (C) Plague (D) Whooping cough

6. Immunotherapy

- Immunotherapy is the treatment of a disease by inducing, enhancing or suppressing an immune response.
- Immune responses can be modulated bysuitably altering the working of the various components of the immune system. They may include interleukins, interferons and tumor necrosis factors (TNFs).
- Immunomodulators are drugs that modulate the activity of a patient's immune response to reach a desired level of therapeutic effect.

Types-

- **Immunoactivation therapy–**

  It aims to heighten the immune response. E.g. administration of preformed antibodies.

- **Immunosuppressive therapy-**

  It aims to reduce the immune response by the use of cytokine inhibitors or other drugs.

7. Diseases

They can be of two types-

- Congenital or genetic disorders.
- Acquired disorders.

7.1 Congenital or Genetic Disorders

- They occur due to faults in the genome of the organism.
- They may be inheritable or non-inheritable
- They may be due to recessive type or dominant type genes.
- Gene therapy is the only proposed 'cure' for these disorders. Most approaches are in clinical trials.
- It is observed that almost all the existing treatments aim to alleviate the symptoms and improve 'quality of life' rather than treat the disorder.

Autosomal Recessive Disorders

They are linked to autosomes. As the mutant genes are recessive many individuals may be carriers of the mutant genes but may now suffer from the diseases as they have a dominant 'healthy' version of the gene.

Phenylketonuria (PKU)-

- It occurs due to the deficiency of an enzyme called phenyl alanine hydroxylase.
- The levels of phenylalanine in the blood increases.

- This phenylalanine or phenyl pyruvic acid accumulates in brain and destroys the brain cells.
- This causes mental retardation.
- Phenyl acetate is present in urine and sweat.
- If detected at an early age, a diet with low quantities of phenylalanine along with some medication can be used to keep the levels of phenylalanine in check and thereby ensure proper brain development.

Alkaptonuria (Black Urine Disease)-

- It occurs due to deficiency of enzyme homogentisatedioxygenase which is involved in tyrosine metabolism.
- There is accumulation of alkaptone and homogentisic acid in blood and in tissues like joints, ligaments, tendons, cartilages
- It is also excreted in urine which leads to black colour of the urine when it is exposed to air.
- There is no cure for the disorder and the treatment includes C vitamin doses and monitored diet.

Albinism-

- This disorder is due to deficiency of the enzyme tyrosinase.
- Due to its necessity in melanin production, the body parts like skin, iris of eye etc., become melanin deficient.
- This leads to a ghostly white appearance.
- Melanin provides protection against U.V. rays.
- There is no cure for this disorder. The patients use various optical aids and have to take precautions in order to avoid sun-burns.

Tay-Sachs Disease-

- This disease was first reported by Tay and Sachs.
- This genetic disorder occurs due to the deficiency of enzyme β-N acetyl hexose aminidase which is involved in fat metabolism.
- The fat accumulation damages the nervous cells leading to progressive destruction.
- Mental retardation and paralysis is seen.
- The child does not live beyond 3-4 years.
- There is no cure or treatment. Genetic screening is regarded as a promising approach with respect to analyzing the risks before conception.

Thalassemia/Cooley's anaemia-

- This disorder was, first noted in the population of Mediterranean region.

- Mutations cause a decrease in synthesis of β and α (mainly β-chain) polypeptide chain of hemoglobin.
- Hb in the body reduces and less RBCs are found in circulation.
- Treatments include blood transfusions (not in excess) and chelation therapy to remove excess iron from the body. Some people do not require any major treatment.

Sickle cell anaemia-

- Glutamic acid is replaced by valine at the 6^{th} position in the β chain of hemoglobin.
- This abnormal Hb changes the shape of RBCs from spherical to sickle shaped.
- Sickle cell anemia patients are resistant to malaria.
- Treatment approaches include blood transfusions, folic acid supplements, bone marrow transplant, doses of antibiotics to prevent infections etc.

Autosomal dominant gene mutational disorder

They are linked to autosomes. Females do not have any specific protection with regard to these types of disorders.

Examples-

- **Polydactyly**

  Presence of extra fingers and toes
- **Brachydactyly**

  Presence of abnormal short fingers and toes.
- **Huntington's disease**

  This disorder occurs due to the dominant mutation occurring on the 4^{th} chromosome. Mental and muscle degeneration is seen in patients. It causes abnormal movement of limbs and defective speech. This disease manifests at the age of 25-55 yrs. of age. Nerve degeneration causes involuntary shaking of legs, arms and head.
- **Achondroplasia/Dwarfism**

  The defective formation of cartilaginous bones causes dwarfism
- **Marfan syndrome**

  Mutation is present on the 15^{th} chromosome. The connective tissue is affected. Sometimes the heart valves and aorta are also affected leading to death.

X-Linked recessive disorders-

These are linked to genes on the X chromosome. They may not be manifested in females as they have 2 copies of the X chromosome and may have the 'healthy'/non mutant version of the gene on one X chromosome which negates the effect of the mutant on the other X chromosome.

E.g. Glucose-6-Phosphate dehydrogenase (G-6-PD) deficiency syndrome

- The G-6-PD enzyme is present in the RBCs.
- This enzyme stabilizes the membrane of R.B.Cs.
- Deficiency of this enzyme causes the rupture of R.B.Cs when it comes in contact with sulfa drugs, chloroquine or some bean legumes.

Duchenne's muscular dystrophy

- Dystrophin protein is absent in muscles.
- This protein helps in the conduction of Ca^{++} ion.
- Due to deficiency of dystrophin protein muscles cannot contract properly.

X-linked dominant disorders-

The mutant genes causing these genes are dominant and hence females have no special protection against them. E.g. - Goltz syndrome, Aicardi syndrome, Fragile X syndrome.

Fragile X syndrome

The patients for this disease may satisfy the criteria for autism. They have cognitive disabilities. Other characteristics may include long faces, large testes etc.

Aneuploidy linked diseases-

They occur due to the occurrence of an abnormal number of chromosome in a cell.

Autosomal Aneuploidy-

The number of autosomes is less or more than normal.

Down's Syndrome/Mongolism

- This disorder was first reported by John Langdon Down.
- It is first aneuploidy linked disorder to be discovered.
- It causes mental retardation in children.
- Its frequency or incidence 1 in 700 children.
- This abnormality or disorder occurs mostly by fusion of normal sperm with abnormal ovum. This abnormal ovum contains an extra 21^{st} chromosome.
- Women around the age of 45 are more likely to give birth to children having Down syndrome.
- Symptoms include short stature, rounded face, extra folds in eye lids (epicanthus), broad fore head, retracted tongue and lower lips, flattened nasal bridge, open mouth, short neck, flat hands, stubby fingers, undeveloped genitals and gonads and mental retardation.
- Amniocentesis can be carried out to detect this syndrome in embryonic stage.

Edward's syndrome/Trisomy 18

- Its incidence is 1 in 8000 births.
- The symptoms include defective formation of ears and nervous system. Mental retardation, small eyes (micropthalmia), small jaw (micrognatha) etc.may also be seen.
- As per name the abnormality exists in the number of copies of the 18^{th} chromosome.

Patau's syndrome/Trisomy 13

- Symptoms include polydactyly, small hands, tiny eyes, mental retardation.
- As per name the abnormality exists in the number of copies of the 13^{th} chromosome.
- Incidence 1 in 15000 births

Cri-du-chat syndrome

- This disorder occurs due to partial deletion of the short arm of chromosome 5.
- Patients are mentally retarded and exhibit characteristic cat like cry.
- It occurs in 1 per 50000 births and is said to be more common in females.

Sex chromosomal (Aneuploidy)

The number of sex chromosomes is abnormal.

Klinefelter's syndrome

- It occurs when more than one X chromosome is present along with a lone Y chromosome.
- The features of a person suffering from this disorder are- person is male, sterility, weaker muscles, less body hair, development of breasts and lack of interest in sexual activities etc.
- In some cases the symptoms are very much less prominent making the detection very difficult.
- The severity of the symptoms increases with the number of X chromosomes.
- The disease occurs due to fusion of an egg with two or more X chromosomes with a normal sperm or due to the fusion of an egg with a sperm having both X and Y chromosomes.
- The occurrence is 1 per 500-100 live male births.

Turner's Syndrome

- The individuals are females. They have only one X chromosome. Thus they have only 45 chromosomes.
- Some cases may have one complete and 1 partial X chromosome.
- Symptoms – Sterile females, primary amenorrhoea (absence of menstruation), undeveloped ovaries, small uterus, shielded chest, webbed neck, mental retardation, short stature.
- Cardiovascular malformation is present in many cases and is a cause of death.
- The frequency is 1 in 2000 to 5000 female births.

Jacob's Syndrome

- Incidence is 1 in 1000 live male births.

- It occurs due to the fusion of a YY sperm with a normal egg or due to errors in cell division after the formation of zygote.
- The use of the word 'syndrome' with respect to this case is highly debated as the individuals do not suffer from any disease or disorder. They even have an IQ which is greater than the patients of Klinefelter's Syndrome or Turner's syndrome and which is equal to the normal population. It goes undetected in many cases.
- The testosterone production is high and hence the height is more than the average.
- As against previous beliefs, these males are not 'by default more aggressive' than XY males.

Super females

- They are females with more than 2 X chromosomes.
- Similar to Jacob's syndrome, the symptoms are very mild and the individuals do not suffer from any concrete disorders owing to the karyotype.
- They may show accelerated growth in their childhood and a more than average height.
- They also may have some learning disabilities and a shy personality in their childhood.

Table 8.3: Disorders and the chromosomal abnormalities

Disorder	Chromosome number
Huntington's Chorea	4^{th}
Cri-du-chat syndrome	5^{th} (short arm)
Cystic fibrosis	7^{th}
Sickle cell anemia	11^{th}
PKU	12^{th}

7.2 Acquired Disorders

These are diseases which an individual may acquire after birth. They may be caused due various infectious agents like bacteria, viruses etc. Sometimes, certain chemicals may also be a cause of diseases. They are not due to chromosomal aneuploidy. Categories of Acquired Disorders -

- **Communicable/Contagious/Infectious diseases**

  They may be-

  - Bacterial
  - Viral
  - Protozoal
  - Helminthic

- **Non-communicable or non-infectious disease**

  They may be-

  - Degenerative
  - Deficiencies
  - Cancer

7.2.1 Bacterial Diseases

Table 8.4: Bacterial diseases

Disease	Pathogen	Mode of transfer	Symptoms	Detection	Treatment
Tuberculosis	*Mycobacterium tuberculosis*	Air borne. Droplet inhalation.	Chronic cough, fever, weakness, bloody sputum, breathlessness. High grade fever, difficulty in breathing	Mantoux test Sputum analysis	Rifampicin, Ethambutol etc. Direct Observation Therapy (DOT) to ensure that medicines are not skipped. Vaccine- BCG
Diphtheria	*Corynebacterium diphtheriae*	Direct contact. Air borne	Fever, chills, fatigue, bluish skin coloration, sore throat, hoarseness, cough, headache, painful swallowing, difficulty breathing, rapid breathing, foul-smelling bloodstained nasal discharge	Isolation of pathogen from patient	Erythromycin Penicillin variants Vaccine- Quinvaxem
Pertussis (100 days cough)	*Bordetella pertussis*	Air borne	Severe cough, Whooping cough	Isolation of pathogen from host. Polymerase Chain Reaction (PCR) based detection.	Erythromycin Vaccine is available.

Cholera	*Vibrio cholerae*	Water borne	Diarrhoea. Rice water stools, drop in blood pressure.	Dipstick based test. Stool test	Doxycycline Electrolyte supplements Vaccine available. Filtration of water using a cloth can be useful.
Pneumonia	*Streptococcus pneumoniae* Also caused by *Haemophileus influenzae*	Air borne, droplet inhalation.	Persistent large bouts of cough.	Chest radiograph. Blood culture. PCR based detection.	Amoxicillin Amantadine (If viral) Vaccine available
Tetanus	*Clostridium tetani*	Soil, manure coming in contact with open wounds.	Muscle spasms.	No specific test	Anti-toxin antibodies Metronidazole Magnesium (IV) Vaccine available
Leprosy	*Mycobacterium leprae*	Direct contact. Nasal droplets.	Patches on skin, ulcers and nodules formation in skin and nerves, wasting of fingers and toes	Symptoms based on isolation from host	Dapsone BCG vaccine may be useful
Typhoid	*Salmonella typhi*	Contaminated food and water	Stomach pain, constipation, headache, high fever, loss of appetite, intestinal, ulcers, bradycardia	Widal test	Cephalosporins Ampicillin Vaccine available
Plague	*Yersinia pestis*	Vector borne	High fever, headaches, enlargement of axillary lymph nodes, unconsciousness	Blood tests	Streptomycin, gentamycin etc. Vaccine available

Note: The antibiotics mentioned are not the only ones used for the treatment of the disease.

7.2.2 Viral diseases

Table 8.5: Viral diseases

Disease	Pathogen	Mode of transfer	Symptoms	Detection	Treatment
Polio	Polio virus (Group-Picorna virus)	Fecal matter	Fever, headache, limb damage	Testing CSF	No cure. Antibiotics, physiotherapy etc. Vaccination is effective and important.
Influenza (Avian, Swine etc.)	Othomyxovirus	Air borne	Coughing, sneezing, sudden fever after headache, nasal discharge	Throat swabs	Amantadine, Oseltamivir Vaccine available
Measles	Paramyxovirus	Air borne Direct contact	4 day fevers, cough, brown patches across the body	Symptom based. Detection of viral RNA in the nasal discharges	No specific treatment. Rest etc. Vaccine available
Chicken pox	Pox virus	Direct contact Sometimes via coughs and sneezes	Fever, blisters across the body	Symptoms based. PCR based test of amniotic fluid for detection in embryos	No specific treatment. Wearing of gloves, anti-itch ointments etc. Aspirin should NOT be used Vaccine available
Mumps	Para myxovirus	Respiratory droplets	Fever, white-brown patches on the body.	Symptom based PCR based	No specific cure. Rest etc. Aspirin should NOT be used Vaccine available

Dengue	Arbovirus	Vector borne. *Aedes aegypti*	High fever, rash	PCR based tests Blood testing for WBC counts Torniquet tests for hemorrhage	No specific drugs. Oral rehydration Vaccine NOT available.
Rabies	Rhabdo virus	Vector borne. Dogs etc.	Affects nervous system, hydrophobia etc.	Fluorescent antibody test	No specific cure Vaccine available. It is effective for treatment also.
Common cold	Rhinovirus	Droplet infection	Infects nose and upper respiratory tract but not the lungs, Nasal congestion and discharge, headache, tiredness.	Symptoms based	NO specific cure As the number of viruses causing it is high and as they mutate very fast, there is no vaccine preparation that has shown promise
Chikungunya	Togaviruses	Vector borne. Mosquitoes	Fever, joint pain, arthritis.	PCR based detection Nonspecific test	No specific cure Aspirin should NOT be used Vaccine not available. In experimental stages
Swine flu	H1N1 Influenza virus	Air borne	Flu like symptoms	Throat swabs used for PCR based tests	Tamiflu. Vaccine available

Hepatitis A, B, C, D, E	Enterovirus	Blood to blood	Jaundice	Blood chemistry, ELISA	Some drugs available. Vaccines available
AIDS **Acquired Immuno-deficiency Syndrome**	HIV Human Immuno-deficiency Virus	Unprotected sexual intercourse, Exposure to infected bodily fluids Via sharing of syringes From infected mother to fetus	Reduced immunity. Opportunistic infections	Serological tests for anti-HIV antibodies. Western blot	Anti-Retroviral Cocktail (At-least 3 anti-Retroviral drugs) Zidovudine No promising vaccine

Figure 8.3: Boy suffering from chicken pox

Figure 8.4: Boy suffering from mumps

Did You Know

Aspirin consumption (especially by children) during some viral infections can cause Reye's syndrome, a potentially fatal condition affecting the liver and the brain.

Did You Know

Typhoid Mary

She was a cook by profession and was a typhoid carrier who continued to spread typhoid for several years through the food she prepared. She was twice forcibly isolated by public health authorities and died after a total of nearly three decades in isolation. She is said to have infected 51 people.

7.2.3 AIDS (Acquired Immuno Deficiency Syndrome)

- AIDS was first reported in 1981.
- It was first detected in homosexual males in USA at Centre for Disease Control, Atlanta.
- It has resulted to more than 25 million deaths.
- HIV I is more common in India and HIV II is more common in West Africa.
- It is characterized by decrease in number of helper T-cells.
- **HIV (Human Immuno Deficiency Virus)**
    - It is roughly spherical
    - It is around 60 times smaller than a red blood cell,
    - It is composed of two copies of single-stranded RNA
    - The RNAs are enclosed by a conical capsid composed of 2,000 copies of the viral protein p24.
    - The RNA is tightly bound to nucleocapsid proteins
    - A matrix composed of the viral protein p17 surrounds the capsid.
    - The matrix is surrounded by the viral envelope that is composed of two layers of phospholipids.
    - A viral protein and some host proteins are embedded in the envelope. This glycoprotein enables the virus to attach to and fuse with target cells

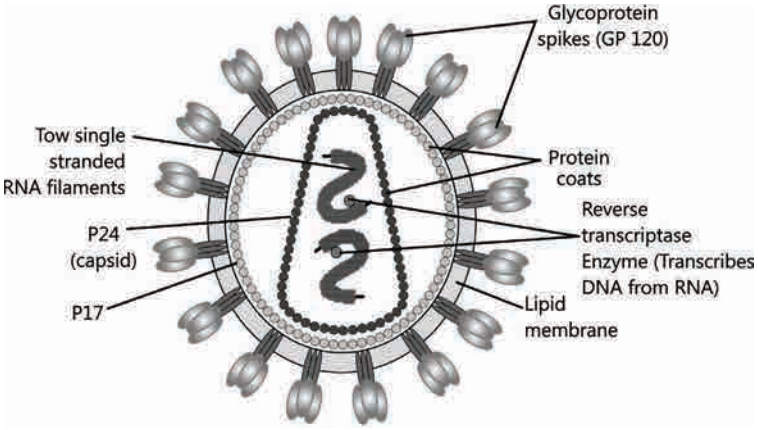


Figure 8.5: Human Immuno-deficiency Virus

- **Modes of transfer**
    - Due to unprotected sexual intercourse with infected partners.
    - Contact of blood with infected tissue/blood.
    - Use of unsterilized material for tattooing or any practice that punctures the skin.
    - From mother to fetus during pregnancy.

- From mother to child during lactation.
- AIDS does not spread through mere touch, hugging, sharing meals, shaking hands, mosquito bites, coughing, sneezing etc.

- **Infection**
  - After getting into the body of the person, the virus enters into macrophages.
  - Here the RNA genome of the virus replicates to form viral DNA and makes use of the cellular machinery to produce more and more virus particles.
  - HIV enters T-helper cells and continue to multiply.
  - The progeny viruses are released in the blood. They attack other T-helper cells.
  - This leads to a progressive decrease in the number of T-helper cells.
  - The person suffers from fever, diarrhoea and weight loss.
  - Due to decrease in the number of T-helper cells, the person suffers from infections that the immune system otherwise could have overcome.
  - The person becomes immuno-deficient.

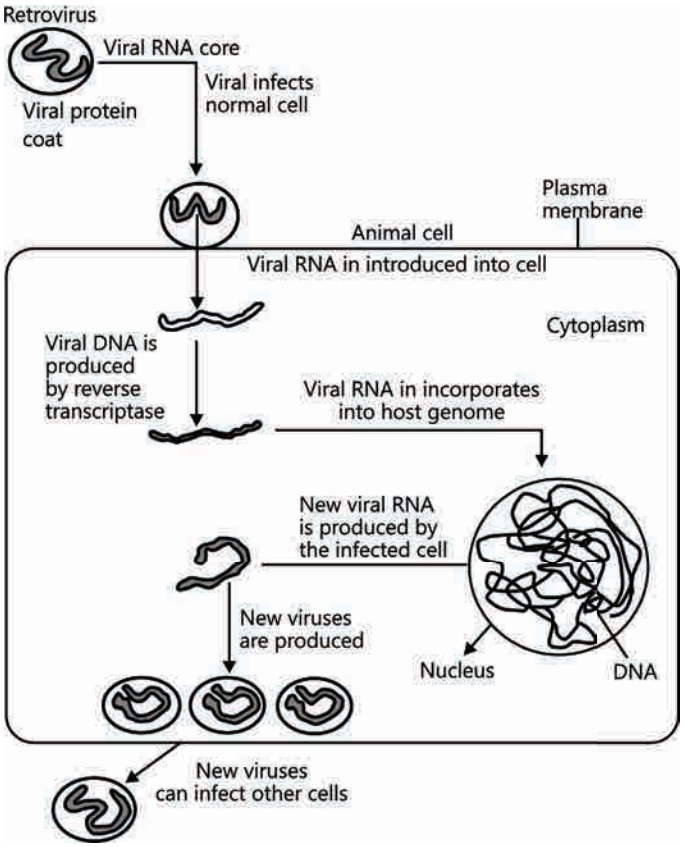


Figure 8.6: Multiplication cycle of Retrovirus

Symptoms

- **Asymptomatic phase**
  - For 5-10 years antibodies are not produced against HIV.
  - There are no specific symptoms.
  - ELISA test comes out to be negative.
  - A fever and some illness may occur in 2-4 weeks after the infection.
- **Full blown AIDS**
  - The person suffers from fever, diarrhoea and weight loss.
  - The person becomes immunodeficient.
  - The person gets infected by opportunistic infections.
  - The person may suffer from Kaposi's sarcoma, Burkitt's lymphoma, primary central nervous system lymphoma and cervical cancer.
  - Suffering from Pneumonia, TB is possible.
- **Diagnosis**
  - ELISA- Enzyme linked immunosorbent assay-
  - It is a sensitive test for detection of proteins.
  - Western Blot test for antibodies against HIV in the patient's serum.
  - PCR based test.
- **Treatment**
  - Reverse transcriptase inhibitors- Zidovudine (previously called AZT), Stavudine, Trizivir, Foscarnet, DDI (Didexymidine) etc.
  - Protease inhibitors-Ritonavir, Nelfinavir etc.
  - HAART (Highly Active Anti-Retroviral Therapy) includes both reverse transcriptase inhibitors and protease inhibitor drugs.
  - Treatment does not cure. Only helps to reduce viral load.
- **Prevention**
  - Use of appropriate contraceptives/protection (condoms) during sexual intercourse.
  - Proper sterilization of surgical equipment.
  - Use of disposable instruments for any body puncture practice.
  - Avoiding intra-venous drug use and sharing of needles, razors etc.
  - Creating social awareness.

7.2.4 Protozoan diseases

Table 8.6: Diseases caused by protozoans

Disease	Pathogen	Mode of transfer	Symptoms	Detection	Treatment
Malaria	*Plasmodium vivax* *Plasmodium falciparum* *Plasmodium malariae*	Vector borne. The parasite spreads via female Anopheles mosquito.	Fever, chills, head-ache, body-ache, severe weakness, shivering. The parasites first reside in the liver asymptomatically (1-4 weeks) and then invade the RBCs. They rupture RBCs to infect new ones. These cycles of rupture lead to the bouts of fevers and chills. The pathogen has adapted various mechanisms to avoid the action of immune system.	Blood film test. PCR based tests are rarely used.	Chloroquine, hydroxychloroquine Anti-pyretic drugs etc. Spraying of anti-mosquito chemicals on stagnant water and other areas, rearing of *Gambusia* fishes which eat mosquito larvae, use of mosquito-repellent ointments, mosquito nets etc. are preventive measures. No vaccine is available.
Amoebic dysentery	*Entamoeba hystolytica*	Contaminated food and drinks	Blood in stools, aggressive diarrhoea, fever, weakness, chills, abdominal cramps etc.	Testing of stools, blood	Metronidazole, paromomycin etc. Vaccine is NOT available

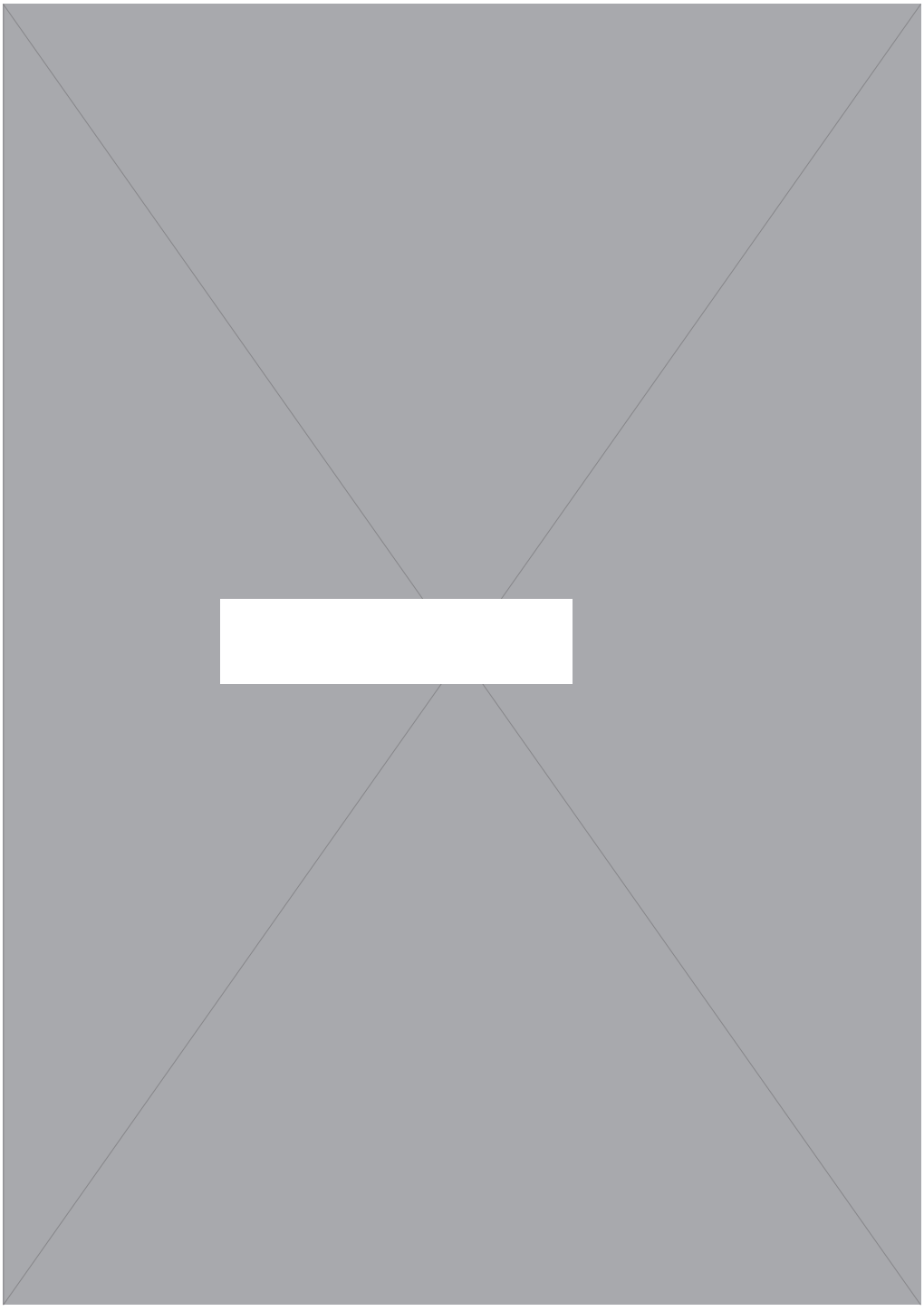


Figure 8.7: Life cycle of *Entamoeba histolytica*

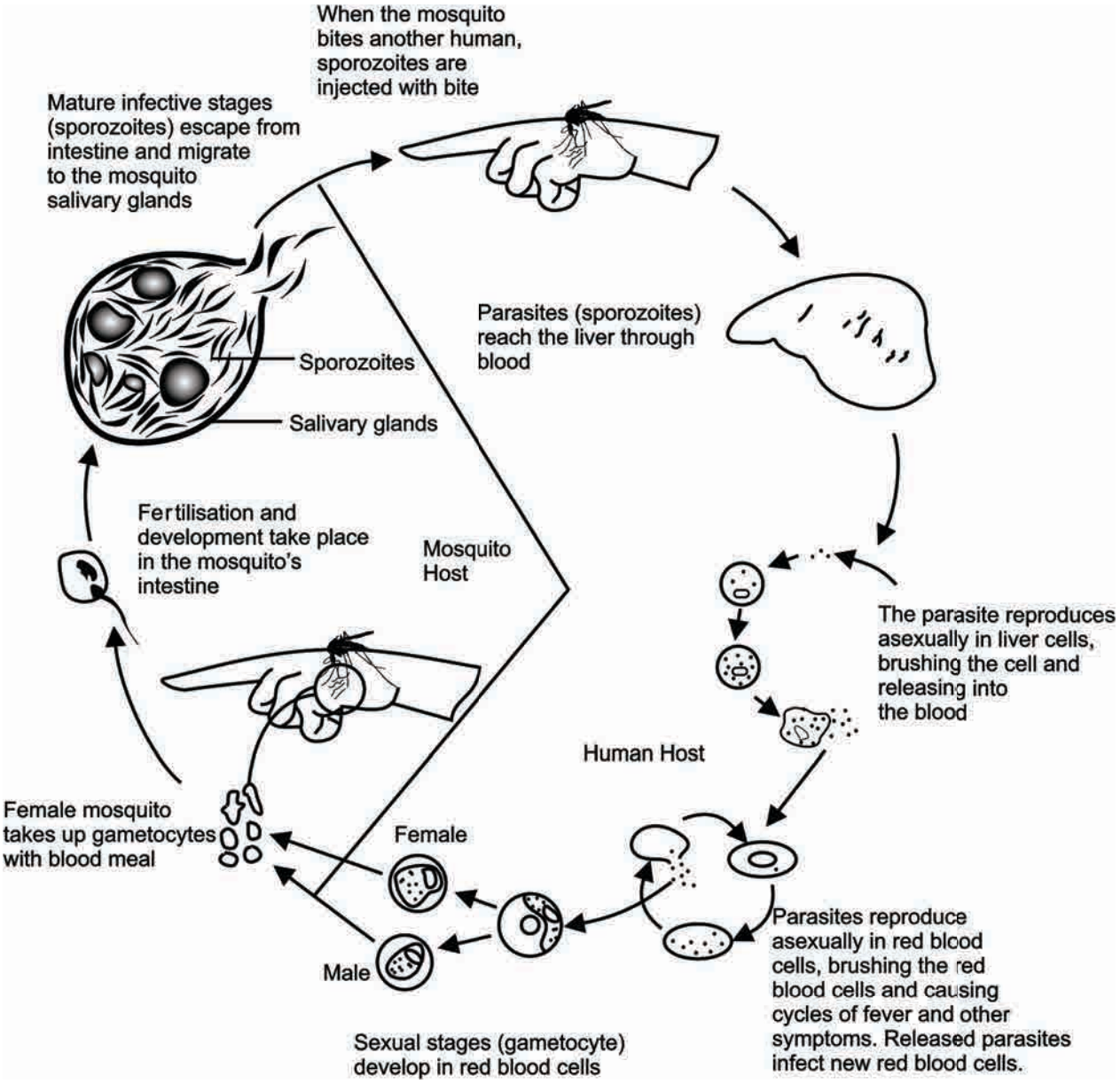


Figure 8.8: Life cycle of *Plasmodium*

Try It Yourself

Elucidate the life cycle of *Plasmodium*.

7.2.4 Helminthic diseases

Table 8.7: Helminthic diseases

Disease	Pathogen	Mode of transfer	Symptoms	Detection	Treatment
Ascariasis **Round worm infection**	*Ascaris lumbricoides*	Ingestion of eggs via contaminated food, soil etc.	Presence of worms/ eggs in stools. Very much asymptomatic in initial phase. The worms may cause obstruction of intestine. The worms derive nutrients from the host leading to malnutrition Swelling of liver may be seen. Sometimes the worms may enter the lungs and come out from the mouth.	Detection via testing stools (Kato technique)	Albendazole, mebendazole, levamisole and pyrantel pamoate. No vaccine is available. If the infection is common in an area, all the school children and other population may be given the medicines as a preventive measure.
Elephantiasis or Filariasis	*Wuchereria bancrofti* *W. malayi*	Vector borne. Culex mosquito	Extremely enlarged limbs or genitals	Nocturnal collection of blood samples and microscopy	Albendazole, ivermectin No vaccine is available. If the infection is common in an area all the population may be given the medicines as a preventive measure.

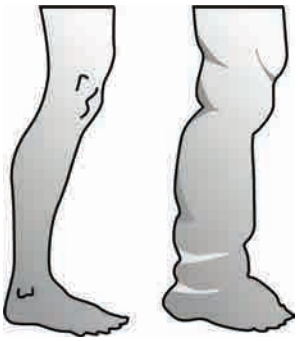


Figure 8.9: A. Normal foot and B. Foot affected by filariasis

7.2.5 STDs (Sexually Transmitted Diseases)

Table 8.8: Sexually transmitted diseases

Disease	Pathogen	Mode of transfer	Symptoms	Detection	Treatment
Syphilis	*Treponema pallidum*	Sexual intercourse with an infected person.	Ulcers on genitals, blisters across the body, nodules.	Blood tests	Single dose of intramuscular benzathine Penicillin G. Doxycycline and tetracycline. No vaccine is available. Prevention- usage of condoms and completely avoiding sexual intercourse with infected persons.
Gonorrhoea	*Neisseria gonorrhoeae*	Sexual intercourse with an infected person.	Discharge of white thick fluid from urethra, pain during urination.	Gram staining, PCR based testing	Ceftriaxone (pathogen is resistant to most other drugs). No vaccine is available. Prevention- usage of condoms and completely avoiding sexual intercourse with infected persons.

Try It Yourself

1. Anomaly in which chromosome causes Down's syndrome?
2. Name any two sex-chromosome related disorders
3. What is the causative organism of tuberculosis?
4. Name a few antibiotic drugs.
5. Name any one acquired disease for which a vaccine is not available.
6. Roundworm disease is an STD (True/False).

8. Cancer

- Cancer is a major cause of death across the globe.
- It can both be acquired or hereditary.
- It is generally caused due to mutation in genes coding for cell division linked proteins.
- Cancer cells divide uncontrollably.
- They derive their nutrition from the body itself.
- **Tumors/Neoplasm**
    - Neoplasm means new growth.
    - Abnormal growth of tissue is termed as a tumor.
    - Tumors are of two types- malignant or benign.
    - The benign tumors do not spread and are generally covered by a capsule. They are non-invasive and thus non-cancerous. They grow slower than malignant tumors. The cells in benign tumors are more differentiated than the ones in malignant tumors.
    - Benign tumors are generally non-fatal. Some benign tumors do not require treatment.
    - Malignant means harmful.
    - Cells from malignant tumors delocalize and form new tumors where they settle again. This is called metastasis. They divide faster than benign tumors.
    - Such tumors are invasive and cancerous. They do not have a capsule around them.
    - They are fatal if left untreated.

Did You Know

- Most animal cells exhibit a property called contact inhibition. They stop dividing when they encounter a surface on a particular side.
- Cancerous cells do not exhibit this property.
- Normal animal cells are capable of a certain number of cell divisions i.e. a cell will divide x number of times and after x divisions it will not enter the cell cycle again.
- Cancer cells are generally capable of infinite number of cell divisions.

- **Carcinogens**

There are various factors that may lead to a normal cell becoming a cancerous cells. Agents that are responsible for the same are called carcinogens.

Factors causing cancer-

- **Physical agents-**
  - UV radiation, X-rays etc. Radiation leads to DNA damage and a mutation caused may be cancerous.
  - Kangri- It is a pot filled with embers kept under the clothing by Kashmiri people to keep warm. The constant exposure to heat causes cancers in some cases.
  - It is said that extremely sharp teeth can cause cancer in the tongue. In general, constant friction can cause cancer.
- **Chemical agents-**
  - They may be carcinogenic due to various reasons. They can create oxidative stress or be analogous to bases of the DNA and get incorporated in the DNA itself and cause mutations. Some are intercalating agents E.g. Benzo[a]pyrene, Ethidium bromide are intercalating agents.
  - Carcinogens in cigarette smoke- Polycyclic aromatic hydrocarbons like benzopyrene, acrolein, nitrosamines etc.
  - Artificial sweeteners, asbestos, some pesticides can also be carcinogenic.
- **Biological agents-**
  - Estrogen imbalance can cause breast cancer.
  - Some viruses can induce cancer in humans. E.g. Hepatitis B virus, Epstein Barr virus, Human Papilloma virus etc.
  - *Helicobacter pylori* infections can increase the risk of some cancers in the colon.

- **Carcinogens and organs-**

Carcinogens	Affected Organs
Soot	Skin and lungs
Cigarette smoke	Lungs
Coal tar	Skin and lungs
Aflatoxin	Liver
Cadmium oxide	Prostate gland
Mustard gas	Lungs
Asbestos	Lungs
Nickel and Chromium compounds	Lungs, Larynx
Vinyl chloride	Liver
Arsenic	Urinary bladder, lung, skin

Types of cancer

- **Carcinoma**
    - This type of tumor originates from the skin/epithelial tissue.
    - It is the most common kind of tumor. (85% cases of cancer are carcinomas).
    - Oral cancer is men and uterine cancer in females is more common in India.

Examples-

- Brain carcinoma
- Oral carcinoma
- Gastric carcinoma
- Colon carcinoma
- Lung carcinoma
- Cervical carcinoma
- Adeno carcinoma (gland)
- Breast carcinoma

- **Sarcoma**
    - It is a tumor of mesenchymal origin.
    - The forms 1 % of the instances of cancer.

Examples-

- Bone cancer- Osteosarcoma
- Muscle cancer- Myosarcoma
- Lymph node cancer- Lymphosarcoma.

- **Leukaemia**
  - This is the cancer of white blood cells (WBCs).
  - It is the most common cancer in children (Note- 90% cases of leukemia are reported in adults).
  - It is reported more in developed countries.
- **Mechanisms**
  - Though cancer is one of the most complex phenomena of biology, some basic mechanisms can be understood.
  - Some genes are 'proto-oncogenes'. They code for proteins which may be cell cycle regulators etc.
  - When these genes are subjected to mutation, they may become 'oncogenes'. After mutation/s, the function of the proto-oncogene is disrupted. Thus it may stop producing a protein that regulates the cell cycle or may start up-regulating the production of a protein that promotes cell division.
  - Thus mutation in a tumor suppressor gene can cause unchecked growth of tumors.
  - Some cancers are also caused due to down-regulation of DNA repair proteins. Thus the DNA damaged is not repaired properly and may lead to cancer.

Note- Not all mutations are carcinogenic.

- **Diagnosis**

It can be on the basis of-

  - Detection of the abnormal cells or cancerous cell in blood.
  - Detection of the tumor markers in blood. Most tumor markers are tumor antigens which can be detected in blood or urine or tissue samples.
  - Monoclonal antibodies against known cancer antigens.
  - X-Rays, CT scans, MRI scans. Mammography is the X-Ray technique used to detect breast cancer.
  - Biopsy (tissue examination can be carried out to determine the condition of tissue.
  - Pap smear is used for cervical cancer.

- **Treatment**

There are various approaches for treatment

  - Surgery to remove cancerous tissue or lymph nodes.
  - Radiation like Cobalt-60 therapy, X-rays are used to destroy rapidly dividing cells.
  - Chemotherapy (use of chemicals to treat the disease).
  - Some drugs inhibit DNA synthesis and thereby affect the newly growing cells.

Example-

- Vincristine a compound from Madagascar periwinkle or *Cantharanthus roseus* and similarly Vinblastine from the same plant.
- Immunotherapy by using monoclonal antibodies.
- Some new approaches rely on using the immune system of the body by stimulating it in innovative ways.

It should be noted that a combination of surgery, radiation and chemotherapy are used. Very rarely will isolated therapies be preferred.

DID YOU KNOW

Prions and prion diseases

- A prion is a protein that can fold in multiple, structurally distinct ways, at least one of which is transmissible to other prion proteins.
- Consider a protein X which is a prion. When it comes in contact with other molecules of protein X it causes them to misfold. The misfolded proteins do not perform the function they are supposed to. Additionally these misfolded molecules aggregate forming 'amyloids'.
- This leads to disorders called prion diseases. E.g. Mad cow disease, Kuru etc.

TRY IT YOURSELF

1. Symptom of diphtheria is

(A) Suffocation (B) Fear of water (C) Gum bleeding (D) Stomach ache

9. General Preventive Measures for Diseases

- Maintenance of hygiene is very important. It is essential to keep the body clean, make best possible attempts to purify drinking water and eat non-contaminated food. One must also keep once residence and workspace clean. Garbage should be thrown in an appropriate manner and at an appropriate place.
- Civic bodies must provide clean drinking water and sanitation.
- One must undergo regular health check-ups. It is important to not ignore any symptoms of illness.
- The civic body must carry out inspections for stagnant water, waste disposal etc.
- Gambusia fish should be reared in ponds.

- Vaccination schedules should be followed.
- Isolations, curfews should be implemented when necessary.
- Health awareness, awareness about STDs and their preventive measures should be encouraged.
- Smoking, excess consumption of alcohol and drugs (narcotics etc.) should be avoided.
- The society as a whole should try to help those suffering from diseases rather than shun them. Sound mental health is also important for leading a healthy life.
- Diet should be proper.
- Every person in the society should make attempts to reduce air, water sound pollution.
- The civic bodies should take strict action against the individuals/corporations following any practices that may harm the health of the community.
- It should be very clearly noted that 'Prevention is always better than Cure'.

10. Mental Health

- **Definition of Mental health**
    - Just like the physical aspects of the body, the psychological ones also play an important role in the well-being of an individual.
    - It is the level of psychological well-being of an individual.
    - Absence of known psychological disorders is one of the criteria of being psychologically healthy.
- **Mental illnesses**

It is a behavioral pattern that causes suffering or disability.

- Symptoms include-
    - Depression
    - Insomnia (lack of sleep) or Hypersomnia excessive sleeping
    - Compulsive actions
    - Feeling of hopelessness
    - Suicidal thoughts
    - Severe phobias/fears not within reason
    - Loss of memory
    - Behavior that is detrimental to one’s life and property
    - Anorexia (eating very less food)
    - Delusions (false beliefs)
    - Hallucinations (perceiving/sensing without external stimulus)
    - Social dysfunction.

They are of 2 types-

- **Psychosis**
    - It occurs due to a distorted perception of reality. The person does not live in the 'real world' in which other normal individuals live.
    - Consequently the person typically will not accept that he/she is ill. The person will refuse to seek any treatment.
    - It is more severe than neurosis.
    - It can be due to- brain damage due to alcohol, poisoning, old age or severe traumatic incidence/s.
- **Neurosis**
    - The person perceives the same reality as normal individuals. He/she has problem coping up with it leading to a disorder.
    - Thus, the patient can be made to realize that he/she is suffering from some disorder and he/she may be interested in getting cured.
    - Anxiety disorders, mood disorders, attention deficit disorder etc. are types of neurosis.

11. Adolescence, Drugs and Alcohol Abuse

11.1 Adolescence

- It is loosely defined as the time of the life of an individual between the age of attaining puberty and the age of becoming an 'adult'.
- In modern times it is seen that characteristics of becoming an adolescent start manifesting themselves in the age prior to attaining puberty.
- It is an important period in the life of an individual.
- Adolescence is of major importance concerning mental health and addictions. This is because adolescents are capable of making and implementing their choices but may not be in as positon to fully understand or face the consequences of the choices.
- **Common problems of adolescents**
    - **Acne -** A long term skin problem which may include- blackheads, pimples, greasy skin etc.
    - **Hypochondria -** The condition of being concerned about one's health. It may lead to anorexia (skipping meals to lose weight) or other such disorders.
    - **Neurasthenia -** It is the inability to enjoy life and may comprise of irritability, fatigue, insomnia, depression and headache.
    - **Post-traumatic stress -** Occurs due to some trauma.
    - **Addiction -** Uncontrollable use of alcohol, drugs, tobacco smoking and chewing.
    - **Phobia -** It is a fear of certain things like dogs, height etc.
    - **Peer-** Pressure may cause complications in adolescence.

11.2 Addiction

- Compulsive engagement in an activity is termed as addiction. It may interfere with normal life.
- Alcohol addiction or tobacco addiction are the most common addictions. Drug abuse is another common addiction.
- Similarly, addictions can also be associated with activities like gambling etc. They may not cause any direct damage to the body but affect the social life of an individual.
- Euphoria and a temporary feeling of wellness associated with drugs and alcohol is a cause of addiction. Hence people begin to consume them even when they are not needed.
- With repeated usage, the body becomes 'tolerant' and hence the addicts consume more of the substance to achieve the required 'high'.
- Dependence is the condition in which the individual experiences unpleasant symptoms (anxiety, shivering, nausea and sweating) when dosage is discontinued. The symptoms subside when dosage is relieved.
- The symptoms may be life threatening and the person may need medical supervision.
- All the above may cause financial and social problems in the life of an individual.
- Intravenous drug usage may lead to contraction of HIV infection if the needle is shared with an HIV affected individual.

11.2.1 Alcoholism

- Ethyl alcohol is consumed as a fermented beverages with low content of alcohol e.g. beer, wine
- Distilled beverages have a relatively high percentage of alcohol. E.g. Rum, Whisky, Gin.
- Alcohol is rapidly absorbed from the wall of stomach and enters the bloodstream within minutes of ingestion.
- Consumption of alcohol causes a mild alcoholic flush. The person may experience a feeling of warmth and freeness. As more and more alcohol is consumed, the person loses control over himself/herself. This may lead to loss of balance, consciousness etc.
- Some research indicates that moderate consumption of alcohol may have some protective effects.
- In some cases the person gets addicted to consumption of alcohol and thus becomes and alcoholic.
- Overdose of alcohol can be fatal. The tolerance level may vary.
- Alcohol has the potential to cause permanent damage to the brain or other organs of the body.
- The ill effects of alcohol are commonly associated with the liver. Alcoholism leads to fatty liver and/or liver cirrhosis.
- Excess alcohol consumption is detrimental to the gastro-intestinal tract.
- Alcohol is metabolized to acetaldehyde which is regarded as a carcinogen.

- Excess consumption of alcohol is known to have effects on varied aspects of the body ranging from hormonal imbalance to diabetes to sexual dysfunction.
- Excess consumption of alcohol causes impaired decision making and irrational behavior. Lack of co-ordination may lead to accidents and reckless behavior which may affect the quality of and/or endanger the life of the person.
- A person may commit a crime under the influence of alcohol or to finance his addiction.
- The reasons for resorting to alcohol vary from stress to peer pressure to recreation.
- Endorsement of alcoholism in various form of literature and movies are also said to play an important role in its wide-spread usage/abuse.
- Sometimes alcohol vendors lace it with methanol and other chemical which can lead to serious cases of 'methanol poisoning' which may be fatal.

11.2.2 Drug Abuse

- It means unnecessary usage and/or addiction to drugs. The scope of the term 'drugs' is not limited to recreational substances. It may also include analgesics, sedatives, stimulants, steroids etc.
- Commonly abused drugs include opiates, cannabinoids and coca alkaloids. Majority of these are obtained from flowering plants while some are obtained from fungi.
- Opioids bind to specific opioid receptors present in the central nervous system and gastrointestinal tract. Morphine and its modified form- heroin are opiates derived from poppy plant-*Papaver* somniferum.
- They are ingested via snorting or injection. Their consumption causes slowing down of body functions.
- Cannabinoids are a group of chemicals, which interact with cannabinoid receptors. They are obtained from the plant *Cannabis sativa*. The drugs include marijuana, hashish, charas and ganja. They are ingested by inhalation and oral consumption. They induce euphoria and a 'high' very quickly. They also tend to increase the appetite.
- Coca alkaloids like cocaine is obtained from coca plant *Erythroxylum coca,* native to South America. It affects the central nervous system, creating a sense of euphoria, competitiveness and energy. Excessive dosage of cocaine causes hallucinations.
- Drugs like barbiturates, amphetamines, benzodiazepines, that are normally used as medicines to help patients cope with mental illnesses like depression and insomnia, are often abused for recreation.
- Sports persons may develop addiction to pain-killers. Bodybuilders may resort to excessive use of steroids to build up muscle tone. This type of drug abuse also has a very detrimental impact on the body.

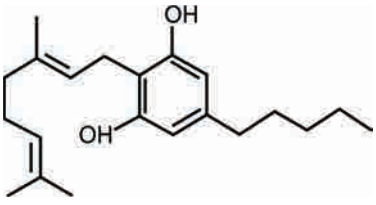


Figure 8.10: Chemical structure of a cannabinoid molecule

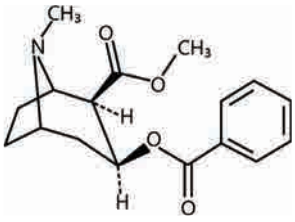


Figure 8.11: Chemical Structure of cocaine

Combinations or cocktails of drugs

- Some addicts use mixtures of drugs to have immediate 'kick' or 'high.
- Simultaneous use of drugs and alcohol may have dangerous effects and may be fatal.
- A mixture of cocaine and heroin, called speed ball, leads to the fast kick of cocaine and the prolonged high of heroin.

Interaction of Alcohol and other Substances of abuse with some common drugs

Table 8.9: Effects of interaction of alcohol and narcotics

Drugs	Effects
Alcohol and other depressants e.g., barbiturates	Dramatically increased depressant effect.
Alcohol + Antihistamines	Marked drowsiness (normally little or no sedative effect).
Alcohol + Benzodiazepines	Rapid increase in sedative effect ; often dramatic.
Alcohol + Marijuana or Hashish	Decreased coordination, increased reaction time, impaired judgement.
Alcohol + Aspirin	Increased risk of damage to gastric mucosa.

11.2.3 Tobacco

- Tobacco has been used by human beings since historical times.
- It is smoked, chewed or used as a snuff.
- Tobacco contains a large number of chemical substances including nicotine which stimulates the release adrenaline which tends to raise blood pressure and increase heart rate.
- Smoking leads to increased incidence of cancers of lung, urinary bladder, throat etc.
- It can also cause bronchitis, coronary heart disease, gastric ulcer, etc.
- Tobacco chewing may lead to cancer of the oral cavity.
- Smoking increases carbon monoxide (CO) in the blood and reduces the concentration of haembound oxygen. This causes oxygen deficiency in the body.

11.2.4 Treatment/Management and other remedies

- It can be understood that not engaging into excessive consumption or alcohol/smoking/drug abuse is the best way to prevent all the disorders occurring due to their consumption.
- Awareness about their ill effects should be spread.
- School education must emphasize on the importance of these aspects.

- An addict should be provided proper medical attention and should be subjected to counselling. He/she should be supported and not shunned. Similarly an addict should also try to seek medical help.
- Treatment as such can include drugs which may be antagonistic with the dependence related chemistry. Some drugs like disulfiram slow down the removal of acetaldehyde from the system. This leads to quickly induced and long lasting 'hangover' (discomfort associated with alcohol consumption). Thus pleasantness associated with alcohol is cut down thereby reducing the addiction. It should be noted that chemicals solely may not solve the problem.

TRY IT YOURSELF

1. What is adolescence?
2. Name a few types of drugs that are abused for recreation.
3. Cocaine is an opiate. (True/False).
4. Describe the mode of action of disulfiram.

Summary

- Health is a state of complete physical, mental and social well-being, and not merely an absence of disease or infirmity (W.H.O – 1948).
- Disease is defined as a structural or functional abnormality in an organism which impairs the normal functioning of its mind and/or body.
- Pathogens are disease causing organisms. E.g. *Mycobacterium tuberculosis* which causes TB.
- Humans have a highly evolved and complex immune system.
- There two arms of the immune system namely- The innate immune system and the Adaptive immune system.
- The innate immune system is not pathogen specific. It serves as an infection prevention + containment + attack system which is in place to check the multiplication of the pathogen until the adaptive immune system is active.
- The adaptive immune response is pathogen specific. It is highly effective.
- The adaptive immune system is of two major types- Cell mediated and Humoral immune system.
- The T cells are the major enforcers of cell mediated immunity.
- The antibody secreting B cells are the major enforcers of humoral immunity.
- Antibodies are proteins (immunoglobulins). They bind to antigens.
- There are 5 major types of antibodies- IgA, IgM, IgD, IgG, IgE (M A D G E).
- Adaptive immune response also has mechanisms for 'memory'.

- The immune cells are trained to not recognize antigens present on self cells as foreign antigens.
- Error in the above (in)ability may lead to auto-immune disorder.
- Vaccination aims to introduce weaken pathogens/dead pathogens/components of pathogens in the body to induce adaptive immune response and formation of memory cells. Thus when the actual pathogen enter the body, the adaptive immune system is active and functional quickly thereby protecting the individual from the pathogen.
- Recognition of 'non self' may cause problems in tissue grafting.
- Diseases are caused by various agents- protozoa, bacteria, viruses, prions, chemicals, physical factors etc.
- Some diseases are congenital and may be caused due to errors in chromosome segregation.
- Cancer is a disease in which some cells of the body start dividing uncontrollably. This occurs due to mutation in genes encoding for cell cycle regulation proteins. The non-mutated versions of the genes are called proto-oncogenes while the mutant ones are called oncogenes.
- The agents which may lead to cancer are called carcinogens.
- Physical agents include UV rays, X-rays, heat etc.
- Biological agents include viruses like Epstein - Barr virus, HPV etc.
- Many chemicals found in cigarette smoke are carcinogenic.
- Cancer can be treated by surgery, chemotherapy and radiation.
- There are various mental illnesses too.
- Compulsive engagement in an activity is termed as addiction. It may interfere with normal life.
- Humans may be addicted to various substances like alcohol, tobacco, opiates, steroids etc.
- In cases of addictions or diseases 'Prevention is always better than cure

EXERCISE

Objective Questions

Q.1 Health is

(A) Wealth

(B) Absence of disease or infirmity

(C) Weight of body according to height

(D) State of complete physical mental and social well-being.

Q.2 Which is a bacteriostatic drug?

(A) Penicillin

(B) Tetracycline

(C) Streptomycin

(D) Ciprofloxacin

Q.3 Epidemiology is more helpful in

(A) Non-communicable disease

(B) Communicable disease

(C) Selective mating population

(D) Random mating population.

Q.4 Which is an analgesic drug?

(A) Chloramphenicol

(B) Alprazolam

(C) Codeine and Morphine

(D) Paracetamol

Q.5 Antihistamine drug is effective in

(A) Bacterial infection

(B) Viral infection

(C) Paraplegia

(D) Allergy

Q.6 Proteinuria is

(A) Protein in blood

(B) Protein in urine

(C) Both

(D) None of these

Q.7 Who is called the father of surgery?

(A) Hippocrates

(B) Susruta

(C) Charaka

(D) Robert Koch

Q.8 Agents used to kill microbes on living surfaces are called

(A) Disinfectant (B) Tranquilizers

(C) Antiseptic (D) (A) and (C) are correct

Q.9 Presence of R.B.C in urine is known as

(A) Hematuria (B) Urolethiasis

(C) Nephritis (D) Proteinuria

Q.10 Penicillin is bacteriolytic because –

(A) It checks spindle formation (B) It destroys chromatin

(C) It inhibit cell wall formation (D) It inhibit protein synthesis

Q.11 The pain killer aspirin is also related with

(A) Antipyretic (B) Antiallergic

(C) Anticoagulant (D) All above

Q.12 Antiviral substances produced by many vertebrates in response to viral infection for resisting the multiplication of virus is known as

(A) Virion (B) Interferon

(C) Antivirin (D) Antigen

Q.13 An excessive enlargement of a diseased organ due to an increase in the number of cells in called

(A) Atrophy (B) Ahyperplasia

(C) Necrosis (D) Angina

Q.14 First line of defence of body is

(A) Skin and Mucous membrane (B) Neutrophils and Monocytes

(C) Fever (D) Interferon

Q.15 Antigen is

(A) Substances which stimulates the production of venom

(B) Vaccine

(C) Antibody production stimulating agent

(D) Part of the body defence system

Q.16 Substances that regulate or coordinate other leucocytes are called.

(A) Interferon
(B) Interleukin
(C) Phagocytic chemical
(D) Enzyme

Q.17 Which is correct sequence of events of inflammation or phagocytosis –

(A) Vasodilation → Diapedesis → Adhesion → Chemotaxis → Phagocytosis
(B) Vasodilation → Adhesion → Emigration → Chemotaxis → Phagocytosis
(C) Adhesion → Vasodilation → Diapedesis → Chemotaxis → Phagocytosis
(D) Vasodilation → Adhesion → Chemotaxis → Diapedesis → Phagocytosis

Q.18 Immune system retain the memory of which response in vaccination process

(A) Passive immunization response
(B) Primary immune response
(C) Secondary immune response
(D) All the above.

Q.19 D.P.T vaccine is an example of

(A) Passive immunity
(B) Active immunity
(C) Both (A) and (B)
(D) Interferon

Q.20 Cell mediated immunity is provided by

(A) B-lymphocytes
(B) Plasma cells
(C) C-lymphocytes
(D) Thymus cells or Thymocytes

Q.21 Which is a primary lymphoid organ?

(A) Bone marrow and spleen
(B) Spleen and thymus
(C) Bone-marrow and tonsils
(D) Thymus gland and bone marrow

Q.22 Clonal selection is

(A) Change in gene frequency
(B) Proliferation of T and B-cell
(C) Formation of dolly sheep
(D) Allergy

Q.23 Number of polypeptide chain present in a molecule of antibody –

(A) 2
(B) 4
(C) 6
(D) 8

Q.24 Which of the following is a circulating antibody that protect the body fluid?

(A) IgD (B) IgZ (C) IgG (D) IgA

Q.25 Nobel Prize for passive immunity was awarded to

(A) Edward Jenner (B) Von Behring (C) Wakmen (D) A. Fleming

Q.26 Which antibody is called secretary antibodies.

(A) IgE (B) IgA (C) IgG (D) IgM

Q. 27 At the time of birth, presence of which antibody indicates the infection of foetus (Intrauterine infection)?

(A) IgG (B) IgD (C) IgM (D) IgA

Q.28 Vaccination is a part of

(A) Treatment of disease (B) Etiology

(C) Cow (D) Prophylaxis

Q.29 Vaccine is

(A) Live oral pathogen (B) Inactivated antigen

(C) Inactivated pathogen (D) Complete pathogen

Q.30 Immunisation is based on

(A) Memory of individuals (B) Pathogenic power

(C) Phagocytosis (D) Memory of immune system

Q.31 Second generation vaccine is

(A) Small pox vaccine (B) D.P.T vaccine

(C) Hepatitis – B vaccine (D) Polio vaccine

Q.32 Colostrum, the first milk secretion of mammary gland is rich in immunoglobulin

(A) IgE (B) IgM (C) IgA (D) IgG

Q.33 Cyto-toxic cells are

(A) T-cells (B) B-cells (C) Memory cells (D) Mast cells

Q.34 Interferons

(A) Kill the virus in virus infected cell

(B) Kill the virus and destroy cancerous cell

(C) Stimulate the T.I.P (Translation Inhibiting protein)

(D) None of the above

Q.35 Damage to thymus in a child may lead to

(A) A reduction in haemoglobin content of blood

(B) A reduction in stem cell production

(C) Loss of antibody mediated immunity

(D) Loss of cell mediated immunity

Q.36 Neutrophils and monocytes are important cells participating in

(A) Phagocytosis

(B) Perforin production

(C) Passive immunity

(D) Antibody production

Q.37 An antibody is a

(A) component of blood

(B) Secretion of mammalian erythrocyte

(C) Molecule that specifically react with an antigen

(D) White corpuscle which attack invading bacteria

Q.38 Which are not a type of T-lymphocyte?

(A) Helper

(B) Suppressor

(C) Cytotoxic

(D) Repressor

Q.39 Which of the following organs is not involved in the elicitation of immune response?

(A) Brain

(B) Lymph nodes

(C) Spleen

(D) Thymus

Q.40 Short lived immunity acquired from mother to foetus across placenta or through mother's milk to the infant is categorised as –

(A) Active immunity

(B) Passive immunity

(C) Cellular immunity

(D) Innate non-specific immunity

Q.41 Membrane attack complex (MAC) associated with

(A) B-lymphocytes (B) Compliments system

(C) Macrophages (D) T-lymphocytes

MAC = It causes pores in invading microbes

Q.42 BCG vaccine is a preventive measure against

(A) Tuberculosis (B) Typhoid

(C) AIDS (D) Cholera

Q.43 Angiology is

(A) Study of Anxiety (B) Study of blood vessels

(C) Study of blood (D) Study of X-ray

Q.44 Allograft is

(A) Grafting in between the individuals of different species

(B) Grafting in between the individuals of same species

(C) Heterograft

(D) Isograft

Q.45 Now a days cornea transplant is very popular reason is that

(A) Is easy to preserve (B) Is transplant very easily

(C) It can be easily obtained (D) Cornea is avascular.

Q.46 During deficiency of folic acid the number of leucocytes fall considerably and then the disease or condition is called

(A) Leukaemia (B) Leucopenia

(C) Polycythemia (D) Tay-sac disease

Q.47 Vishuchika in Ayurveda is called

(A) Plague (B) Small pox (C) AIDS (D) Cholera

Q.48 Congenital diseases are

(A) Diseases present at birth (B) Deficiency diseases

(C) Spread from one individual to another (D) Occur during life

Q.49 Number of Barr body present in a female child with Down syndrome

(A) 0 (B) 1

(C) 2 (D) All are correct

Q.50 Which is an autosomal chromosomal mutational disorder?

(A) Huntington chorea (B) Cri-du-chat

(C) Thalassemia (D) Jacob syndrome or super male

Q.51 Most common cause of mental retardation (Congenital in male children) is

(A) Jacob syndrome or super males (B) Down's syndrome

(C) Patau's syndrome (D) Phenyl ketonuria

Q.52 Which disorder is due to gene incompatibility?

(A) Erythroblastosis foetalies (B) Jaundice

(C) Hemolytic disease of new born (D) All of the above

Q.53 Which disorder is due to 4th chromosomal abnormality?

(A) Huntington chorea (B) Cri-du-chat or Cat-cry syndrome

(C) Tay-Sac disease (D) Achondroplasia

Q.54 Thalassemia is due to

(A) Increased consumption of sea food

(B) Decreased synthesis of β-polypeptide chain of haemoglobin

(C) Decreased production of R.B.C that cause anemia

(D) All the above.

Q.55 Individuals with a karyotype of 45 chromosome 44 autosome and one sex chromosome have been found to suffering from the abnormally called female dysgenesis or

(A) Down syndrome (B) Turner syndrome

(C) Klinefelter's syndrome (D) Testicular feminization.

Q.56 A person has long legs, female like appearance with breast (gynecomastia) and sterile will have one of the genetic complement.

(A) XO (B) XXY (C) XXO (D) XXX

Q.57 Huntington chorea is a disease

(A) Which affects the kidney

(B) In which degeneration of nervous system leading to involuntary shaking of head, arms and legs

(C) Common in Korea

(D) Similar to diabetes

Q.58 Achondroplasia is a disease related with the defect in formation of

(A) Mucosa

(C) Cartilage

(C) Membrane of joint

(D) Bone

Q.59 Trisomic autosomal congenital disease is

(A) Criminal syndrome

(B) Down's syndrome

(C) Klinefelter's syndrome

(D) Turner's syndrome

Q.60 Symptoms of Diphtheria is

(A) Gum bleeding

(B) Fear of water

(C) Suffocation

(D) Stomach ache

Q.61 Which is an infectious disease?

(A) Coronary thrombosis

(B) Diphtheria

(C) Diabetes mellitus

(D) Hypertension

Q.62 Diphtheria is connected with

(A) Lungs

(B) Throat

(C) Blood

(D) Liver

Q.63 Widal test is employed for detecting

(A) Yellow fever

(B) Malaria

(C) Typhoid

(D) Cholera

Q.64 Toxin produced by tetanus affects

(A) Voluntary muscles

(B) Involuntary muscles

(C) Both voluntary and involuntary muscles

(D) Jaw bones

Q.65 Syphilis a sexually transmitted disease is caused by

(A) *Lephtospira* (B) *Vibrio*

(C) *Pasteurella* (D) *Treponema*

Q.66 Which of the following is not correctly matched?

(A) Dengue fever – *Arbovirus* (B) Plague – *Yersinia pestis*

(C) Syphilis – *Trichuris trichura* (D) Sleeping sickness – *Trypanosoma*

Q.67 'Lock Jaw' is associated with

(A) Opisthotonus (B) *Risus sardonicus*

(C) *Clostridium* (D) All of these

Q.68 Which disease is caused by vector *Xenopsylla cheopsis*?

(A) Plague (B) Black fever

(C) *Yersinia pestis* (D) All of these

Q.69 Multi Drug Therapy (M.D.T) is given in

(A) Tetanus (B) Diphtheria

(C) Leprosy (D) All of these

Q.70 Ciprofloxacin drug is ineffective in

(A) Tuberculosis (B) Chicken pox

(C) Pneumonia (D) Typhoid

Q.71 Mantoux test is done to detect.

(A) Leprosy (B) Typhoid (C) Tuberculosis (D) Diphtheria

Q.72 Tetanus affect

(A) Involuntary muscle (B) Voluntary muscle

(C) Lungs (D) Respiratory mucosa

Q.73 Schick test is associated with

(A) *Bordetella pertussis* (B) *Chlamydia trochomatis*

(C) *Diplococcus pneumoniae* (D) *Cornebacterium diptheriae*

Q.74 Causative agent of French pox (Syphilis)?

(A) *Tryponema* (B) *Varicella*

(C) H.I.V (D) *Treponema pallidum*

Q.75 Antibiotic used in tetanus is

(A) Erythromycin (B) Tetracycline

(C) Penicillin (D) Ciprofloxacin

Q.76 V.D.R.L test is done in

(A) Gonorrhoea (B) Diptheria

(C) Syphilis (D) A.I.D.S

Q.77 Bradycardia, high fever, anorexia, is found in

(A) Hepatitis – A (B) Kala – azar

(C) Typhoid (D) A.I.D.S

Q.78 Causative agent of 100 days cough

(A) *Clostridium* (B) *Neisseria*

(C) *Bordetella* (D) *Corynebacterium*

Q.79 O.R.S is given in infection of

(A) *Vibrio cholerae* (B) *Entamoeba histolytica*

(C) *Clostridium botulinum* (D) All the above

Q.80 AIDS is caused by

(A) Fungus (B) Virus

(C) Bacteria (D) Helminth

Q.81 Which one is a viral disease?

(A) Syphilis (B) Rickets

(C) Measles (D) None of the above

Q.82 Jaundice a pathological disease of liver is commonly due to

(A) Bacterium (B) Virus

(C) Protozoan (D) Helminth

Q.83 Small pox and rabies are caused by

(A) Virus (B) Protozoan

(C) Bacterium (D) Nematode

Q.84 Which of the following is a viral disease?

(A) Tetanus (B) Dysentery

(C) Typhoid (D) None of the above

Q.85 Which of the following disease is spread by mosquito but not caused by virus?

(A) Dengue fever (B) Yellow fever

(C) Filariasis (D) Chicken pox

Q.86 Dengue fever is transmitted by

(A) *Aedes aegypti* (Tiger mosquito) (B) *Culex fatigaus*

(C) *Anopheles* (D) *Aedes donovoni*

Q.87 Which is not a viral droplet infection?

(A) Measles (B) Mumps

(C) Whooping cough (D) Influenza

Q.88 Which safe vaccine is used in pulse polio programme ?

(A) Live vaccine (B) Killed vaccine

(C) Recombinant D.N.A vaccine (D) Third generation vaccine

Q.89 Most common cause of jaundice

(A) Yellow Fever (B) AIDS

(C) Hepatitis – A (D) Hepatitis – B

Q.90 Mumps affect which part of the body ?

(A) Parotid gland (B) Thyroid gland

(C) Testis (D) (A) and (C) is correct

Q.91 Tourniquet test is done in

(A) Diphtheria (B) Break bone fever (C) A.I.D.S (D) Hepatitis – A

Q.92 Dew drop like appearance on trunk is caused by which virus

(A) Corona virus (B) Myxo virus

(C) Varicella virus (D) Arbo virus

Q.93 Which disease is not transmitted through placenta

(A) Hepatitis –A (B) Hepatitis – B (C) A.I.D.S (D) Syphilis

Q.94 30 pregnant female A.I.D.S. patient are admit in female ward. Find out the probable number of neonates (children) having the H.I.V. from these pregnant female

(A) 30 children (B) 20 Children (C) 10 children (D) 3 children

Q.95 Which of the following disease is eradicated from India

(A) Polio (B) Leprosy (C) Measles (D) Small pox

Q.96 Street virus affects

(A) Kidney (B) C.N.S (C) Lungs (D) Eyes

Q.97 Arthritis is a disease of the inflammations of

(A) Joint (B) Blood vessel (C) Brain (D) Intestine

Q.98 Myasthenia gravis due to

(A) Interferon (B) Autoantibody (C) Antigen (D) Toxins

Q.99 The disease in which high level of uric acid in blood is characteristic is

(A) Arthritis (B) Rheumatism

(C) Gout (D) Rheumatic heart

Q.100 Which is not cancer?

(A) Leukaemia (B) Glaucoma (C) Carcinoma (D) Sarcoma

Q.101 Blood cancer is

(A) Leukemia (B) Thrombosis (C) Haemophilia (D) Haemolysis

Q.102 Which is carcinogen and pathogen?

(A) Mycobacterium (B) LAV (Lymphadenopathy Associated virus)

(C) Hepatitis – A virus (D) Cancero bacterium virus

Q.103 Radiation is a health hazard because it causes

(A) Haemophilia (B) Leucopenia

(C) Pneumonia (D) Leukaemia

Q.104 Which of the following is cancerous tumour?

(A) Benign tumour (B) Malignant Tumour

(C) Lipoma (D) All the above

Q.105 Most common type of tumour in the world (male) is

(A) Oral cancer (B) Breast cancer

(C) Blood cancer (D) Pulmonary cancer

Q.106 Causative factor of cancer is called

(A) Oncogenes (B) Radiogens

(C) Estrogens (D) Carcinogens

Q.107 Treatment of cancer is

(A) Surgery (B) Radiation (C) Chemotherapy (D) All of the above

Q.108 Nucleic acid in HIV

(A) ss RNA (B) ds RNA (C) ss DNA (D) ds DNA

Q.109 Reason for trisomy in Down's syndrome

(A) Non disjunction during sperm formation

(B) Non disjunction during egg formation

(C) Non disjunction at the time of egg or sperm formation

(D) Addition of one extra chromosome during mitosis

Q.110 Typhoid is caused by

(A) *Rickettsia* (B) *Chlamydia*

(C) *Salmonella typhi* (D) *Mycobacterium*

Q.111 HIV infects

(A) RBC (B) T- Helper cells (C) B – cells (D) Basophils

Q.112 Which of the following is an accurate pairing

(A) Syphilis – *Treponema pallidum*

(B) AIDS – *Bacillus conjugalis*

(C) Gonorrhoea – *Leishmania donovani*

(D) Typhoid – *Mycobacterium leprae*

Q.113 Mongolian idiots are due to trisomy in 21st chromosome is called

(A) Down's syndrome

(B) Turner's syndrome

(C) Klinefelter's syndrome

(D) Triplex syndrome

Q.114 *Salmonella* is related with

(A) Typhoid

(B) Polio

(C) T.B

(D) Tetanus

Q.115 Severe Acute Respiratory Syndrome (SARS)

(A) Is caused by a variant of pneumococcus pneumonia

(B) Is caused by a variant of the common cold virus (Corona virus)

(C) Is an acute form of asthma

(D) Affects non-vegetarians much faster than the vegetarians

Q.116 Which of the following disease is 100% fatal with mode of transmission through infected animals?

(A) AIDS

(B) Rabies

(C) Tetanus

(D) Hepatitis – B

Q.117 The bacterial disease cholera is accompanied by

(A) Peptic ulcers

(B) Rapid loss of fluid from the intestine

(C) Infection of heart muscles

(D) Rose spots

Q.118 AIDS is due to

(A) Reduction in number of helper T cells

(B) Lack of interferon

(C) Reduction in number of killer T cells

(D) Autoimmunity

Q.119 The best diagnosis of cancer is done by

(A) Biopsy

(B) X-ray

(C) Microscopic examination of body fluids

(D) Any of these

Q.120 Carcinoma is a cancer of

(A) Lymphocytes
(B) Connective tissue
(C) Erythrocytes
(D) Ectoderm and endoderm

Q.121 The disease pneumonia in humans which infects the alveoli of the lungs is caused by

(A) *Plasmodium*
(B) *Haemophilus influenzae*
(C) *Salmonella typhi*
(D) None of these

Q.122 Diphtheria is caused by

(A) Viruses
(B) Eukaryotes
(C) Mycoplasma
(D) Bacteria

Q.123 Which is not cancer?

(A) Leukemia
(B) Trachoma
(C) Carcinoma
(D) Sarcoma

Q.124 HIV has a protein coat and a genetic material which is

(A) ss-RNA
(B) ds-RNA
(C) ds-DNA
(D) ss-DNA

Q.125 Turner's syndrome is caused by

(A) Polyploidy
(B) Autosomal aneuploidy
(C) Sex-chromosome aneuploidy
(D) Trisomy

Q.126 Widal test is performed for

(A) Malaria fever
(B) Cholera
(C) Typhoid fever
(D) Dengue fever

Q.127 Klinefelter's syndrome is denoted by chromosome

(A) 44 + XXY
(B) 44 + XO
(C) 44 + XXX
(D) 44 + YY

Q.128 Hepatitis – B is also called

(A) Epidermic jaundice
(B) Serum jaundice
(C) Catarrhal jaundice
(D) None of the above

Q.129 In India AIDS was reported in

(A) 1932 (B) 1986

(C) 1990 (D) 1992

Q.130 Plague is caused by

(A) *Diplococcus pneumoniae* (B) *Yersinia pestis*

(C) *Corneybacterium diptheriae* (D) All of the above

Q.131 Which of the following is correctly matched

(A) *Anopheles* – Malaria (B) House fly – Yellow fever

(C) Body louse – Typhoid (D) Sand fly – Plague

Q.132 Cancer cells are characterized by

(A) Uncontrolled growth (B) Invasion of local tissue

(C) Spreading to other body parts (D) All of these

Q.133 The cause of Kala-azar disease is

(A) *Trypanosoma gambiense* (B) *Wuchereria bancrofti*

(C) *Leishmania donovani* (D) *Taenia solium*

Q.134 Which of the following group can be considered immune disorder?

(A) A.I.D.S and Cholera (B) S.C.I.D and Diphtheria

(C) S.C.I.D and A.I.D.S (D) Hepatitis and Leukemia

Q.135 Which of the following is a severe allergic reaction

(A) Hay fever (B) Asthma

(C) Anaphylactic shock (D) AIDS

Q.136 Autoimmunity against the synovial membrane at joint is called

(A) Multiple sclerosis (B) I.D.D.M

(C) Hashimoto disease (D) Rheumatoid arthritis

Q.137 Cause of immunodeficiency is

(A) Mutation (B) Nutritional deficiency

(C) Infection of HTLV-III (D) All of these

Q.138 Which of the following is an air-borne disease

(A) A.I.D.S
(B) Asthma
(C) Jacob syndrome
(D) Thalassemia

Q.139 Euthanasia (mercy killing) was first legalized in

(A) Switzerland
(B) Netherland
(C) France
(D) Italy

Q.140 The disorders like Alkaptonuria and phenylketonuria are referred as

(A) Acquired disease
(B) Infectious disease
(C) Congenital disease
(D) All the above

Q.141 Allergy involves

(A) IgE
(B) IgG
(C) IgA
(D) IgM

Q.142 Fatty liver syndrome is due to

(A) Infection by a virus
(B) Intake of excessive fat
(C) Intake of excessive alcohol
(D) Intake of tobacco through chewing

Q.143 Emphysema is due to intake of

(A) Narcotics
(B) Heroin
(C) Smoking
(D) Opiates

Q.144 Tobacco chewing results in

(A) Mouth cancer
(B) Lung cancer
(C) Bone cancer
(D) Leukaemia

Q.145 In a drunk person, part of brain affected first is

(A) Cerebellum
(B) Pons varolli
(C) Medulla oblongata
(D) Cerebrum

Q.146 Opium is obtained from

(A) *Thea sinensis*
(B) *Coffea arabica*
(C) *Oryza sativa*
(D) *Papaver somniferum*

Q.147 Organ which is most affected by alcohol is

(A) Heart (B) Cerebrum

(C) Liver (D) Cerebellum

Q.148 Marijuana, Ganja, and LSD are

(A) Narcotics (B) Hallucinogens

(C) Stimulants (D) All the above

Q.149 Caffeine, amphetamine and cocaine are

(A) Sedative (B) Tranquillisers

(C) Hallucinogens (D) Stimulants

Q.150 Which of the following is a mental disorder

(A) Tetanus (B) Neurosis

(C) Drug dependence (D) Alcoholism

Q.151 Effects of nicotine on human body include

(A) Release of adrenaline and hence increased blood pressure and heart beat

(B) Stimulation of nerve impulse and muscle relaxation

(C) Decreased foetal growth

(D) All the above

Q.152 In alcoholics liver gets damaged as it

(A) Accumulates excess of fats (B) Stores excess of glycogen

(C) Secretes more bile (D) Has to detoxify alcohol

Q.153 LSD is obtained from

(A) *Cannabis* (B) *Claviceps*

(C) *Fusarium* (D) *Nostoc*

Q.154 Addiction of tobacco is due to

(A) Histamine (B) Nicotine

(C) Cocaine (D) Caffeine

Q.155 Which one is a hallucinogen

(A) LSD (B) Heroin

(C) Morphine (D) Cocaine

Q.156 A factor responsible for cirrhosis of liver is

(A) Vitamins (B) Fats and oils

(C) Alcoholism (D) Sugar

Q.157 Which of the following drug if taken with alcohol may have dangerous effects?

(A) Morphine (B) Opium

(C) Aspirin (D) None

Q.158 The drug that causes chronic psychosis and severe damage to C.N.S in

(A) Hashish (B) Charas

(C) Marijuana (D) LSD

Q.159 The mildest stimulant is

(A) Amphetamines (B) Caffeine

(C) Cocaine (D) Charas

Q.160 The stimulant present in tea, cocoa and cola drink

(A) Cocaine (B) Tannin

(C) Opium (D) Caffeine

Q.161 The carcinogenic ingredient of tobacco smoke is

(A) Nicotine (B) Polycyclic aromatic hydrocarbon

(C) Carbon monoxide (D) Tar

Q.162 The drug which relieves intense pain is

(A) Hallucinogens (B) Opiates

(C) Stimulants (D) Sedative

Q.163 Opium derivative is/are

(A) Morphine (B) Codeine

(C) Heroin (D) All of these

Q.164 Which of the following is not a mental disorder?

(A) Gout

(B) Epilepsy

(C) Neurosis

(D) Psychosis

Q.165 Tobacco smoke contain

(A) CO_2, tar, nicotine

(B) Nicotine, CO, polycyclic aromatic compound and tar

(C) Nicotine and CO

(D) Nicotine and tar

Q.166 A useful drug that damages gastric mucosa, if taken along with alcohol is

(A) Antihistamine

(B) Morphine

(C) Aspirin

(D) Valium

Q.167 *Cannabis sativa* (Hemp) yields

(A) Bhang

(B) Charas

(C) Ganja

(D) All of these

Q.168 Alcoholism leads to

(A) Amnesia

(B) Lung-damage

(C) Cancer

(D) None of these

Q.169 Amphetamines are central nervous stimulants, barbiturates are

(A) CNS stimulants

(B) No effect on CNS

(C) Hallucinogenic

(D) CNS-depressant

Q.170 Addiction of smoking leads to

(A) Lung cancer

(B) Bronchitis

(C) Emphysema

(D) All of these

Q.171 In the liver alcohol is converted into which toxic substance

(A) Formic acid

(B) Acetaldehyde

(C) Nicotine

(D) Urea

Q.172 Which of the following is related to tobacco addiction?

(A) Gastric and duodenal ulcers (B) Bronchitis

(C) Emphysema (D) All the above

Q.173 Effects of alcohol on human body includes

(A) Reduced blood sugar level (B) Fatty liver syndrome

(C) Amnesia (D) All the above

Q.174 Most potent hallucinogenic drug is

(A) Charas (B) Bhang

(C) Hashish (D) LSD

Q.175 Which one is a sedative drug

(A) Amphetamines (B) LSD

(C) Barbiturates (D) Bhang

Q.176 Tobacco smoking commonly produces

(A) Blood cancer (B) Lung cancer

(C) Cancer of pancreas (D) Bone cancer

Q.177 Opiates narcotics are

(A) Morphine, codeine, heroine (B) Morphine, barbiturates, caffeine

(C) Codeine, heroin, cocaine (D) Cocaine, caffeine, codeine

Q.178 Cocaine is derived from

(A) *Erythroxylon coca* (B) *Coffea arabica*

(C) *Thea sinesis* (D) *Cannabis sativa*

Q.179 The most highly addictive of the drugs is

(A) Heroin (B) LSD

(C) Alcohol (D) Barbiturates

Q.180 Which is synthetic stimulant

(A) Cocaine (B) Amphetamine

(C) LSD (D) Mescaline

Q.181 Which one of the following depresses brain activity and produces feelings of calmness, relaxation and, drowsiness?

(A) Hashish (B) Morphine (C) Amphetamines (D) Valium

Q.182 A young drug addict used to show symptoms of depressed brain activity, feeling of calmness, relaxation and drowsiness. Possibly he was taking

(A) Amphetamine (B) Marijuana

(C) Pethidine (D) Valium

Q.183 A person who shows unpredictable moods outbursts of emotion, quarrelsome behaviour and conflicts with other is suffering from

(A) Borderline personality disorder (BPD) (B) Mood disorder

(C) Addictive disorder (D) Schizophrenia

Q.184 Food poisoning (botulism) is caused by the Infection of a species of

(A) *Azatobacter* (B) *Clostridium* (C) *Lactobacillus* (D) *Rhizobiurn*

Q.185 Which of the following is equivalent to madness

(A) Neurosis (B) Psychosis

(C) Epilepsy (D) All of these

Q.186 Who asserted that health as a state of body and mind where there was a balance of certain humors

(A) Hippocrates (B) Indian Ayurveda system of medicine

(C) William Harvey (D) (A) and (B) Both

Q.187 Who stated that mind influences through neural system and endocrine system, our immune system and that our immune system maintains our health?

(A) Chemistry (B) Biology

(C) Physiology (D) Genetics

Q.188 Health is affected by

(A) Genetic disorders – deficiencies (B) Infections

(C) Life style (D) All of these

Q.189 Mark incorrect about healthy person

(1) More efficient
(2) High productivity
(3) Longevity of people
(4) Increases infant and material mortality

(A) (1) and (2)
(B) Only (4)
(C) (3) and (4)
(D) All the correct

Q.190 Who disproved the ''good humor hypothesis'' of health using thermometer to demonstrate normal body temperature in person with blackbile?

(A) Hippocrates
(B) Indian Ayurveda system of medicine
(C) William Harvey
(D) Both (A) and (B)

Q.191 Mark the correct statement

(1) Yoga has been practised to achieve physical and mental health
(2) Infectious diseases are very common and everyone of us suffers from these at some time or other
(3) AIDS is an infectious disease
(4) Cancer is non-infectious disease
(5) Healthy persons bring economic prosperity

(A) 1, 2 and 3
(B) 2, 3, 4 and 5
(C) 3 and 4
(D) 1, 2, 3, 4 and 5

Q.192 Skin and mucus coating form…. barriers of innate immunity

(A) Physiological (B) Physical (C) Cellular (D) Cytokine

Q.193 N.K cells are types of

(A) Erythrocytes
(B) Neutrophils
(C) Lymphocytes
(D) Monocytes

Q.194 Mucosa is the lining of

(A) Respiratory tract
(B) Urogenital tract
(C) GIT
(D) All of these

Q.195 Anamnestic response is _____ immune response

(A) Primary
(B) Secondary
(C) Booster
(D) Both (B) and (C)

Q.196 Consider the following four statement (I-IV) regarding kidney transplant and select the two correct ones out of these

(I) Even if a kidney transplant is proper the recipient may need to take immunosuppressants for a long time.

(II) The cell-mediated immune response is responsible for the graft rejection

(III) The B-lymphocytes are responsible for rejection of the graft

(IV) The acceptance or rejection of a kidney transplant depends on specific interferons.

(A) II and III (B) III and IV (C) I and III (D) I and II

Q.197 The letter 'T' and T-lymphocyte refers to

(A) Thyroids (B) Thalamus (C) Tonsil (D) Thymus

Q.198 Use of anti-histamines and steroids give a quick relief from

(A) Allergy (B) Nausea (C) Cough (D) Headache

Q.199 Which of the following is a pair of viral diseases?

(A) Ringworm, AIDS (B) Common cold, AIDS

(C) Dysentery, common cold (D) Typhoid, tuberculosis

Q.200 To which type of barriers under innate immunity, do the saliva in the mouth and the tears from the eyes, belong?

(A) Cytokine (B) Cellular (C) Physiological (D) Physical

Q.201 Which is safe technique to detect cancer?

(A) Radiography (B) CT (Computed tomography) scanning

(C) MRI (Magnetic Resonance Imaging) (D) Biopsy

Q.202 Most cancers are treated by combination of

(1) Surgery

(2) Radiotherapy

(3) Chemotherapy

(A) 1, 2 and 3 (B) 1 and 2 (C) 1 and 3 (D) 2 and 3

Q.203 Cancer detection is based on

(1) Biopsy

(2) Histopathological studies of tissues

(3) Blood test

(4) Bone marrow test

(A) 1, 2 (B) 1, 3 and 4 (C) 1, 2 and 3 (D) 1, 2, 3 and 4

Q.204 Which radiations cause DNA damage leading to neoplastic transformation?

(1) Ionising radiations (2) X-rays

(3) Non-ionising radiations (4) UV –rays

(A) 1 and 3 (B) 2 and 3 (C) 1 and 2 (D) 1, 2, 3 and 4

Q.205 Plasmodium enters the human body as

(A) Female anopheles mosquito (B) Sporozoites

(C) Trophozoite (D) Haemozoin

Q.206 Toxin which is responsible for chill and high fever during malaria

(A) Haematin (B) Haemoglobin

(C) Haemozoin (D) Haem

Q.207 Incorrect about *Entamoeba histolytica* or amoebiasis is

(1) Parasite of small intestine

(2) Causes dysentery

(3) Houseflies are mechanical carriers

(4) Symptoms include constipation, abdominal pain and cramps

(A) 1 (B) 3 (C) 1, 3 (D) All are correct

Q.208 C-onc are

(A) Cellular oncogenes (B) Viral oncogenes

(C) Proto-oncogenes (D) Both (A) and (C)

Q.209 *Haemophilus influenza* cause

(A) Typhoid (B) Plague (C) Pneumonia (D) Influenza

Q.210 Widal test is done for

(A) Typhoid (B) Typhoid Mary

(C) Mary Mallon (D) All of these

Q.211 Match the column with regards to vector disease

Column I	Column II
p. *Culex*	i. Dengue
q. *Anopheles*	ii. Filariasis
r. *Aedes*	iii. Malaria

(A) P – i, q – ii, r – iii (B) p – ii, q – iii, r – i

(C) p – ii, q – I, r – iii (D) p – I, q – iii, r – ii

Q.212 House flies are mechanical carriers of

(A) Amoebiasis (B) Malaria

(C) Common cold (D) Plague

Q.213 Match the column I with column II

Column I	Column II
a. Peyer's patches	i. Aedes
b. Rheumatoid arthritis	ii. Neoplastic transformation
c. IgA	iii. Cancer treatment
d. Interferon	iv. Allergy
e. *Gambusia*	v. Secondary lymphoid organ
f. Chikungunya	vi. Metastasis
g. Tetanus	vii. Colostrum
h. IgE	viii. Autoimmunity
i. Malignant tumor	ix. Antitoxin
j. Carcinogen	x. Mosquito larvae

(A) A-(v), B-(viii), C-(vii), D-(iii), E-(x), F-(i), G-(ix), H-(iv), I-(vi), J-(ii)

(B) A-(vi), B-(vii), C-(vii), D-(iii), E-(x), F-(ii), G-(ix), H-(iv), J-(iii)

(C) A-(iv), B-(iii), C-(vii), D-(iii), E-(x), F-(i), G-(ix), H-(v), I-(vi), J-(ii)

(D) A-(x), B-(viii), C-(vii), D-(iii), E-(v), F-(i), G-(ix), H-(iv), I-(vi), J-(ii)

Q.214 Match the following

Column A	Column B
I. Allergy	i. Typhoid fever
II. T-helper cells	ii. Single stranded RNA
III. Hallucinogens	iii. *Wuchereria*
IV. Liver	iv. IgE
V. Widal test	v. Cirrhosis
VI. Filariasis	vi. *Atropa belladonna*
VII. ELISA test	vii. Activation of B-cells
VIII. AIDS virus	viii. Carcinogens
IX. Treatment of cancer	ix. AIDS
X. X-rays	x. Immunotherapy

(A) I-(iv), II-(vi), III-(viii), IV-(v), V-(i), VI-(iii), VII-(ix), VIII-(ii), IX-(x), X-(vii)

(B) I-(iv), II-(vii), III-(vi), IV-(v), V-(i), VI-(iii), VII-(ix), VIII-(ii), IX-(x), X-(viii)

(C) I-(iv), II-(vii), III-(v), IV-(ii), V-(i), VI-(iii), VII-(ix), VIII-(vi), IX-(x), X-(viii)

(D) I-(iv), II-(vii), III-(vi), IV-(v), V-(i), VI-(ix), VII-(x), VIII-(ii), IX-(iii), X-(viii)

Q.215 The drugs, which are commonly abused are opioid, cannabinoids and coca alkaloid, Majority of these are obtained from… while some are obtained from…

(A) Fungi, non-flowering plants (B) Flowering plants, fungi

(C) Fungi flowering plants (D) Non flowering plants, fungi

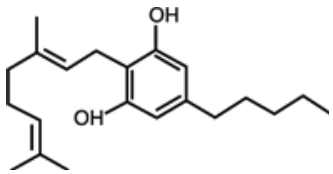
Q.216 Which of the options matches the descriptions?

(a) Smack (b) Diacetylmorphine (c) White (d) Odourless (e) Bitter crystalline compound

(f) Extracted from latex of poppy plant above statement/information is correct for

(A) Morphine (B) Heroin (C) Cocaine (D) Barbiturates

Q.217 Diagram is showing, skeletal structure of



(A) Morphine molecule (B) Cannabinoid molecule

(C) Opioids molecule (D) Coca alkaloid

Q.218 Which of the following is not associated with Narcotic drugs?

(A) Leaves of *Cannabis sativa* (B) Opium poppy

(C) Flowing branch of *Datura* (D) *Pisum sativum*

Q.219 Which of the following is associated with Narcotic drugs

(A) *C. elegans* (B) *Mangifera indica*

(C) *Erythroxylum coca* (D) *Ficus religiosa*

Q.220 The period between… of age may be thought of as adolescence period

(A) 18-21 yrs (B) 12-21 yrs (C) 12-18 yrs (D) 18-25 yrs

Q.221 Which disorder is not related with smoking

(a) Lung cancer

(b) Bronchitis

(c) Emphysema

(d) Coronary heart disease

(e) Gastric ulcer

(f) Urinary bladder cancer

(g) Throat cancer

(A) a, b, e, g (B) a, b, c, f, g (C) c, d, f (D) None of these

Q.222 Which measure would be particularly useful for prevention and control of alcohol and drug abuse among adolescents?

(a) Avoid undue peer pressure

(b) Seeking professional and medical help

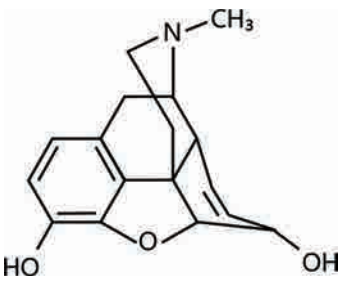
(c) Looking for danger sign

(d) Education and counselling

(e) Seeking help from parents and peers

(A) a, b, d (B) a, c, d, e (C) c, e (D) a, b, c, d, e

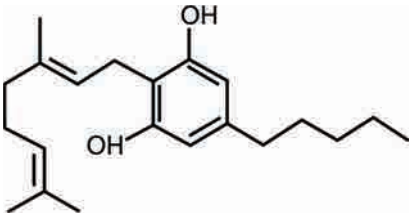
Q.223 Diagram is showing chemical structure of Morphine, which is a natural opiate like codeine, Morphine is a strong analgesic, also has sedative and calming effect. It depresses respiratory centre, BP, heartbeat. Constipation is a prominent feature of morphine action. How many ester linkage are present in a morphine molecule?



(A) 2 (B) 3

(C) 4 (D) Absent

Q.224 The given diagram is showing skeletal structure of cannabinoid molecule. Cannabinoids interact with cannabinoid receptors present principally in the brain. Natural cannabinoids are obtained from inflorescences of the plant *Cannabis sativa*. Nature of cannabinoids is



(A) Aliphatic (B) Phenolic (C) Ketonic (D) Ether

Q.225 Opioids are the drugs which bind to specific opioid receptors present in out CNS and GIT. Heroin, commonly called smack is chemically …… which is white, odourless, bitter crystalline compound, obtained by …… of morphine?

(A) Diacetylmorphine, methylation (B) Diacetylmorphine, acetylation

(C) Benzodiazepines, amination (D) Amphetamines, acetylation

Q.226 Coca alkaloid or cocaine is obtained from coca plant *Erythroxylum coca,* native of

(A) Soutica (B) Africa (C) Australia (D) China

Q.227 Cocaine interferes with transport of

(A) GABA (B) Acetylcholine (C) Dopamine (D) Glutamate

Q.228 Tobacco is

(A) Smoked (B) Chewed (C) Used as a snuff (D) All of these

Q.229 Nicotine

(A) Stimulates adrenal gland (B) An alkaloid

(C) is present in tobacco (D) All of these

Previous Years' Questions

Q.1 Who discovered vaccine against small pox? ***(NCERT 90)***

(A) Fleming (B) Pasteur (C) Koch (D) Jenner

Q.2 Head quarter of World Health Organisation ***(AIPMT – 88)***

(A) New York (B) Geneva (C) London (D) Paris

Q.3 Penicillin was discovered by ***(AIPMT 88)***

(A) Fleming (B) Waksman (C) Burkholder (D) Dubois

Q.4 Surgical removal of thymus of a new born shall result in failure to produce ***(CPMT 93)***

(A) Monocytes (B) B-lymphocytes (C) T- lymphocytes (D) Basophils

Q.5 During injury mast cells secrete **(AIPMT 99)**

(A) Histamine (B) Heparin (C) Prothrombin (D) Antibodies

Q.6 Agglutination occurs in blood present in a test tube, this indicates ***(AIPMT 99)***

(A) Antibodies are present in plasma (B) Antigens are present on R.B.C

(C) Antigens are present in plasma (D) Antibodies are present on R.B.C

Q.7 The treatment of snake-bite by antivenin is an example of ***(AIIMS 2004)***

(A) Artificially acquired active immunity (B) Naturally acquired passive immunity

(C) Naturally acquired passive immunity (D) Specific natural immunity

Q.8 An insect bite may result in inflammation of that spot. This is triggered by the alarm chemicals such as ***(AIIMS 2005)***

(A) Histamine and dopamine (B) Histamine and kinins

(C) Interferons and opsonins (D) Interferons and histones

Q.9 Antigen binding site in an antibody is found between ***(AIIMS 2005)***

(A) Two light chains

(B) Two heavy chains

(C) One heavy and one light chain

(D) Either between two light chains or between one heavy and one light chain depending upon the nature of antigen.

Q.10 The vaccination for which one of the following diseases is not covered in the immunization schedule so far ***(AIIMS 2006)***

(A) Tuberculosis (B) Diphtheria (C) Measles (D) Pneumonia

Q.11 Antibodies in out body are complex ***(AIPMT 2006)***

(A) Prostaglandins (B) Glycoproteins (C) Lipoproteins (D) Steroids

Q.12 The most active phagocytic white blood cells are ***(AIPMT 2008)***

(A) Lymphocytes and macrophages (B) Eosinophils and lymphocytes

(C) Neutrophils and monocytes (D) Neutrophils and eosinophils

Q.13 To which type of barriers under innate immunity, to the saliva in the mouth and the tears from the eyes, belong? ***(AIPMT 2008)***

(A) Cellular barriers (B) Physiological barriers

(C) Physical barriers (D) Cytokine barriers

Q.14 Passive immunity can be obtained by injecting ***(Uttaranchal PMT 2004)***

(A) Antibodies (B) Antigen (C) Antibiotic (D) Vaccination

Q.15 Interferons are useful in controlling ***(C.G PMT 2004)***

(A) TB (B) Cancer (C) Malaria (D) Blood Pressure

Q.16 Immunoglobulins found in serum is ***(Jharkhand 2004)***

(A) IgM (B) IgA (C) IgN (D) IgG

Q.17 DPT provide immunity against ***(Bihar 2003)***

(A) Diphtheria (B) Whooping cough (C) Tetanus (D) all of these

Q.18 The vaccine of Hepatitis B is a ***(MP-CPMT 2003)***

(A) First generation vaccine

(B) Interferon

(C) Second generation vaccine

(D) Third generation vaccine

Q.19 What is true about T-lymphocytes in mammals ***(AIPMT 2003)***

(A) There are three main types – cytotoxic T-cells helper T – cells and suppressor T –cells

(B) These originate in lymphoid tissue

(C) They scavenge damaged cells and cellular debris

(D) These are produced in thyroid

Q.20 Molecular weight of IgG antibody is ***(RPMT 2000)***

(A) 146000 (B) 160000 (C) 190000 (D) 200000

Q.21 Antibodies are the macromolecule of ***(RPMT 2004)***

(A) Fats (B) Protein (C) Carbohydrate (D) Nucleic acid

Q.22 Cornea transplant in humans is almost never rejected. This is because ***(AIPMT 2008)***

(A) It has no blood supply (B) It is composed of enucleated cells

(C) It is a non-living layer (D) Its cells are least penetrable by bacteria

Q.23 Genes involved in cancer are - ***(MPPMT 93)***

(A) Cancer genes (B) Oncogenes (C) Tumour gene (D) Regulator genes

Q.24 Causative agent of TB is ***(RPMT 95, MPPMT 94)***

(A) *Salmonella* (B) *Streptococcus* (C) *Mycobacterium* (D) *Pneumococcus*

Q.25 Which of the following is not correctly matched ***(AIPMT 95)***

(A) Dengue fever – Arbovirus (B) Plague – *Yersinia pestis*

(C) Syphilis – *Trichuris trichura* (D) Sleeping sickness – *Trypanosoma*

Q.26 Mumps is viral diseases that causes inflammation of ***(AIPMT 92)***

(A) Parotid gland (B) Sublingual glands

(C) Submaxillary gland (D) Infra orbital gland

Q.27 In Polio the legs get paralysed and atrophied due to ***(AIPMT 92)***

(A) Obstruction of muscles (B) Degeneration of bones

(C) Death of some muscles (D) Shrinkage of muscles

Q.28 Chicken pox is caused by ***(AIPMT 92)***

(A) Varicella virus (B) Adeno virus

(C) Bacteriophage T2 (D) S.V. 40 Virus

Q.29 AIDS Virus has ***(MPPMT 94)***

(A) Single strand DNA (B) Double strand DNA

(C) Single strand RNA (D) Double strand RNA

Q.30 Sarcoma is cancer of ***(AIPMT 94)***

(A) Epithelial tissue (B) Mesodermal tissue

(C) Blood (D) Endodermal tissue

Q.31 Which of the following is the most infectious disease ***(AIPMT 2001)***

(A)) Hepatitis – B (B) AIDS

(C) Allergic cough and cold (D) Malaria

Q.32 Sickle cell anaemia is due to ***(AIPMT 2001)***

(A) Change of Amino Acid in α – chain of haemoglobin

(B) Change of Amino Acid to β – chain of Haemoglobin

(c) Change of Amino Acid in both α and β chain of Haemoglobin

(D) Change of Amino acid either α or β chains of haemoglobin

Q.33 Which of the following is correct match? ***(AIPMT 2002)***

(A) Down syndrome = 21st Chromosome

(B) Sickle cell anaemia = X – Chromosome

(C) Haemophilia = Y – Chromosome

(D) Parkinson Disease = X and Y chromosome

Q.34 Which of the following is used in the treatment of Thyroid cancer - ***(AIPMT 2002)***

(A) 1131 (B) U238 (C) Ra224 (D) C14

Q.35 Stool of a person contain whitish grey colour due to malfunction of which type of organ ***(AIPMT 2002)***

(A) pancreas (B) Spleen (C) Kidney (D) Liver

Q.36 Cancerous cells can easily be destroyed by radiations due to ***(AIPMT 2002)***

(A) Rapid cell division (B) Lack of nutrition (C) Fast mutation (D) Lack of oxygen

Q.37 Which of the following is the example of sex linked disease ***(AIPMT 2002)***

(A) AIDS (B) Colour blindness (C) Syphilis (D) Gonorrhoea

Q.38 Carcinoma refers to ***(AIPMT 2003)***

(A) Malignant tumours of the connective tissue

(B) Malignant tumours of the skin or mucous membrane

(C) Malignant tumours of the colon

(D) Benign tumours of the connective tissue

Q.39 Which one of the following conditions though harmful in itself, is also a potential saviour from a mosquito borne infectious disease ***(AIPMT 2003)***

(A) Thalassaemia (B) Sickle cell anaemia

(C) Pernicious anaemia (D) Leukemia

Q.40 Cancer cells are more easily damaged by radiation than normal cells because they are ***(AIPMT 2004)***

(A) Undergoing rapid division (B) Different in structure

(C) Non-dividing (D) Starved of mutation

Q.41 A women with 47 chromosomes due to three copies of chromosome 21 is characterized by ***(AIPMT 2005)***

(A) Turner syndrome (B) Triploidy

(C) Down syndrome (D) Super femaleness

Q.42 G-6-P dehydrogenase deficiency is associated with haemolysis or ***(AIPMT 2005)***

(A) Leucocytes (B) Lymphocytes (C) Platelets (D) RBCs

Q.43 AIDS is caused by HIV that principally infects ***(AIPMT 2005)***

(A) All lymphocytes (B) Activator B cells (C) T-4 lymphocytes (D) Cytotoxic T cells

Q.44 The disease, Tetanus also knows as ***(AIIMS 2003)***

(A) Gangrene (B) Shingles (C) Lockjaw (D) Whooping cough

Q.45 The ''cri-du-chat'' syndrome in caused by change in chromosome structure involving ***(AIIMS 2005)***

(A) Deletion (B) Duplication (C) Inversion (D) Translocation

Q.46 A very much publicized treatment method ''DOTS'' is being adopted for the cure of ***(AIIMS 2006)***

(A) Bimentia (B) Tetanus

(C) Tuberculosis (D) Sexually transmitted disease.

Q.47 Cri-du-chat syndrome in humans is caused by the ***(AIPMT 2006)***

(A) Loss of half of the long arm of chromosome 5

(B) Trisomy of 21st chromosome

(C) Fertilization of an XX egg by a normal Y-bearing sperm

(D) Loss of half of the short arm of chromosome 5

Q.48 HIV that causes AIDS, first starts destroying ***(AIPMT 2006)***

(A) Thrombocytes (B) Helper T-lymphocytes

(C) B-lymphocytes (D) Leucocytes

Q.49 Both sickle cell anemia and Huntington's chorea are ***(AIPMT 2006)***

(A) Pollutant induces disorders (B) Virus related diseases

(C) Bacteria related diseases (D) Congenital disorders

Q.50 Sickle cell anemia has not been eliminated from the African population immunity against malaria ***(AIPMT 2006)***

(A) It provides immunity against malaria (B) It is controlled by dominant genes

(C) It is controlled by recessive genes (D) It is not a fatal disease.

Q.51 Which one of the following conditions in humans is correctly matched with its chromosomal abnormality/ linkage? ***(AIPMT 2008)***

(A) Colour blindness – Y – linked

(B) Erythroblastosis foetalis – X linked

(C) Down syndrome – 44 autosomes + XO

(D) Klinefelter's syndrome – 44 autosomes + XXY

Q.52 match the disease in column – I with the appropriate items (pathogen/prevention/treatment) in ***(AIPMT 2008)***

	Column I		**Column II**
(a)	Amoebiasis	(i)	*Treponema pallidum*
(b)	Diphtheria	(ii)	Use only sterilized food
(c)	Cholera	(iii)	DPT Vaccine
(d)	Syphilis	(iv)	Use oral rehydration therapy

(A) a – (ii), b – (iv), c – (i), d – (iii) (B) a – (ii), b – (i), c – (iii), d – (iv)

(C) a – (ii), b – (iii), c – (iv), d – (i) (D) a – (i), b – (ii), c – (iii), d – (iv)

Q.53 Hela cells used in cell biology are ***(MP CPMT 2007)***

(A) Cancerous cells used in cancer research laboratory

(B) Cervical cancer cell derivatives

(C) Both (A) and (B)

(D) None of these

Q.54 Immune deficiency syndrome could develop due to ***(AIIMS 92)***

(A) Enteric fever (B) Defective thymus

(C) AIDS virus (D) Defective bone

Q.55 Opium is got from ***(RPMT 95)***

(A) Leaves (B) Fruits (C) Flowers (D) Roots

Q.56 Which one of the following is the correct statement regarding the particular psychotropic drug specified? ***(AIPMT 2008)***

(A) Opium stimulates nervous system and causes hallucinations

(B) Morphine leads to delusions and disrobed emotion

(C) Barbiturates cause relaxation and temporary euphoria

(D) Hashish causes after thought perceptions and hallucinations

Q.57 Which of the following stimulates the heart? ***(MP CPMT 2006)***

(A) LSD (B) Hashish (C) Mescaline (D) Epinephrine

Q.58 In alcoholics liver gets damaged as it ***(AIIMS 85)***

(A) Accumulates excess of fats (B) Stores excess oflycogen

(C) Secretes more bile (D) Has to detoxify alcohol

Q.59 L.S.D is ***(AIPMT 2001)***

(A) Hallucinogenic (B) Sedative (C) Stimulant (D) Tranquiliser

Q.60 The cell-mediated immunity inside the human body is carried out by ***(NEET 2013)***

(A) Thrombocytes (B) Erythrocytes

(C) T-lymphocytes (D) B-lymphocytes

ANSWER KEY

Objective Type

Q.1 D	**Q.2** B	**Q.3** B	**Q.4** C	**Q.5** D	**Q.6** B
Q.7 B	**Q.8** C	**Q.9** A	**Q.10** C	**Q.11** D	**Q.12** B
Q.13 B	**Q.14** A	**Q.15** C	**Q.16** B	**Q.17** B	**Q.18** B
Q.19 B	**Q.20** D	**Q.21** D	**Q.22** B	**Q.23** B	**Q.24** C
Q.25 B	**Q.26** B	**Q.27** C	**Q.28** D	**Q.29** C	**Q.30** D
Q.31 C	**Q.32** C	**Q.33** A	**Q.34** C	**Q.35** D	**Q.36** A
Q.37 C	**Q.38** D	**Q.39** A	**Q.40** B	**Q.41** B	**Q.42** A
Q.43 B	**Q.44** B	**Q.45** D	**Q.46** B	**Q.47** D	**Q.48** A
Q.49 B	**Q.50** B	**Q.51** B	**Q.52** D	**Q.53** A	**Q.54** B
Q.55 B	**Q.56** B	**Q.57** B	**Q.58** B	**Q.59** B	**Q.60** C
Q.61 B	**Q.62** B	**Q.63** C	**Q.64** A	**Q.65** D	**Q.66** C
Q.67 D	**Q.68** A	**Q.69** C	**Q.70** B	**Q.71** C	**Q.72** B
Q.73 D	**Q.74** D	**Q.75** C	**Q.76** C	**Q.77** C	**Q.78** C
Q.79 D	**Q.80** B	**Q.81** C	**Q.82** B	**Q.83** A	**Q.84** D
Q.85 C	**Q.86** A	**Q.87** C	**Q.88** A	**Q.89** C	**Q.90** D
Q.91 B	**Q.92** C	**Q.93** A	**Q.94** C	**Q.95** D	**Q.96** B
Q.97 A	**Q.98** B	**Q.99** C	**Q.100** B	**Q.101** A	**Q.102** B
Q.103 D	**Q.104** B	**Q.105** D	**Q.106** D	**Q.107** D	**Q.108** A
Q.109 C	**Q.110** C	**Q.111** B	**Q.112** A	**Q.113** A	**Q.114** A
Q.115 B	**Q.116** B	**Q.117** B	**Q.118** A	**Q.119** A	**Q.120** D
Q.121 B	**Q.122** D	**Q.123** B	**Q.124** A	**Q.125** C	**Q.126** C
Q.127 A	**Q.128** B	**Q.129** B	**Q.130** B	**Q.131** A	**Q.132** D
Q.133 C	**Q.134** C	**Q.135** C	**Q.136** D	**Q.137** D	**Q.138** B
Q.139 B	**Q.140** C	**Q.141** A	**Q.142** C	**Q.143** A	**Q.144** D
Q.145 D	**Q.146** C	**Q.147** B	**Q.148** D	**Q.149** B	**Q.150** D

Q.151 A	**Q.152** B	**Q.153** B	**Q.154** A	**Q.155** C	**Q.156** C
Q.157 D	**Q.158** B	**Q.159** D	**Q.160** B	**Q.161** B	**Q.162** D
Q.163 A	**Q.164** B	**Q.165** C	**Q.166** D	**Q.167** A	**Q.168** D
Q.169 D	**Q.170** B	**Q.171** D	**Q.172** D	**Q.173** D	**Q.174** C
Q.175 B	**Q.176** A	**Q.177** A	**Q.178** A	**Q.179** D	**Q.180** A
Q.181 B	**Q.182** A	**Q.183** D	**Q.184** B	**Q.185** D	**Q.186** D
Q.187 B	**Q.188** D	**Q.189** B	**Q.190** C	**Q.191** D	**Q.192** B
Q.193 C	**Q.194** D	**Q.195** B	**Q.196** D	**Q.197** D	**Q.198** A
Q.199 B	**Q.200** C	**Q.201** C	**Q.202** D	**Q.203** D	**Q.204** D
Q.205 B	**Q.206** C	**Q.207** A	**Q.208** D	**Q.209** C	**Q.210** D
Q.211 B	**Q.212** A	**Q.213** A	**Q.214** B	**Q.215** B	**Q.216** B
Q.217 B	**Q.218** D	**Q.219** C	**Q.220** C	**Q.221** D	**Q.222** D
Q.223 A	**Q.224** B	**Q.225** B	**Q.226** A	**Q.227** C	**Q.228** D
Q.229 D					

Previous Years' Questions

Q.1 D	**Q.2** B	**Q.3** A	**Q.4** C	**Q.5** A	**Q.6** B
Q.7 B	**Q.8** B	**Q.9** C	**Q.10** D	**Q.11** B	**Q.12** C
Q.13 B	**Q.14** A	**Q.15** B	**Q.16** D	**Q.17** D	**Q.18** C
Q.19 A	**Q.20** A	**Q.21** B	**Q.22** A	**Q.23** B	**Q.24** C
Q.25 C	**Q.26** A	**Q.27** C	**Q.28** A	**Q.29** C	**Q.30** B
Q.31 A	**Q.32** B	**Q.33** A	**Q.34** A	**Q.35** D	**Q.36** A
Q.37 B	**Q.38** B	**Q.39** B	**Q.40** A	**Q.41** C	**Q.42** D
Q.43 C	**Q.44** C	**Q.45** A	**Q.46** C	**Q.47** D	**Q.48** B
Q.49 D	**Q.50** A	**Q.51** D	**Q.52** C	**Q.53** C	**Q.54** C
Q.55 C	**Q.56** A	**Q.57** C	**Q.58** D	**Q.59** D	**Q.60** C