HUMAN HEALTH AND DISEASES

Health does not simply mean 'absence of disease' or 'physical fitness'. It is defined as a state of complete physical, mental and social well-being not merely absence of disease.

When people are healthy, they are more efficient at work. This increases productivity and brings economic prosperity. Health also increases longevity of people and reduces infant and maternal mortality.

Characteristics of good health
(i) Physical fitness
(ii) Freedom from infection
(iii) Regular exercise
(iv) Free from anxiety
(v) Personal hygiene and proper relaxation

Good health provides efficiency, productivity, personality and longevity. Health was considered as a stage of body and mind where there was a balance of certain 'humors'. This is what early Greeks like Hippocrates as well as Indian Ayurveda system of medicine asserted.
It was thought that persons with 'blackbile' belonged to hot personality and would have fevers. This idea was arrived at by pure reflective thought.

The discovery of blood circulation by William Harvey using experimental method and the demonstration of normal body temperature in persons with blackbile using thermometer disproved the 'good humor' hypothesis of health.

In the later years, biology stated that mind influence, through neural system and endocrine system maintains our health. Hence, mind and mental state can affect our health.
Health is affected by
(i) Infections: bacterial and viral infections can affect health adversely.
(ii) Genetic disorders: deficiencies with which a child is born and deficiencies/defects which child inherits from parents from birth.
(iii) Life style including food and water we take, rest and exercise we give to our bodies, habits that we have or lack etc.

Diseases is malfunctioning of an organ/any functional and physical change from normal stage
Diseases can be broadly grouped into **infectious** and **non-infectious**.

Ways in which biology has helped us to control infectious diseases.

- Biology helps us to properly diagnose the pathogen
- The life cycle of the pathogen is studied.
- Alternate and reservoir hosts are known
- The mechanism of transmission of pathogen to humans are known
- Protective measures against catching the disease are suggested
- Medicines suitable for treating the infectious disease are worked out
- Biology has helped in preparing vaccines against many pathogen

Infectious or communicable diseases

Diseases which are easily transmitted from one person to another, are called **infectious diseases.** Infectious diseases are very common and every one of us suffers from these at sometime or other. Some of the infectious diseases like AIDS are fatal.

Non-infectious or non-communicable diseases

They are not transmitted from the one person to the other. They can be classified into

(i) **Deficiency diseases:** Marasmus, Kwashiorkar, vitamin deficiency diseases, diabetes.
(ii) **Allergy:** Asthma
(iii) **Cancer:** Among non-infectious diseases, cancer is the major cause of death.
(iv) **Degenerative/organic:** Occur due to malfunctioning of vital organs, e.g., heart failure, liver dysfunctioning, renal failure etc.
(v) **Genetic/Congenital:** Occur due to chromosomal aberration or mutations. e.g., Albinism, Sickle cell anaemia, haemophilia, Down syndrome, etc
(vi) **Drug and alcohol abuse also affect our health adversely.**

Transmission/ Epidemiology

Direct transmission (without intermediate agent)	Indirect transmission (with intermediate agent)
Contact	Vector borne
Droplet	Vehicle borne (food, water, ice)
Contact with soil	Air borne
Animal bite	Fomite (through contaminated article)
Transplacental	Human carrier
	Unclean hands

- A wide range of organisms belonging to bacteria, viruses, fungi, protozoans, helminths, etc., could cause diseases in man. Such diseases causing organisms are called **pathogen**.
- Most parasites are therefore pathogens as they cause harm to the host by living in (or on) them.
- The pathogens can enter our body by various means, multiply and interfere with normal vital activities, resulting in morphological and functional damage.
- Pathogens have to adapt to life within the environment of the host. For example, the pathogens that enter the gut must know a way of surviving in the stomach at low pH and resisting the various digestive enzymes.

Measure to prevent water borne diseases

- All water reservoirs, pools, cesspools and tanks should be periodically cleaned and disinfected
- Prevention of passage of garbage and sewage into the water bodies
- Use of only purified (free from contamination, suspended and dissolved substance) water for drinking, washing of salad and fruits as well as preparation of food

Life style of rural and urban area people

Urban Area	Rural Area	Effects
Overcrowded condition	Well space accommodation	Chances of catching infections more in urban areas
Sedentary life	Active life	Pollution related disease more common in urban areas
More pollution	Less pollution	Pollution related disease more common in urban areas

Consequently ruralites have a better physical, mental and social health as compared to urbanites

Diseases may be

i. **Endemic**: localized.
ii. **Epidemic:** throughout the area.
iii. **Pandemic**: Over wide geographical regions.

Life style disorders

- They are diseases caused by food performance, lack of exercise, sedentary habits, excessive club life, addictions, etc. Two such common diseases are obesity and hypertension

Monogenetic parasite: Parasite which has one host.
Digenetic parasite: parasite which has two host.

a. Primary host : where parasite divides sexually
b. Secondary host: where parasite divides asexually.

Carrier: A healthy human which harbour the pathogen without being harmed and passes the same to another susceptible individual.

Mary Mallon nicknamed **Typhoid Marry** was a cock by professional and was a typhoid carrier who continued to spread typhoid for several years through the food she prepared.

Preventive or prophylactic measures: Isolation, vaccination, sanitation, education, sterilisation, eradication of vectors.

Vectors can be eradicated by avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets, introducing fishes like Gamhusia in ponds that feed on mosquito larvae, spraying of insecticides in ditches, drainage areas and swamps etc. Doors and windows should be provided with wire mesh to prevent the entry of mosquitoes.

Prevention is better than cure: Every infection causes some damage to body, loss of working days and source of infection to other. It is therefore, important to prevent the occurrence of infection.

Three preventive measures to control microbial infections

i. Prevention of overcrowding
ii. Taking in of clean food, pure water and clean air.
iii. Hygiene and vaccination

Personal hygiene involves washing of hands after coming from outside, before and after meals, regular bathing, brushing of teeth, daily changing of clean fresh clothes, etc. It can prevent catching of many infections.

Public hygiene or cleanliness is proper disposal of garbage and sewage, covering and cleaning of drains, sweeping of streets and roads, covered dust bins. It will prevent most of the mosquito and fly borne infections.

Pulse polio is an immunisation campaign established by the government of India to eradicated poliomyelitis (polio) in India by vaccination all children under the age of five years against polio virus.

This project deals with the ways to fight poliomyelitis through a large scale immunisation institutions, state government and Non Governmental Organisations.

- In 1995 India launched Pulse Polio Immunisation Program along with Universal Immunisation Program which aimed at 100% coverage. Now, India has been declared Polio free

VIRAL DISEASE IN HUMANS

Disease	Pathogen	Main symptoms	Mode of infection
Influenza (Flu)	Myxovirus influenzae	Infect mucous membranes of respiratory tract symptoms include, Nasal discharge, fever, sneezing coughing, body ache	Airborne, droplets from nose and throat
Common cold	Rhinovirus	Nasal discharge, fever, sneezing, coughing, sore throat, hoarseness, congestion, tiredness last for 3-7 days	Airborne, droplets, fomite like pens, books, doorknobs computer keyboard, mouse
Rabies (hydrophobia)	Polio virus	Virus enter through GIT and damage ventral horn of spinal chord, inflammation of nervous system, muscle shrinkage, limb paralysis, stiffness of neck.	By contaminated food and water
Chickungunya	Chickungunya virus	Joint pain, lymphadenopathy	By bite of Aedes aegypti
Dengue fever (break bone fever)	Arbovirus	Classical fever: Abrupt onset of fever, frontal headache, pain behind eyes, joint pain, loss of sense of taste and appetite, measles like rash, nauseam vomiting, increased thirst, restlessness, platelet count decrease, (no use of disprin)	By bite of Aedes aegypti
Hepatitis B	HBV (DNA virus)	Cause serum hepatitis (most versatile) symptoms include Anorexia, nausea, vomiting, urine turns dark, stool turns pale	Parenteral, close contact
Chickenpox	Varicella zoster	Fever, rash, no permanent scars	Direct contact, formite method
Smallpox	Variola virus	High fever, chill, rash with permanent scars	Direct contact, formite method
Measles	Rubeola virus	Fever, inflammation of air passage	Direct contact, fomite method

H1N1 swine flu

Regular flu like symptoms that include fever, cough, sore throat, runny nose, many people with swine flu may have diarrhoea and vomiting

Fungal diseases/dermatophytoses

Group of closely related fungi are called **dermatophytoses.** They infect the skin, hair, nails. They cause a variety of clinical conditions collectively called as **dermatophytoses / tinea/ ringworm.**

(1) Tinea cruis: Infect groin and the perineum region.

(2) Tinea barbae/Barber itch: Infect bearded areas of face and neck.

(3) Tinea pedis or athletes's foot: Infect foot.

(4) Tinea capitis: Infect scalp

Causative agent:

Many fungi belonging to following genera are responsible for one of the most common infectious diseases in man.

- **Trichophyton:** It is infects skin, hair and nail.
- **Microsporum:** It is infects skin and hair but not the nails.
- **Epidermophyton:** It is infects skin and nails but not the hair.

Symptoms

Appearance of dry, scaly lesions on various parts of the body such as skin, nails and scalp. These lesions are accompanied by intense itching.

Important points

The infection of ringworms is usually acquired from soil or by using towels, clothes or comb of infected persons.
Heat and moisture help these fungi to grow in the skin fold such as those in the groin or between the toes.

Bacterial Disease in Humans

Disease	Pathogen	Main symptoms	Mode of infection
Cholera	Vibrio comma (V. Cholera)	Severe diarrhoea & vomiting, stool like rice water	By contaminated food and water, direct contact, fomite
Pneumonia	Streptococcus pneumonia, Haemophilus influenza	Fever, chill, cough, headache difficulty in breathing, accumulation of mucous and lymph fluid in alveoli leading to severe problem in respiration & bronchioles, lips & nails grey to blue	By patient's, sputum, droplet, aerosol, sharing glasses and utensils with infected person
Typhoid (enteric fever)	Salmonella typhi	Sustained high fever (39^0 -40^0C) spleenomegaly loss of appetite, weakness, headache, intestinal perforation, constipation, stomach pain relapse in neglected cases	B contaminated food and water, migrate to other organs through blood
Tetanus (Lockjaw/ Dhanustamba)	Clostridium tetani	Painful muscular spasms and paralysis, suffocation, degeneration of motor neurons, often fatal	Through wounds and burns, horse dung, contaminated soil
Diphtheria (Galghotu)	Corynebacterium diphthriae	Sore throat, difficulty in breathing, Notorious for very mild early symptoms	By oral and nasal discharges

Whooping cough (pertusis/Kali khansi)	Bordetella pertussis	Server coughing characteristic gasping 'whoop' during inspiration at end of cough, catarrh	By throat discharges & contact
Tuberculosis (Koch's diseases)	Mycobacterium tuberculosis (toxin-Tuberculin)	Cough, bloody sputum chest pain, affect, lungs, lymph nodes, bones, joints, loos of weight, anorexia	By patient's sputum, droplet, contaminated food, water and cow milk
Leprosy (Hansen's disease/Kusht rog)	Mycobacterium leprae	Hypopigmented skin patches, ulcers, deformity to digits, damage to peripheral nerves partial loss of sensation	Long and close contact with patients, droplet

Protozonal diseases

1. **Amoebic dysentery or Amoebiasis**

   Causative agent

   Entamoeba histolytica: It is a parasitic and pathogenic protozoan protists which resides in the upper part of large intestine in human beings. It causes amoebic dysentery or amoebiasis. It has two forms

   i. Adult trophozoite/ magna pathogenic form

   ii. Minuta/ non-pathogenic form.

   Quardrinculeate cyst is the infective stage.

   Houseflies act as **mechanical carriers** and serve to transmit the parasite from faeces of infected person to food. Main source of infection is drinking water and contained food.

   Symptoms include constipation, abdominal pain and cramps, stools with excess mucus and blood clots.

2. **Malaria**

   Causative agent: Plasmodium vivax: It is a protozoan protists with infectious spore like stage in life cycle. It is most notorious and has staggering effect on human population.
   It is digenetic and completes life cycle in two hosts: Man is Secondary host and Female Anopheles is vector, transmitting agent and primary host.
   Malaria, disease man has been fighting since many years.
   Different species of Plasmodium (P. Vivax, P. Malaria and P. Falciparum is the most serious one and can even be fatal.

Life cycle of Plasmodium:

Plasmodium enters the human body as sporozoites (infectious form) through the bite of infected female Anopheles mosquito.

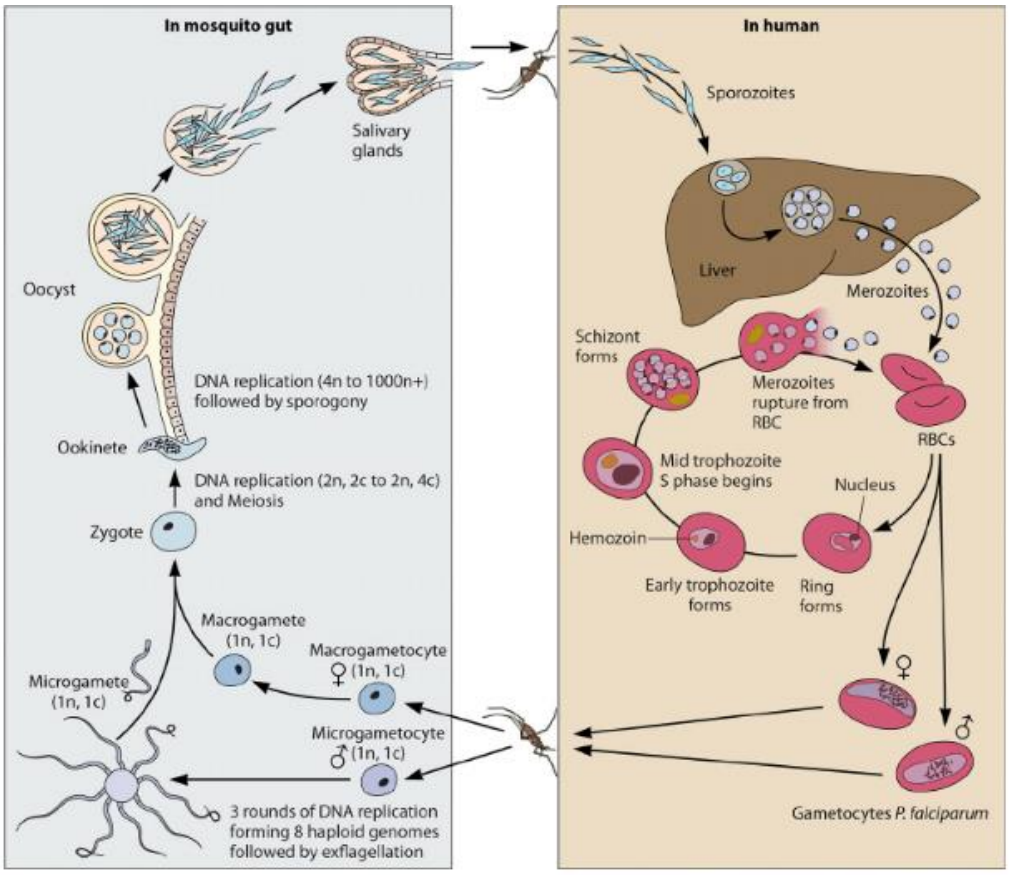
The parasites initially multiply within the liver cells and then attack the red blood cells (RBCs) resulting in their rupture.

The rupture of RBCs is associated with release of a toxic substance, haemozoin, which is responsible for the chill and high fever recurring every three to four days.

When a female Anopheles mosquito bites an infected person, these parasites enter the mosquito's body and undergo further development.

The parasites multiply within them to from sporozzoites that are stored in their salivary glands.

When these mosquitoes bites a human, the sporozoites are introduced into his/ her body, thereby initiating the events mentioned above.



Special points

- Prevention from infection is called prophylaxis.
- Quinine is obtained from bark of Cinochona (discovered in Peru) which is most commonly used against malaria.
- Plasmodium vivax - Benign tertian malaria
- Plasmodium falciparum – malignant tertian malaria.
- Plasmodium malaria – quartan malaria
- Plasmodium ovale – mild tertian malaria
- Paroxysm: Actual attack of malaria occurs after a few initial erythrocytic cycle due to accumulation of haemozoin and toxins in blood. It involves rigour, chills and fever.

Helminthal diseases

Disease	Causative agent	Host	Habitat	Symptoms	Remarks
Ancylostomiasis (Hook worm disease)	Ancylostoma (Hook worm)	Monogen-eticman	Small intestine	Acute anaemia due to injury in intestinal wall	Infection is prevalent in rural areas where people move barefooted and hygiene is neglected
Ascariasis	Ascaris	Monogene-ticman	Small intestine	Internal bleeding, muscular pain, fever, anemia and blockage of intestinal	The eggs of the parasite are excreted along with the faeces of infected persons which contaminate soil. Water, plants, etc. a healthy person acquires this infection through contaminated water, vegetables,

				passage	fruits, etc, infective stage is • Rhabditi form larva (2^{nd} stage (juvenile) • Four larval stages occur in life cycle of Ascaris
Filariasis (elephantiasis)	Wuchereria bancrofti, W.malayi (Viviparous)	Digenetic man (1^0) Culex (2^0)	Blood and lymph. Usually Lymphatic vessels of lower limbs	Slowly developing chronic inflammation of the organs in which they live for many years fever, anaemia inflammation, deformities	Larva is microfilarae which is harmless, show nocturnal periodicity
Taeniasis	Taenia	Digenetic man (1^0) pig (2^0)	Small intestine	Muscular pain, anaemia and irriability	Onchosphere is an infective stage for pig and cysticercus (bladderworm) is an infective stage for man. Infection occur by eating measly pork

For diseases such as malaria and filariasis that are transmitted through insect vectors, the most important measure is to control or eliminate the vectors and their breeding places. This can be achieved by avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets, introducing fishes like Gambusia in ponds that feed on mosquito larva, spraying of insecticides in ditches, drainage areas and swamps, etc. In addition, doors and windows should be provided with wire mesh to prevent the entry of mosquitoes.

Such precautions have become all the more important especially in the light of recent widespread incidences of the vector-borne (Aedes mosquitoes) diseases like dengue and chikungunya in many parts of India.

Diagram showing inflammation in both lower limbs due to elephantiasis

Sexually Transmitted Diseases (STDs)

Diseases or infections which are transmitted through sexual intercourse are collectively called sexually transmitted diseases (STD) or venereal diseases (VD) or reproductive tract infections (RTI).

Gonorrhoea syphilis, genital herpes, chlamydiasis, genital warts, trichomoniasis, hepatitis-B and of course, the most discussed infection in the recent years, HIV leading to AIDS are some of the common STDs. Among these HIV infection is most dangerous.

Some of these infections like hepatitis-B and HIV can also be transmitted by sharing of injection needles, surgical instruments, etc., with infected persons, transfusion of blood, or from an infected mother to the foetus too.

Except for hepatitis-B, genital herpes and HIV infections, other diseases are completely curable if detected early and treated properly.

Early symptoms of most of these are minor and include itching, fluid discharge, slight pain, swellings etc., in genital region. Infected females may often be asymptomatic and hence, may remain undetected for long.

Absence or less significant symptoms in the early, stages of infection and the social stigma attached to the STDs, deter the infected persons from going for timely detection and proper treatment. This could lead to complications later, which include pelvic, inflammatory diseases (PID), abortions, still births, ectopic pregnancies infertility or even cancer of the reproductive tract.

STDs are a major threat to a healthy society. Therefore, prevention or early detection and cure of these diseases are given prime consideration under the reproductive health-care programmers. Though all persons are vulnerable to these infections, their incidences are reported to be very high among persons in the age group of 15-24 years – the age group to which you also belong. There is no need to paniced. Prevention is our hands. One could be free of these infections if you follow simple principles given below:

i. Avoid sex with unknown partners/multiple partners.
ii. Always use condoms during coitus.
iii. In case of doubt, go to a qualified Doctor for early detection and get complete treatment if diagnosed with disease.

Important STDs/Venereal diseases/Reproductive Tracts infections (RTI)

Disease	Causative organism	Nature of disease
AIDS (acquired Immunodeficiency syndrome)	Retrovirus -HIV	Viral
Genital Herpes	Herpes simplex virus	Viral
Genital warts	Human papilloma virus (HPVs)	Viral
Gonorrhea	Neisseria gonoerrheae	Bacterial
Syphilis	Treponema pallidum	Bacterial
Chlamydiasis	Chlamydia trachomatis	Chlamydia
Trichomoniasis	Trichomonas veginails	Protozoa

Over crowded human settlements have more diseases

- Overcrowded settlements cannot have proper public and domestic hygiene. Infectious disease spread in such areas through contact, water, food and air.
- Dysentery, cholera and typhoid are all spread through contaminated food and water

AIDS (Acquired immune deficiency syndrome)

The world AIDS stands for **Acquired immune Deficiency Syndrome.** This means deficiency of immune system, acquired during the lifetime of an individual indicating that it is not a congenital disease. 'Syndrome' means a group of symptoms.

It is disorder of cell mediated immune system of the body. There is a reduction in the number of cell called helper T-cell which stimulate antibody production by B-cell. This results in the loss of natural defence against viral infection.

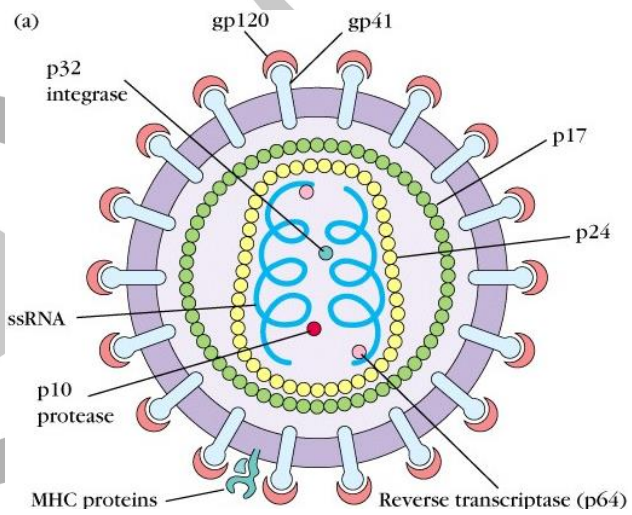
Discovery: AIDS was first reported in 1981 and in the last twenty-five years or so, it has spread all over the world killing more than 25 million persons.

Pathogen causative agent: AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called **retrovirus**, which have an envelope enclosing the RNA genome.

RNA Vs DNA viruses

- RNA viruses mutate faster. RNA is quite labile due to the presence of nitrogen base uracil.

Structure of HIV



HIV is retrovirus. It contains of glycoprotein coat, double layer of lipid membrane and protein coats. It contains RNA and reverse transcriptase enzyme.

The envelope consists of a lipid bilayer derived from host cell membrane and projecting knob like glycoprotein spikes with pedicles formed of virus coded glycoprotein. It contains two protein coats.

Transmission

Transmission of HIV-infection generally occurs by

(i) Sexual contact with infect person
(ii) Transfusion of Contaminated blood and blood products
(iii) By sharing infected needles as in the case of intravenous drug abusers.
(iv) From infected mother to her child through placenta.

Risk groups of AIDS

(i) Individuals who have multiple sexual partners
(ii) Drug addicts who take drugs intravenously.
(iii) Individuals who require repeated blood transfusions.
(iv) Children born to an HIV infected mother.

AIDS cannot be acquired by the following

It is important to note that HIV/AIDS is not spread by mere touch or physical contact or by

i. Insect bites.
ii. Crowded transport.
iii. Shaking hands.
iv. Sharing towels.
v. Coughing and sneezing.
vi. Kissing and embracing.
vii. Sharing utilities and telephone.
viii. Swimming pools and toilets.

It spread only through body fluids. It is, hence, imperative, for the physical and psychological well-being, that the HIV/AIDS infected persons are not isolated from family and society.

Incubation period:

There is always a time-lag between the infection and appearance of AIDS symptoms. This period may vary from a few month to many years (usually 5-10 years).

Mode of action of AIDS virus

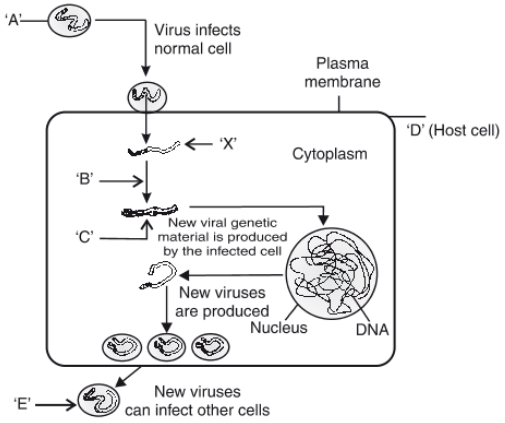
After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase. This viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles.

The macrophages continue to produce virus and in this way act like a HIV factory. HIV enters into helper T-lymphocytes (T_H) replicates and produce progeny viruses released in blood attack other helper T- lymphocytes. This is repeated leading to a progressive decrease in number of helper T- lymphocytes.

During this period, the person suffers from bouts of fever, diarrhoea and weight loss. Due to decrease in the number of helper T- lymphocytes, the person starts suffering from infections that could have been otherwise overcome such as those due to bacteria especially *Mycobacterium*, viruses, fungi and even parasites like Toxoplasma. The patient becomes so immune-deficient that he/she is unable to protect himself/herself against these infections.

AIDS –Related complex (ARC)

It is mild form of AIDS. Its symptoms are swollen lymph nodes, fever, sweating at night and weight loss. Patients with ARC have a high possibility of early development of AIDS, ARC is also known as prodromal AIDS.



Diagnosis

A widely used diagnostic test for AIDS is enzyme linked immune-sorbent assay (**ELISA**) and **western Blotting** (confirmatory test)

Treatment

Treatment of AIDS with anti-retroviral drugs is only partially effective. They can only prolong the life of patient but cannot prevent death, which is inevitable. Zidovudine or AZI was the drug used and continues to be the drug of choice for the treatment of AIDS. Didanosine, Dideoxyionosine are another drugs employed to treat AIDS.

Antiretroviral Therapy

- This therapy is given to the patients of AIDS.

Prevention

(i) National AIDS control organization (NACO) and Non-governmental organization (NGOs) is doing a lot to educate people about AIDS.
(ii) WHO has started a number of programmers to prevent the spreading of HIV infection.
(iii) Making blood (from blood banks) safe from HIV, ensuring the use of only disposable needles and syringes in public and private hospitals and clinics.
(iv) Monogamous sexual relationship.
(v) Dentists should use sterilized equipments.
(vi) Avoid tattoos, ear and nose pierching from unqualified people.
(vii) Avoid use of common blades in barber's shop. Infection with HIV or having AIDS is something that should not be hidden – since then, the infection may spread to many more people.
(viii) HIV/ AIDS- infected people need help and sympathy instead of being shunned by society. Unless society recognizes it as a problem to be dealt with a collective manner – the chances of wider spread of the disease increase manifold.
(ix) It is a malady that can only be tackled, by the society and medical fraternity acting together, to prevent the spread of the disease.
(x) HIV position people have HIV virus which means they can pass it on but do not show symptoms of AIDS, on the other hand AIDS patient shows spectrum of diseases caused by having reduced immunity due to HIV.

❖ As AIDS has no cure so prevention is the better option. It spreads due to conscious behavior pattern and is not something that happens in advertently like pneumonia, Tuberculosis, Typhoid. It may also occur due to poor monitoring as in case of patients undergoing blood transfusions. AIDS day is 1st December

Immune system

System of animal body, which protects it from various infectious agents is called **immune system**. A study of immune system is called as **immunology**.

The Latin term "**immune**" means **"exempt"** or **"freedom"** so it refers to all the mechanisms used by the body for protection from foreign agents.

Types of Immunity: Immunity is of two types

1. **Innate immunity or non-specific immunity:**

It comprises of all those defence elements with which an individual is born and it consists of following barriers.

i. Physical / Anatomical Barrier :

a. Skin is physical barrier of body Stratum corneum prevents entry of foreign agents.

b. Mucus traps and immobilizes microorganisms

c. The cilia sweep the mucus loaded with microorganisms and dust particles into the pharynx (throat) from where it is thrown out or swallowed for elimination with the faces.

d. Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts also help in trapping microbes entering our body.

ii. Physiological barrier :

a. Factor like body temperature, pH and various body secretions prevent growth of pathogen.

b. Acidity of stomach kill pathogens and fever inhibit their growth.

c. Lysozymes present in body secretions digest bacterial cell wall.

d. Certain bacteria normally live in vagina. These bacteria produce lactic acid, Lactic acid kill the foreign bacteria.

e. Acid in the stomach, saliva in the mouth, tears from eyes-all prevent microbial growth.

iii. **Cytokine barrier**

a. Virus infected cells release interfreons which are glycol proteins that protect unattached cells. They act outside cells, are quick acting and action is temporary.

b. Interferon are natural proteins produced by cells of immune system in response to foreign agents such as viruses, tumor cells and parasites and protect non-infected cells from further infection.

c. Interferons inhibit the viral replication within host cells, activate natural killer cells and macrophages, and increase resistance of host cells to viral infection. When the antigen is presented to matching T-cell and B-cells, these cells multiply and remove the foreign substance.

iv. Phagocytic/ Cellular Barrier :

Monocytes and neutrophils (polymorpho nuclear leucocytes, PMNL) destroy pathogens by engulfing them. Macrophages are formed by enlargement of monocytes. Fixed macrophages include alveolar macrophages in lungs, histiocytes in connective tissue, kupfeer cells in liver etc.

v. Inflammatory Barrier :

When microorganisms enter the body tissue through some injury, these produce some toxic substances which kill more cells. These broken cells release material which attract mast cells which release histamine.

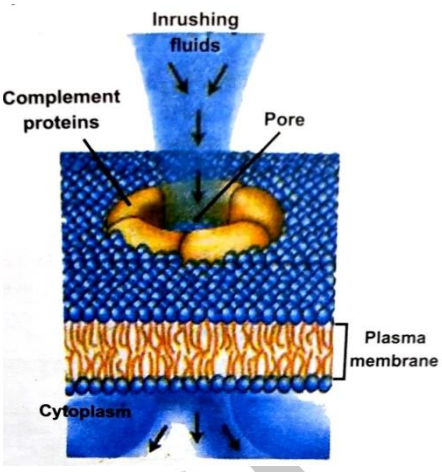
Histamine causes dilation of capillaries and small bloods vessels surrounding injury and increases the permeability of capillary walls. As a result, more blood flows to area making it red and warm. The fluid (plasma) leaks out into the tissue spaces, which dilute toxins and causes swelling. This reaction of body is known as **inflammatory response.**

vi. Fever :

- The inflammatory response may be localized, or may be systemic. The fever is caused by the toxins released by the pathogens or by compounds called **pyrogens.**
- These compounds are releases by W.B.C. in order to regulate temperature of the body. Moderate fever stimulates the phagocytes and inhibits growth of microorganisms. However, a very high fever is dangerous.

- Beside the phagocytes, **natural killer cells** kill **virus infected cells and some tumour cells** of body by creating perforins lined pores in plasma membrance of target cells. These pores allow entery of water into target cell which then swells and bursts.

vii. Complement system :

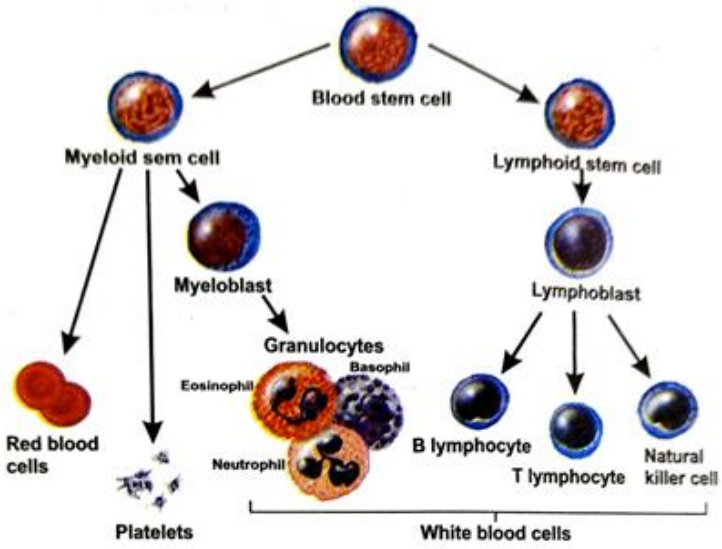


- A system of over 30 proteins work in a cascade manner to attack membrane, causing their death. Skin, mucus, nasal hair, saliva, cilia, lysozyme, gastric juice, vaginal secretion form **first line of defense** while interferons, macrophages, inflammatory response, fever and natural killer cells are included in **second line of defence.**

2. Specificity immunity or acquired immunity

It forms **third line of defence.**

Specificity, diversity, recognition of self and non-self and memory are important characters of this immunity. Main cells of immune system are lymphocytes and antigen presenting cells (APCs). Lymphocytes and other cells of immune system are produced in bone marrow by stem cells by the process called hematopoiesis.



Every antigen is processed by APCs like macrophages, histiocytes, monocytes, B-cells, dendritic cells (Langerhans cells of skin). Processed antigen is presented to helper T-cell. Activated T_H cell activates B-cell and other T-cell. APCs are able to deliver a costimulatory signal necessary for helper T-cell activation.

Difference between B-lymphocytes and T- lymphocytes

Feature	B-Lymphocytes (B-cells)	T –Lymphocytes (T-cells)
Origin and site of differentiation	Bone marrow, Bursa of Fabricus (in fowl), gut associated lymphoid tissue (GALT) (Peyer's patches)	Bone marrow Thymus
Immune system	B-cells form humoral viruses and bacteria that enter the blood and lymph	T-cells form cell-mediated system (CMIS)
Action	They defend against viruses and bacteria that enter the blood and lymph	They defend against pathogens including bacteria, virus, protists & fungi that enter the cells
Movement	Plasma cells do not move to the site of infection	Lymphoblasts move to the site of infection
Reaction against transplants and cancer cells	Plasma cells do not react against transplants and cancer cells	Killer cells react against transplants and cancer cells
Effect of immune system	Plasma cells have no inhibitory effect on immune system	Suppressor cell inhibit immune system

- Specific immune system include

i. **Humoral immune system or antibody-mediated immune system (AMIS):** Humoral refers to body fluids and this immune system results in **production of antibodies.** It is function of B-lymphocytes.
Antibodies circulated in blood and lymph (Humors) and protect the body against bacteria and viruses that enter humors.

ii. **Cell-mediated immune system (CMIS):** Highly specialized T-cell carry out defensive activities which circulate in blood and tissue. It protects the body against pathogens including the **protists and fungi.**
This system also reacts against **tissue transplants** and perhaps also against the body's own cells if they become cancerous.

Antigens

a. They are foreign 'molecules' that invade the body of an organism. Antigens stimulate the production of antibodies in response to infection.

b. Antigens are generally large molecules, mostly **proteins or polysaccharides** found on the cell walls of bacteria or on the coats of viruses.

c. Antigens may be pollen grains, white of an egg, shell fish, certain fruit and vegetables, chicken, feathers of birds, blood cells from other persons or animals, drugs, chemicals,etc.

d. **Epitopes** represent areas on antigens which are recognized by antibody.

e. The region of antibody that combines with antigen is called **paatope.**

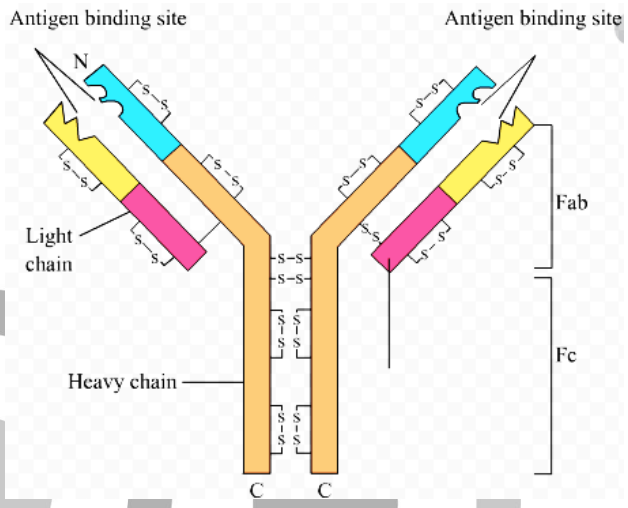
Mode of Action of B – Cells

In response to antigen B-cells are stimulated to produce plasma cells which produce antibodies at a rate of about 2,000 molecules per second, millions per day for about 4-5 days. This 'capacity' of B-Cells to produce

antibodies is acquired during its development and maturation even before it was exposed to an antigen. However, antigen is required to stimulate antibody production.

Antibodies (immunologlobulins – soluble proteins)

They are glycoproteins and are Y-shaped. Each antibody is made up of four polypeptide chains two heavy and two light connected with one an other with help of disulphide bonds. Hence an antibody is represented as H_2L_2. Light chains are either kappa or lambda. Each chains has a **variable region** to attach to epitope of pathogen and a **constant region** to which carbohydrate residue is attached. Two identical fragments of y- shaped molecule have antigen binding sites called **fragment antigen binding (Fab).**



The third fragment which lacks ability to bind an antigen and can be crystallized, known as **fragment crystallizable (Fc).**

Antibody molecules may remain bounded to cell membrane of B cell or may remain free. Free antibody has three main functions:

- **Agglutination of particulate matter,** including bacteria and viruses
- **Opsonisation** or coating of bacteria to facilitate phagocytosis by cells
- **Neutralization** of toxins released by bacteria e.g., tetanus toxins.

Types of Antibodies	Properties
IgG	Smallest & most abundant, 75%, pass via placenta, stimulates opsonization, phagocytosis & complement system, show 2^0 immune response
IgA	Second most abundant, 10-22% present in secretions, protects from inhaled & ingested pathogens, J-chain present, copro antibody, found in tears, saliva, colostrum, secretory antibody.
IgM	Largest, pentamer with 10 binding sties, has J-chain, 7% earliest antibody to be synthesized by foetus, cause activation of B-cells, show 1^0 immune response.

IgE	Heat labile, mediates hypersensitivity, acts as mediator in allergic reactions.
IgD	Present on surface of B lymphocytes cause activation of B-cells

Mother's Milk

The most appropriate food for a new born baby

Mother's milk is a complete diet having carbohydrates, fats and proteins. It has phagocytes that kill and devor pathogens and contains antibodies (lgA, lgG) which protect infact from serval infections.

Monoclonal antibodies: They are identical antibody molecules, specific for a particular epitope which have developed from clone of a single cell like hybridoma which is formed by fusion of antigen sensitized cells with myeloma cells.

Different types of T- cells:

(i) **Killer T-cells:** These cells attack directly and destroy antigens. They move to the site of invasion and produce chemicals which attack pathogens by causing osmotic imbalance. They have capacity to react against graft.

(ii) **Helper T- cells:** These cells stimulate B- cells to produce more of antibodies. They regulate immune system and play a key regulatory link between CMIS and AMIS.

(iii) **Suppressor T-cell:** These cells suppress the entire immune system keeping it away from attacking the own body cells. Some of these cells also become memory cells.

(iv) **Memory T- cells:** These cells give secondary immune response and are stored in liver and spleen.

Types of Acquired immunity: It is of two types – active and passive.

Active immunity and passive immunity

Active immunity	Passive immunity
It is developed when the person's own cells produce antibodies in response to infection or vaccine.	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen.
It provides relief after some time.	It provides immediate relief.
It is long lasting	It is not lasting.
e.g. immunity developed due to repeated subclinical infections or due to vaccines which contain live or killed micro-organisms.	e.g. immunity transferred from mother to foetus through placenta or use of anti-tetanus serum.

Lymphoid organs

- They are those organs where the maturation and proliferation of lymphocytes takes place.
- There are two types of lymphoid organs :
  - **i.** **Primary lymphoid organs:** These are organs where T-cells and B-cells **mature** and acquire their antigen-specific receptors, e.g., bone marrow and thymus.

ii. **Secondary lymphoid organs:** These are the organs where lymphocytes undergo **proliferation and differentiation** in response to specific antigen, e.g., lymph nodes, spleen, tonsils, peyer's patches, **mucosa associated lymphoid tissue** (MALT), etc.

MALT is lymphoid tissue located within the lining of the major tracts (respiratory, digestive and urogenital tracts). It constitutes about 50 percent of the lymphoid tissue in human body

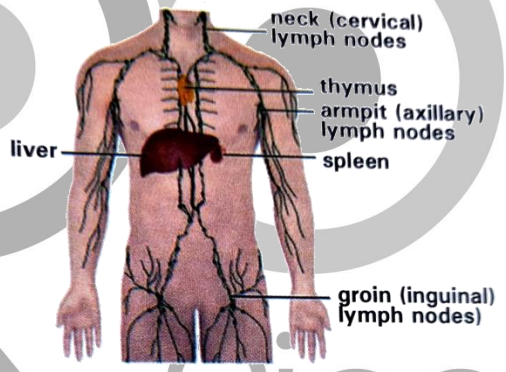
Bone marrow: It is main lymphoid organ where all blood cells including lymphocytes are produced.

Thymus: It is a lobed organ located near the heart and beneath the breastbone. It is quite large at the time of birth but keeps reducing in size with age.

Both bone-marrow and thymus provide microenvironments for the development and maturation of T-lymphocytes.

Spleen: It is large bean shaped organ and mainly contains lymphocytes and phagocytes. It also has a large reservoir of erythrocytes. It acts as a filter of the blood by trapping blood-borne microorganisms and is also known as graveyard of RBC.

Lymph nodes: These are small solid structures located at different points along the lymphatic system. Lymph nodes serve to trap the micro-organisms or other antigens, which happen to get into the lymph and tissue fluid. Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.



Primary and secondary immune response

Primary response	Secondary/Anamnestic response
1. This occurs as a result of the first contact of animal with an antigen.	This response occurs at the second and subsequent exposure of the same host to same antigen
2. Take longer time to establish immunity	It is more repid
3. Declines rapidly	Lasts for longer time

Vaccination and immunization

Vaccination is the process of inoculation of harmless antigenic material into healthy person for providing active acquired immunity against diseases.

Immunization is the phenomenon of increasing specific antibody production and development of memory B and T- Cells against potential attack of pathogen.

Edward Jenner prepared first vaccine when he injected fluid from sore of milkmaid suffering from cowpox into James Phipps who did not later caught small pox even when he was injected with fluid containing small pox germs. **Louis Pasteur** developed vaccine against rabies and coined the term vaccine. **Von Behring** discovered technique of passive immunization.

Vaccines are of following types:

i. Live vaccines / Attenuated vaccines
ii. Killed vaccines or inactivated vaccines
iii. **Toxoids:** Toxins produced by organisms are detoxicated and used in the preparation of vaccines.
iv. Cellularfractions
v. Combination vaccines

Vaccines can also be classified as

i. **First generation vaccines:** Produced by conventional methods using whole microorganisms.
ii. **Second generation vaccines: Prepared** by recombinant DNA technology or genetic engineering, e.g., Hepatitis B virus vaccine, Herpes virus vaccine and Pneumonia vaccine.
iii. **Third Generation vaccines: These** are chemically synthesized multivalent vaccine, e.g., vaccine against diphtheria toxin.

DNA Vaccines

- Genetic / DNA immunization is a novel technique used to efficiently stimulate humoral and cellular immune responses to protein antigens.
- The direct injection of genetic material into a living host causes small amount of its cells to produce the introduced gene products.
- This inappropriate gene expression within the host has important immunological consequences. Resulting in the specific immune activation of the host against the gene delivered antigen.

1. **Allergies:** Allergy is the hypersensitiveness of a person to some foreign coming in contact with or entering the body. e.g. asthma, hay fever. The substance that cause allergic reaction are called **allergens**, e.g., dust pollen, mould spore, fabrics, lipsticks, nail paints, feathers, fur, plants, bacteria, foods, heat, cold, sunlight, animal dander etc.

   During allergic reaction **IgE** causes degranulation of mast cells causing release of **histamine and serotonin** which results in marked dilation of all the peripheral blood vessels and increased permeability so that large amounts of fluid leak out from the blood into the tissues.

❖ **Symptoms:** Sneezing, water eyes, running nose and difficulty in breathing.

❖ **Diagnosis of allergy:** For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens, and the reactions studied.

❖ **Treatment of allergy:** The use of during like antihistamine, adrenalin and steroids quickly reduce the symptoms of allergy.

Anaphylactic Shock : It involves all the tissues of the body and occurs in a few minutes after the injection of an antigen such as penicillin. Such a reaction is very serious as there is a drastic fall in blood pressure. The affected person may be come unconscious and the individual may die within a short time.

More allergic cases in Metropolitan cities

- In metropolitan cities air pollution is high.
- The air pollution function as allergens and cause hyper-sensitivity with symptoms like watery eyes, sneezing, running nose and difficult breathing
- Modern day life style has resulted in lowering of immunity and more sensitivity to allergens more and more children in metro cities of India suffer from allergies and asthma due to sensitivity to the environment. This could be because of the protected environment provided early in life.

2. **Autoimmune diseases:** Memory-based acquired immunity evolved in higher vertebrates based on the ability to differentiate foreign organisms (e.g., pathogen) from self-cell. While we still do not understand the basis of this, two corollaries of this ability have to be understood.

   One, higher vertebrates can distinguish foreign molecules as well as foreign organisms. Most of the experimental immunology deals with the aspect. Two, sometimes, due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called **auto-immune** disease.

   Common autoimmune diseases are:

   i. Myasthenia gravis (affect neuromuscular junction).
   ii. Grave's Disease (antibodies mimicking TSH)
   iii. Rheumatoid arthritis.

3. **Immunodeficiency disease:** They occur due to a defect in one or more components of innate or acquired immunity.
4. **Important examples of these diseases are :**
   i. **Severe Combined immune deficiency (SCID) :**
   A congenital disease in which new born children are with-out T-cells and B-cells and thus are highly susceptible to various infections. In developed countries like U.S.A. such children are kept alive by keeping them in germ-free environments called isolation suits.
   ii. **AIDS:** Primary immunodeficiency disease.

Organ transplantation and antibodies

- Organ transplation is the replacement of injured, disease tissue or organ by grafting a healthy tissue /organ.
- Grafts from just any source- an animal, another primate, or any human beings cannot be made since the graft would be rejected sooner or later.
- The body is able to differentiate 'self' and 'non-self' and the cell-mediated immune response is responsible for the graft rejection.
- Tissue matching, blood group matching are essential before undertaking any graft / transplant.
- Success of transplantation depends on **tissue matching or HLA protein matching** which is major histocompatibility complex in human whose genes are located on chromosome number six.
- Even after this the patient has to take immunosuppressant all his/ her life.
- The preference order for transplantation is: Identical twins > sibling > parent > unrelated donor.

Organ transplantation and identical twins

In identical twins there may not be any problem of rejection and requirement of immunosuppressant

Cancer biology

Cancer is one of the most dreaded diseases of human beings and is a major cause of death all over the globe. More than a million Indians suffer from cancer and a large number of them die from it annually. The mechanisms that underlie development of cancer or oncogenic transformation of cells, its treatment and control have been some of the most intense areas of research in biology and medicine. It is an abnormal and uncontrolled division of cells that

invade and destroy the surrounding tissues. Cancerous cells penetrate and infiltrate into the adjoining tissue and dislocate their function.

Properties of Cancer cells

i. Cell growth and differentiation is highly controlled and regulated, In cancer cells, there is breakdown of these regulatory mechanisms.
ii. Normal cells show a property called **contact inhibition** by virtue of which contact with other cells inhibits their uncontrolled growth. Cancer cells appear to have lost this property.
iii. They have uncontrolled proliferative ability.
iv. They do not require extracellur growth factors.
v. Their nucleus becomes irregular with abundant granuals.
vi. There is increase in number of lysosomes, reduction in mitochondrial cristae, more melanin and debris in cytoplasm.
vii. They show overgrowth and ability to invade new sites (metastasis).
viii. Cancer cells resist induction of cell death which promotes development of tumours. These are a mass of proliferating cells called neoplastic or tumor cells.

Types of Tumours

Benign Tumour (Non- malignant Tomour):

It remains confined to the site of its origin and does not spread to other parts of body. It causes limited damage to the body. It is non- cancerous.

Malignant Tumour (Cancerous Tumour) :

Initially, no symptoms are noticed as it grows slowly (latent stage). Then, cell grow very rapidly, invading and damaging the surrounding normal tissues by metastasis. As these cells actively divide and grow they also starve the normal cells by competing for vital nutrients. Cells sloughed from such tumors reach distant sites through blood, and wherever they get lodged in the body, they start a new tumor there. This property called **metastasis** is the most feared property of malignant tumors.

Types of Cancer

- **Carcinomas:** These are derived from epithelial cells. They include cancer of cervix, breast, skin, brain, lung and stomach. About 85% of all cancers are carcinomas.
- **Sarcomas:** These are located in connective and muscular tissues derived from mesoderm. They include the cancer of bones (osteoma), cartilages, tendons, adipose tissue (lipomas) and muscles.
- **Lymphomas:** Cancer of lymphatic tissue are termed as lymphomas e.g., **Hodgkin's** disease. In Hodgkin's disease there is chronic enlargement of spleen and often the liver and there is excessive production of lymphocytes by lymph nodes and spleen.
- **Melanomas:** These are cancerous growth of melanocytes.
- **Leukemias:** They are characterized by abnormal increase of white blood corpuscles count due to their increased formation in the bone marrow.

Causes of cancer

(i) Transformation of normal cells into cancerous neoplastic cells may be induced by physical, chemical or biological agents. These agents are called carcinogens.
(ii) Ionizing radiations like X-rays and gamma rays and non-ionizing radiations like UV cause DNA damage leading to neoplastic transformation.
(iii) The chemical carcinogens present in tobacco smoke have been identified as a major cause of lung cancer.

(iv) Cancer causing viruses called oncogenic viruses have genes called viral oncogenes. Furthermore, several genes called genes called cellular oncogenes (co-onc) or proto oncogenes have been identified in normal cells which when activated under certain conditions, could lead to oncogenic transformation of the cells.

Detection and Diagnosis

Early detection of cancers is essential as it allows the disease to be treated successfully in many cases.

(a) Bone marrow biopsy and abnormal count of WBs in leukemia.
(b) Biopsy if tissue directly or through endoscopy. In biopsy, a piece of the suspected tissue cut into thin sections is stained is stained and examined under microscope (histopathological studies) by a pathologist.
(c) Pap test is used for detecting cancer of cervix and other parts of genital tract.
(d) X-rays using genital tract.
(e) CT (computed tomography) and MRI (magnetic resonance imaging) are very useful to detect cancers of the internal organs. Computed tomography uses X-rays to generate a three-dimensional image of the internals of an object.
(f) MRI uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue.
(g) Mammography is radiographic examination of breasts for possible cancer.
(h) Antibodies against cancer-specific antigens are also used for detection of certain cencers.
(i) Monoclonal antibodies coupled to appropriate radioisotopes can detect cancer specific antigens.
(j) Techniques of molecular biology can be applied to detect genes fin individuals with inherited susceptibility to certain cancers. Identification of such genes, which predispose an individual to certain cancers, may be very helpful in prevention of cancers. Such individuals may be advised to avoid exposure to particular carcinogens to which they are susceptible (e.g., tobacco smoke in case of lung cancer)

Treatment

(i) Sugery: It involves the removal of the entire cancerous tissue. However, all tumours are not accessible for surgical manipulation
(ii) Radiation: It involves the exposure of the cancerous parts of the body to X-rays lethally which destroy rapidly growing cells without harming the surrounding tissue.
(iii) Chemotherapy: It involves the administration of certain anticancer drugs. These drugs check cell division by inhibiting DNA synthesis. These drugs may be more toxic to cancerous cells than to normal cells. Some common drugs are vincristine and vinblastine (from Catharanthus roseus) and tetrathiomolybdate. Majority of drugs have the effect like hair loss, anemia.
(iv) Immunotherapy: One of the recent approaches of cancer treatment involves augmentation of natural anti-cancer immunological defence machanisms. Monoclonal antibodies have been used in various ways, e.g., radio immunotherapy. The patients are given substances called biological response modifiers such as α-interferon which activate their immune system and help in destroying the tumor.
(v) Most cancer are treated by combination of surgery, radiotherapy and chemotherapy. Research is in progress to develop cancer vaccines.

Adolescence

Adolescence means both ‘a period’ and ‘a process’ during which a child becomes mature in terms of his/her attitudes and beliefs for effective participation in society. The period between 12-18 years of age may be thought of as adolescence period. In other words, it is a bridge linking childhood and adulthood and is accompanied by several biological and behavioral changes. It is a very vulnerable phase of mental and psychological development of an individuals.

Alcohol abuse

The use of alcohol during adolescence may also have long term effects. It could lead to heavy drinking in adulthood. The chronic use of drugs and alcohol damages nervous system and liver (cirrhosis). The use of drugs and alcohol during pregnancy is also known to adversely affect the foetus.

Influence of friends for Alcoholism or Drug Addiction

Friends and peers initiate new comers to addiction for the sake of company as well as pooling of the resources. This can be avoided by

- Choosing friends and going out in the company of those who are not addicts
- Discussing way and means to counteract the pressure if any with family elders and teacher/counselor
- Telling the programme of outing to fa,o;u
- Keeping contact with family while outside home
- If one happens to get trapped to addiction, counseling and medical treatment must be sought without much delay.

Smoking

Tobacco

The tobacco was first smoked by Red Indians in America. It then spread to European countries in the early 1600s, and today a large part of the world population smoke and today a large part of the world population smoke tobacco, while some other chew it. Dried and cured leaves of plant 'Nicotiana tobacum' and N. rustica is smoked in the form of cigars, cigarettes, bidi etc. It is very toxic to the body.

Smoke of tobacco contains about 300 compounds. The main compounds are nicotine, CO, HCN, polycyclic aromatic hydrocarbons, certain other stimulating products. Statutory warning is present on the packing which warns against smoking and says how it is injurious to health. Yet smoking is very prevalent to society, both among young and old.

Effect of Nicotine

(a) Nicotine stimulates passage of nerve impulses, causes muscles to relax and causes the release of adrenaline and noradrenaline from adrenal gland. It increases both blood pressure and heart beat rate.
(b) Smoking produces a feeling of tranquility (calmness) and in some cases makes people alert and active.
(c) Nicotine is the major stimulatory component of tobacco products including cigarettes. It is highly poisonous. The amount present in one cigar can be fatal, if it is injected intravenously into a person. When smoked, about 10 percent of the smoke is inhaled.

Diseases caused by smoking

i. Cancer: Benzpyrene present in tobacco smoke is carcinogenic. About 95% victims of lung cancer are due to smoking. Cancer of urinary, bladder and throat is also associated with smoking. Reverse smoking causes oral cancer. Bidi smoking causes cancer of tongue, pharynx (throat), larynx, tonsils and oesophagus. Lip cancer is caused by ciger and pipes. Tobacco chewing leads to oral cancer.
ii. Cardio-vascular diseases
iii. Emphysema
iv. Coughing and Bronchitis
v. Pulmonary Tuberculosis
vi. Gastric and Duodenal Ulcers
vii. Reduction in immunity
viii. Decrease in oxygen carrying capacity of haemoglobin due to increase in carbon monoxide content in blood.
ix. Smoking also paves the way to hard drugs

Passive smoking Vs active smoking

- Passive smoking is inhaling of smoke produced by a person smoking tobacco (active smoking)
- While an active smoker inhales only 10% of the smoke, a passive smoker picks up nearly 100% of the same.
- Therefore, passive smoking is more dangerous then active smoking.

Drug(French Dorgue – a dry herb)

Drug is any substance or product that is used or is intended to be used to modify or explore physiological systems or pathological state for the benefit of the recipient.

Drug abuse

It is consumption of drugs for purpose other than their normal clinical use in an amount, concentration or frequency that impairs one's physical, physiological and psychological functioning. The habitual non-medical use of an addictive drug (drug dependence) often leads to altered consciousness and perception.

Physical dependence

If a habitual user discontinues taking a drug his body stops to function normally. A complex of unpleasant withdrawal symptoms and rebound are experienced. The withdrawal symptoms may range from mild tremors to convulsions, severe agitation and fits.

Psychological dependence

It stems from a craving. It is often much more difficult to overcome than physical dependence.

Substance abused is generally taken with alcohol or some medicines like aspirin. The combined use reduces efficacy of medicines and may cause severe complications.

Major categories of psychotropic drugs, their effects and clinical uses

Types of drug	Examples	Effects	Clinical uses
Sedatives and tranquillizers	Barbuturates Benzodiazepines	Depress brain activity, produce feeling of calmness, relaxation, drowsiness and deep sleep	Hypnotic and anti anxiety
Opiate narcotics	Opium, morphine, heroin, pethidine, methadone.	Suppress nervous system, make a person more wakeful, increase alertness and activity, produce excitement	Attention deficit, narcolepsy, weight control
Hellucinogens	ESD, charas, hashish, marijuana (bhangi), mescaline psilocybin	Alter thoughts, feeling perceptions and causes hallucinations	None

Commonly abused drugs are opioids, cannabinoids and coca alkaloids. These are obtained from flowering plants and some fungi.

Common name	**Botanical name**	**Parts of the plant from which the product is obtained**	**Product obtained**
Poppy plant (Opium poppy)	Papaver samniferum	Unripe capsules (fruits) or latex of plant	Opium (Afeem) and its derivatives (e.g. morphine, codeine, heroin, pethidine and methadone).
Hemp plant	Cannabis sativa	Leaves and flower tops and resin of plant	(i) Bhag (ii) Ganja (iii) Charas (iv) Marijuana
Cocca plant (Cocaine plant)	Erythroxylon	Leaves and young twigs	cocaine
Tea plant (a shrub)	Thea sinensis	Dried leaves	Tea (contain caffeine)
Coffee plant	Coffee Arabica	Dried seeds	Coffee (contain caffeine)
Coca plant (Small tree)	Theobroma cacao	Dried seeds	Coffee (contain caffeine)
Ergot fungus	Claviceps purpurea	Fruiting bodies	LSD

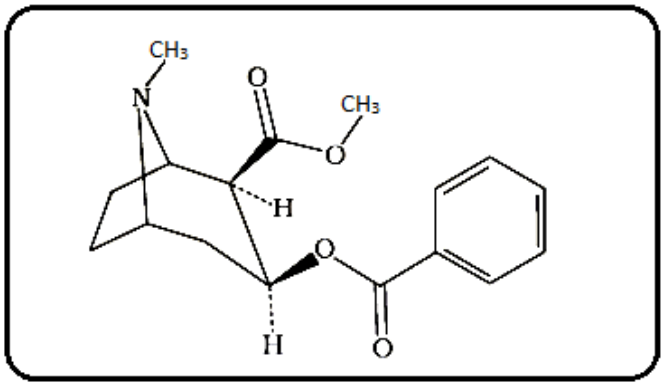
OPIOIDS

Opioids are commonly obtained from opium. It is dried latex of unripe capsules of poppy. Their receptors are present in our central nervous system and gastrointestinal tract.

Heroin commonly called smack is chemically diacetylmorphine which is a white, odourless, bitter crystalline compound. This is obtained by acetylation of morphine, while is extracted from the latex of poppy plant papaver somniferum.

Generally take by snorting and injection, heroin is a depressant and slows down body functions.

Opioids have narcotic, analgesic and sedative effect.



- Codeine is used in cough syrups.
- Morphine is widely used to relieve pain and induce sleep during serious injuries and surgeries.

Cannabinoids

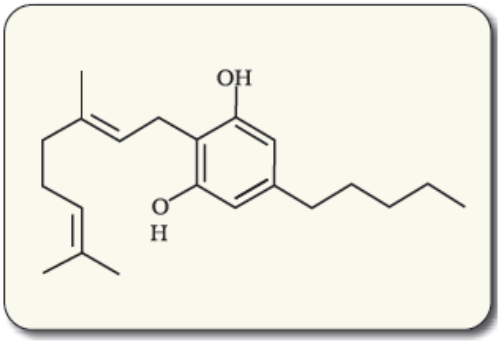
Natural Cannabinoids are obtained from the inflorescences of the plant **Cannabis sativa.** The flower tops, leaves and resin of **Cannabis** plant are used in various combinations to produce marijuana, hashish, charas and ganja. These are a group of chemicals, which interact with cannabinoid receptors present principally in the brain.

Mode of intake

These are generally taken by inhalation and ingestion, these are known for their effects on cardiovascular system of the body.

These days cannabinoids are also being abused by some sportspersons.

- Of the hemp preparations, marijuana is least potent and charas is the most potent.



Ban on cannabinoids

- Cannabinoids cause tachycardia (rapid heartbeat) decrease vital capacity of lungs, impair perception and delay responses

Coke or crack

Cocaine, commonly called coke or crack interferes with the transport of the neuro-transmitter dopamine. It is usually snorted and has a potent stimulating action on CNS and it produces a sense of euphoria and increase energy. Excessive dosage may lead to hallucinations.

Coca alkaloid or cocaine is obtained from coca plant Erythroxylum coca, which is a native of South America.

- Other well-known plants with hallucinogenic properties are Atropa belladonna and Datura.

Anabolic steroids

Certain sportspersons misuse anabolic steroids to enhance their performance. They misuse narcotic analgesics, anabolic steroids, diuretics and certain hormones in sports to increase muscle strength and bulk and to promote aggressiveness and as a result increase athletic performance.

Side effect of the use of anabolic steroids in males:

Masculinisation (features like males), increased aggressiveness, mood swings, depression, reduction of size of the testicles, decreased sperm production, breast enlargement, premature baldness and enlargement of the prostate gland.

Side-effect of use of anabolic steroids in adolescents: In the adolescent male or female, severe facial and body acne, and premature closure of the growth centres of the long bones may result in stunted growth.

- These effects may be permanent with prolonged use.

Important Points:

i. Drugs like barbiturates, amphetamines, benzodiazepines, LSD, opiates, anabolic steroids are often misused.
ii. Several plants, fruits and seeds with hallucinogenic properties have been used for hundreds of years in folk-medicine, religious ceremonies and rituals all over the globe.

Addiction and dependence

Drugs are frequently used repeatedly because of the perceived benefits. The most important thing is the inherent addictive nature of alcohol and drugs.

Addiction is a psychological attachment to certain effects such as euphoria and a temporary feeling of well-being associated with drugs and alcohol. These drive people to take them even when these are not needed, or even when their use becomes self-destructive.

With repeated use of drugs, the tolerance level of the receptors present in our body increase. The receptors respond only to higher doses of drugs or alcohol leading to greater intake and addiction.

Drugs even once take can be a fore-runner to addiction. The addictive potential of drugs and alcohol, pull the user into a vicious circle leading to their regular use. In the absence of any guidance or counseling, the person gets addicted and becomes dependent on their use.

- Patient ignores all social norms in order to get sufficient funds to satiate needs.

Effects of Drug / Alcohol Abuse

Immediate effects are in the form of reckless behavior, vandalism and violence.

Excessive does may lead to coma and death due to respiratory failure, heart failure or cerebral hemorrhage. A combination of drugs or their intake along with alcohol generally results in overdosing and even death.

The most common warning signs among youth include drop in academic performance, unexplained absence from school/ college, lack of interest in personal hygiene, withdrawal, isolation, depression, fatigue, aggressive and rebellious behavior, deteriorating relationships with family and friends, loss of interest in hobbies, change in sleeping and eating habits, fluctuations in weight, appetite, etc.

Addictive nature of alcohol and drugs, and their perceived benefits like relief from stress, a person may try taking these in the face of peer pressure, examinations related and competition-related stresses. In doing so, he/she may get addicted to them. Education about their harmful effects, counseling and seeking immediate professional and medical help would totally relieve the individual from these evils.

Short term effect and long term damages caused by drug and alcohol:

Short term effect	Long term damage
Feeling of intoxication and euphoria	Permanent damage to liver, kidney, lungs, cardio vascular system

Prevention and control

Smoking, taking drug or alcohol is more likely to be taken up at a young age, more during adolescence.
Parents and the teachers have a special responsibility to identify the situations that may push an adolescent towards the use of drugs or alcohol and to take remedial measures well in time.
Some of the measures are mentioned below.

i. Avoid undue peer pressure.
ii. Education and counseling.
iii. Seeking help from parents and peers.
iv. Looking for danger signs.
v. Seeking professional and medical help.

Important points

- **Secondary metabolism:** Metabolism required for the formation of secondary metabolites like pigments, antibiotics, drugs, toxins, lectins, essential oils is called secondary metabolism.
- Maintenance of personal and public hygiene is very important for prevention and control of many infectious diseases.
- Measures for personal hygiene include keeping the body clean; consumption of clean drinking water, food, vegetables, fruits, etc.
- Public hygiene includes proper disposal of waste and excreta; periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks and observing standard practices of hygiene in public catering.
- These measures are particularly essential where the infections agents are transmitted through food and water such as typhoid, amoebiasis and ascariasis.
- In cases of air-borne diseases such as pneumonia and common cold, in addition to the above measures, close contact with the infected persons or their belongings should be avoided.
- For diseases such as malaria and filariasis that are transmitted through insect vectors, the most important measure is to control or eliminate the vectors the most important measure is to control or eliminate the vectors and their breeding places. This can be achieved by avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets, introducing fishes like Gambusia in ponds that feed on mosquito larvae, spraying of insecticides in ditches, drainage areas and swamps, etc. in addition, doors and windows should be provided with wire mesh to prevent the entry of mosquitoes.
- Such precautions have become all the more important especially in the light of recent widespread incidences of the vector-boron (Aedes mosquitoes) diseases like dengue chikungunya in many parts of India.
- The advancements made in biological science have armed us to effectively deal with many infectious diseases.

- The uses of vaccines and immunization programmers have enabled us to completely eradicate a deadly disease like smallpox.
- A large number of other infectious diseases like polio, diphtheria, pneumonia and tetanus have been controlled to a large extent by the use of vaccines.
- Biotechnology is at the verge of making available newer and safer vaccines. Discovery of antibiotics and various other drugs has also enabled us to effectively treat infectious diseases.
- Addictive nature of alcohol and drugs, and their perceived benefits like relief from stress, a person may try taking these in the face of peer pressure, examinations-related and competition-related stresses. In doing so, he/she may get addicted to them. Education about their harmful effects, counseling and seeking immediate professional and medical help would totally relieve the individual from these evils.

EXERCISE - 1

1. Diseases which are easily transmitted from one person to other are
   (a) Infectious diseases
   (b) Communicable diseases
   (c) Degenerative diseases
   (d) Both (a) and (b)
2. Which of the following is not an infectious disease
   (a) AIDS
   (b) Allergy
   (c) Hepatitis B
   (d) Tetanus
3. Which disease is a major cause of death amongst non – infectious diseases
   (a) Heart failure
   (b) Kwashiorkar
   (c) AIDS
   (d) Cancer
4. Amongst infectious diseases, very high mortality rate lies with
   (a) Cancer
   (b) AIDS
   (c) Hepatitis A
   (d) Diabetes
5. Who disapproved the hypothesis of 'good humor'
   (a) William Harvey
   (b) Einstein
   (c) L. Pauling
   (d) L. Pasteur
6. Degenerative diseases occur due to
   (a) Malfunction of vital organs
   (b) Chromosomal aberrations
   (c) Infections
   (d) Deficiency of vitamins.
7. Which of the following disease is vector borne?
   (a) Typhoid
   (b) AIDS
   (c) Influenza
   (d) Malaria
8. Which of the following is not a prophylactic measure
   (a) Isolation
   (b) Vaccination
   (c) Eradication of vector
   (d) Taking antibiotics and preventive medicines
9. The disease spread by use of infected articles is categorised under
   (a) Vehicle borne
   (b) Air borne
   (c) Human carrier
   (d) Fomite borne
10. Pathogens can cause disease by
    (a) Interfering with normal vital activities
    (b) Release of toxins
    (c) Causing morphological anatomical damage
    (d) All of the above
11. Widal test is performed for
    (a) Diphtheria
    (b) TB
    (c) Typhoid
    (d) Malaria
12. The fungal agents infecting all i.e. skin, hair and nails are
    (a) Dermatophytes
    (b) Trichophyton
    (c) Microsporum
    (d) Epidermatophyton
13. Dermatophytes are
    (a) Group of closely related fungi
    (b) Variety of clinical conditions caused by fungi
    (c) Group of virus infecting the skin
    (d) Group of clinical conditions caused by viruses
14. Fungal infections are acquired
    (a) From soil
    (b) By use of infected clothes
    (c) By use of combs of infected person
    (d) All of the above
15. _____Conditions help the fungi to grow in skin folds.
    (a) Hot and humid
    (b) Cold and humid
    (c) Hot and dry
    (d) Cold and dry
16. The genera infecting skin and nails are
    (a) Epidermatophyton
    (b) Microsporum
    (c) Trichophyton
    (d) Both a and c
17. Ring worm are clinical conditions of

(a) Viral infections
(b) Fungal infections
(c) Bacterial infections
(d) Mixed infections

18. Influenza is caused by
(a) Arbovirus
(b) Polio virus
(c) Myxovirus
(d) Rhino virus

19. Polio virus cause damage primarily to
(a) Brain
(b) Spinal cord
(c) Leg nerves
(d) Eyes

20. What is common to Chikungunya and dengue?
(a) Both are water borne diseases
(b) Both are characterised by haemorrhage
(c) Both are caused by same vector
(d) Both have common symptoms

21. Which of the following are viral diseases of upper respiratory tract?
(a) Influenza and common cold
(b) Common cold and pneumonia
(c) Influenza and hydrophobia
(d) Diphtheria and pneumonia

22. A person complains of red watery eyes, skin rash, itching, burning, inflammation of air passage. Doctor would interpret it as a case of
(a) Dengue
(b) Influenza
(c) Measles
(d) either (b) or (c)

23. Which of the following is true for Polio?
a. Oral vaccine is not safe
b. Polio is incurable
c. It muscles of larynx and pharynx are involved in paralytic attack, it proves fatal
d. It is restricted to infants
(a) b & c
(b) c & d
(c) a, b, c
(d) a, b, c, d

24. Chickenpox and smallpox are
(a) Viral diseases
(b) Bacterial diseases
(c) Fungal diseases
(d) Protozoal diseases

25. An eruptive viral disease that has been completely eradicated through widespread and compulsory vaccination is
a. Polio
b. Measles
c. Small pox
d. Chicken pox
(a) b & d
(b) c & d
(c) a & c
(d) c only

26. Which of the following set represents the viral diseases?
a. Influenza, Tuberculosis, Common cold
b. Rabies, Polio, Flu, Enteric fever
c. Measles, Pneumonia, Diphtheria, Rabies
d. Mumps, Dengue, Chikungunya, Measles
(a) a & b
(b) d only
(c) b & c
(d) b & d

27. Viral diseases can be transmitted by
(a) Coming directly in contact with the patient
(b) Using articles soiled with saliva of the patient
(c) Oro – faecal route
(d) All of these

28. The proteins known as interferons provides protection to non infected cells from
(a) Protozoal infection
(b) Fungi infection
(c) Bacterial infection
(d) Virus infection

29. One of the most infectious human ailments caused by rhinovirus is
(a) Pneumonia
(b) Common cold
(c) Polio
(d) Measles

30. Dengue is transmuted by
(a) A mite
(b) A mosquito
(c) A flea
(d) A house fly

31. Entero virus causes
(a) Anteric fever
(b) Infantile paralysis
(c) Poliomyelitis
(d) Both (b) and (c)

32. An easily preventable viral disease with early symptoms like stiffening of neck and difficulty in chewing and swallowing is
(a) Polio
(b) Tetanus
(c) Pneumonia
(d) Both (a) and (b)

33. Which of the following is an air borne viral disease?
(a) Pneumonia
(b) Common cold
(c) Polio
(d) Dengue

34. Mycobacterium leprae cause
(a) Leprosy
(b) Tuberculosis
(c) Kusht rog
(d) Both (a) and (c)

35. Enteric fever is
(a) Cholera
(b) Typhoid
(c) Diphtheria
(d) Tuberculosis

36. Fever, chills, cough, headache, difficulty in breathing accumulation of mucous and lymph fluid in alveoli are caused due to infection of
(a) Streptococcus pneumoniae and Haemophilus influenzae
(b) Bordetella pertussis and Mycobacterium leprae
(c) Clostridium tetani and Salmonella typhi
(d) pasteurella pestis and Yersinia pestis

37. DPT vaccine is given for
(a) khali khansi
(b) Galghotu
(c) dhanustamba
(d) All fo these

38. Pneumonia can be caused by
(a) Bacteria like Streptococcus pneumoniae and virus Haemophilus influenza
(b) Bacteria like Diplococcus pneumnoniae and virus Haemophilus influenza
(c) Bacteria like streptococcus pneumoniae and Haemophilus influenza
(d) Both (a) and (b)

39. Which Is a correct different between polio and tetanus?

	Tetanus	**Polio**
(a) Causative agent	Bacteria	virus
(b) Transmitted by	Entry of spores Through wounds	
(c) Effect	Muscles Spasms	Muscles

(d) All are correct

40. Which of the following set of bacterial diseases are associated with respiratory system?
(a) Pneumonia, measles, diphtheria, pertussis
(b) Tuberculosis, pneumonia, typhoid, polio
(c) Pneumonia, tuberculosis, diphtheria, kali khansi
(d) Both (a) and (c)

41. Which of the following pathogens live in intestine?
(a) Vibrio cholera, Myxovirus
(b) Vibrio cholera, salmonella typhi
(c) Vibrio cholera, Salmonella, E. coli, Paramyxovirus
(d) Vibrio cholera, diarrheal pathogen, pasteurella pestis

42. If you keep the sanitary system around yourself sound then the diseases which will not most probably break out are
(a) cholera, diphtheria,
(b) cholera, deficiency diseases
(c) cholera, dysentery
(d) all of these

43. Just as Mary Mallon was to typhoid so is
(a) Anopheles to malaria
(b) Mycobacterium to leprosy
(c) Myxovirus to syphilis
(d) All of these

44. Which of these is not a probable consequence of infection by Haemophilus influenzae?
(a) Fever, chills, cough and headache
(b) Bluish lips and finger nails
(c) Reduced oxygenation of blood
(d) Abdominal cramps and constipation

45. Which of the following are correctly matched to their site of entry into human body?
(a) Salmonella typhi – respiratory system
(b)Streptococcus pneumoniae – digestive system
(c) Haemophilus influenzae – respiratory system
(d) Polio virus – respiratory system

46. Which of the following are bacterial diseases?
(a) Pneumonia, influenza, common cold
(b) Common cold, pneumonia, tuberculosis
(c) Pneumonia, tuberculosis, hepatitis
(d) None of these

47. Which of the following are bacterial diseases?

(a) Plague, Dysentery
(b) Diphtheria, Polio
(c) Common Cold, Plague
(d) Diphtheria, Plague, Malaria

48. In amoebiasis, which of the following conditions occur
(a) Constipation
(b) Stool with mucus
(c) Stool with blood
(d) All of these

49. Which of the following is correct w.r.t. Entamoeba histolytica?
a. Cramps, abdominal pain
b. Cramps, stools with excess mucous and blood
c. Female Anopheles acts as mechanical carrier
d. Parasite in large intestine
(a) a, b, c are correct
(b) a, b, d are correct
(c) a, c, d are correct
(d) a, b, c, d are correct

50. Symptoms of amoebiasis are
a. Stool with blood
b. Abdominal pain
c. Stool with mucus
d. Enlarged lymphatics
(a) a, b, c & d
(b) a, b & c
(c) a, b & e
(d) b, c & e

51. House flies act as mechanical carriers in transmission of
(a) Amoebiasis and Ascariasis
(b) Ascariasis and typhoid
(c) Ascariasis and cholera
(d) All of these

52. Entamoeba histolytica is
(a) Protozoan parasite in small intestine
(b) Protest parasite in large intestine
(c) Protozoan parasite in small & large intestine
(d) Protozoan parasite neither in small nor in Large intestine

53. Which life history stages of malarial parasites are likely to be found in the contents of mosquito gut immediately after it had drawn blood (before digestion) from the patient
(a) Sporozoite, schinzont and oocyst
(b) Trophozoite, merzoites and gametocytes
(c) Gametocytes, ookinete and schinzont
(d) Merzoites, ookinete and zygote

54. The infectious form of malarial parasite which enters into human body is
(a) Merzoites
(b) Crptozoites
(c) Cryptomerozoites
(d) Sporozoite

55. Introduction of fishes like Gambusia in ponds will not help to control spread of which insect borne diseases?
(a) Dengue
(b) Malaria
(c) Amoebiasis
(d) Chikungunya

56. What is true for the protozoan disease transmitted by the bite of Anopheles?
a. Causative agent of disease Is Trypanosoma.
b. Parasite lives in blood plasma
c. Parasite lives in RBCs
(a) a, b c
(b) c only
(c) a & b
(d) a & c

57. The malaria caused by Plasmodium _____is the most serious one and can even be fatal. The chill and high fever reclaiming every three to four days is due to release to toxic substance_____.
(a) Vivax, endotoxin
(b) Malaria, haemozoin
(c) Falciparum, haemozoin
(d) Ovale, endotoxin

58. Female Anopheles is a _____vector of _____disease
(a) Biological; malaria
(b) Biological: filarial
(c) Mechanical: malaria
(d) Physical: ascariasis

59. Complete the following using correct option "Ascaris lumbricoides enter the small intestine through ____and migrate to organs through _____".
(a) Contaminated articles, neurons
(b) Contaminated food and water, blood
(c) Contaminated syringes, blood
(d) Contaminated food and water, axon Terminals

60. Which of the following statements is correct?
(a) STDs can cause infertility and cancer of

Reproductive tract
(b) Use of IUDs can help control transmission of STD
(c) STD infection is highest in people in the age group of 30 – 40 years
(d) All of the STDs are completely curable

61. Consider the following statement concerning elephantiasis
a. It is also known as filariasis
b. The pathogen lives mainly in the lymphatics of the lower limbs
c. Genital organs and salivary glands are affected resulting in gross deformities
d. Pathogens are transmitted to a healthy person through the bite by the female mosquito
Which of the above statements are correct?
(a) a, b, c & d
(b) a, b & c
(c) a, b & d
(d) a, c & d

62. Symptoms like anaemia, fever, inflammation deformities etc. are associated with
(a) Amoebiasis
(b) Elephantiasis
(c) Giardiasis
(d) Enteritis

63. Complete the following using correct option oncosphere of Taenia enter the small intestine through _____and migrate to other organs through_____".
(a) Contaminated articles, neurons
(b) Contaminated food, blood
(c) Contaminated syringes, blood
(d)Contaminated food and water, axon terminals

64. Incorrect pair of venereal disease – causative agent and its nature is
(a) Genital Herpes – Human papilloma virus – virus
(b) Syphilis – Treponema pallidum – bacterial
(c) AIDS – HIV – Virus
(d) Trichomoniasis – Trichomonas vaginalis – protozoa

65. Which of the following STDs is curable if detected early?
(a) HIV infections
(b) Hepatitis B
(c) Genital herpes
(d) Syphilis

66. The early detection of STDs is hindered due to
(a) Asymptomatic conditions
(b) Social stigma
(c) Personal inhibitions
(d) All of these

67. Which of the following STDs are not completely curable?
(a) AIDS, Hepatitis B
(b) Genital, Herpes, AIDS
(c) AIDS, Chlamydiasis
(d) Both (a) and (b)

68. STDs can lead to
(a) PID
(b) Abortion
(c) Ectopic pregnancy
(d) All of these

69. Which of the following STDs is caused by the protozoan?
(a) Gonorrhoea
(b) Genital warts
(c) Trichomoniasis
(d) Herpes

70. AIDS is related to
(a) Deficiency of immune system
(b) Non – congenital diseases
(c) A group of symptoms
(d) All of these

71. AIDS was first reported in _____
(a) 1981, USA
(b) 1984, USA
(c) 1984, India
(d) 1986, India

72. Which one of the following is correct?
(a) AIDS is caused by HIV
(b) HIV is a member of arbovirus
(c) HIV has an envelope enclosing the DNA genome
(d) All are correct

73. Transmission of HIV infection generally occurs by
(a) Transfusion of contaminated blood
(b) Mere touch or physical contact
(c) Sharing infected needles
(d) Both (a) and (c)

74. HIV that causes AIDS, first start destroying
(a) Leucocytes
(b) Thrombocytes
(c) B – lymphocytes
(d) Helper T – lymphocytes

75. Choose the correct match

(a) HIV – T – helper lymphocytes reduction
(b) HIV – B – memory cells production
(c) HIV – T – helper lymphocyte formation
(d) HIV – not a deadly microbe

76. Incubating period of AIDS ranges between
(a) 2 months – 3 yrs
(b) 4 months – 5 months
(c) 6 months – 10 yrs
(d) 7 months – 2 yrs

77. AIDS day is celebrated on
(a) 5^{th} June
(b) 1^{st} December
(c) 11^{th} July
(d) 1^{st} October

78. AIDS is a
(a) Cancerous type of disease
(b) Bacterial disease
(c) Viral – borne disease
(d) Deficiency disease

79. AZT is used in treatment of
(a) Malaria
(b) AIDS
(c) TB
(d) Kala – azar

80. ELISA test is widely used for diagnosis of
(a) Cancer
(b) AIDS
(c) Myasthenia gravis
(d) SCID

81. AIDS can be transmitted by
(a) Embracing
(b) shaking hands
(c) Sexual intercourse
(d) All the above

82. ELISA is used to detect viruses where
(a) Southern blotting is done
(b) DNA probes are required
(c) Catalase is the key reagent
(d) Alkaline phosphatase is the key reagent

83. Which of the following statement is correct w.r.t. AIDS?
(a) HIV can be transmitted through eating food together with an infected person
(b) Drug addicts are least susceptible to HIV infection
(c) AIDS
(d) HIV is retrovirus and enter the lymphocytes thus reducing their number

84. "Don't die of ignorance" is a quotation used with
(a) Pandemic disease AIDS
(b) Bacterial disease AIDS
(c) Viral disease cancer
(d) Congenital disease nephritis

85. Incorrect statement is
(a) Cellular oncogenes are found in normal cells
(b) Oncogenic transformation is due to activation of proto – oncogenes
(c) Identification of genes in individuals with inherited susceptibility of cancer is not possible
(d) Carcinogens are cancer causing substances

86. In malignant tumors, the cells proliferate, grow rapidly and move to other parts of the body to form new tumors. This stage of disease is called
(a) Metagenesis
(b) Metastasis
(c) Teratogenesis
(d) Mitosis

87. Non – cancerous cells do not divide to form a tumour because of
(a) Oncogenic transformation
(b) Carcinogenesis
(c) Contact inhibition
(d) Metastasis

88. Choose the correct match
(a) Proto oncogenes – C – onc
(b) Ionising radiation – UV rays
(c) Non ionizing radiations – gamma rays
(d) Both (a) and (c) are correctly matched

89. Cell affected by leukemia are
(a) Plasma cells
(b) Thrombocytes
(c) Leucocytes
(d) Erythrocytes

90. Genes involved in cancer are
(a) Cancer genes
(b) Oncogenes
(c) Tumour genes
(d) Regulatory genes

91. Which type of cancer occurs in lymph nodes and spleen?
(a) Carcinoma
(b) Myeloma
(c) Leukemia
(d) Lymphoma

92. Sarcoma is cancer of
(a) Bone

(b) Adipose tissue
(c) Connective tissue and muscular tissue
(d) All the above

93. Metastasis is connected with
(a) Benign tumour
(b) Malignant tumour
(c) Both benign and malignant tumour
(d) crown gall tumour

94. Cancer is
(a) Air borne
(b) Viral disease
(c) Environmental disorder
(d) Cellular disease

95. Which one is carcinoma?
(a) Cancer of lymph gland
(b) Cancer of bone
(c) Cancer of blood
(d) Cancer of skin

96. Alpha interferons
(a) Activate immune system and help in destroying tumor
(b) Inactivate immune system and help in destroying tumor
(c) Activate immune system and inhibit growth of tumor
(d) Activate immune system and destroy carcinogens

97. Most of the cancers are treated by
(a) Chemotherapy
(b) Radiotherapy
(c) Surgery
(d) Chemotherapy, radiotherapy & surgery

98. Choose the incorrect match w.r.t. cancer diagnostic techniques
(a) Pap test – cervix cancer
(b) Mammography – breast cancer
(c) C.T. scan – pancreases
(d) MRI – leucocyte count

99. Cancer cells are damaged by radiations while others are not due to cancer cells
(a) Being starved
(b) Being different in nature
(c) Undergoing rapid division
(d) None of the above

100. Some protection is provided against carcinogens by
(a) Penicillin
(b) Aflatoxin
(c) Streptomycin
(d) tocopherol/vit. E

101. Treatment of cancer by x- rays or gamma rays is
(a) Radiotherapy
(b) Chemotherapy
(c) Hormone therapy
(d) Immunotherapy

102. One of the following is not cancer
(a) Carcinoma
(b) glaucoma
(c) Sarcoma
(d) Lymphoma

103. Cancer cells/cancer
(a) show contact inhibition
(b) do not follow regulatory mechanisms
(c) Can be detected by biopsy and histopathological studies
(d) Both (b) and (c)

104. All tomours are
(a) Accessible for surgical manipulation
(b) Not Accessible for surgical manipulation
(c) Cancerous
(d) Benign

105. Cancer specific antigens can be detected by
(a) Monoclonal antibodies
(b) Mammography
(c) CT scan
(d) MRI

EXERCISE - 2

1. Which of the following statements is correct?
   (a) 'Health' means absence of disease
   (b) 'Yoga' provides mental fitness
   (c) All human diseases can be prevented by maintaining personal hygiene
   (d) None of these
2. Degenerative diseases include
   (a) Kwashiorkar and marasmus
   (b) Emphysema and hay fever
   (c) Cardiac and renal failure
   (d) Asthma and anaphylactic shock
3. Congenital diseases are
   (a) Diseases present at birth
   (b) deficiency diseases
   (c) Spread from one individual to another
   (d) Those which occur during life
4. Cholera and typhoid are similar in that the causative organism for both
   (a) Is a virus
   (b) Is a bacteria
   (c) Affects lungs only
   (d) Damages all tissues
5. Select the correct statement pertaining to most of the pathogens.
   (a) Pathogens are parasites
   (b) Pathogens have to adapt to life within the environment of host
   (c) Pathogens interfere with normal vital activities causing functional damage
   (d) All fo these ar correct
6. Prophylaxis does not usually include
   (a) Vaccination and isolation
   (b) Education and eradication of vectors
   (c) Sanitation
   (d) Use of antibiotics
7. People eating at a local restaurant complain of sustained high fever, stomach pain, constipation and loss of appetite about a week after visiting the restaurant. It could be because of
   (a) contaminated food and water being supplied
   (b) A carrier of the disease working in the establishment
   (c) Improperly cooked food
   (d) Both a and b
8. A disease whose vector is an arthropod and pathogen is a virus is
   (a) chikungunya
   (b) Trachoma
   (c) Measles
   (d) Mumps
9. If one volunteers to work in an area where break bone fever has broken out, what precautions on must take?
   a. Use mosquito repellents
   b. Sleep in a mosquito net
   c. Take prophylactic vaccination
   d. Carry dispirin in case one gets the fever
   (a) a, b, c & d
   (b) a, b & c
   (c) a, b & d
   (d) a & b
10. Pain behind the eyes, severe frontal headache, measles like over chest and upper limbs and frequent vomiting with or without blood are features of
    (a) Tuberculosis
    (b) Dengue fever
    (c) Chikungunya
    (d) All of these
11. A person complains of fever, severe frontal headache and frequent vomiting with blood and measles like rash over chest and upper limbs. The doctor would advice him to
    (a) Take aspirin to reduce fever
    (b) Reduce intake of fluids to control vomiting
    (c) Use paracetamol to control body temperature
    (d) Both b and c
12. Match the diseases under column – I with their characteristics under column – II

Column – I		Column – II
a.	Small pox	p. 100% fatal
b.	Rabies	q. no sure cure
c.	Measles	r. Easily prevented
d.	Polio	s. Eradicated

    (a) a – s, b – p, c – r, d – q
    (b) a – p, b – s, c – r, d – q
    (c) a – s, b – p, c – q, d – r
    (d) a – q, b – r, c – s , d – p
13. Read the following statements and identify which are true for smallpox, chickenpox and measles

(a) Small pox has been eradicated from world but chicken pox still prevail
(b) Small pox and measles are viral diseases while chicken pox is not
(c) Small pox and chicken pox spread through contact and droplets while measles through contamination food
(d) All of these

14. Dengue fever and chikungunya
(a) Are Bacterial diseases
(b) Are not curable
(c) Have the same vector
(d) All of these

15. Which is not a correct difference between polio and tetanus?

	Tetanus	Polio
(a) Causative agent	Bacteria	Virus
(b) Transmitted by	Entry of spores Through wounds	Intestinal
(c) Affect	Muscle Spasms	Atrophy of Muscles
(d) Common name	Infantile Paralysis	lock jaw

16. The clinical conditions dermatophytes' are acquired from
(a) Soil
(b) Using towels of infected person
(c) Using clothes or comb of infected person
(d) All of these

17. A 40 year old man complained of intensely itching scaly lesions on his skin and scalp. The doctor recongised it as an infectious disease and advised him
a. To sleep in a dark and humid room
b. To keep a separate comb
c. Not to share his towel and clothes
(a) a and b
(b) b and c
(c) a and c
(d) a, b and c

18. Ringworm, one of the most common infectious diseases in man, is caused by
(a) Microsporum
(b) Trichophyton
(c) Epidermophyton
(d) All of the these

19. Ringworm infection can be acquired
a. From soil
b. By using towels/clothes of infected person
c. Oro – faecal route
d. Droplet infection
(a) a and b
(b) a and c
(c) b and c
(d) c and d

20. An easily preventable bacterial disease with early symptoms like stiffening of neck and difficulty in chewing and swallowing is
(a) Polio
(b) Tetanus
(c) Pneumonia
(d) Diphtheria

21. Identify the group containing bacterial diseases only
(a) Pneumonia, dysentery, plague, diphtheria
(b) Pneumonia, plague, diphtheria, malaria
(c) Pneumonia, plague, mumps, diphtheria
(d) Pneumonia, influenza, mumps, diphtheria

22. There are two pathogenic viruses, one with DNA and other with RNA. Which would mutate faster?
(a) DNA
(b) RNA
(c) Both DNA & RNA will mutate faster
(d) Intially RNA then DNA will mutate faster

23. Spores manufactured in intestine of horses and other animals may survive in the soil for 60 or more years. This statement is applicable to
(a) Diplococcus pneumoniae
(b) Salmonella typhi
(c) Clostridium tetani
(d) Yersinia pestis

24. Widal test is employed for detecting
(a) Elephantiasis
(b) Malaria
(c) Typhoid
(d) Cholera

25. Rehydration therapy is a must for
(a) Diarrhoea
(b) Cholera
(c) Both (a) and (b)
(d) Diarrhoea, cholera and tetanus

26. Entamoeba histolytica is a protozoan parasite living in
(a) Stomach
(b) Small intestine
(c) Large intestine
(d) Oesophagus

27. RNA is Quito labile because of the presence of
    (a) Uracil
    (b) Thymine
    (c) Adenine
    (d) Guanine
28. Which of the following diseases is known to affect nervous system?
    (a) Sleeping sickness
    (b) Poliomyelitis
    (c) Rabies
    (d) All of these
29. Which of the following diseases is known to affect nervous system?

Disease	Symptoms

    (a) Typhoid – Intestinal perforations
    (b) Amoebiasis – difficulty in breathing
    (c) Pneumonia – difficulty in expiration
    (d) Ringworm – muscular cramps
30. Which of the following statements w.r.t. life cycle of plasmodium is true?
    (a) Sporogony occurs in the salivary glands of Anopheles
    (b) Schizogony produces Sporozoite in the liver
    (c) Syngamy is anisogamous
    (d) Haemozoin granules are of unknown origin
31. Which of the following is a bacterial disease?
    (a) Rabies
    (b) Measles
    (c) Smallpox
    (d) Tuberculosis
32. Plasmodium falciparum causes
    (a) Malignant malaria
    (b) Pernicious malaria
    (c) Cerebral malaria
    (d) All of these
33. The mosquito, Anopheles is infective
    (a) Sometime after Sporogony
    (b) Before Sporogony
    (c) Sometime after Schizogony
    (d) In the ookinete stage
34. Plasmodium enters the human body as sporozoites and
    (a) Initially multiplies in liver cells and then attacks RBCs
    (b) Initially multiplies in RBCs and then attacks liver
    (c) Multiplies only in RBC
    (d) Multiplies only in liver cells
35. Which of these may be introduced in the water to control malaria?
    (a) Gambusia
    (b) Utricularia
    (c) Ducks
    (d) All of these
36. Introduction of insectivorous plants and larvaevorous fish in the water can help prevent the spread of
    (a) Flu
    (b) Typhoid
    (c) Malaria
    (d) Cholera
37. Transfer of Taenia to secondary host occurs as
    (a) Bladderwom
    (b) Morula
    (c) Onchosphere
    (d) Cysticercus
38. Ascaris and Wuchereria are similar in that both are
    (a) Intestinal parasites
    (b) Pathogenic helminths
    (c) Transmitted by female mosquito vectors
    (d) Both a & b
39. Tapeworm infection occurs amongst vegetarians through
    (a) Improperly cooked measly pork
    (b) Improperly washed raw vegetables
    (c) Fomite infection
    (d) Bite of insects
40. Common roundworm infecting human beings is
    (a) Ascaris lumbricoides
    (b) Enterovirus vermicularis
    (c) Ancylostoma duodenale
    (d) Wuchereria bancrofti
41. Sexually transmitted diseases
    (a) Are always caused by virus and protozoa
    (b) Are easily preventable by any form of contraception
    (c) Can be transmitted during sexual on intimate contact
    (d) All of these
42. Identify the group of sexually transmitted diseases which are not completely curable
    (a) HIV, Genital warts, syphilis
    (b) HIV, genital herpes, syphilis
    (c) Genital herpes, hepatitis B, HIV
    (d) Trichomoniasis HIV, Chlamydiasis
43. 80% Of all tomours are

(a) Sarcomas
(b) Melanomas
(c) Carcinomas
(d) Lymphomas

44. Transformation of normal cells into neoplastic cells can be induced by
a. Physical agents
b. Chemical agents
c. Biological agents
(a) b and c
(b) a and b
(c) a and c
(d) a, b and c

45. On the basis of histopathological studies a doctor suggested that a certain patient is suffering from cancer. What did he observes in the slide?
(a) Irregular nucleus with abundant granules
(b) Increase in number of lysosomes
(c) Reduction in mitochondrial cristae
(d) All of these

46. Propto – oncogenes
(a) Are present in normal cells
(b) Are inactive generally but are activated under certain conditions
(c) Can lead to oncogenic transformation of cells
(d) All the above

47. Cancer can be detected through various techniques. Which of the techniques uses non – ionising radiations?
(a) CT – scan
(b) Radiography
(c) MRI
(d) Mammography

48. Malignant tumours are different from benign tumours as these
(a) Remain localized
(b) Contain cells which have property of metastasis
(c) Contain slow dividing cells
(d) All of these

49. Cancer associated genes are called
(a) Retrogenes
(b) Cellular genes
(c) Ontogenies
(d) Oncogenes

50. Which of these are the treatments of cancer?
(a) Use of monoclonal antibodies
(b) Surgery
(c) Radio immunotherapy
(d) All of these

51. Which of the techniques can be used for detection of breast cancer?
(a) CT – scan
(b) Radiography
(c) MRI
(d) Mammography

52. Which of these is not a property of cancer cells?
(a) Need extracellular growth factors
(b) Have increased number of lysosomes
(c) Show more melanin and debris in cytoplasm
(d) Resist induction of cell death

53. Non – cancerous cell do not divide to form a tumour because of
(a) Oncogenic transformation
(b) Uncontrolled differentiation
(c) Contact inhibition
(d) Metastasis

54. Which of the following would not be an effective treatment for AIDS?
(a) Immunosuppressive therapy
(b) Anti – viral therapy
(c) Immunopotentiation
(d) None of these

55. One of these is applicable to the AIDS virus. Identify it.
(a) AIDS virus is a retro – virus and multiplies by reverse transcription
(b) HIV has high mutability
(c) HIV attacks both T – cells and macrophages
(d) All of these

56. Body is unable to mount an immune response against HIV because the virus
(a) Has very short incubation period
(b) Attacks the cells that are the key to the entries immune system
(c) Results in opportunistic infections
(d) Is directly transmitted into blood

57. Which of the following is not associated with AIDS?
(a) Incubation period of six days
(b) Zidovudine
(c) Westerin blot test
(d) Retrovirus

58. After getting into the body of a person, HIV enters into
(a) Macrophages

(b) Helper T – lymphocytes
(c) Both a and b
(d) B – lymphocytes

59. Immunosuppressive drugs may decrease the severity of symptoms of all the following except
(a) Myasthenia gravis
(b) Rheumatoid arthritis
(c) Graft – host reaction
(d) AIDS

60. Which of the following is most serious plasrnodium and can even be fatal?
(a) p, vivax
(b) P. malariae
(c) P. falciparum
(d) P. ovale

61. Plasmodium enters the human body as …….and through the bite of…..
(a) Cryptozoite, ♀ Culex
(b) Sporozoite, ♀ anopheles
(c) Sporozoite, ♂ anopheles
(d) Merozoite, ♀ Culex

62. Choose the right option

	Category	Examples	Exception
(a)	Infectious, diseases	Polio, tetanus cancer, AIDS	AIDS
(b)	Diseases which can be prevented by spraying of insecticides in ditches	Chikungunya, filariasis, Taeniasis, malaria	Taeniasis
(c)	Bacterial diseases	Plague, pneumonia, dengue, diphtheria	Plague
(d)	Bacterial diseases controlled by vaccination	Tetanus, polio, diphtheria, pneumonia	Diphtheria

63. Pair of diseases mainly spread by contaminated food and water are
(a) Diphtheria and cholera
(b) Typhoid and leprosy
(c) Cholera and typhoid
(d) Tetanus and Leprosy

64. Symptoms of Wuchereria bancrofti and W. malayi are
a. Chronic inflammation
b. Gross deformities
c. Abnormal genital organs
d. Dry scaly skin
(a) a, b & d
(b) a, b & c
(c) a, c & d
(d) a, b, c & d

65. Internal bleeding muscular pain, fever, anaemia & blockage intestinal passage are symptoms of
(a) Filariasis
(b) Ascariases
(c) Malaria
(d) Ascariasis and malaria

66. Diseases transmitted through insect vectors are
    (a) Filariasis and schistomiasis
    (b) Filariasis and malaria
    (c) Ancylostomiasis and malaria
    (d) All of the above
67. Which of the following are Vector borne diseases
    a. Dengue
    b. Chikungunya
    c. Ascariasis
    d. Ringworm
    e. Filariasis
    (a) a, b & e
    (b) b, c & d
    (c) a, b & d
    (d) a & b
68. Which of the following diseases have been controlled by the use of vaccines?
    (a) Polio, pneumonia and malaria
    (b) Polio, pneumonia and tetanus
    (c) Filariasis, pneumonia and tetanus
    (d) Filariasis, pneumonia and malaria
69. Mature infective stages, Sporozoite of plasmodium migrates from
    (a) Liver to RBC of man
    (b) Stomach to salivary gland of mosquito
    (c) Salivary gland to stomach of mosquito
    (d) RBC to liver of man
70. Which of the following helminthes infect people who move barefooted & where hygiene is neglected
    (a) Wuchereria
    (b) Taenia
    (c) Ancylostoma
    (d) Ascaris
71. Which of the following are symptoms of typhoid?
    a. Sustained high fever
    b. Weakness
    c. Stomach pain
    d. Constipation & intestinal perforation
    e. Headache, anorexia
    (a) a, b, c & d
    (b) a, b, c, d & e
    (c) a, b & d
    (d) a, b, c & e
72. A healthy person can get the infection of pneumonia by
    (a) Inhaling the droplets
    (b) Sharing glasses/utensils
    (c) Fomite method
    (d) All of these
73. What is true for common cold?
    (a) Caused by rhinovirus and affects lung only
    (b) Caused by Rhinovirus and infect nose and respiratory passage but not lungs
    (c) Caused by Rhinoviruses and infect respiratory system
    (d) Caused by the rarest virus and attack respiratory system
74. A disease which may be associated with blue colour of fingers and nails is
    (a) Pneumonia
    (b) Diphtheria
    (c) Tuberculosis
    (d) All of these
75. The causative agent of Dysentery, plague & diphtheria can be
    (a) Bacteria
    (b) Virus
    (c) Nutritional component
    (d) Chlamydias
76. Viral diseases are
    (a) Tetanus, leprosy, rabies, polio
    (b) Rabies, polio
    (c) Tetanus, rabies, mumps
    (d) Rabies, polio, leprosy
77. Haemophilus influenza is a
    (a) Virus that causes influenza
    (b) Bacteria that causes pneumonia
    (c) Virus that causes pneumonia
    (d) Both (a) & (c)
78. Term syndrome stands for
    (a) Group of disease symptoms
    (b) Particular kind of deficiency disease
    (c) A disease indicating deficient immune system
    (d) None of these
79. AIDS is
    (a) Congenitally acquired deficiency of immune system caused by enzyme deficiency
    (b) acquired deficiency of immune system in the life time
    (c) Transplacental acquired deficiency of immune

(d) Deficiency of immune system either natural or acquired caused by bacteria

80. Transmission of HIV does not occur by
(a) Transfusion of blood
(b) Sharing infected needles in case of drug abuser
(c) Infected mother to foetus
(d) Sharing utensils and shaking hands

81. Spreading of AIDS is mainly through
(a) Physical touch
(b) Kissing
(c) Body fluids
(d) Sweat

82. The time lag between the infection and appearance of AIDS syndrome may vary from
(a) Few month to 1 year
(b) Few months or days
(c) Few months to 5 years
(d) 6 Months 20 years

83. The target cells of HIV in body are
(a) T – helper cells & T – killer cells
(b) Macrophages & T – killer cells
(c) T – helper cells & B – lymphocytes
(d) T – helper cells & macrophages

84. Cancer cells just continue to divide as they do not
(a) Follow regular growth pattern mechanism
(b) Follow property of contact inhibition
(c) Follow regulated growth and differentiation
(d) All of above

85. Pap smear test is for the detection of
(a) Cancer of cervix
(b) Breast cancer
(c) Leukemia
(d) Melanoma

86. The immune response of body is not effective against malignant cells as
(a) They do not follow contact inhibition
(b) They have high proliferation capacity
(c) The avoid detection & destruction by immune system
(d) They have neoplastic transformations

87. Which of these are affects of smoking?
(a) Increased incidence of cancers of lung, urinary bladder & throat
(b) Emphysema, bronchitis, gastric ulcer & coronary heart disease
(c) Reduction of haem bound oxygen causing oxygen deficiency in the body
(d) All of these

88. What is not applicable to tobacco?
(a) It is chewed, smoked & used as a snuff
(b) It is addictive in nature
(c) Smoking tobacco in moderation lowers incidence of heart disease
(d) Tobacco addict requires counselling & medical help to get rid of the habit

89. Adolescence is a period & a process during which one becomes mature in terms of ones beliefs & attitudes. It is between the age of
(a) 12 – 18 years
(b) 9 – 13 years
(c) 18 – 21 years
(d) 21 – 25 years

90. Psychological attachment to euphoria & a temporary feeling of well being associated with drugs & alcohol is called
(a) Drug abuse
(b) Withdrawal effect
(c) Withdrawal syndrome
(d) Addiction

91. Identify the statement relevant to 'dependence'
(a) It is the tendency of body to manifest unpleasant & Characteristic with drawl syndrome in case of abrupt increase in dose of the drug
(b) It is characterised by euphoria
(c) Anxiety, shakiness, nausea & sweating are Some symptoms elicited in absence of drug
(d) All of these

92. Vandalism, reckless behaviour & violence are the immediate adverse effects of
(a) Chewing tobacco
(b) Drugs & alcohol abuse
(c) Steroid dependence
(d) Smoking cigarettes

93. A 20 years old boy with lack of interest in personal hygiene & unexplained absence from collage is found dead. Autopsy reveals respiratory failure to be the cause of his death. It was most probably due to
(a) Discontinuation of nicotine consumption
(b) lowered immunity
(c) Excessive does of drugs
(d) Sudden discontinuation of drugs

94. Chronic & fatal infections transferred from one person to another by sharing needles & syringes are

(a) Tuberculosis & AIDS
(b) Hepatitis B &AIDS
(c) Hepatitis B & Tuberculosis
(d) Pneumonia & AIDS

95. Misuse of narcotic analgesics, anabolic steroids & some hormones by certain sports person
(a) Increases aggressiveness
(b) Increases muscles strength & bulk
(c) Increases athletic performances
(d) Causes all of these

96. In adolescent male or female, misuse of anabolic steroids results in stunted growth due to
(a) Increased muscle mass & strength
(b) Decreased muscle mass & strength
(c) Premature closure of growth centres of long bones
(d) Severe facial & body acne

97. How many of these are likely to be consequences of smoking tobacco?
Cancer of urinary bladder, emphysema, gastric ulcers, pulmonary tuberculosis, coronary heart disease, bronchitis, cancer of lung.
(a) Seven
(b) Six
(c) five
(d) Four

98. Match the name of drug under column – I with its source under column – II

Column – I	Column – II
i. Heroin	a. Erythroxylum coca
ii. Charas	b. Papaver somniferum
iii. Cocaine	c. Cannabis sativa

(a) I – b, ii – c, iii – a
(b) I – b, ii – a, iii – c
(c) I – a, ii – b, iii – c
(d) I – a, ii – c, iii – b

99. Hashish, marijuana, Charas & ganja are all obtained from
(a) Leaves of Cannabis
(b) Flower tops of Cannabis
(c) Resin of Cannabis
(d) Various combinations of 1 – 3

100. An alkaloid obtained from a plant native of South America, interfering with transport of dopamine is
(a) Morphine
(b) Heroin
(c) Cocaine
(d) Charas

101. What is common to Atropa Belladona, Datura & Erythroxylum coca?
(a) Yield cannabinoids
(b) Depressant effect
(c) Hallucinogenic property
(d) Analgesics

102. Identify the drug correctly matched to its property
(a) Heroin – Hallucinogen
(b) Morphine – analgesic
(c) Cocaine – depressant
(d) Marijuana – stimulant

103. An effective sedative & painkiller in patients who have undergone surgery is
(a) Amphetamine
(b) Barbiturates
(c) Benzodiazepine
(d) Morphine

104. Which of the following drugs is correctly matched to its medicinal use?
(a) Barbiturates – Insomnia
(b) Cocaine – analgesic
(c) Heroin – depression
(d) All are correctly matched

105. HIV decreases natural immunity of the body by
(a) Destroying B – cells
(b) Attacking T c cells
(c) Attacking suppressor T cells
(d) Attacking T_H –lymphocytes

106. The term 'Health' is defined in many ways. The most accurate definition of the health would be.
(a) Health is the state of body and mind in a balanced condition
(b) Health is the reflection of a smiling face
(c) Health is a state of complete physical, mental and social well – being
(d) Health is the symbol of economic prosperity.

107. The organisms which cause diseases in plants and animals are called:
(a) Pathogens
(b) Vectors
(c) Insects
(d) Worms

108. If you keep the sanitary system around yourself sound then the diseases which will not most probably break out are
(a) Cholera, diphtheria
(b) Cholera, deficiency diseases
(c) Cholera, dysentery

(d) All of these

109. Diseases are broadly grouped into infectious and non – infectious diseases. In the list given below, identify the infectious diseases.
   i. Cancer
   ii. Influenza
   iii. Allergy
   iv. Small pox
   (a) I and ii
   (b) ii and iii
   (c) iii and iv
   (d) ii and iv
110. Sporozoites that cause infection when a female Anopheles mosquito bites a human being are present in
   (a) Liver of human
   (b) RBCs of mosquito
   (c) Salivary glands of mosquito
   (d) Intestine of human
111. The disease chikungunya is transmitted by:
   (a) House flies
   (b) Aedes mosquitoes
   (c) Cockroach
   (d) Female Anopheles
112. Many diseases can be diagnosed by observing the symptoms in the patient. Which group of symptoms are indicative of pneumonia?
   (a) Difficulty in respiration, fever, chills, cough, headache
   (b) Constipation, abdominal pain, cramps, blood clots
   (c) Nasal congestion and discharge, cough, sore throat, headache
   (d) High fever, weakness, stomach pain, loss of appetite and constipation
113. The genes causing cancer are:
   (a) Structural genes
   (b) Expressor genes
   (c) Oncogenes
   (d) Regulatory genes
114. In malignant tumors, the cells proliferate, grow rapidly and move to other parts of the body to form new tumors. This movement is called
   (a) Metagenesis
   (b) Metastasis
   (c) Teratogenesis
   (d) Mitosis
115. When an apparently healthy person is diagnosed as unhealthy by a psychiatrist, the reason could be that:
   (a) The patient was not efficient at his work
   (b) The patient was not economically prosperous
   (c) The patient shows behavioural and social mal adjustment
   (d) He does not take interest in sports
116. A statement which is not true of AIDS is
   (a) There is always a time lag between the infection and appearance of AIDS symptoms
   (b) It is not spread by mere touch
   (c) It is a congenital disease i.e. spread all over the world
   (d) Intravenous drug abusers sharing infected
117. AIDS is caused by HIV. Among the following, which one is not a mode of transmission of HIV?
   (a) Transfusion of contaminated blood
   (b) Sharing the infected needles
   (c) Shaking hands with infected persons
   (d) Sexual contact with infected persons
118. 'Smack' is a drug obtained from the:
   (a) Latex of papaver somniferum
   (b) Leaves of cannabis sativa
   (c) Flowers of Datura
   (d) Fruits of Erythroxylum coca
119. Tobacco consumption is known to stimulate secretion of adrenaline and nor – adrenaline. The component causing this could be:
   (a) Nicotine
   (b) Tannic acid
   (c) Curaimin
   (d) Catechin
120. Haemozoin is
   (a) A precursor of hemoglobin
   (b) A toxin from Streptococcus
   (c) A toxin from Plasmodium species
   (d) A toxin from Haemophilus species
121. Which is not the causal organism for ringworm
   (a) Microsporum
   (b) Trichophyton
   (c) Epidermophyton
   (d) Microsporum
122. A person with sickle cell anemia is
   (a) More prone to malaria
   (b) More prone to typhoid
   (c) Less prone to malaria
   (d) Less prone to typhoid

123. The immune system of a person is suppressed. In the ELISA test, he was found positive to a pathogen. From the given options, identify the disease, causative organism and the cells of body which are affected.
(a) AIDS, HIV, T_c cells
(b) Typhoid, salmonella, intestinal cells
(c) Malaria, plasmodium, liver cells
(d) AIDS, HIV, T_H −cells

124. Find incorrect match among the following
(a) Virus – Common cold
(b) Salmonella – Typhoid
(c) Microsporum – Filariasis
(d) Plasmodium – Malaria

125. What will happen if a regular does of drug or alcohol is not provided to an addicted person?
(a) Nothing will happen
(b) He will show withdrawl symptoms
(c) Anxiety, sweating, nausea and shakiness will be felt
(d) Both (b) & (c)

126. Identify A, B, C & D respectively from the given options

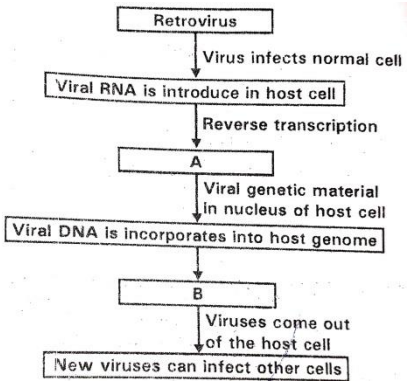
Name of the disease	Causative organism
i. A	Trichophyton
ii. Typhoid	B
iii. C	Rhino viruses
iv. Filariasis	D

(a) Dermatophytes, Clostridium, Flu, Wuchereria bancrofti
(b) Ringworm, Salmonella typhi, common cold, Wuchereria bancrofti
(c) Tinea, Bacillus typhi, Influenza, Ascaris
(d) Ringworm, Salmonella typhi, Common cold, Ancylostoma

127. Antiretroviral therapy is advised to the patient who is suffering from
(a) Cancer
(b) AIDS
(c) Malaria
(d) Tetanus

128. Metastasis is the most feared property of
(a) Benign tumors
(b) Localised tumors
(c) Malignant tumors
(d) Non malignant tumors

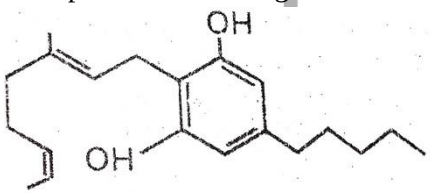
129. Identify A & B from the following flow chart respectively



(a) Viral DNA produced, new viral RNA produced
(b) Viral RNA produced, new viruses produced
(c) Host DNA produced, new RNA produced
(d) Host RNA produced, New viral RNA produced

130. Which among the following is correct w.r.t. secondary metabolites of plants?
(a) Many have medicinal properties
(b) Their misuse create problems
(c) Morphine & codeine are examples of secondary metabolites
(d) All the above are correct

131. Identify the given structure, its mode of consumption and the system of body affected consumption of these drugs.



(a) Morphine, orally, respiratory system
(b) Cannabinoids, inhalation and orally, cardio vascular system
(c) Amphetamine, inhalation, cardiovascular system
(d) Cannabinoids, orally, digestive system

132. Which among the following technique uses strong magnetic field and non – ionising radiations to detect cancer?
(a) CT
(b) MRI
(c) Sonography
(d) All of above

133. Hepatitis B vaccine is produced from transgenic
    (a) Bacteria
    (b) Virus
    (c) Yeast
    (d) Plants
134. The normal cells attain cancerous nature by
    (a) Losing the property of the contact inhibition
    (b) Acquiring the property of the contact inhibition
    (c) Exposure to physical chemical or biological carcinogens
    (d) Both (a) and (c)

ANSWER KEY

EXERCISE – 1

Ques.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ans.	d	b	d	b	a	a	d	d	d	d
Ques.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Ans.	c	b	a	d	a	d	b	c	b	c
Ques.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
Ans.	a	c	a	a	d	b	d	d	b	b
Ques.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Ans.	d	a	b	d	b	a	d	c	d	c
Ques.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
Ans.	b	c	a	d	c	d	a	d	b	b
Ques.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
Ans.	d	b	b	d	c	b	c	a	b	a
Ques.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
Ans.	c	b	b	a	d	d	d	d	d	d
Ques.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
Ans.	a	a	d	d	a	c	b	c	b	b
Ques.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
Ans.	c	d	d	a	c	b	c	a	c	b
Ques.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
Ans.	d	d	b	d	d	a	d	d	c	d
Ques.	101.	102.	103.	104.	105.					
Ans.	a	b	d	b	a					

EXERCISE – 2

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