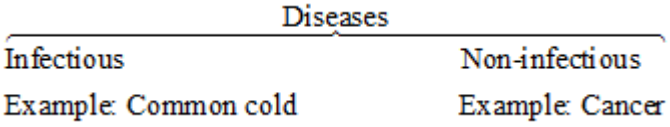
Human Health and Disease

- **Disease** is characterised by various signs and symptoms.



Infectious diseases

- It spreads through infectious agents that include bacteria, viruses, protozoans and fungi.
- **Bacterial diseases**
- **Typhoid fever:** *Salmonella typhi*; Widal test is used for confirmation of typhoid
- **Pneumonia:** *Streptococcus pneumoniae and Haemophilus influenzae*; it infects the alveoli of lungs
- Other examples include **dysentery, plague, diphtheria**
- **Viral diseases**
- **Common cold:** Spreads through Rhino viruses
- **Protozoan diseases**
- **Malaria:** Pathogen is *Plasmodium*; malarial parasite requires two hosts: humans and female anopheles mosquito; malarial parasite reproduces asexually in the human host while in the mosquito host it reproduces sexually
- **Amoebiasis (amoebic dysentery):** *Entamoeba histolytica*
- **Helminthes diseases**
- **Ascariasis:** Pathogen is *Ascaris*
- **Elephantiasis or filariasis**: Pathogen is *Wuchereria bancrofti*
- **Fungi**
- **Ringworms:** Caused by fungi which belong to genera *Microsporum*, *Trichophyton* and *Epidermophyton*

- **Immunity**
- Ability of the body to fight infectious agents
- On the basis of the immunity possessed by the body, immunity can be innate immunity and acquired immunity.
  - **Innate immunity** is a non-specific type of defence mechanism.
  - It has four types of barriers –
    - **Physical barrier:** Example, skin covering of the body, secretion of mucous in the respiratory tract
    - **Physiological barrier:** Example, acid in the stomach, tears from the eyes
    - **Cellular barrier:** Example, monocytes and lymphocytes in blood
    - **Cytokine barrier:** Example, interferon
  - **Acquired immunity** is a specific type of defence mechanism. It shows two types of responses: primary response and secondary response.
  - **It involves two types of lymphocytes –**
    - **B lymphocytes:** Show humoral immune response
    - **T lymphocytes:** Show cell mediated immunity (CMI)
- On the basis of production of antibodies, immunity can be further categorised as –
  - **Active immunity:** Body produces its own antibodies against antigens
  - **Passive immunity:** Readymade antibody is transferred from one individual to another Colostrum (contains antibodies IgA) is an example of passive immunity provided by the mother to her child.
- **Vaccination:** It is the protection of the body from communicable diseases by administration of agents (called vaccines) that mimic the microbes. Vaccines are available against tetanus, polio, etc.
- **Antibodies:** Special, proteinous chemicals produced by B-lymphocytes present in our blood, in response to the entry of any foreign pathogen on our body.

AIDS (Acquired immunodeficiency syndrome)

- It can spread –

- through sexual contact with the infected person
- from the mother to her child, through the placenta
- infected blood transfusion
- by the use of infected syringe
- It is caused by HIV virus (a retro virus) and has RNA as genetic material. HIV stands for Human Immunodeficiency Virus.
- When HIV virus enters the host cell, the viral RNA gets converted into viral DNA, which gets incorporated into the host DNA and starts producing new virus particles.
- Diagnostic test for AIDS: ELISA (enzyme-linked-immunosorbent serologic assay)

Treatment –No permanent cure; antiretroviral therapies can prolong the life of patient

Prevention of AIDS

- Ensuring use of disposable syringes
- Screening blood from blood banks
- Advocating safe sex

Cancer

- Tumour caused by abnormal and uncontrolled cell division. It is of two types –
  - **Benign tumour:** Remains confined to a particular location and does not spread
  - **Malignant tumour:** Cells divides and invades new locations by getting transported through blood to distant sites
- **Metastasis:** Property of malignant tumour to invade the distant body parts, thereby initiating formation of new tumours.
- **Carcinogen:** Cancer-causing agents; e.g., X-rays, UV rays
- **Cancer detection and diagnosis:** Techniques involved are radiography, computed tomography and magnetic resonance imaging.
- **Treatment of cancer:** Involves techniques like radiotherapy, chemotherapy and immunotherapy.

Drugs and alcohol abuse includes –

¬ Opioids: Example, Heroin (extracted from Papaver somniferum)

¬ Cannabinoids: Example, marijuana, hashish, charas, ganja (obtained from Cannabis sativa), cocaine (obtained from Erythroxylum coca)

- **Adolescence and Drug abuse**

  Adolescence is the period during which the child becomes matured.
  It is between 12 – 18 years of age.

- **Causes of drug abuse –**

  ¬ Curiosity
  ¬ Adventure
  ¬ Excitement
  ¬ Experimentation
  ¬ Stress or pressure to excel in examination

- **Effects of drug/alcohol abuse –**

  ¬ Reckless behaviour
  ¬ Malicious mischief
  ¬ Violence
  ¬ Drop in academic performance
  ¬ Depression, isolation, aggressiveness, etc.

- **Prevention and control –**

  ¬ Avoid pressure
  ¬ Counselling and education
  ¬ Take help from parents and peers
  ¬ Take professional and medical help