

## Medical Parasitology

**Parasitology** is the area of biology concerned with the phenomenon of dependence of one living organism on another.

**Medical parasitology** deals with the parasites which infect man, the disease they produce, the response generated by him (man) against them (parasites), and various methods of diagnosis, prevention and treatment.

**Parasites** are one of the five ( P's ) constituting " Nature's Hangmen " , other four include Pathogens , Parasitoids , Pest , and Predators . A parasite is an organism that is entirely dependent on another organism, the term parasite can be applied to infectious agent but, by convention, it is generally restricted to infections caused by protozoa and helminthes and excluded the viruses, bacteria and fungi.

### **Parasite is of two types;**

\***Microparasite:** It is small, unicellular and multiplies within its vertebrate host, often inside cells. Protozoa are microparasites.

\* **Macroparasite:** It is large, multicellular and has no direct reproduction within its vertebrate host. This category includes helminthes .

**On the basis of their location** , there are several types of parasites.

**Ectoparasite** - a parasite that lives on the host's surface , examples include some mites and hair and body lice . The infection by these parasites is known as infestation.

**Endoparasite** - one that lives inside the host, examples include heartworm, tapeworm, and flatworms. One that inhabits the spaces inside the host's body is an intercellular parasite, while an intracellular

parasite inhabits the cells of the host's body, these include bacteria or viruses , The invasion by these parasites is known as infection **Epiparasite** - This one feeds on another parasite , a relationship known as hyperparasitism . A flea which lives on a dog may have a protozoan in its digestive tract, the protozoan is the hyperparasite.

**Parasitoid**- the larval development takes place in / on another organism, the host usually dies. In this case there are characteristics of predation, because the host dies.

### Further subdivided of parasites into the following types:

- 1- **Obligate parasites:** Organisms cannot exist without a host (eg *Toxoplasma gondii*)
- 2- **Facultative parasites:** Organisms that under favorable circumstances may live either a parasitic or free-living existence (eg *Naegleria fowleri*).
- 3- **Accidental parasites:** Organisms that attack an unusual host (e.g. *Echinococcus granulosus* in man).
- 4- **Aberrant parasites :** Organisms that attack a host where they cannot live or develop further ( e.g. *Toxocara canis* in man ).
- 5- **Free-Living:** The term free-living describe the non parasitic existence which are lived independently of a host (eg hookworms have active free-living stages in the soil.

**HOST** It is defined as an organism which harbors the parasite and provides the nourishment and shelter to the latter.It is following types:

- 1-**Definitive host:**the host which harbor the adult parasite ,where the parasite replicate sexually.

**2-Intermediat host:** this is the host which alternates with the definitive host and harbor the larval or asexual stages of parasite. some parasites require two intermediate hosts for completion of their life cycle

**3- Paratenic host:** It is a host in which larval stage of a parasite survives but does not develop further. part of the life cycle

**4- Reservoir host:** It is a host that harbors the parasite and serves as an important source of infection to other susceptible host.

**5- Compromised host:** It is a host in whom normal defense mechanism are impaired ( e.g. AIDS ), or absent ( e.g. congenital deficiencies ), Such hosts are extremely susceptible to a variety of common as well as opportunistic

## Host - Parasite Relationships

Host - parasite relationships are of the following types:

**Symbiosis** An association in which both host and parasite are so dependent upon each other that one cannot live without the help of the other. Neither of the partners suffers from any harm from this association .

**Commensalism:** An association in which only parasite derives benefit without causing any injury to the host. A commensal lives on food residues or waste products of the body and is capable of leading an independent life.

**Parasitism:** Parasitism is a relationship in which a parasite benefits and the host provides the benefit. The host gets nothing in return and always suffers from some injury . The degree of dependence of a parasite on its host varies. addicts

## Sources of infections:

Parasitic infections originate from the following sources:

- 1- **Contaminated soil and water:** Soil polluted with human excreta acts as a source of infection with *Ascaris lumbricoides*, *Trichuris trichiura*, *Ancylostoma duodenale*, *Necator americanus* and *Strongyloides stercoralis* eggs of these parasites undergo certain development in the soil. These are known as soil transmitted helminthes. Water polluted with human excreta may contain viable cyst of *Entamoeba histolytica*, *Giardia lamblia*, *Balantidium coli*, eggs of *Taenia solium*, *Hymenolepis nana*, and the infective cercarial stage of *Schistosoma haematobium*, *S.mansoni* and *S.japonicum*.
- 2- **Fresh water fishes:** Constitute the source of *Diphyllobothrium latum* and *Clonorchis sinensis*.
- 3- **Crab and crayfishes:** Are the source of *Paragonimus westermani*.
- 4- **Raw or undercooked pork:** Is the source of *Trichinella spiralis* and *T.solium*
- 5- **Raw or undercooked beef:** Is the source of *T. saginata*, *Toxoplasma gondi*
- 6- **Watercress:** Is the source of *Fasciola hepatica*
- 7- **Blood - sucking insects:** Transmit *Plasmodium spp.*, *Wuchereria bancrofil*, *Trypanosoma cruzi*, *Leishmania spp.*
- 8- **Housefly (Mechanical carrier)** is the source of *Entamoeba histolytica*
- 9- **Dog:** Is the source of *Echinococcus granulosus* and *Toxocara canis*
- 10- **Cat:** Is the source of *Toxoplasma gondii*.
- 11- **Man:** Is the source of *E.histolytica*, *Giardia lamblia*, *Entrobilus vermicularis* and *Hymenolepis nana*.
- 12- **Autoinfection** : May occur with *E.vermicularis* and *Strongtloides stercoralls* leading to **hyperinfection**.

### Portal of entry into the body

**1-Mouth:** The commonest portal of entry for parasites is oral, through contaminated food, water, or soiled finger,

**2-Skin:** Entry through skin is another important portal of entry for parasites , larvae of certain nematodes penetrate the unbroken skin of an individual walking over faecally contaminated soil, others are introduced percutaneously when blood- sucking arthropods puncture the skin to feed

3 - **Sexual contact:** Tricchomonas vaginalis is transmitted by sexual contact

4- **Kissing :** Entamoeba gingivalis is transmitted from person - to - person by kissing or from contaminated drinking utensils.

5- **Conginital:** Infection with Toxoplasma gondii and plasmodium spp. May be Transmitted from mother to foetus transplacentally .

6 - **Inhalation:** Airborne eggs of Entrobisus vermicularis may be inhaled into posterior pharynx leading to infection.

7 - **Latrogenic infection:** Malaria parasites may be transmitted by transfusion of blood from the donor with malaria containing asexual forms of erythrocytic schizogony. This known as **trophozoite-induced malaria**

or

transfusion malaria. Malaria parasites may also be transmitted by the use of contaminated syringes and needles .This may occur in drug addicts.

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