Host-Parasite relationships

Symbiosis: It is the permanent relationship between two dissimilar organisms which depending each others. They are three types

1- **Parasitism**: It is a relationship between two different organisms; one called the parasite which depend on the other which is called the host. This relationship may be harmful for the host or harmless.

2- **Commensalism**: It is a relationship in which one organism gets benefit without causing damages to the host.

3- **Mutualism**: It is a relationship between two beneficially organisms or both of them mutually got benefits.
Subkingdom: Protozoa
- Unicellular
  - Just one cell

Subkingdom: Metazoa
- Multicellular
  - Many cells (systems)
Protozoa (PR0TO=PRMITIVE ,,,, ZOA = ANIMAL)

- **General characters**
- 1- Unicellular microorganism (just one cell) eukaryotic with true nucleus, cytoplasm. The nucleus contain karyosome.
- 2- The most important protozoan size range usually from 10 to 52 microns
- 3- They are seen by microscope.
- 4- They move by a variety of organs pseudopodia, flagella, cilia.
- 5- Perform all metabolic mechanisms (e.g., movement, digesting, excretion, reproduce by asexually and sexually.....etc).
- 6- They are found in different parts of the body intestine, blood and tissues, cavities like mouth, Uro-genital system.
- 7- Most intestinal protozoa have direct life cycle, either have:
  - A- Cyst stage...it is non motile, non feeding, non active stage, it is the infective stage if the parasite has trophozoite and cyst stage in the life cycle. It is diagnostic stage in case of chronic infection. Transmitted to the human by contamination of food and water.
  - B- Trophozoite stage ..it is active, motile, feeding stage of parasite.
    - a- it is the pathogenic stage of parasite.
    - b- it is the diagnostic stage in case of acute infection.
    - c- it is the pathogenic, diagnostic and infective stage if the parasite has no cyst stage.
Classification of Protozoa.

- Kingdom: Protista = (simplest of eukaryotic microorganisms)
- Subkingdom: protozoa

1- Phylum: Sarcomastigophora
   - Subphylum: 1- Sarcodina. Ex. Entamoeba histolytica
   - 2- mastigophora. EX. Giardia lambelia


3- Phylum: Apicomplexa
   - Class: Sporozoasida like Plasmodium (Malaria).
Ameba                  Paramecium

BOTH ARE UNICELLULAR (PROTOZOA)  PROTESITA
Life cycle stages of intestinal protozoa.

- Intestinal, lumen-dwelling protozoa has either both:
  1- **Trophozoite**: it is the pathogenic stage or diagnostic stage, usually motile, active, feeding, appear in acute diarrheic infection.
  2- **Cyst stage**: it is the infective stage, diagnostic stage, usually non motile, inactive, non-feeding appear in the chronic diarrheic infection or has only Trophozoite without cyst.
LIFE CYCLE OF INTESTINAL PROTOZOA

GENERAL L.C. OF INTEST.PROTOZOA

Typical Fecal-Oral Life Cycle

CYST
- passed in feces
- resistant
- infective

excystation

TROPHozoITE
- feeding
- motile
- replication

encystment
Entamoeba histolytica

- **Disease** → amebiasis, amebic dysentery, amebic hepatitis.
- **Infective stage** → quadrinucleated mature cyst
- **Distribution** → cosmopolitan (all the world).
- **Life cycle** → direct no intermediate host.
- **Mode of infection** → by food and water contamination with infective stage.
- **Pathogenic stage** → only Trophozoite which seen in diarrheic acute dysentery stool.
- **Habitat** → trophozoite in large intestines, extraintestinal infection. Cyst only in large intestine.
- **Diagnostic stage** → cyst in chronic infection and trophozoite in acute diarrheic infection.
Ingestion in contaminated food and water

Noninvasive infection
Cysts exit host in the stool

Quadrinucleate cyst

Invasive infection through the bloodstream, infecting sites such as the liver, brain, and lungs.

Excystation
One trophozoite with four nuclei emerges, divides three times and each nucleus divides once to produce eight trophozoites from each cyst.

Trophozoites migrate to the large intestine

Encystation

Trophozoites multiply by binary fission

Immature cyst

Trophozoites invade the intestinal mucosa
CLINICAL MANIFESTATION IN SUMMARY

Fig. 9.8: Clinical classification of amoebiasis
Prevention and Control of *E. histolytica*

Determine:

- The source of infection by lab. Methods.
- Asymptomatic cyst carriers detection.
- Diagnose and treat the infective cases.
- Improvement water supply and sewage
- Good health education.
Treatment

- Iodoquinol drug for asymptomatic infections and metronidazole (FLAGYLE) for symptomatic and chronic amebiasis including extra intestinal disease are the drugs of choice.

The dose depends on:

- 1- Severity of the infection
- 2- Age of patients.
- 3- Infected organ.
Entamoeba coli:

- **Disease**: Non pathogenic commensally in living.
- **Infective stage**: Octancleated mature cyst with eccentric karyosome.
- **Distribution**: Cosmopolitan (worldwide).
- **Life cycle**: Direct, no intermediate host.
- **Mode of infection**: By food and water contamination with infective stage.
- **Pathogenic stage**: (Trophozoite) but the parasite is non pathogenic.
- **Habitat**: Trophozoite in large intestine mostly colon.
- **Diagnostic stage**: Cyst and trophozoite in stool.
- **Larger in size than**: *E. histolytica in both cyst and trophozoite.*