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Hemoflagellates (blood and tissue flagellates)

*Morphological forms of hemoflagellates

1-Amastigote (Leishmania) form:

Round or oval in shape, 2-5 microns in diameter, surrounded by delicate cell membrane, have single vesicular nucleus with large central karyosome, the kinetoplast (which consists from dot-like blepharoplast and parabasal body beside it) lies at right angle to the nucleus. Closely located nucleus and kinetoplast known as torpedo form. The axoneme is a delicate membrane extends from the kinetoplast to the margin of the body and represents the rest of the 2 flagellum with vacuole lying alongside the axoneme. This form (amastigote) has no flagellum.

2-Promastigote (leptomonad) form:

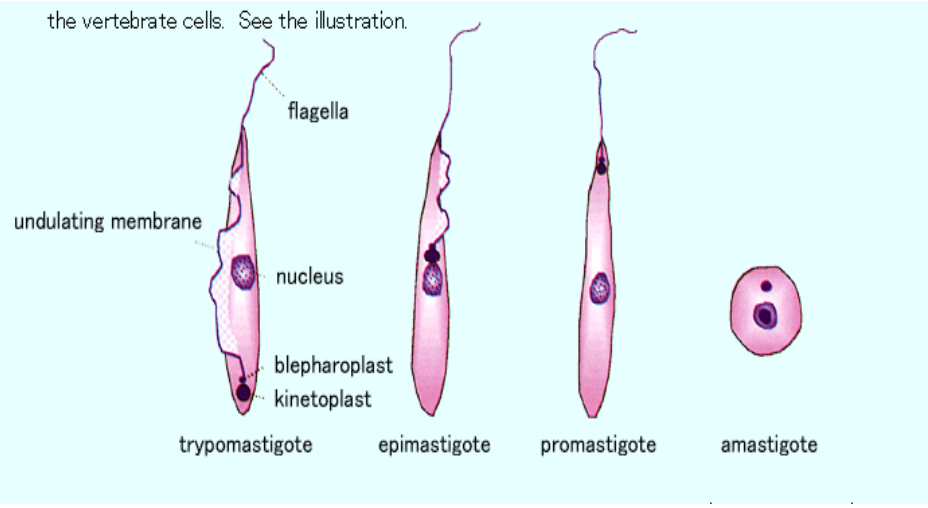
Elongated (spindle in shape) measuring 15-20 microns X 1-2 microns, have centrally located nucleus and the kinetoplast situated at the anterior end. The vacuole lying in front of the kinetoplast. From blepharoplast, single free flagellum projects from the anterior end, equal or longer than the body length.This form has no undulating membrane.

3-Epimastigote (crithidia) form:

Elongated form, 15-20 microns long and slightly wider than promastigote, nucleus near middle, kinetoplast is anterior to the nucleus. From blepharoplast flagellum arise forming the undulating membrane extending half of the body length, and project from the anterior end as a free flagellum.

4-Trypomastigote (Trypanosome) form:

Elongated form with highly polymorphism from rather short and stumpy (15micron X 2-4micron) to a long slender from (35micron X 2-4micron). In stained blood film, *Trypanosoma cruzi* appears as C or U shape. Nucleus near middle, kinetoplast is at the posterior end, the flagellum and undulating membrane pass anteriorly along entire body length and free flagellum extends from anterior end when present.



Leishmania

It includes parasites cause three diseases in human:

1- Cutaneous Leishmaniasisor oriented sore.

2- MucocutaneousLeishmaniasisor Espondia

3- Visceral Leishmaniasis or Kala-azar

General characters of genus *Leishmania*

1- Life cycle is indirect and completed in tow hosts, vertebrate (human, dog, rodent) as a final host and invertebrate; blood sucking insect (female of sand fly) as an intermediate host (vector).

2- Tow developmental forms are found, amastigote and promastigote ,amastigote in the final host (human) and promastigote in the vector (sand fly).

3- The vector is sand fly of genus *Phlebotomus* in Old World and genus *Lutzomyia* in New World.

4- Promastigote is the infective stage to final host (man) and amastigote is infective stage to sand fly (vector).

5- The parasite infects the reticuloendothelial cells of skin, mucus membrane or viscera (as liver, spleen and bone marrow) of the final host (man).

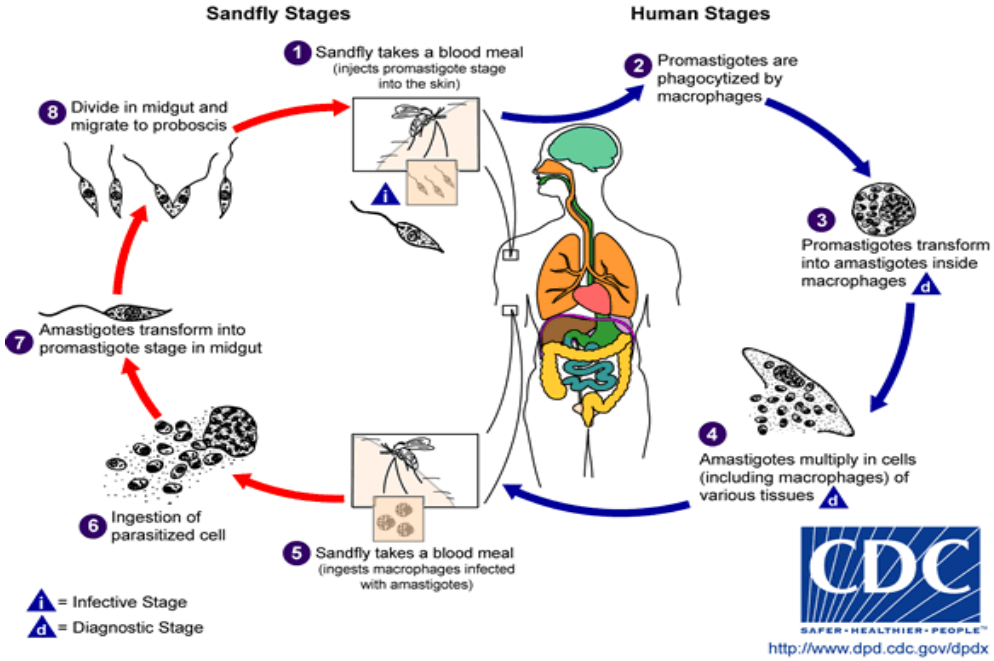
6- The parasite multiplies by binary fission (asexual).

Life cycle

Involves an alternative existence in a vertebrate (man,…ect) and an insect (sand fly).The flagellated promastigote enter the body (skin) of the final host through infected sand fly bite → the parasites engulfed by macrophage and endothelial cells of skin capillaries →promasitgote develops into amastigote (Leishman-Donovan (LD) bodies) →amastigote multiply inside macrophages by binary fission → cell burst → free amastigote either infect other cells (macrophages) in skin as in cutaneous

leishmaniasis or other cells in skin and the adjacent cells in mucous membrane as in mucocutaneousleishmaniasis or pass to different organ by blood stream (spleen, liver, bone marrow and lymph nodes) as in visceral leishmaniasis, then amastigotes engulfed by new reticuloendothelial cells →a blood sucking sand fly (female) draws amastigotes (L.D bodies) with its blood meal (by bites of proboscis) →amastigotes develop in promastigote forms in the mid gut of sand fly → multiply by longitudinal binary fission → solid mass of promastigotes fill up the anterior end of the mid gut and the esophagus , extending up to the pharynx → a heavy pharyngeal infection of the sand fly is known as anterior station development , which may block esophagus → at the time of sucking blood , regurgitation of promastigotes from their buccal cavity in the skin puncture by proboscis (biting organ) → infection of man.

Anterior station development is the anterior migration of the parasites from the mid gut to foregut, pharynx and buccal cavity of insect vector (as sand fly in Leishmania species).

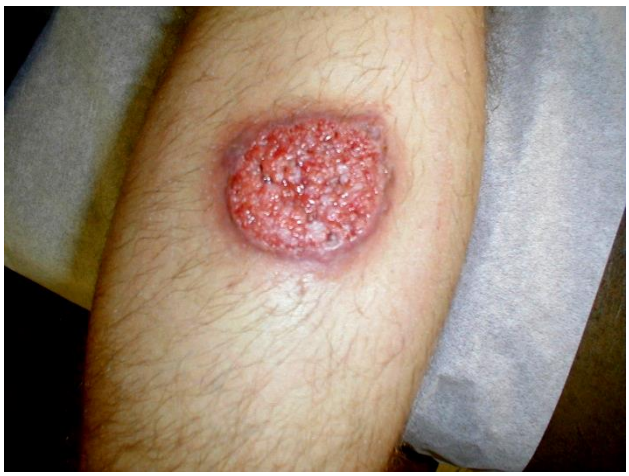


Pathogenicity and clinical signs

Cutaneous Leishmaniasis

- Most common form
- Characterized by one or more sores, papules or nodules on the skin
- Sores can change in size and appearance over time
- Often described as looking somewhat like a volcano with a raised edge and central crater
- Sores are usually painless but can become painful if secondarily infected
- Swollen lymph nodes may be present near the sores (under the arm if the sores are on the arm or hand…)
- Most sores develop within a few weeks of the sandfly bite, however they can appear up to months later
- Skin sores of cutaneous leishmaniasis can heal on their own, but this can take months or even years

- Sores can leave significant scars and be disfiguring if they occur on the face
- If infection is from *L. tropica* it can spread to contiguous mucous membranes (upper lip to nose)



Diagnosis

-Smear: Giemsa stain – microscopy for LD bodies (amastigotes)

-Biopsy: microscopy for LD bodies or culture in NNN medium for promastigotes

Treatment

-Pentavalent antimony (Pentostam), Amphotericin B

-Antibiotics for secondary bacterial infection.

Visceral Leishmaniasis

- Most severe form of the disease, may be fatal if left untreated
- Usually associated with fever, weight loss, and an enlarged spleen and liver
- Anemia (low RBC), leukopenia (low WBC), and thrombocytopenia (low platelets) are common
- Lymphadenopathy may be present

- Visceral disease from the Middle East is usually milder with less specific findings than visceral leishmaniasis from other areas of the world
- Symptoms usually occur months after sandfly bite
- - Soldiers from Desert Storm presented up to five months after leaving the Persian Gulf
- Because symptoms are non-specific and often start after redeployment there is usually a delay in diagnosis
- Visceral leishmaniasis should be considered in any chronic FEVER patient returning from an endemic area.
- Fever
- Splenomegaly, hepatomegaly, hepatosplenomegaly
- Weight loss
- Anaemia
- Epistaxis
- Cough

  Diarrhoea

*Untreated disease can be fatal

*After recovery it might produce a condition called post kala-azar dermal leishmaniasis (PKDL)

Diagnosis

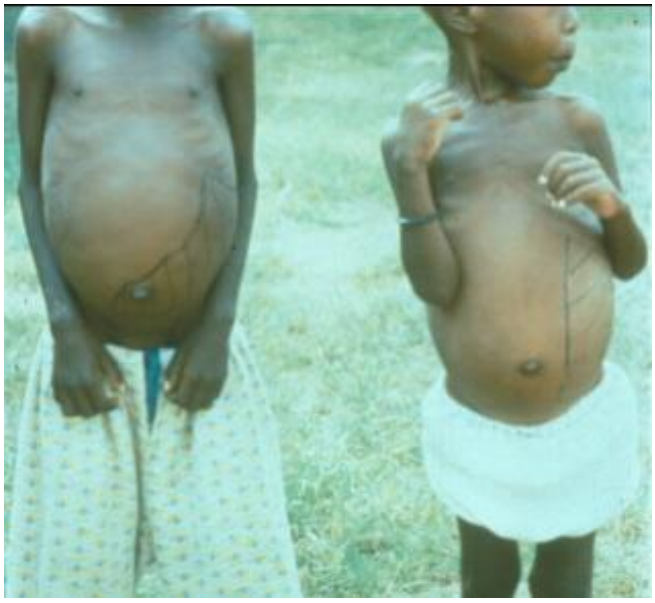
1. microscopy — Bone marrow aspirate
2. culture in NNN medium — Splenic aspirate

Lymph node

Tissue biopsy

Treatment

-Pentavalent antimony (Pentostam)



Lect. 2

1- ……. A reservoir of Leishmania.

2- enumerate the haemoflagellate stages?

3- draw the life cycle of Leishmania?

4- After recovery Leishmania might produce a condition called ……..

5- mention the most clinical signs with dermal leishmaniasis?

6- mention the most clinical signs with visceral leishmaniasis?

7- L.tropica engulfed by ……. of skin capillaries and grow to …… stage.

8- the vector for Leishmania is ……..