Leishmania donovani

ZOOA-DSE(A)-5-1 UNIT-2

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Systematic Position(Levine et al,1980)

Kingdom : Protista

Subkingdom : Protozoa

Phylum : Sarcomastigophora

Subphylum : Mastigophora

Class: Zoomastigophora

Order: Kinetoplastida

Genus : *Leishmania*

Species : *L.donovani*

PREVALENCE

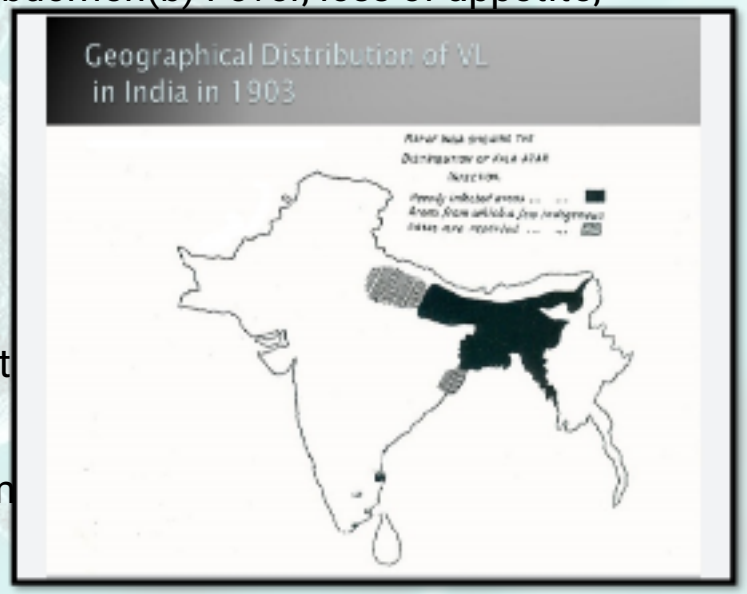
Endemic in many places in **India, China, Africa, Southern Europe, South America and Russia.**

In India, it is specaily common in **Assam and Bengal** along the coasts of the Ganges and the Brahmaputra. It is also endemic in **Bihar, Orissa, Madras and the eastern parts of Uttar Pradesh as far as Lucknow.**

HABITAT : Inside the vertebrate host (man) the parasite is always intra-cellular, occurring in the amastigote form. It is essentially a parasite of the R.E. system.

EPIDEMIOLOGY

The disease caused by infection with *Leishmania donovani* is **called Kala azar Or black fever**. It is an extremely rare disease with fewer than 5thousand cases per year (India). Visceral Leishmaniasis is spread by sandfly bites. This type of Leishmaniasis affects the internal organs ; usually the spleen, liver, etc. Some of the common symptoms include - (a) Pain in the abdomen(b) Fever, loss of appetite, anemia, night sweats(c) Diarrhea(d) Abnormally thin and greyish discoloration of the skin (e) swollen lymph nodes etc



- **PKDL (Post-kala-azar dermal Leishmaniasis)**

PKDL develops in about 10% of kala azar patients generally one or two years after completion of antimonial treatment for the original disease where the visceral infection disappears but the skin infection persists. It is prevalent in endemic areas of kala azar in India chiefly in Bengal less so in Madras and Assam In India, man is the main or only source of infection acting as a **reservoir of the disease.**

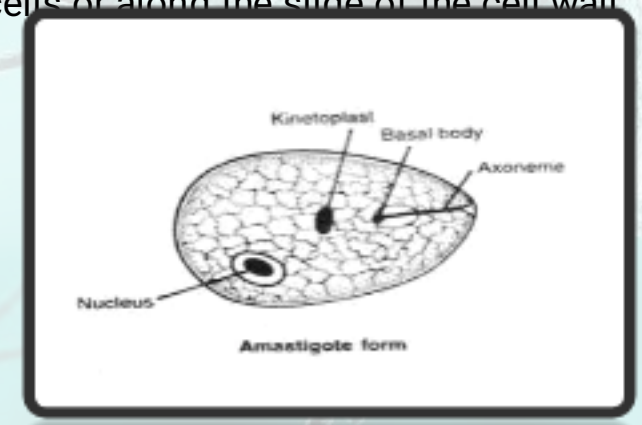
MORPHOLOGY

The parasite exists in two forms :

- Amastigote Form or aflagellar Form (formerly called “leishmanial form”) : The parasite at this stage resides in the cells of the reticulo-endothelial system of vertebrate hosts(man, dog and hamster).

The characteristics of the **amastigote form** are as follows –

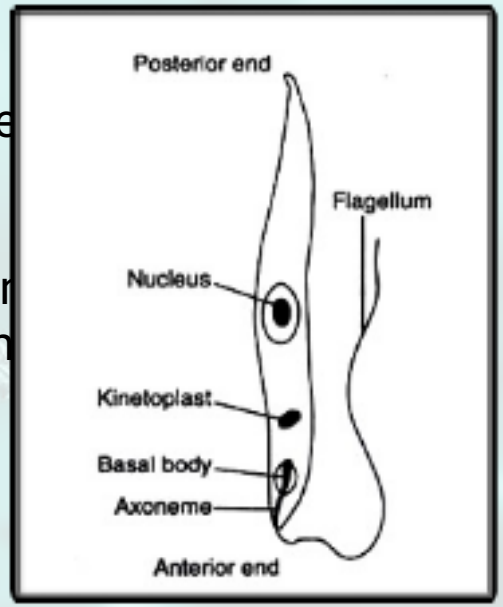
- Shape and Size – It is a round or oval body measuring 2um to 4um along the longitudinal axis. **Cell Membrane** is delicate . **Nucleus** measures a little than 1um in diameter. It is oval or round and is usually situated in the middle of the cells or along the slide of the cell wall.



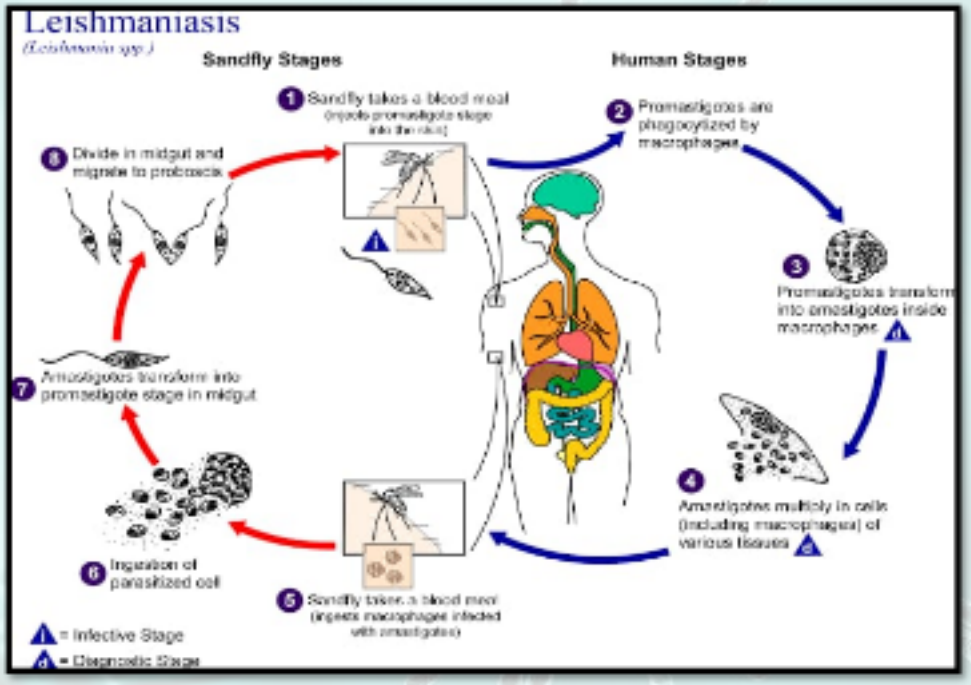
- Kinetoplast lies tangentially or at right to the nucleus. **Axoneme(rhizoplast)**,a delicate filament which the root of the flagellum.

❑ Promastigote Form (formerly called "leptomonad form") : Occurs in gut of insect (sandfly)

- **Shape & Size** — The earlier ones are short, oval or pear shaped bodies measuring 5 to 10 um in length by 2 to 3 um in breadth. The fully developed ones are long, slender spindle shaped bodies measuring 15 to 20 um in length by 1 to 2 um in breadth.
- **Nucleus** is situated centrally. **Kinetoplast** lies transversely ne the anterior end.
- **Flagellum** may be of the same length as the body or even lor projecting from the front. The flagellum does not curve roun the body of the parasite.



LIFE CYCLE OF *L.donovani*



➤ Methods of Transmission include (a) Bite from the infected sandfly. (b)congenital infection of a child in utero (c)Transmission of blood transfusion

PATHOGENECITY

Incubation Period- This is the period when the time of the initial infection and the appearance of clinical manifestation takes place . It generally varies from three to six months but it may exceed one and sometimes two years.

Infection with *L. Donovani* produces the disease Kala Azar or Visceral Leishmaniasis characterized by the following clinical features-

(a)**Pyrexia** is often an early symptom. In 20 percent of the cases, pyrexia shows a double rise in 24hours.

(b)**Splenomegaly** - Splenic enlargement is one of the most striking features but the rate of splenic enlargement may vary from patient to patient.

(c) **Liver is also enlarged** but not as much as the spleen.

(d) **Anemia** becomes noticeable.

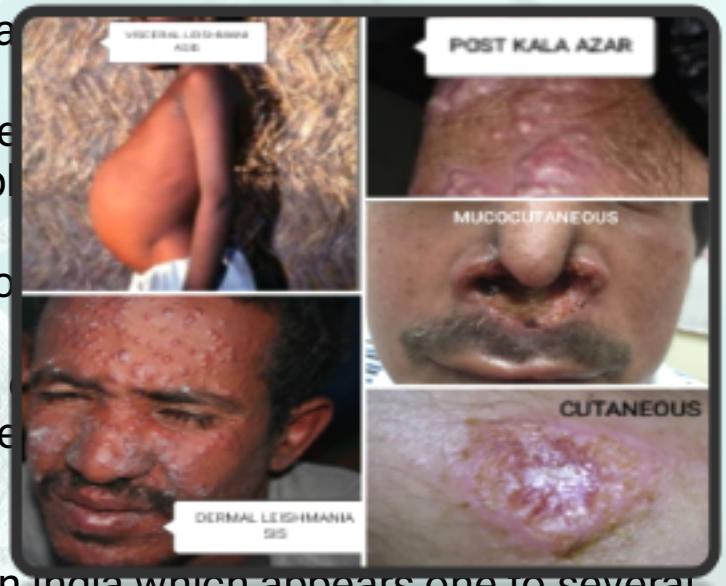
(e) The **skin** over the entire body is **dry rough and harsh and is often pigmented (darkened).**

(f) **Hair tends to be brittle and falls out.**

(g) If left untreated, **70% to 90% of the patients die** within a period of 2 years. Death in kala-azar is always due to some complications, such as amoebic or bacillary dysentry , pneumonia, pulmonary tuberculosis and other septic infections.

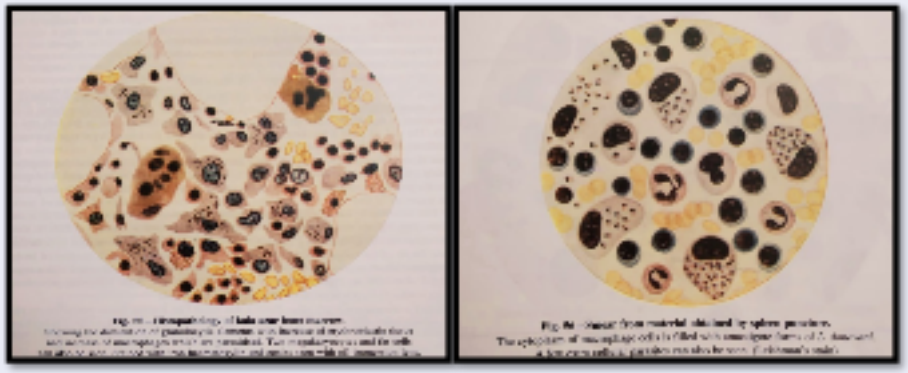
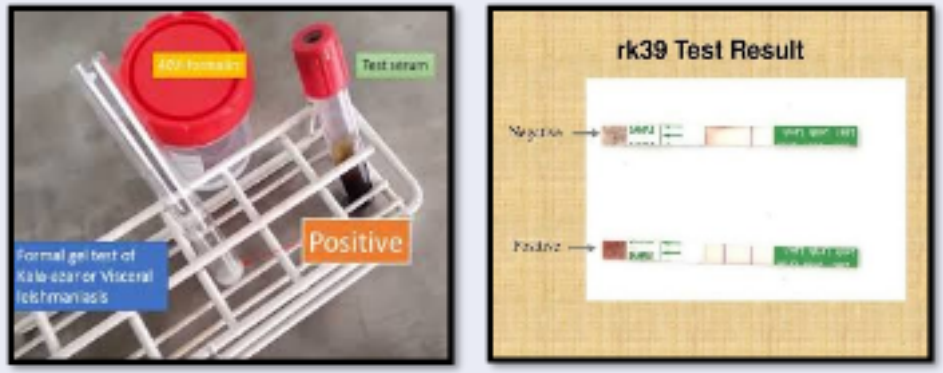
SPECIAL CLINICAL FEATURES

- **Endemic visceral Leishmaniasis** : Affects children of 1-4yea
Mediterranean area, Latin America . In India, the peak age is
5-9 years or older. The common symptoms are fever, malaise
weight loss, anorexia accompanied by enlargement of the spl
anemia and skin darkening.
- **Sporadic visceral Leishmaniasis** - This affects non-indigeno
entering a epidemic area. It is characterized
by a markedly sudden onset of fever, 3weeks to 2 years after
- **Epidemic visceral Leishmaniasis :** All ages are susceptible e
those who are old enough.



- **Post Kala Azar Dermal Leishmaniasis –** PKDL is common in India which appears one to several years after apparent cure of kala-azar. The lesions consist of multiple ulceration.
- **Muco- Cutaneous Leishmaniasis**: Ulcers exhibit around the margins of mouth nose which can mutilate the face so badly that the victims may become social outcasts.
- **Cutaneous Leishmaniasis** : There are several forms of cutaneous Leishmaniasis such as Zoonotic cutaneous Leishmaniasis (ZCL), Anthroponotic (urban) cutaneous Leishmaniasis (ACL), diffuse cutaneous Leishmaniasis (DCL) etc. This febrile disease is characterized by a painful ulcers in the parts of the body exposed to sandfly bites (legs, arms or face) inhibiting the victim's ability to work. Here the agent is confined to skin.

DIAGNOSIS

DIRECT EVIDENCES	INDIRECT EVIDENCES
• BLOOD • BLOOD CULTURE • SPLEEN PUNCTURE • BONE MARROW BIOPSY (FROM THE STERNUM OR ILIAC CREST)	• BLOOD COUNT • SEROLOGICAL TEST • ELISA TEST • ANTIMONY TEXT -NOT USED NOWADAYS. • COMPLEMENT FIXATION TEST WITH W. K. K ANTIGEN- NOT USED NOWADAYS
	

PROPHYLAXIS

The preventive measures include the following :

1.Attack on the Parasite : In India, control measures should be treatment campaign, whereas in China and Mediterranean areas the campaign areas should be directed against dogs serving as reservoirs of infection.

2.Attack on the Vector : This consists of measures directed against the sandfly, the transmitting agent. This can be achieved by clearing out low trees and bushes etc in endemic areas.

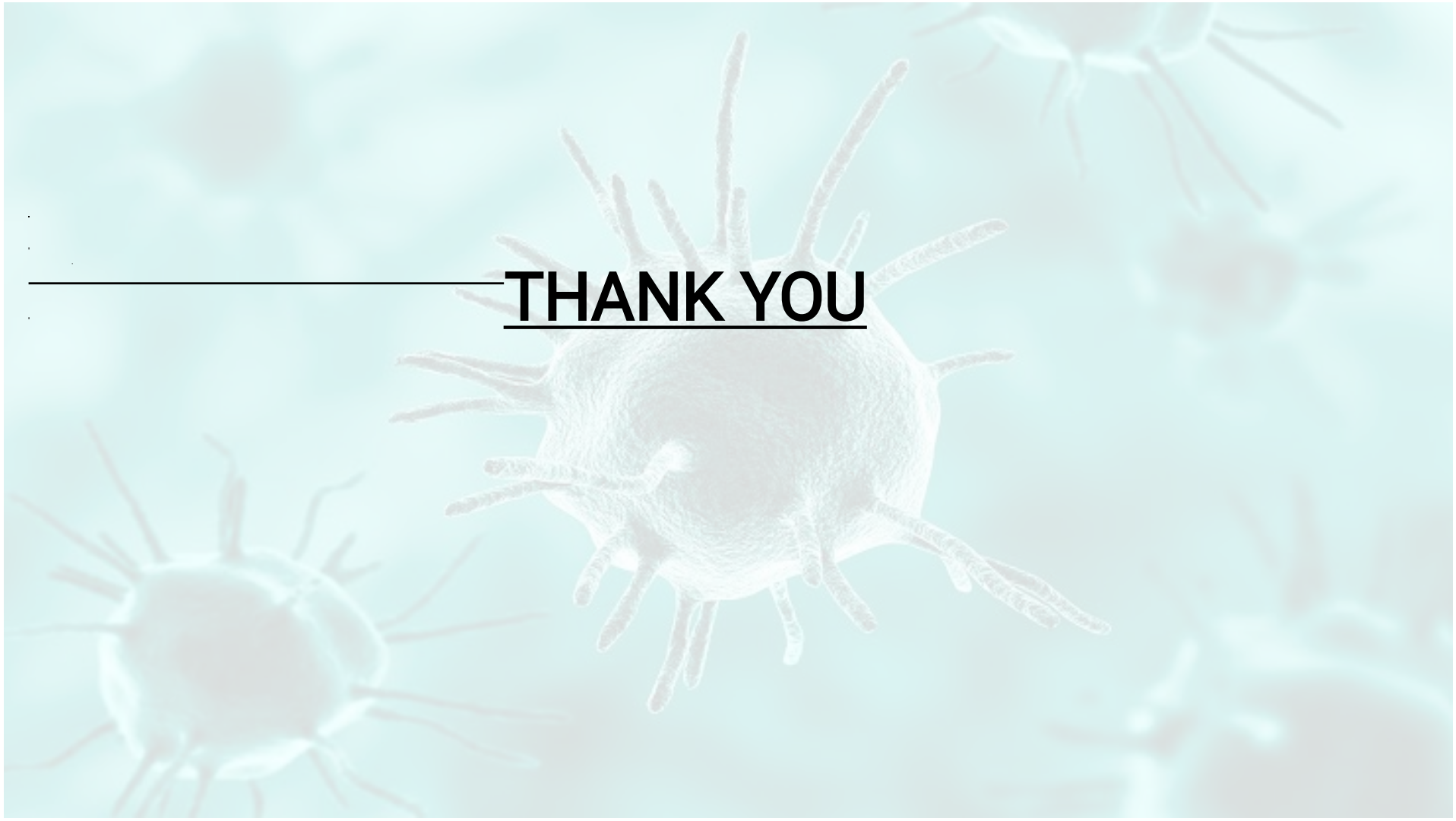
3. Personal Prophylaxis : Use of mosquito-net or screen(of 22 meshes to the square inch)avoiding the ground floor for sleeping purposes and periodic fumigation of sleeping quarters.

TREATMENT

The specific chemotherapeutic drugs include the following :

1.Antimony compounds : Pentavalent Antimony compound is now the drug of choice and includes **sodium-antimony-gluconate**(SAG 600mg daily for 6-10 days)

2.Synthetic non-metallic compound: **Pentamidine isethionate** (4mg/kg/day IM for 10 days)


THANK YOU