VISCERAL LEISHMANIASIS

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Objectives

- Scientific names of causative organisms
- Life cycle- morphological forms, mode of transmission, vectors & reservoir hosts
- Epidemiology of VL
- Clinical manifestations
- Diagnosis
- Management
- Prevention & control

LEISHMANIASES

- About 100 million people affected in Africa, Asia, Middle East, Europe Central & South America (about 2 million new cases each year)
- Sri Lanka –
  - A newly established infectious disease
  - Previously only cutaneous form was seen
  - Recently few cases of mucocutaneous and visceral forms diagnosed

Leishmaniases……

- Caused by flagellate protozoan parasites of the order ‘Kinetoplastida’

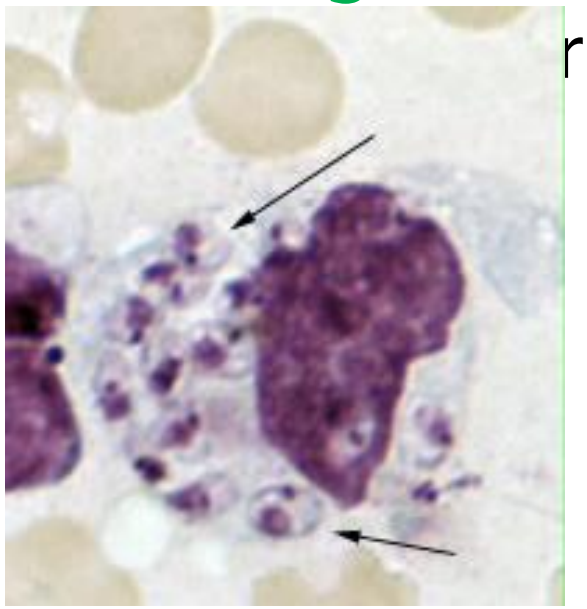
- Species of *Leishmania* causing VL
  - *Leishmania donovani*
  - *Leishmania infantum*

- VL is also known as ‘Kala-azar’ (black disease), or dumdum fever

Morphology of *Leishmania* sp.

2 morphological forms

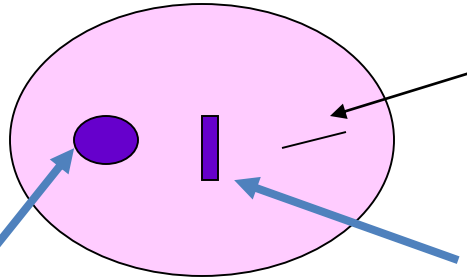
Amastigote (Leishman-Donovan bodies)



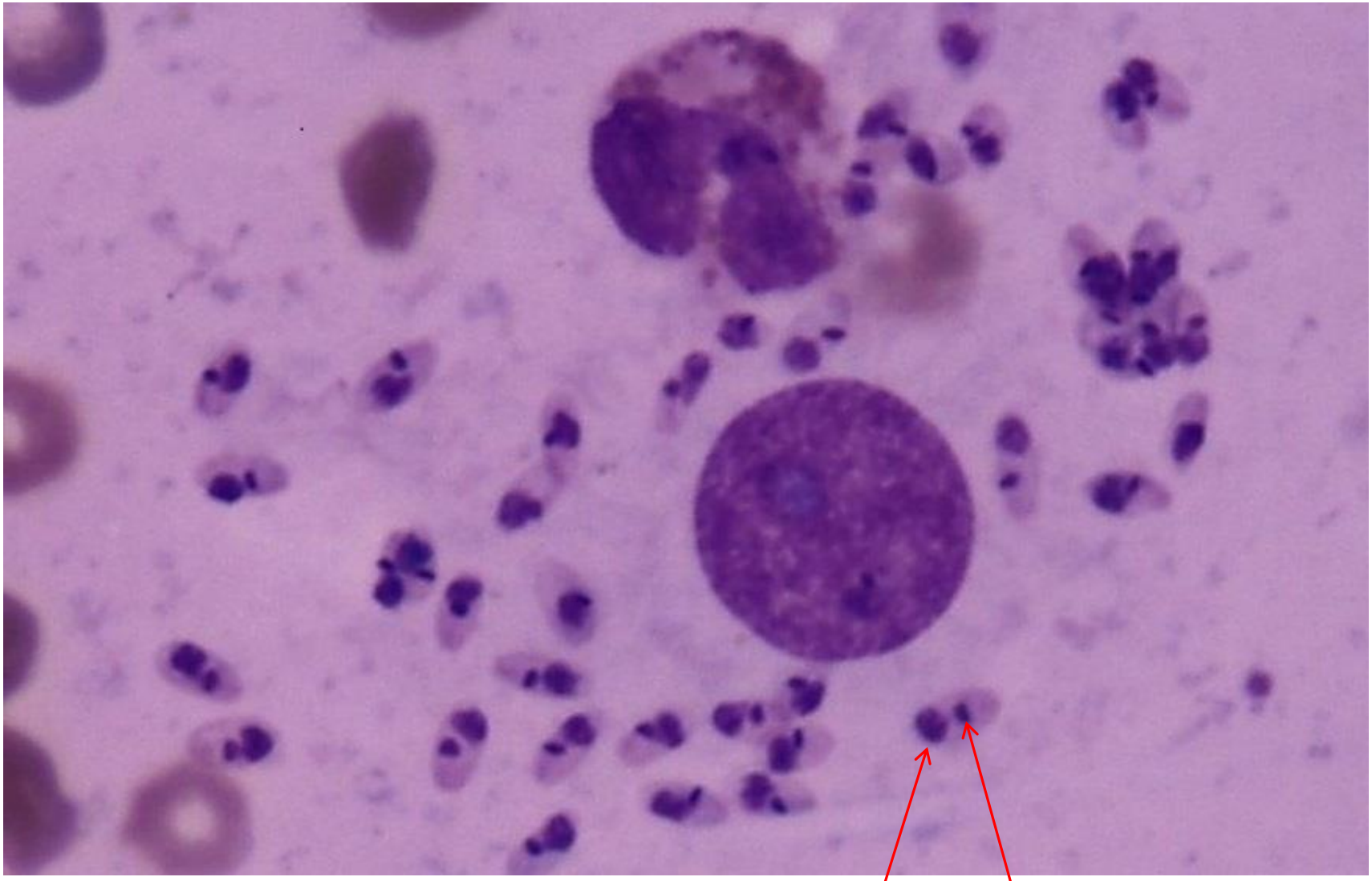
r (within
macrophages)

-found in vertebrate host

-‘dot and dash’ appearance



2- 6 microns in size

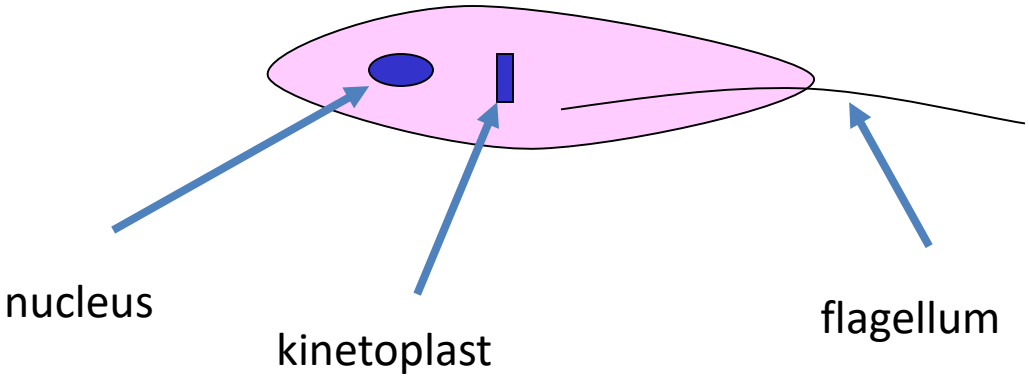

Nucleus
Kinetoplast

Morphology…….

Promastigote

- Extracellular form
- Found in invertebrate vector and in culture
- Long and slender body with anterior flagellum
- Surface proteins bind C3 and attach to C3b receptors on macrophage surface

15-30 microns x 2-3 microns



***Leishmania* - promastigotes**

Life Cycle

Promastigotes regurgitated while feeding

Promastigotes ingested by skin macrophages

Multiply inside macrophage as amastigotes

Macrophage ruptures to release amastigotes

Amastigotes invade new macrophages

MAMMALIAN HOST

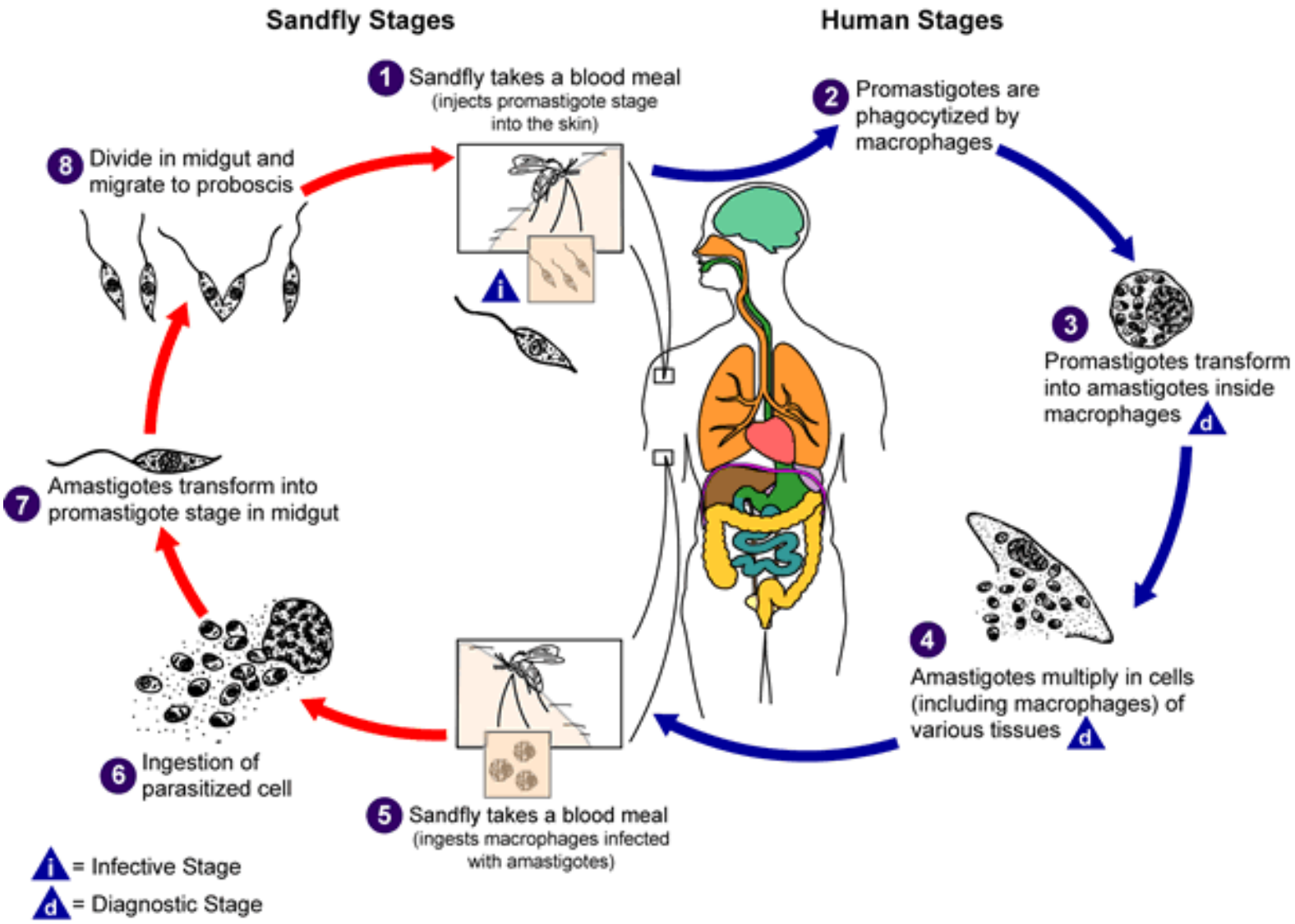
Taken up by sandfly while feeding

SANDFLY VECTOR

Amastigotes released from macrophages convert into promastigotes

Promastigotes multiply in midgut and hind gut of sandfly

Leishmania life cycle



Pathology

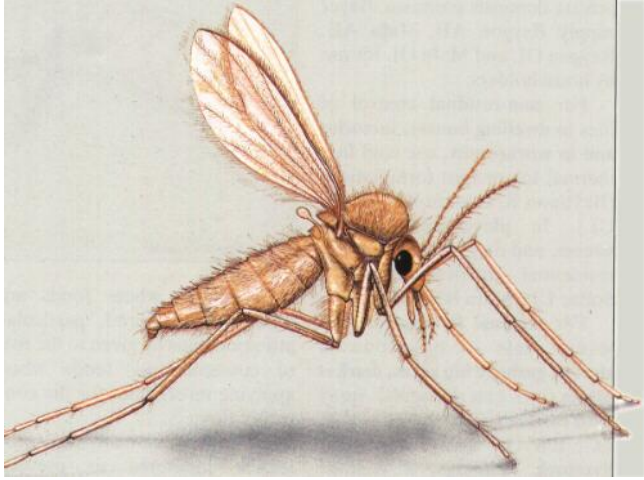
- Metacyclic promastigotes inoculated by sandfly bite, escape complement activation
- Phagocytosed by macrophages and transformed into amastigotes
- Amastigotes resists digestion by lysosomal enzymes and multiplies within macrophages
- Spread to organs of reticulo-endothelial system ⟶ Visceral leishmaniasis

Epidemiology of Visceral leishmaniasis

- Found in Northern India, Mediterranean, African and South American regions
- VL may be zoonotic or non-zoonotic
- Usually zoonotic in Africa and the Mediterranean region
- Reservoir hosts
  - Africa- rats, ground squirrels etc.
  - Mediterranean- dogs
- Largely human-human transmission in India

Geographic distribution of leishmaniases

Vector



Phlebotomine sandflies

- Small, hairy, brown flies like mosquitoes
- Feed at night
- Found in relatively dry habitats because larvae live in cracks & crevices of trees, rocks, houses, etc. (places with high humidity and moisture) – do not require pools of water

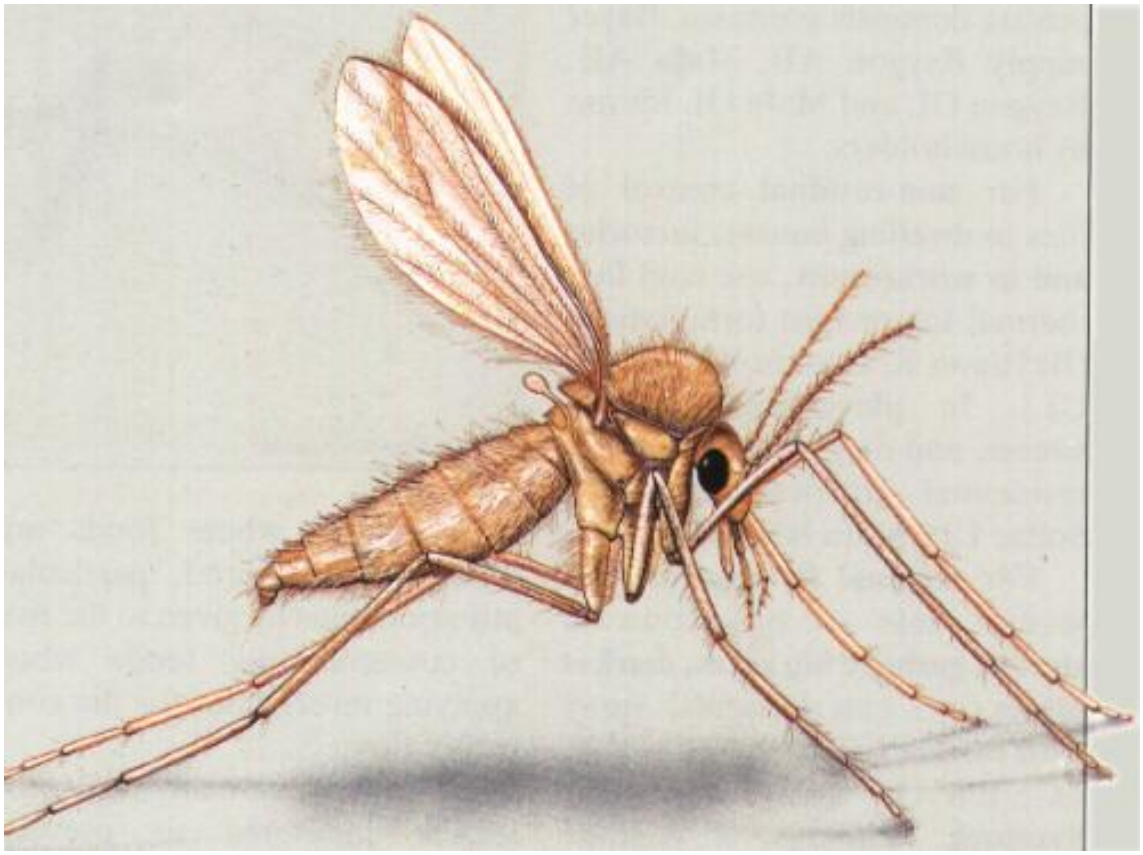
Phlebotomine sandfly

Uniformly brown in colour

Generally hairy appearance

Wings held upright at rest

Long stilt-like legs



Clinical Manifestations

- Severe illness, often fatal if left untreated

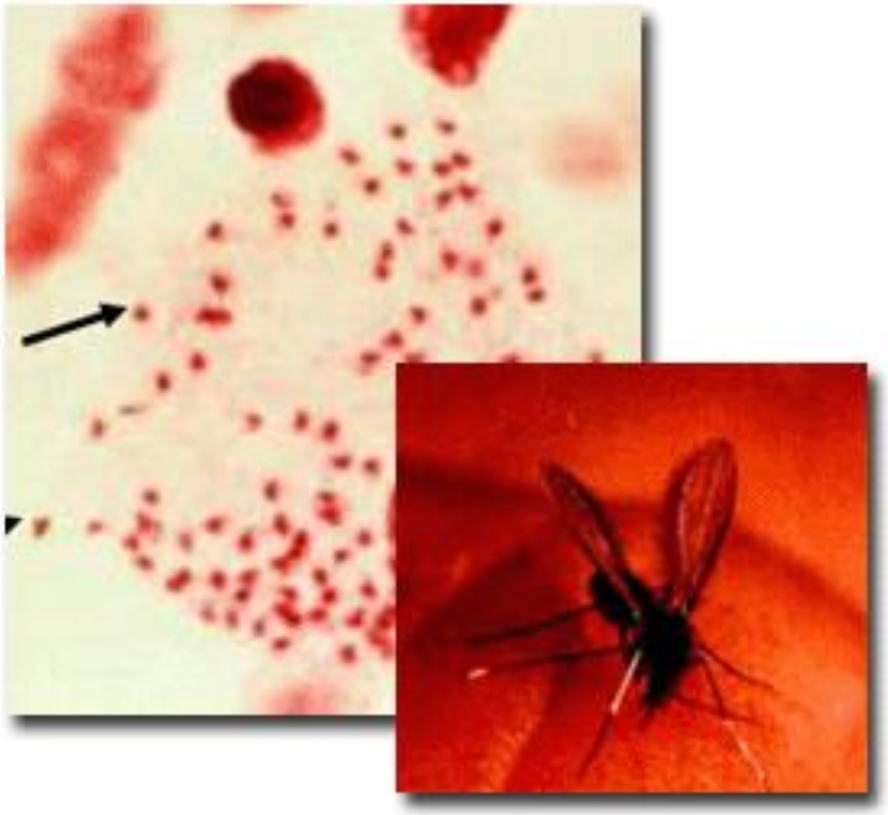
- Clinical features
  - Long incubation period (4 – 6 months)
  - Insidious onset (maybe sudden in visitors)
  - Fever intermittent or remittent, with sweats
  - Massive splenomegaly
  - Moderate hepatomegaly
  - lymphadenopathy
  - Skin pigmentation (blackish discolouration –'kala azar')
  - Cachexia

Clinical manifestations……..

- Anaemia, leucopaenia and thrombocytopaenia
- Dysproteinaemia – reversal of albumin: globulin
- Majority of deaths due to intercurrent infections

Massive splenomegaly with mild-moderate hepatomegaly

Leishmaniasis



Lab diagnosis & treatment of VL

- Parasitological diagnosis: demonstrate amastigotes in bone marrow or spleen (by biopsy) as for CL(i.e. by smear or culture)
- Serological diagnosis: demonstrate specific antibodies or antigens (eg.rK 39 antibodies)
- Molecular diagnosis: PCR assays

Treatment

First line

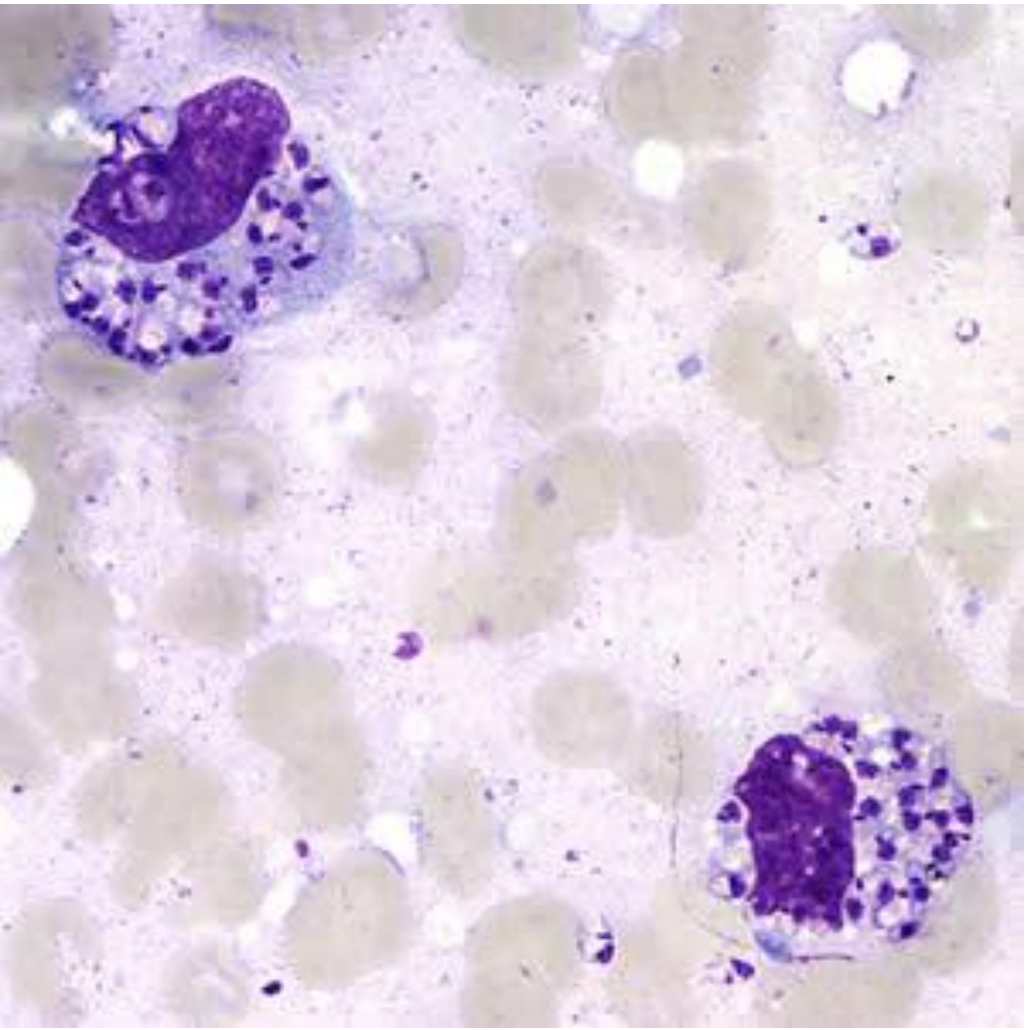
- IV pentavalent antimonials (sodium stibogluconate or meglumine antimonate) for several weeks

Second line

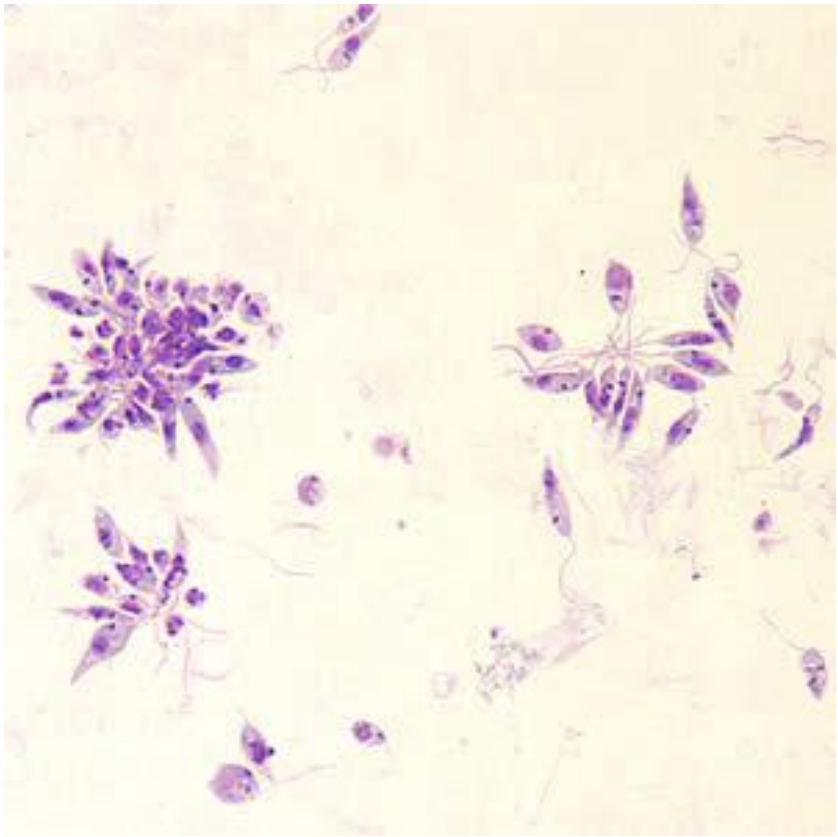
- Amphotericin B

- Oral miltefosine

In smears and H & E stained sections



In culture



Prevention and control of leishmaniasis

Primary preventive measures

- Avoiding outdoor activities during peak sandfly biting hours
- Proper clothing
- Using insect repellents
- Using bed nets

Vector control: usually only if malaria vector control is also being carried out

Summary

- Leishmaniases are transmitted by sandfly vectors
- Life cycle; promastigote (I) & amastigote (D)
- VL- *L. donovani* & *L. infantum*
- Presents with fever, massive spenomegaly, moderate hepatomegaly
- Diagnosis-amastigotes in splenic & Bone marrow aspirate , culture (in-vitro & in-vivo) , PCR
- Treatment; Pentavalent antimonials, miltefosine

Thank You!