



**INTERNATIONAL SCHOOL OF MEDICINE**

**Department of Infectious Diseases**

# **Leishmaniasis**

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# Leishmaniasis



Leishmaniasis is a **zoonosis**.

Transmitted among mammalian hosts by female **sand flies**.

# Leishmaniasis

## Species Pathogenic in Humans

*Leishmania donovani* (complex) (VL)

*Leishmania tropica* (CL)

*Leishmania major* (CL)

*Leishmania aethiopica* (CL)

*Leishmania mexicana* (Complex) (CL)

*Leishmania brazilliensis* (complex) (MCL)

# Three important Species

## *Leishmania donovani* (VL)

VISCERAL LEISHMANIASIS : involving endothelial tissue liver, spleen, and bone marrow.

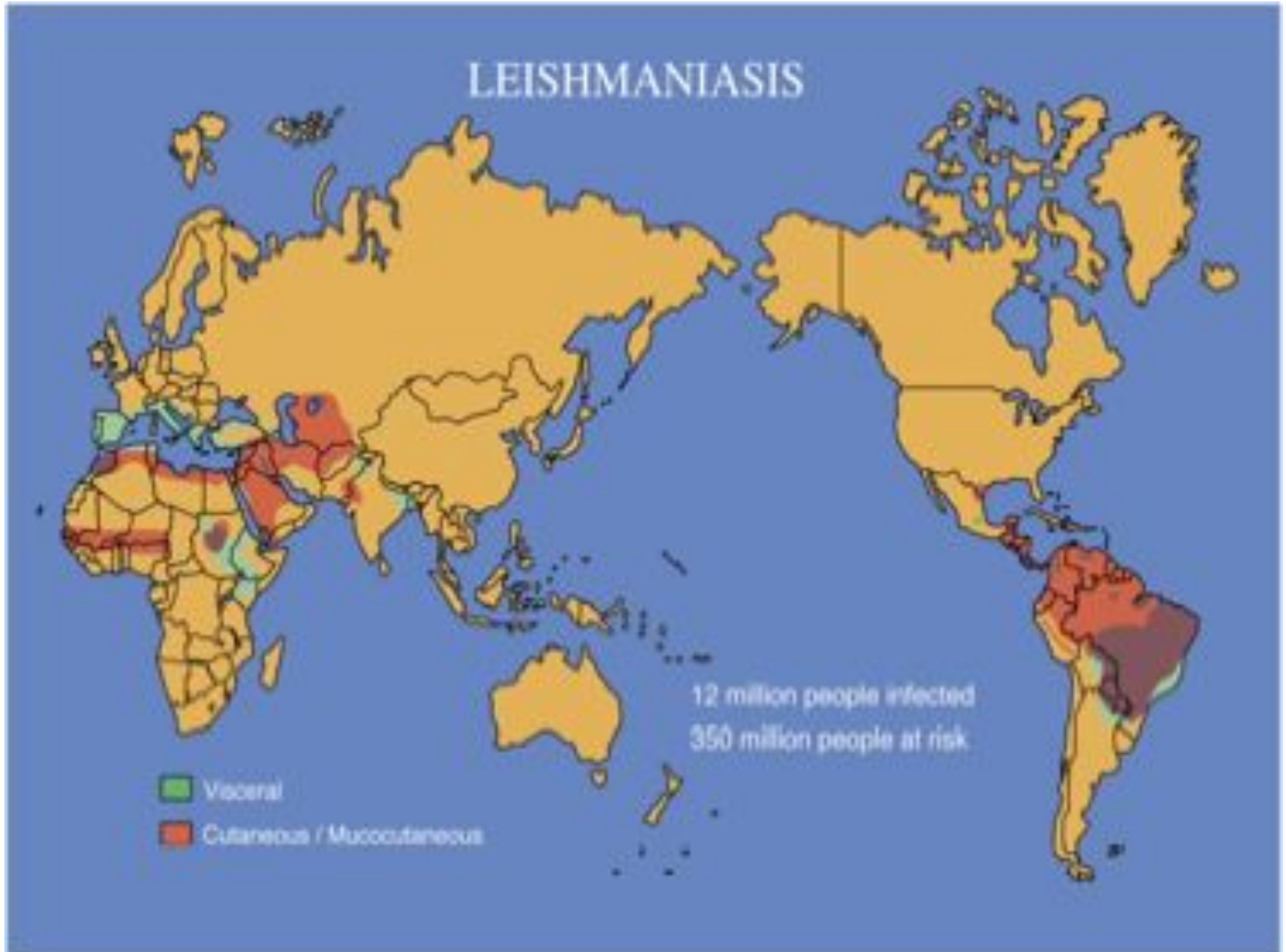
## *Leishmania tropica* (CL)

OLD WORLD CUTANEOUS LEISHMANIASIS : involving epithelial cells the skin at the site of a sand fly bite.

## *Leishmania brazilliensis* (MCL)

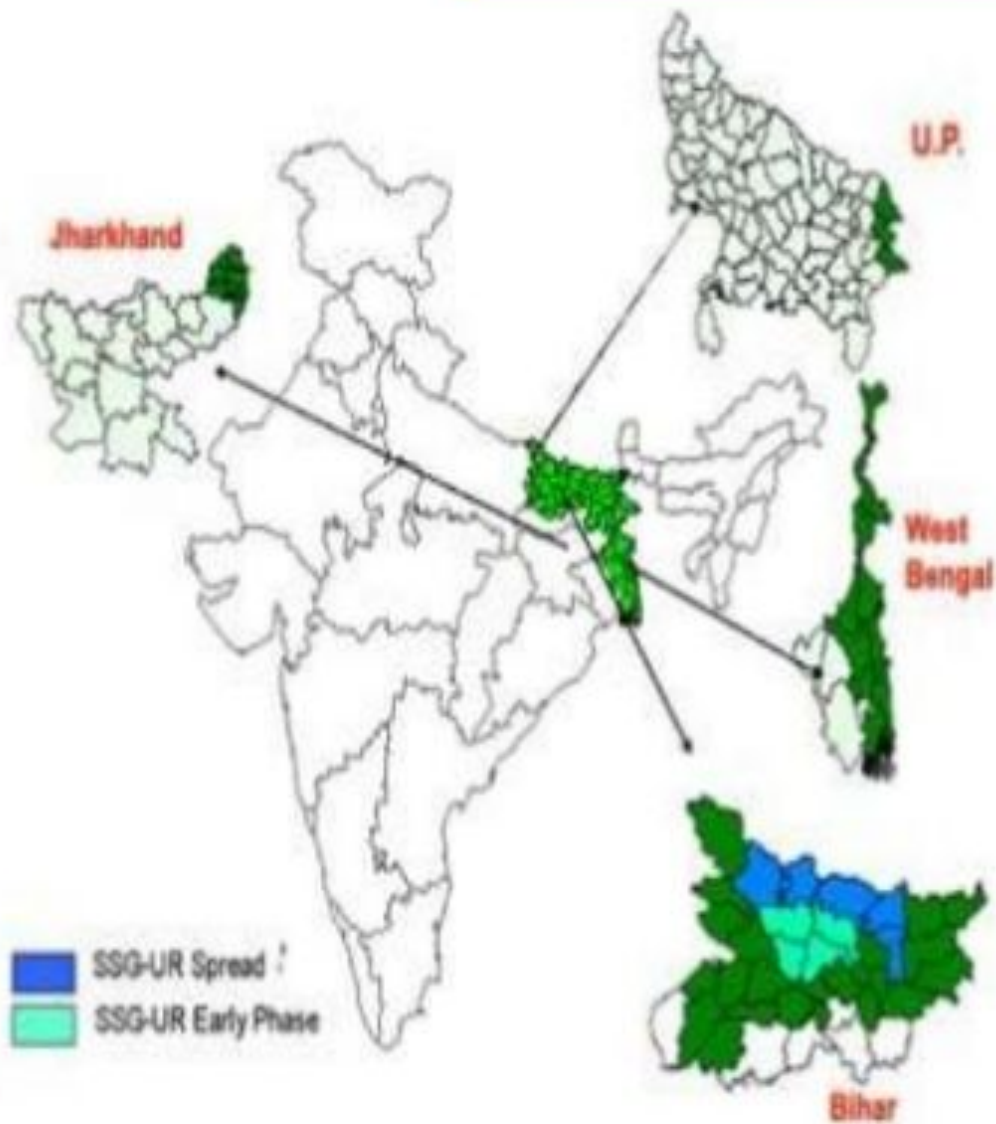
NEW WORLD MUCO CUTANEOUS LEISHMANIASIS : involving mucous membranes of the mouth and nose after spread from a nearby cutaneous lesion.

# Geographical distribution of leishmaniasis



- Currently, leishmaniasis occurs in 4 continents and is considered to be endemic in 88 countries, 72 of which are developing countries:
  - **90% of all VL**: Bangladesh, Brazil, **India**, Nepal and Sudan
  - **90% of all MCL**: Bolivia, Brazil and Peru
  - **90% of all CL** : Afghanistan, Brazil, Iran, Peru, Saudi Arabia and Syria
- Annual incidence: 1- 1.5 million cases of CL  
: 500,000 cases of VL
- Prevalence: 12 million people
- Population at risk: 350 million

# SITUATION IN INDIA

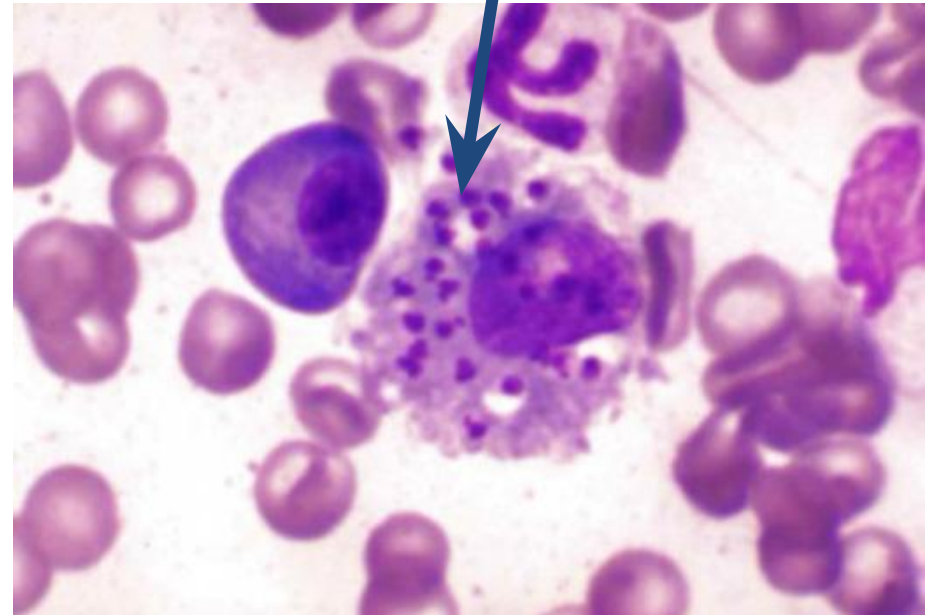
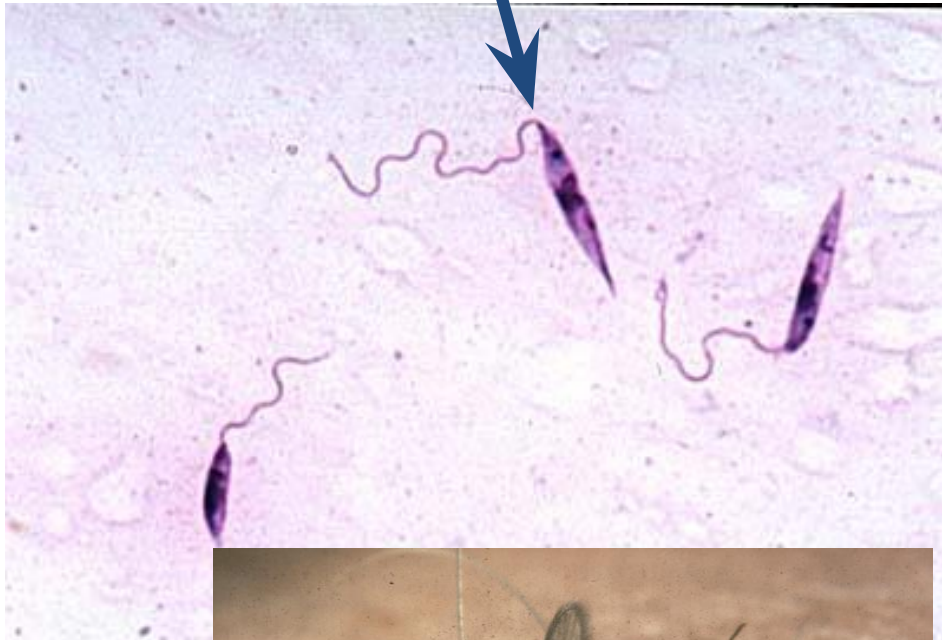


(NVBDPC, 2010)

- 40-50% of global burden  
(Bora 1999, *Natl Med J India*)  
48 districts affected
- Surveillance being done by NVBDPC
- INDIA: 13869 cases and 20 deaths by VL (2013)
- Endemic states in Eastern India: Bihar, Jharkhand, West Bengal, Uttar Pradesh
- Estimated 165.4 million population at risk in 4 states

# Life Cycle of leishmaniasis

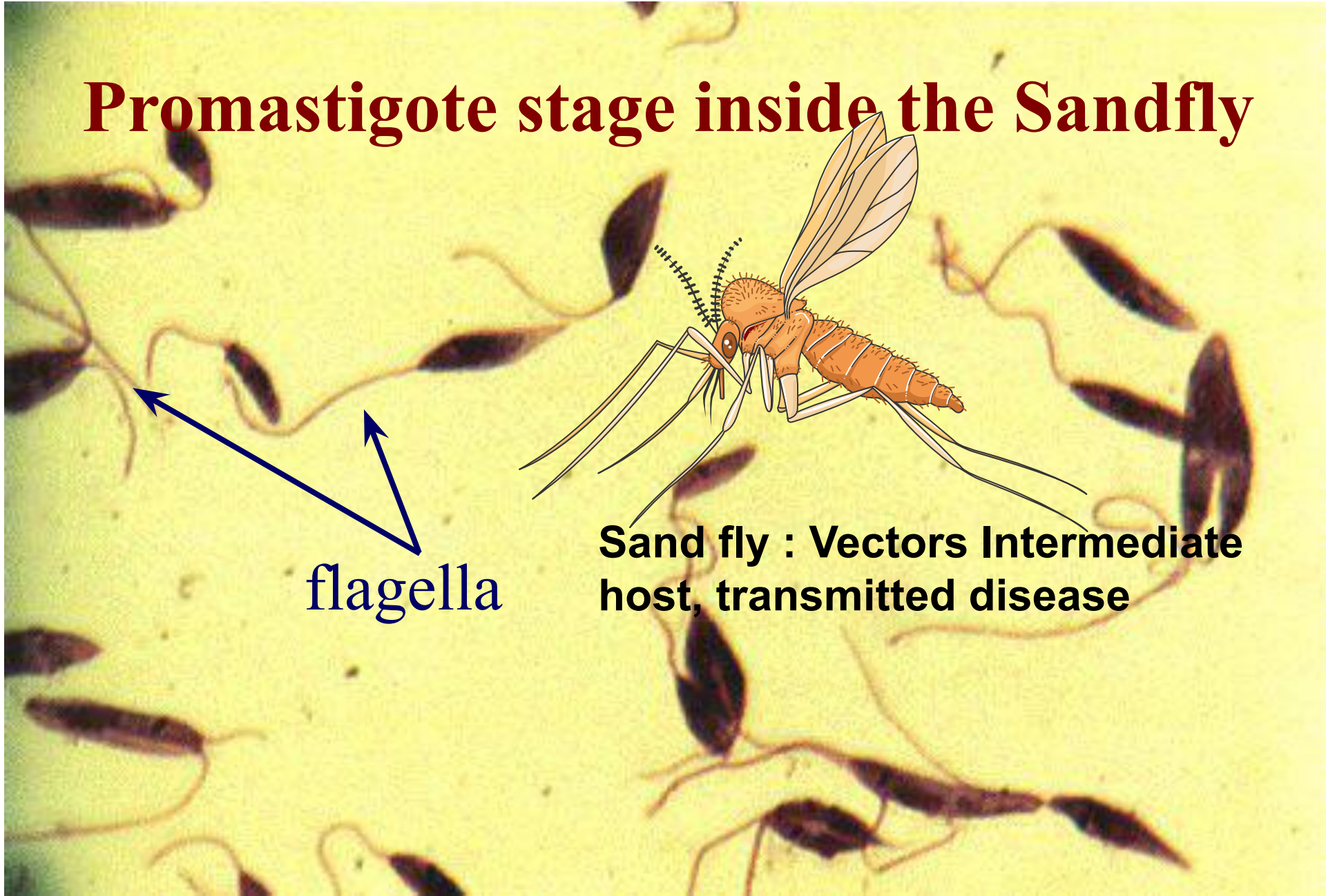
*Promastigote* ← **Transformation** → *Amastigote*





# Promastigote stage

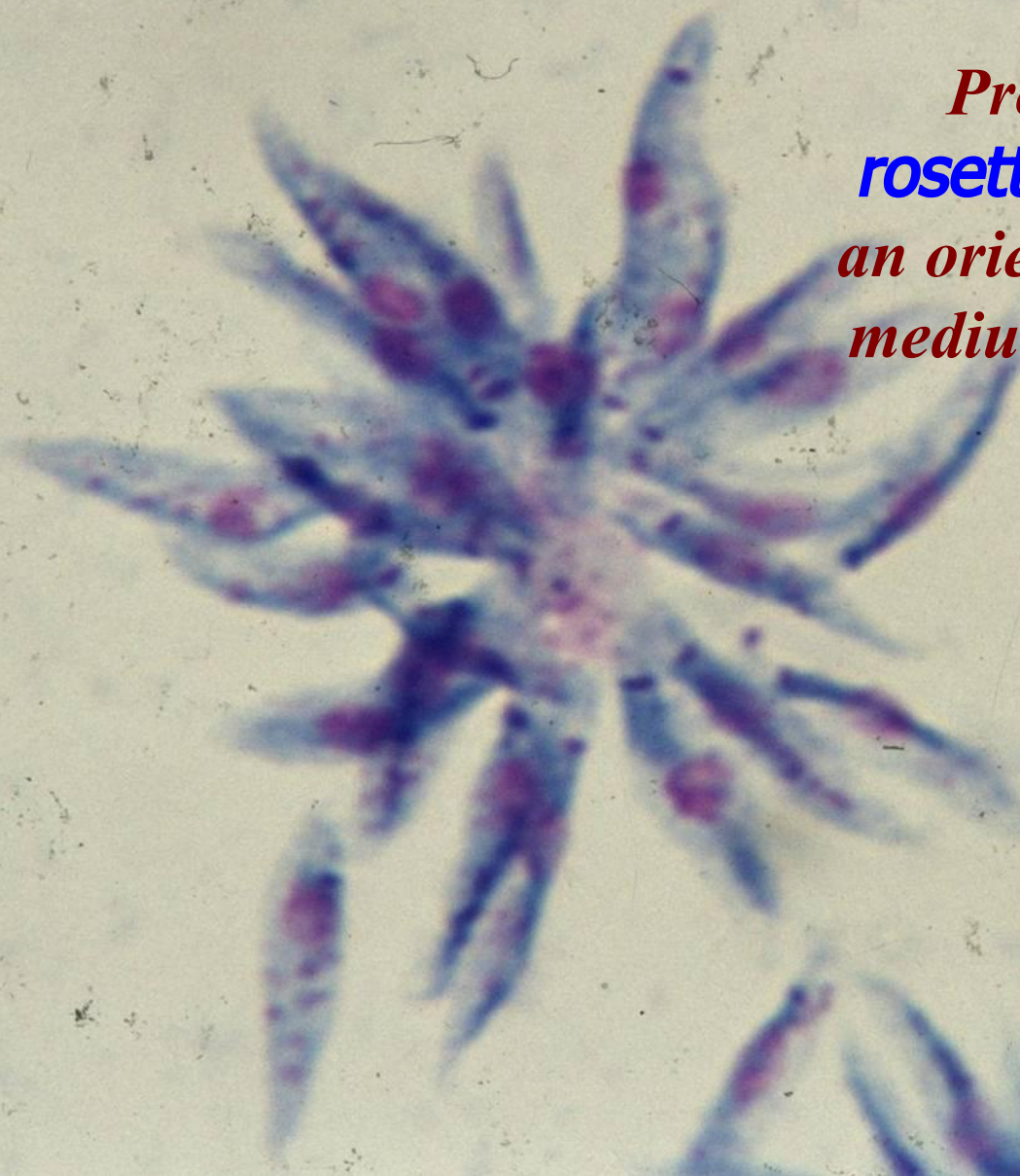
## Promastigote stage inside the Sandfly



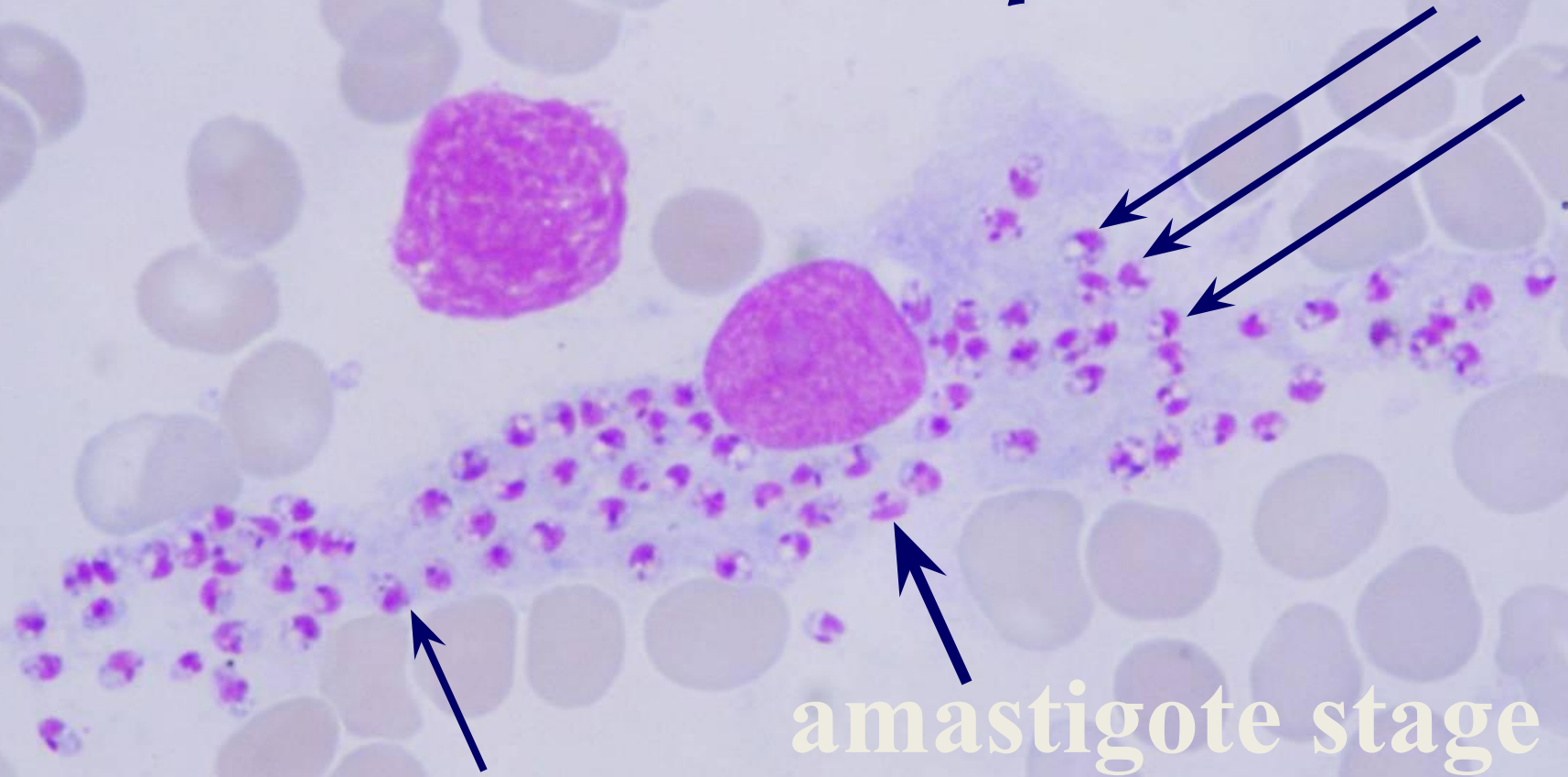
flagella

**Sand fly : Vectors Intermediate host, transmitted disease**

*Promastigotes in  
rosettes in a culture of  
an orient sore on N.N.N.  
medium (Giemsa stain).*



# *Leishmania sp.*



**Ovoid small intracellular parasites in a bone marrow aspirate. The typical rod shaped kinetoplast is seen besides the nucleus.(Giemsa stain).**

20  $\mu$ m

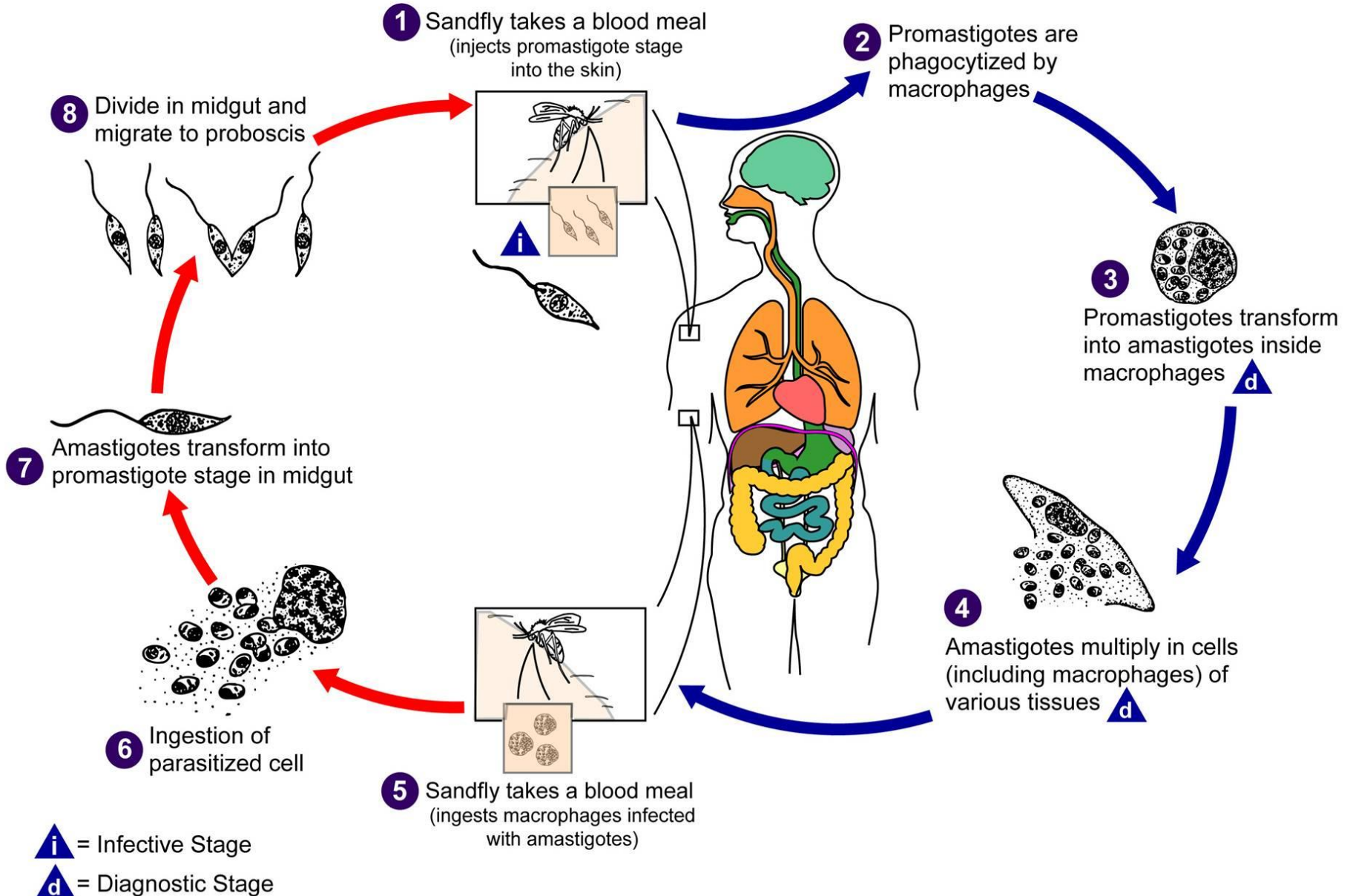
***Life cycle***

# Leishmaniasis

(*Leishmania spp.*)

## Sandfly Stages

## Human Stages



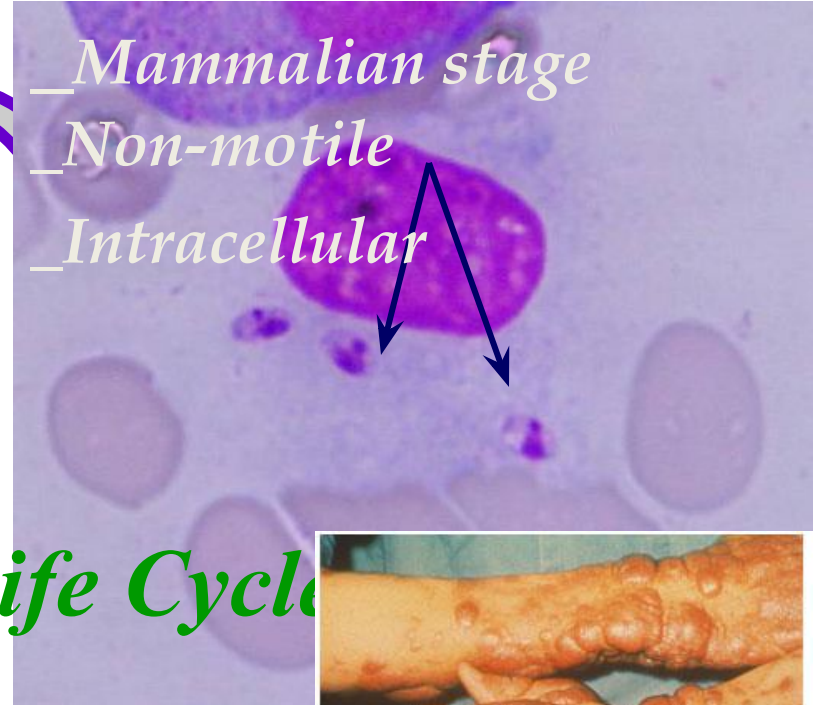


orphology

*Amastigote stage*

*\_Mammalian stage*  
*\_Non-motile*  
*\_Intracellular*

*of sand fly*



*Digenetic Life Cycle*

*Promastigote stage*

*\_inside the Insect*  
*\_Motile form*  
*\_infectious stage*



*Bite of sand fly*



# Transmission of Leishmaniasis

\_ by sand flies.

\_ artificial transmission of leishmania via the sharing of **contaminated syringes and needles**, from one intravenous drug user to another.

**Rarely, Leishmaniasis is spread from a pregnant woman to her baby (Materno-fetal transplacental transmission).**

**Blood transfusion or contaminated needles also can spread Leishmaniasis.**



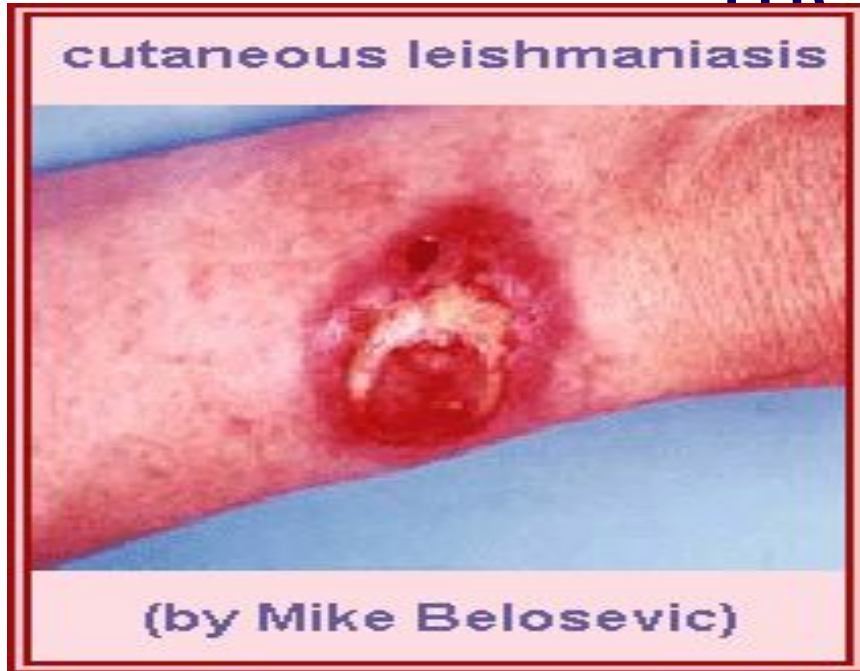
# Cutaneous Leishmaniasis

**Cutaneous** forms of the disease normally produce skin ulcers on the exposed parts of the body such as the face, arms and legs. The disease can produce a large number of lesions





# A cutaneous leishmaniasis lesion on the arm.



**Some people have swollen lymph glands near the sores.**

**For example, the glands under the arm can swell if the sores are on the arm or hand.**



**The skin sores will heal by themselves, but this can take months or years. The sores can leave ugly scars.**

# Cutaneous Leishmaniasis



# The Baghdad boil

## Baghdad-boil, 2004

Several hundred US soldiers  
in Iraq.



## *Leishmania tropica*

- Causes ulceration of the skin called Cutaneous Leshmaniasis
- Dry or urban C.L.
- Dry sore that may persist for several months before healing, then person is immune
- Some people “vaccinate” their children against Leshmaniasis.
- Rarely can cause infections of the viscera



# Mucocutaneous Leishmaniasis

Mucocutaneous leishmaniasis (Espundia)

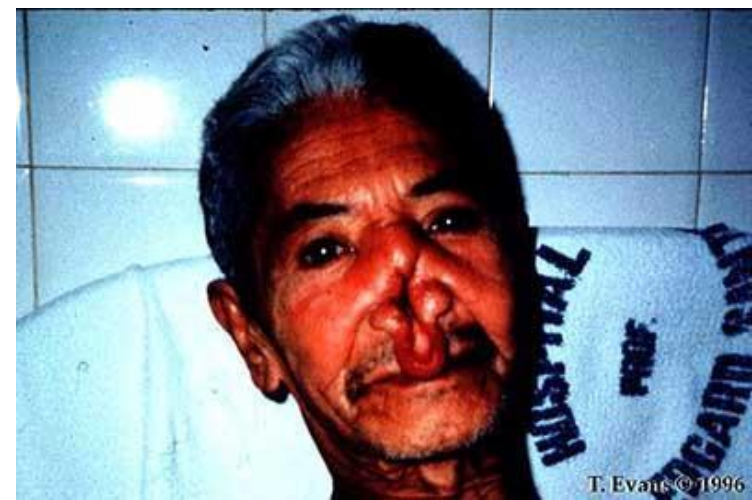
*Leishmania braziliensis* &  
*L. maxicana*



# Mucocutaneous Leishmaniasis

**mucocutaneous** forms of leishmaniasis , lesions can lead to partial or total destruction of the mucosa membranes of the nose, mouth and throat cavities and surrounding tissues.

Nasal stuffiness, runny nose , bleeding of nose, rectum & vagina.  
Ulcer & erosion of mouth, nose, rectum, lips, gums, vaginal



# **Visceral Leishmaniasis**

**Visceral disease (Kala-azar)**

# Visceral disease (Kala-azar)

Most severe form of disease, the disease typically starts with irregular bouts of fever, chills, and general anemia



Since leishmaniasis is primarily a disease of the reticulo-endothelial system, replacement of infected cells produces hyperplasia and consequent enlargement of the visceral organs associated with the system (e.g., spleen and liver).

*Hepatosplenomegaly*



# Post Kala Azar Dermal Leishmanoid

Normally develops <2 years after recovery

Restricted to skin, rare but varies geographically

- Some people recover spontaneously
- Some people who were treated later develop Post-Kala- azar dermal leishmanoid

黑热病人照片



黑热病主要的临床表现为长期不规则发热、肝脾肿大、全血贫血。照片中患者肝、脾肿大。

皮肤型黑热病人照片



我国常见的皮肤型黑热病为结节型，皮肤结节多呈黄豆或绿豆大，结节的皮肤发红，多见于面部和颈部。



**Dogs can act as reservoirs  
of *Leishmania* parasites.**

**They also exhibit  
symptoms of infection.**

# Diagnosis

**Diagnosing Leishmaniasis can be difficult Sometimes the Lab tests are negative even if a person has Leishmaniasis.**





# Diagnosis

## 1. Clinical Diagnosis: signs & symptoms

Patient history (travel, vectors)

## 2. Laboratory Diagnosis :

# Laboratory Diagnosis of leishmaniasis :

## Cutaneous leishmaniasis :

- Tissue sample (scraping, aspirate or punch biopsy) for smear and culture

## Visceral leishmaniasis :

- Bone marrow biopsy or splenic aspirate for smear and culture.(N.N.N) V.L.(anemia , leukopenia , glubuline/albumine is high (Hypergammaglobulinia)
- Serology ( ELISA ) ( IFAT ).
- PCR
- Skin test
- Inoculate serum of infected person in lab. animals.

# *Animal inoculation*

Inoculate serum of infected person in lab. animals.



# Cutaneous and mucocutaneous treatment

- Antimony components : Meglumine antimoniate (Glucantime) and Sodium stibogluconate (Pentostam) are drugs of choice.
  - 20 mg/kg/d IV or IM for 20d
- Pentamidine, Paromomycin are alternative drugs for CL
- Amphotricine B for antimony resistant MCL
- Fluconazole may decrease healing time

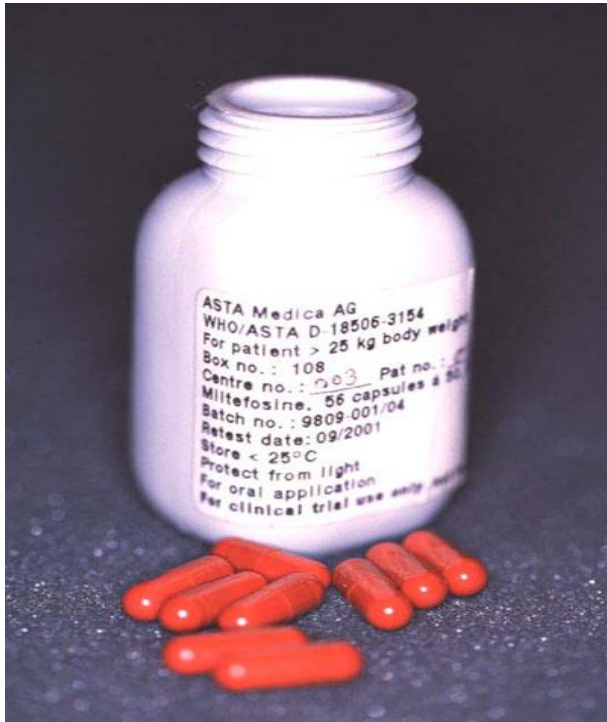


# Visceral leishmaniasis treatment

- Pentostam or Glucantime 20 mg /kg/d IV or IM for 28d
- Amphotricin B: 0.5-1 mg/kg IV daily 15-20d
- Liposomal Amphotricin B (Ambisome): 3 mg/kg/d IV on days 1-5, day 14 and day 21
  - Low toxicity and high stability, better delivery
- Alternative: Pentamidine (4mg/kg three times weekly, between 5-25 weeks ), Parmomycine

## Visceral leishmaniasis treatment (con.)

- **Miltefosine (Impavido)** (2.5 mg/kg /d p.o. for 28 d)
  - It was developed for cancer therapy at first
  - **The only oral drug**
  - safer and more tolerable drug (less toxicity for bone marrow and haematopoietic progenitor cells)
  - teratogenic



# Leishmaniasis control

- Vector control
  - insecticides
  - insecticide impregnated bed nets (IIB)
- Case finding treatment
- Animal reservoir control
  - Treatment or killing of seropositive dogs
  - Rodent killing
- Decrease of susceptibility: Childhood age, malnutrition and Immunosuppression are susceptibility factors for VL.
  - eliminating of childhood malnutrition
  - try to produce an efficient vaccine

