

الكلية: الطب

القسم او الفرع: الاحياء المجهرية

المرحلة: الثالثة

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اسم المادة باللغة العربية: الطفيليات الطبية

اسم المادة باللغة الإنكليزية: **Medical Parasitology**

اسم المحاضرة الخامسة باللغة العربية: داء الليشمانيات

اسم المحاضرة الخامسة باللغة الإنكليزية: **Leishmaniosis**

محتوى المحاضرة الخامسة

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# **leishmaniasis**

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# **Clinical classification of Leishmaniasis**

## **Leishmania parasitic in human classified in to two broad groups :-**

**1-Visceral leishmaniasis** : caused by *L.donovani* and transmitted by Phlebotomus sand flies.

**2-Cutaneous leishmaniasis** : (cutaneous and mucocutaneous leishmaniasis),no visceral manifestation,these include:

❖ **Oriental sore:- (Old world leishmaniasis)**,transmitted by Phlebotomus sand fly and caused by *L.tropica* :

1-*L.tropica minor*----- dry type, causes urban cutaneous leishmaniasis , reservior host is dog.

2-*L.tropica major*----- wet type, cause rural cutaneous leishmaniasis , reservior host is rodent.

❖ **Espundia or nasopharyngeal leishmaniasis: (New world leishmaniasis)** ,transmitted by Lutzomyia spp. And caused by *L.braziliensis*, caused cutaneous and muco-cutaneous leishmaniasis.

❖ **Post kala-azar dermal leishmaniasis(PKDL)**,also this named as dermal leishmanoid, it is a late sequel of visceral leishmaniasis infection caused by *L.donovani* .

## Species of *Leishmania* parasitic to man:

**1-*Leishmania donovani***:causing (kala-azar) , the infection is generalized and the parasites are distributed in the internal organs,so this disease is also called visceral leishmaniasis. The parasite is also cause a variety of skin lesions( dermal leishmanoid) without any visceral manifestation.

**2-*Leishmania tropica***:causing (Oriental sore),the infection is limited to local lesions of the skin and subcutaneous tissues.

**3-*Leishmania braziliensis***:causing (Espundia),the infection is limited to local lesion of the skin and nasopharyngeal mucous membrane.

**\*\**Leishmania infantum***:causing infantile kala-azar, occurring in the mediterranean areas .It is regarded as a separate variety but is now considered to be identical to *L. donovani* .

**\*\**Leishmania chagasi***:It is the parasite of south American kala-azar,it was later found to be identical to *L. donovani* .

# Life cycle

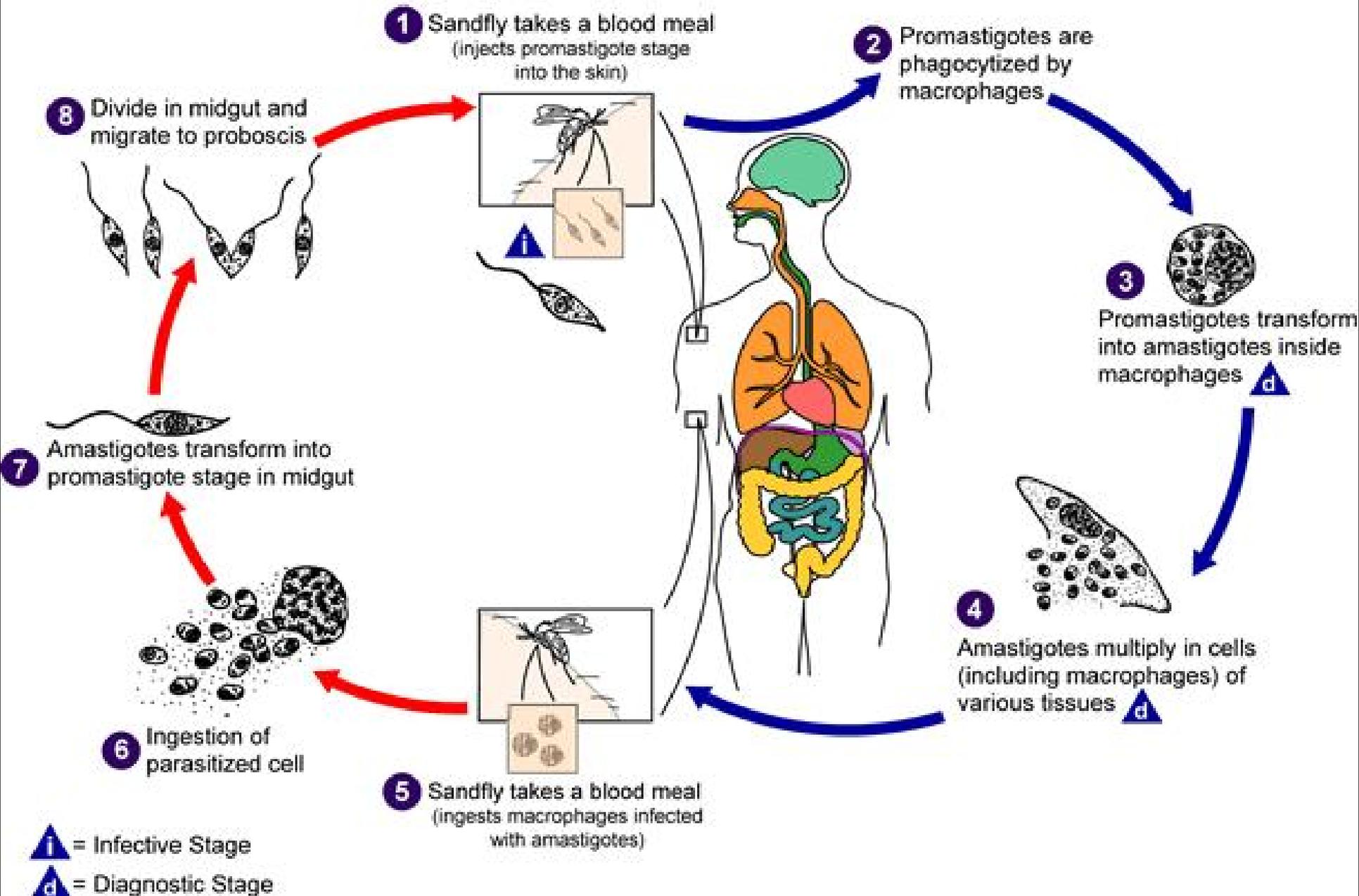
- ▶ The sand fly vector becomes infected when feeding on the blood of an infected individual or an animal reservoir host.
- ▶ The *leishmania* parasites live in the macrophages as round, non-motile amastigotes (3-7 micrometers in diameter).
- ▶ The macrophages are ingested by the fly during the blood-meal and the amastigotes are released into the stomach of insect.
- ▶ immediately the amastigotes transform into the motile, elongated (10-20 micrometers), flagellate promastigote form.

- ▶ The promastigotes then migrate to the alimentary tract of the fly and multiply by binary fission.
- ▶ Four to five days after feeding the promastigotes move forward to the oesophagus and the salivary glands of the insect.
- ▶ When the sandfly next feeds on a mammalian host, its proboscis pierces the skin .
- ▶ the *leishmania* promastigotes are transferred to the host along with the saliva.
- ▶ Once in the host the promastigotes are taken up by the macrophages where they rapidly revert to the amastigote form.

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- ▶ multiplication inside the macrophages, leading to the lysis of the macrophages.
  - ▶ The released amastigotes are taken up by additional macrophages and so the cycle continues.
  - ▶ Ultimately all the organs containing macrophages and phagocytes are infected, especially the spleen, liver and bone marrow and less often in other locations such as the skin, intestinal mucosa and lymph nodes.

## Sandfly Stages

## Human Stages



# Insect vector

- ▶ The vector of the *leishmania* parasite is the blood-sucking female of the genus *Phlebotomus* in the old world and *Lutzomyia* in the new world.
- ▶ The sandflies usually feed at night while the host is asleep.



**insect vector (female of sand fly)**

# Visceral Leishmaniasis

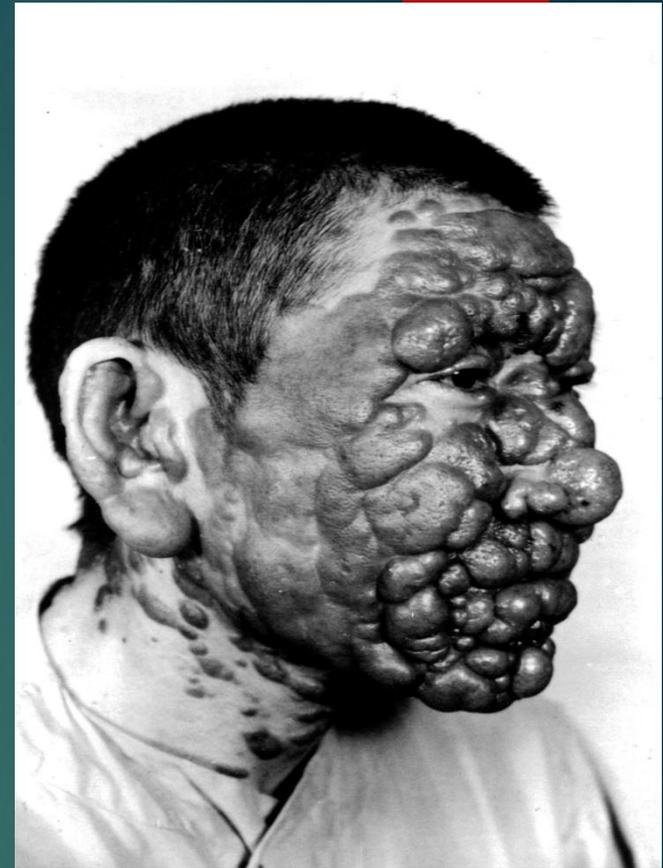
- ▶ visceral leishmaniasis including Dum-dum fever, and tropical splenomegaly.
- ▶ The most commonly used term is **Kala azar**, which means black sickness or **black fever**.
- ▶ Visceral leishmaniasis is caused by the parasites *Leishmania donovani donovani*, *Leishmania donovani infantum* in the old world and by *Leishmania donovani chagasi* in the new world.

- ▶ Visceral leishmaniasis can be complicated by serious secondary bacterial infections such as pneumonia, dysentery and pulmonary tuberculosis, which often contribute to the high fatality rate of VL patient
- ▶ recurrence of Kala-azar that may appear on the skin of affected individuals up to 20 years after being partially treated, untreated or even in those considered adequately treated.
- ▶ They manifest as hypo-pigmented macules, papules, nodules, or facial erythema (butterfly patches).
- ▶ it is commonly associated with *L .donovani*.



Post kala-azar cutaneous leishmaniasis: Papular non-pruritic rash

[www.aids-images.ch](http://www.aids-images.ch)

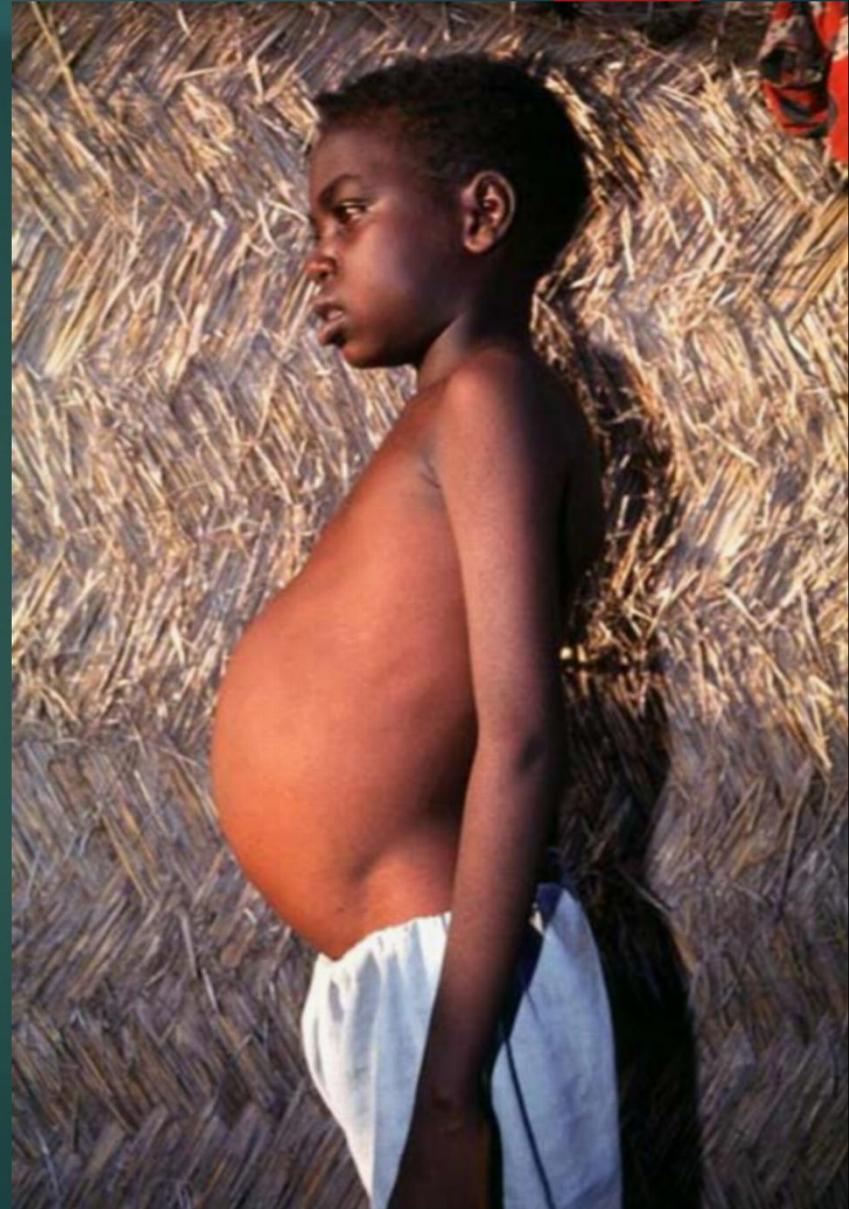


extensive facial nodular lesions in **late** PKDL



Hypo-pigmented skin changes in **early** PKDL

- Profile view of a ten age boy suffering from **visceral leishmaniasis**.
- The boy exhibits splenomegaly, distended abdomen .



# Daignosis

■ Clinical :such as splenomegaly, hepatomegaly and high undulating fever

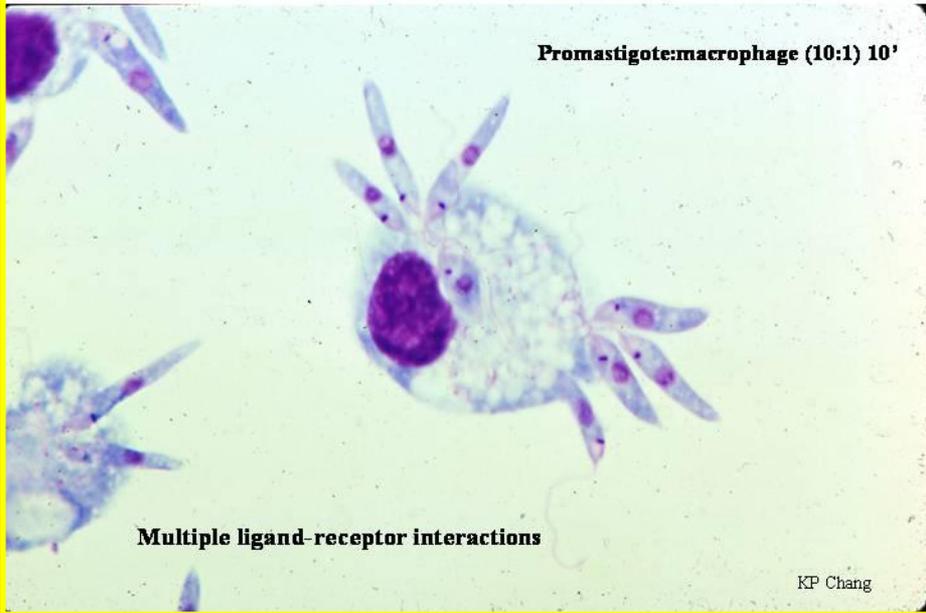
Methods employed in laboratory are as follows:-

❖ Demonstration of the parasites in materials obtained from patients by **microscopy**, **culture**, and **animal inoculation**. These material are:-

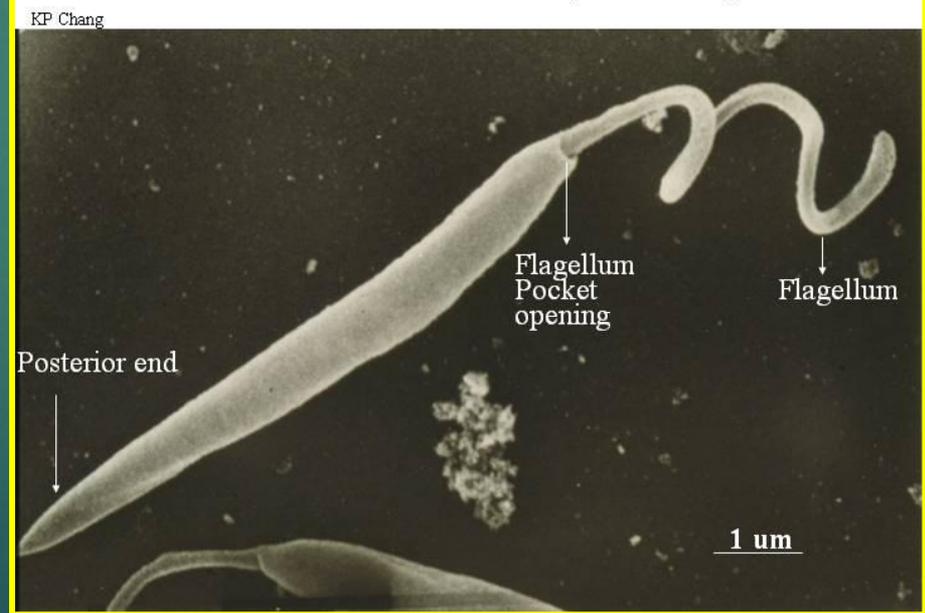
- **peripheral blood**
- **Bone marrow aspirates**
- **Spleen aspirates**



***Leishmania donovani* promastigote-binding to macrophage**



***Leishmania donovani* promastigotes**



## These materials collected can be tested by:-

- **Microscopy**: smears are stained by leishman, giemsa or wright stains and examined under the oil immersion objective, amastigotes (**LD bodies**) can be seen in the large number within the macrophages. Is the gold standard method for the diagnosis of VL.
- **Cultures** : are made on (NNN) Novy-McNeal-Nicole medium , incubated at 24 C for 7 days .

- **Animal inoculation:** is not used for routine diagnosis, the materials are inoculated intraperitoneally or intradermally into the skin of the nose and feet, the inoculated animals are kept at 23-26 C but takes several weeks to become positive.
- ❖ **Leishmanin or Montenegro test** , a skin test and is used to measure delayed hypersensitivity. 0.1ml of antigen suspension of washed promastigotes in 0.5 percent phenol saline in a strength of 10 percent is injected intradermally positive result is indicated by an induration of 5mm or more in 48-72 hours
- ❖ Demonstration of antibodies or antigens (**serological methods**)
- ❖ **Molecular diagnosis:-** by using polymerase chain reaction (PCR) technique, this method based on the amplification of the leishmania DNA .

# Cutaneous leishmaniasis

## *Leishmania tropica*

**Disease :- Oriental sore, Delhi ulcer, Aleppo boil, Delhi boil or Baghdad boil, cutaneous leishmaniasis .**

- ▶ **Oriental sore:-** (Old world leishmaniasis), transmitted by Phlebotomus sand fly and caused by *L.tropica* :
- ▶ 1-*L.tropica minor*----- dry type, causes urban cutaneous leishmaniasis , reservior host is dog.
- ▶ 2-*L.tropica major*----- wet type, cause rural cutaneous leishmaniasis , reservior host is rodent.

- ❖ **Espundia or nasopharyngeal leishmaniasis: (New world leishmaniasis)**, transmitted by *Lutzomyia* spp. And caused by *L. braziliensis*, caused cutaneous and muco-cutaneous leishmaniasis. If the ear is infected, this is called (**Chiclero`s ulcer**) characterized by destruction of the cartilage and disfigurement of the ear (caused by *Leishmania Mexicana*).
- ❖ **Post kala-azar dermal leishmaniasis(PKDL)**, also this named as dermal leishmanoid, it is a late sequel of visceral leishmaniasis infection caused by *L. donovani*.



**Dry type, urban C. l.**



**Ulcerated wet lesion C.L.**



- ▶ Scraping from the side or edge of the ulcer smeared on a slide and stained with Wrights or Giemsa stain .
- ▶ will show the parasites in endothelial cells and monocytes.





**Amastigotes**

- ▶ **Leishmanin** or **Montenegro test** , a skin test and is used to measure delayed type hypersensitivity.
- ▶ 0.1ml of antigen suspension of washed promastigotes in 0.5 percent phenol saline in a strength of 10 percent is injected intradermally
- ▶ positive result is indicated by an induration of 5mm or more in 48-72 hours

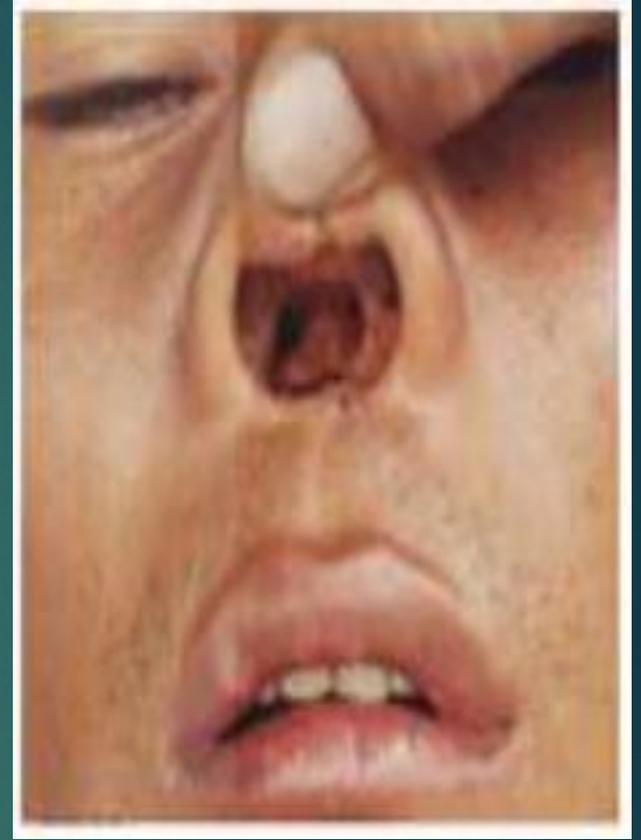


- ▶ *L. braziliensis*, the parasites have a tendency to metastasize , or spread directly from the primary lesion to mucocutaneous zones.
- ▶ The secondary lesion often involves the nasal system and buccal mucosa, causing degeneration of the cartilages and soft tissues
- ▶ Necrosis and secondary bacterial infection are common. **Espundia** and **uta** are the names applied to these condition
- ▶ The ulceration may involve the lips, palate, and pharynx  
Invasion of the infection into the larynx and trachea destroys the voice.
- ▶ The condition may last for many years, and death may result from secondary infection or respiratory complications.

B. New World CL (i- *L. mexicana* complex)



**Chiclero's ulcers**



**mucocutaneous leishmaniasis**