



# Parasitic infection of the skin

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# Nematodes of medical importance

## Intestinal

## Tissue & Blood

Small intestine

### □ With tissue stage:

- *Ascaris lumbricoides*
- *Ancylostoma duodenale*
- *Necator americanus*
- *Strongyloides stercoralis*

• *Trichinella spiralis*

### • Without tissue stage:

- *Enterobius vermicularis*
- *Trichuris trichiura*

Large int.

- *Wuchereria bancrofti*
- *Brugia malayi*
- *Loa loa*
- *Onchocerca volvulus*
- *Dracunculus medinensis*
- *Trichinella spiralis*

### □ Larva migrans:

- *Ancylostoma spp.*
- *Toxocara spp.*



# Skin diseases caused by parasitic infection

➤ **Caused by nematoda**

❖ **Cutaneous larva migrans**



❖ **Trichinellosis**



➤ **Caused by protozoa**

❖ **Cutaneous leishmaniasis**





## Cutaneous larva migrans



but





# Cutaneous larva migrans

(Creeping eruption, Plumber's itch, Sand worm)

- ❖ **Definition** : serpiginous eruption of the skin due to skin invasion by animal hookworms' larvae.
- ❖ **Serpiginous**: slowly spreading, healing over in one portion while continuing to advance in another.
- ❖ **Causative parasite**: filariform larvae of *Ancylostoma caninum* & *Ancylostoma braziliense* which are dog and cat hookworms
- ❖ **Geographical distribution**: Cosmopolitan.



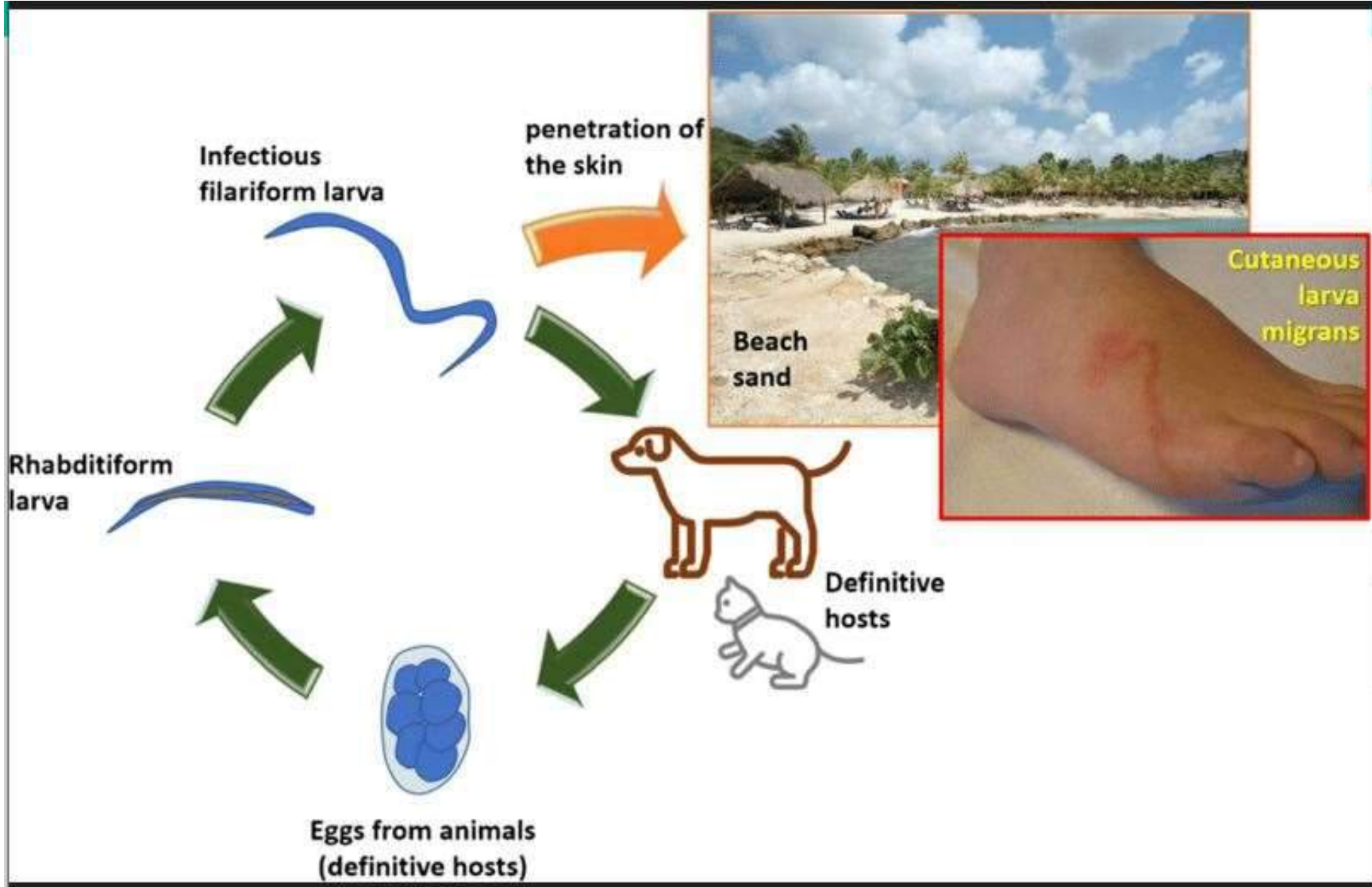
# Cutaneous larva migrans



## ❖ Mode of infection

1. Human infection is caused by **penetration of the skin** by **animal hookworm's filariform larvae** which are not adapted to man.
2. Infection occurs due to contact with contaminated soil (moist or sandy) with dog & cat excreta.
3. The larvae migrate in the **superficial layers of the skin** and do not go beyond the basal layer of the skin and keep **migrating** in the **epidermis** without development and rarely reaching the circulation.

# Life cycle





# Pathogenesis and clinical picture



➤ At the site of entry red itchy papule can develop few hours after penetration

➤ Erythematous zigzag tunnel (2-4 mm), vesicular and elevated may be complicated by secondary bacterial infection causing severe irritation and pruritis.

➤ Larvae remain active, move **very slowly** in the epidermis layer only for several weeks or months till die.

Commonly affect the skin of feet, hands or buttocks and may advances to 1-2 cm / day.

➤ The skin lesion heals leaving linear white scars at the affected sites.

➤ **Rarely** larvae may elicit generalized allergic manifestations







# Treatment



## ❖ Systemic:

- Ivermectin 200 µg/kg single oral dose
- Albendazole 400mg/kg orally for 3 days
- Antihistaminic to relieve itching

## ❖ Local:

- Topical ivermectin cream
- Local antibiotic for secondary bacterial infection
- Local freezing: Spray of skin by ethyl chloride (local freezing) or carbon dioxide snow which produce freezing of larvae till death → skin bleb → larvae are lost with epidermal sloughs.





# Trichinellosis



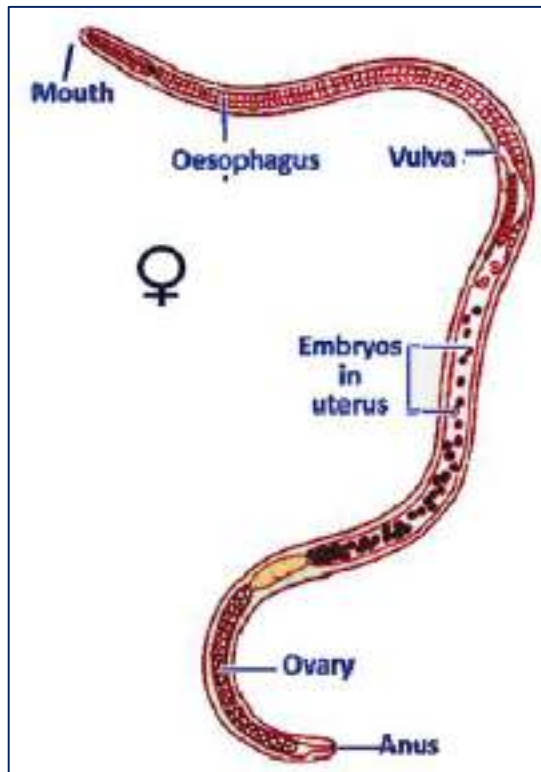


# *Trichinella spiralis*

❖ **Distribution:** worldwide specially in pork eating countries

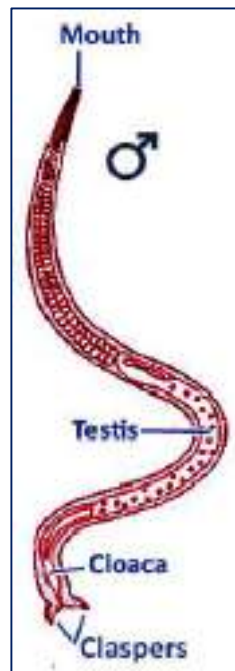
❖ **Morphology:**

**Female**



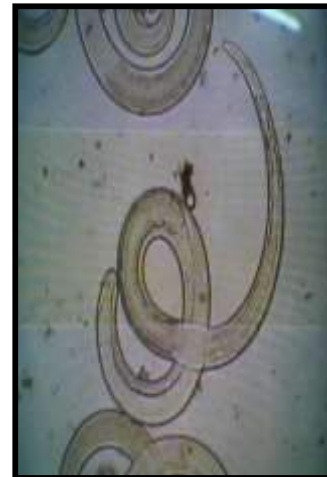
3 mm long

**Male**



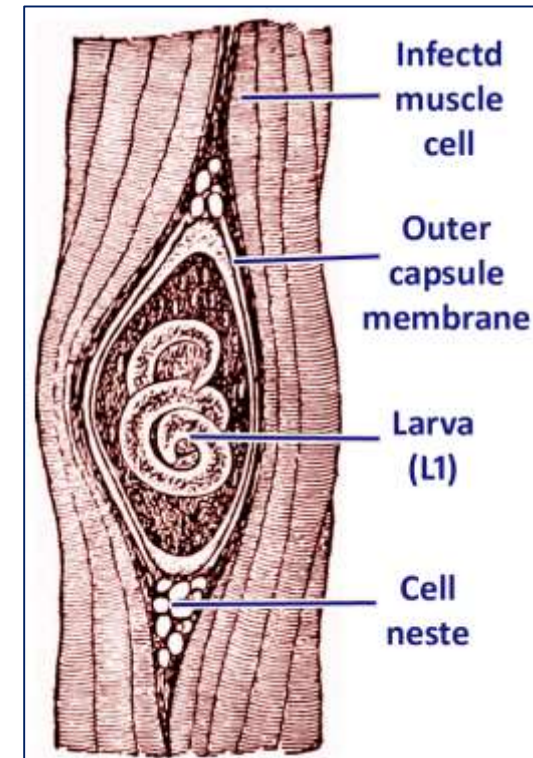
1.5 mm long

**Newborn larva**



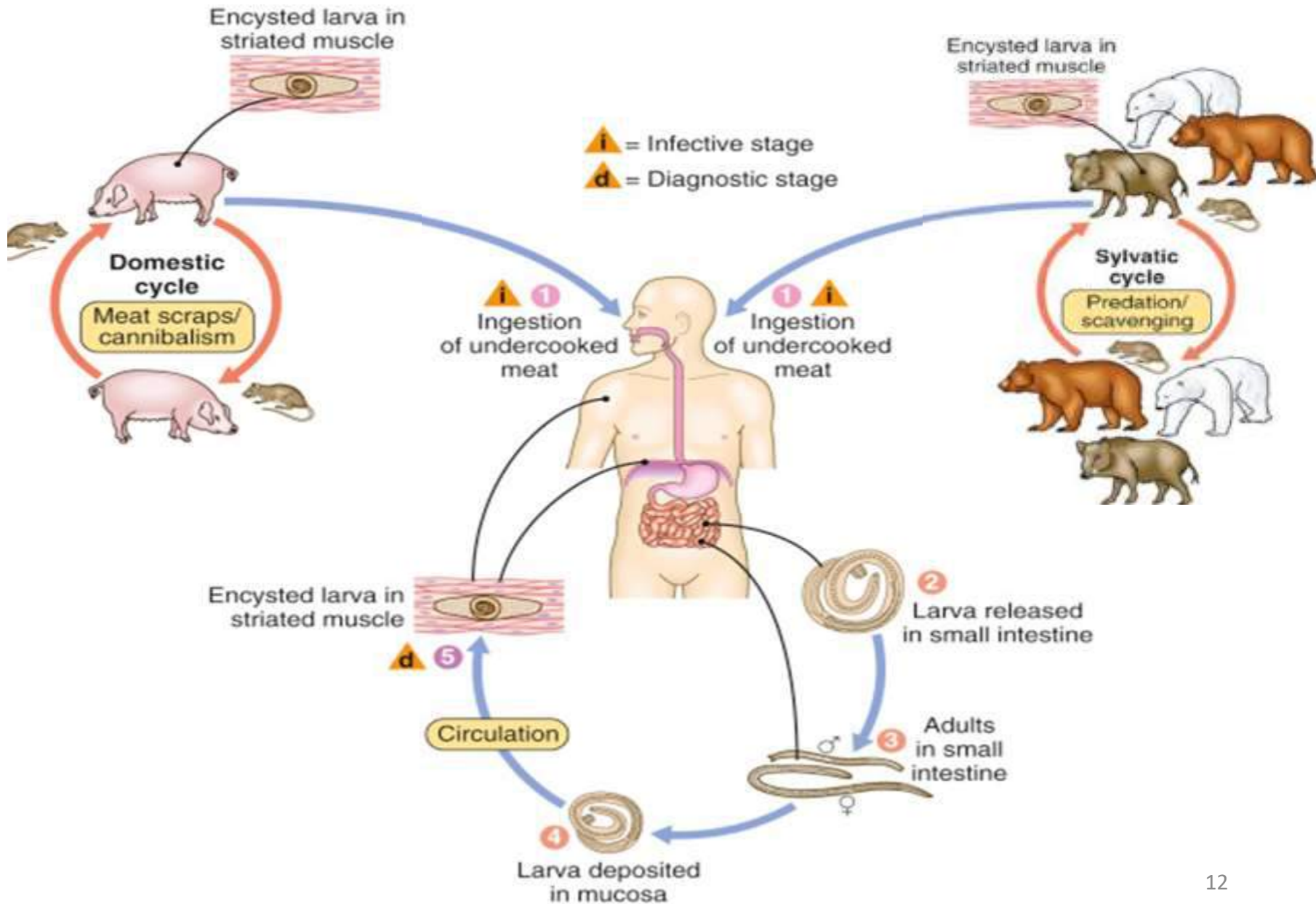
0.1 mm long

**Encysted larva in muscle**



1 mm long in a muscle capsule of 0.5 mm long

# Life cycle of *Trichinella*





# *Trichinella spiralis*



❖ **Definitive host:**

➤ Pigs, rats & sometimes man.

❖ **Intermediate host:**

➤ Pigs, rats & sometimes man.

❖ **Habitat:** Adults live in the small intestine.

Males in lumen & females in tissues (embedded in submuco).

**Infective larvae** live mainly in active striated muscles.



# *Trichinella spiralis*



## ❖ Diagnostic stages:

- *T. spiralis* larvae in muscles
- Adults and newborn larvae in stool

## ❖ Infective stage: Encysted larvae in skeletal muscles



## ❖ Mode of infection: Eating undercooked pork meat, containing encysted *T. spiralis* larva

**Man is a complete blind host.**



# Pathogenesis and clinical picture

## ➤ Enteral phase

- From **2-7 days post infection**
- Due to burrowing of adults and larvae in the intestinal mucosa
- Abdominal pain, diarrhea, nausea and vomiting

## ➤ Parenteral phase

- **Second week post infection**
- Due to migratory larvae with blood vessels injury, hypersensitivity reactions and toxic product
- Fever, facial oedema, splinter and subconjunctival haemorrhage, cough, skin rash
- Patients die from encephalitis, myocarditis and peritonitis

## ➤ Muscular phase

- **Third week post infection**
- Due to encysted larvae in muscles
- Severe muscle pain, swelling in muscles, Difficulty in breathing, may end in muscle paralysis



**Trichinellosis**





# Laboratory diagnosis



## Direct

- **Stool examination:** For larvae or adult.
- **Blood examination:** For larvae.
- **Muscle biopsy:** Taken from the swollen tender part & compressed between two slides after digestion in acid pepsin to see larvae .
- **Xenodiagnosis and Trichinoscopy:** suspected meat is given to a lab animal and its muscles are examined after one month
- **X ray** for calcified cyst.
- **CT** for brain lesions.

## Indirect

- **Intradermal test (Bachman test).**
- **Serological tests:** CFT, IHA, IFAT, ELISA.
- **Eosinophilia (20-50%).**

### Bachman test

A skin test for trichinosis in which an extract of *Trichinella* larvae is suspended in saline and injected intradermally. An immediate wheal-and-flare reaction or a delayed response indicates infection



# Treatment



## General treatment

## Specific therapy

- Bed rest and fluid therapy
- Sedatives for headache and muscle pain.
- Corticosteroids to reduce inflammatory reaction.
- Cardiac and respiratory monitoring.

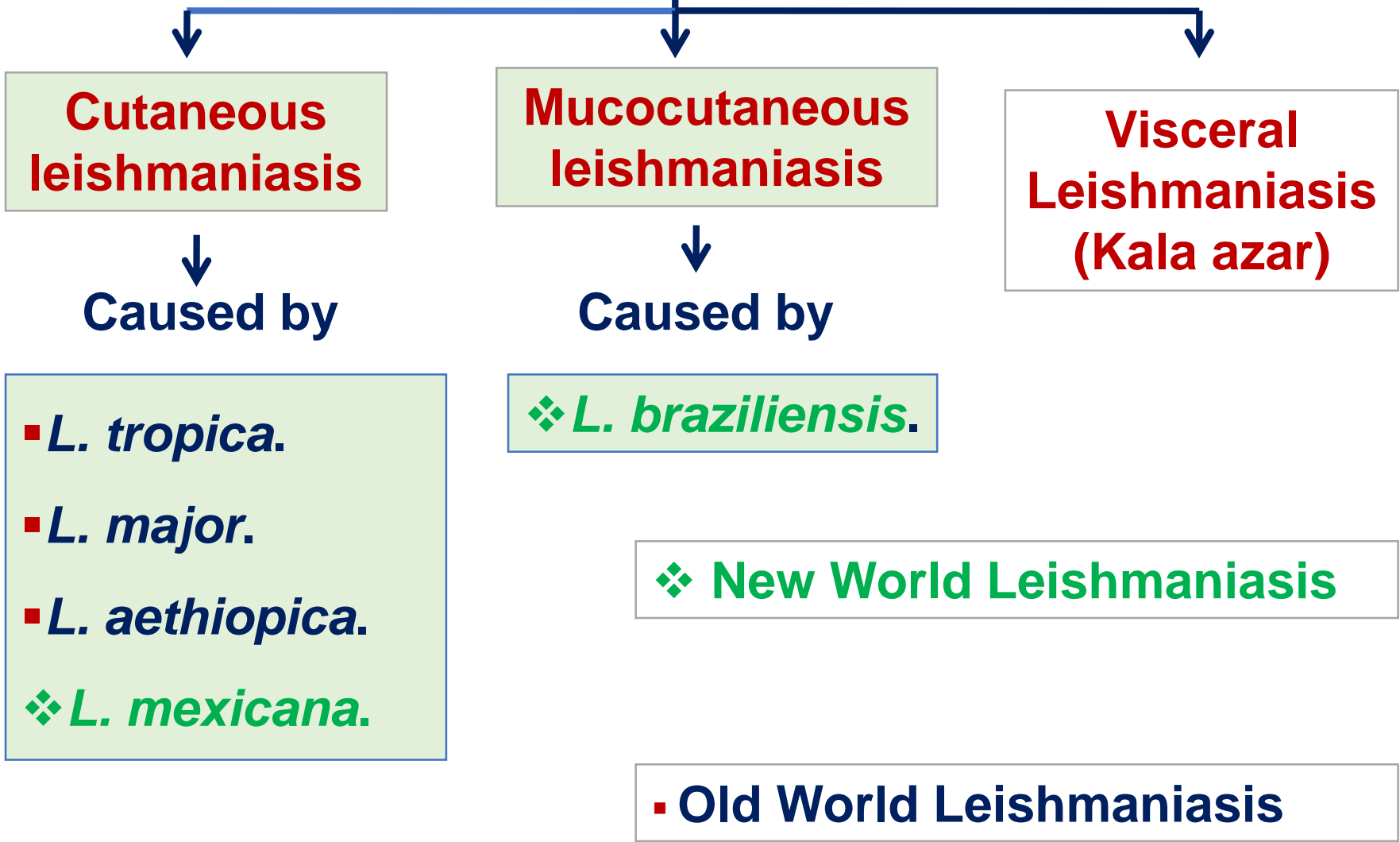
- Thiabendazole.
- Mebendazole.



# Cutaneous leishmaniasis



# Leishmaniasis classified into

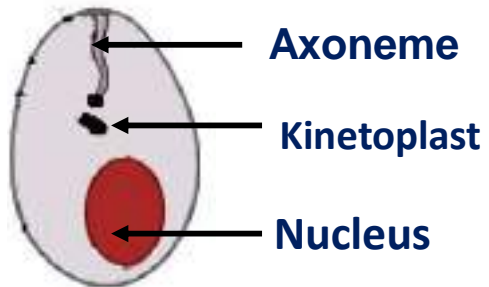




## ❖ Morphological forms

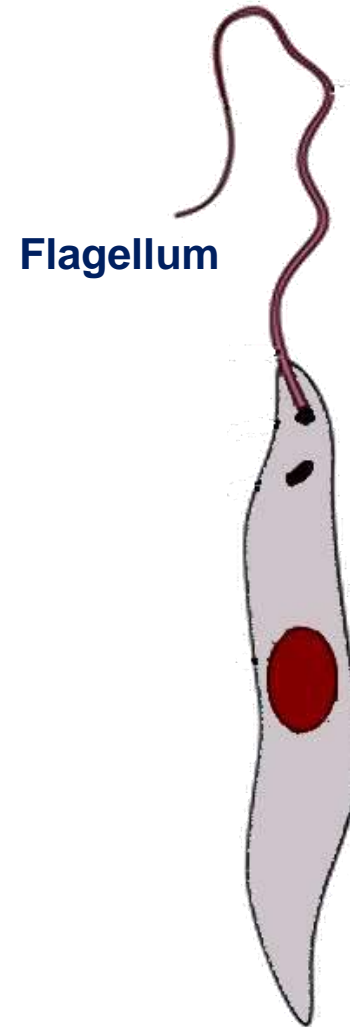


### Leishmanial or Amastigote stage



Round or oval  
(2–4 $\mu$ m)

### Leptomonad or promastigote stage



spindle-shaped  
(15-20 $\mu$ m)



## ❖ Morphological forms

### 1- Amastigote

- Shape:** Oval
- Kinetoplast:** Beside the nucleus
- Flagellum:** Absent
- Nucleus:** -Eccentric with central  
Karyosome
- Habitat:** -Intracellular (macrophage)  
-Tissue culture

### 2- Promastigote

- Shape:** Fusiform or spindle
- Kinetoplast:** At the anterior end
- Flagellum:** Present
- Nucleus:** -Central with central  
Karyosome
- Habitat:** -Midgut of the insect  
-Culture media



## ❖ Mode of transmission



- 1- Bite of female sand fly (*Phlebotomus* species).
- 2- Direct contact with infected lesions.
- 3- Transmission by blood sucking fly as *Stomoxys*.

**D.H:** Man

**R.H:** Dogs in *L. tropica*.  
Rodents in *L. major* & *L. aethiopica*.

**D.S:** Amastigote (specimen)  
Promastigote (culture)

**I.S:** Promastigote (sand fly)  
Amastigote (contact)

**Vector:** Female sand fly (*Phlebotomus*)





## ❖ Pathogenesis



- The lesion develops on the exposed parts of the body
- Single or multiple
- Starts as erythematous papule that enlarges to form nodule that ulcerates forming an ulcer with sharp edge
- The lesion is **painless** unless secondary bacterial infection occurs
- The ulcer heals with a disfiguring scar
- Solid immunity to the same species



<p><b><i>L. tropica</i></b>  <b>(Dry or urban oriental sore)</b></p>	<p><b><i>L. major</i></b>  <b>(Moist or wet oriental sore)</b></p>	<p><b><i>L. aethiopica</i></b>  <b>(Diffuse cutaneous)</b></p>
<p><b>Chronic course</b></p>	<p><b>Acute course</b></p>	<p><b>Chronic widely distributed lesions in immunosuppressed individuals (opportunistic)</b></p>
<p><b>Long incubation period (2-12 ms)</b></p>	<p><b>Short incubation period (3-6 ms)</b></p>	<p><b>One week to several months</b></p>
<p><b>Ulcer with scanty exudate and slow healing (12 ms)</b></p>	<p><b>Ulcer with serous exudate and rapid healing (6ms)</b></p>	<p><b>Lesions not restricted to the site of infection and appears as multiple nodules</b></p>
<p><b>In Europe, Asia and Africa (cities and urban regions)</b></p>	<p><b>In Europe, Asia and Africa (rural areas)</b></p>	<p><b>East Africa (Ethiopia and Kenya)</b></p>
<p><b>Solid immunity</b></p>	<p><b>Solid immunity</b></p>	<p><b>Can relapse</b></p>

# Oriental sore



# *Leishmania aethiopica*

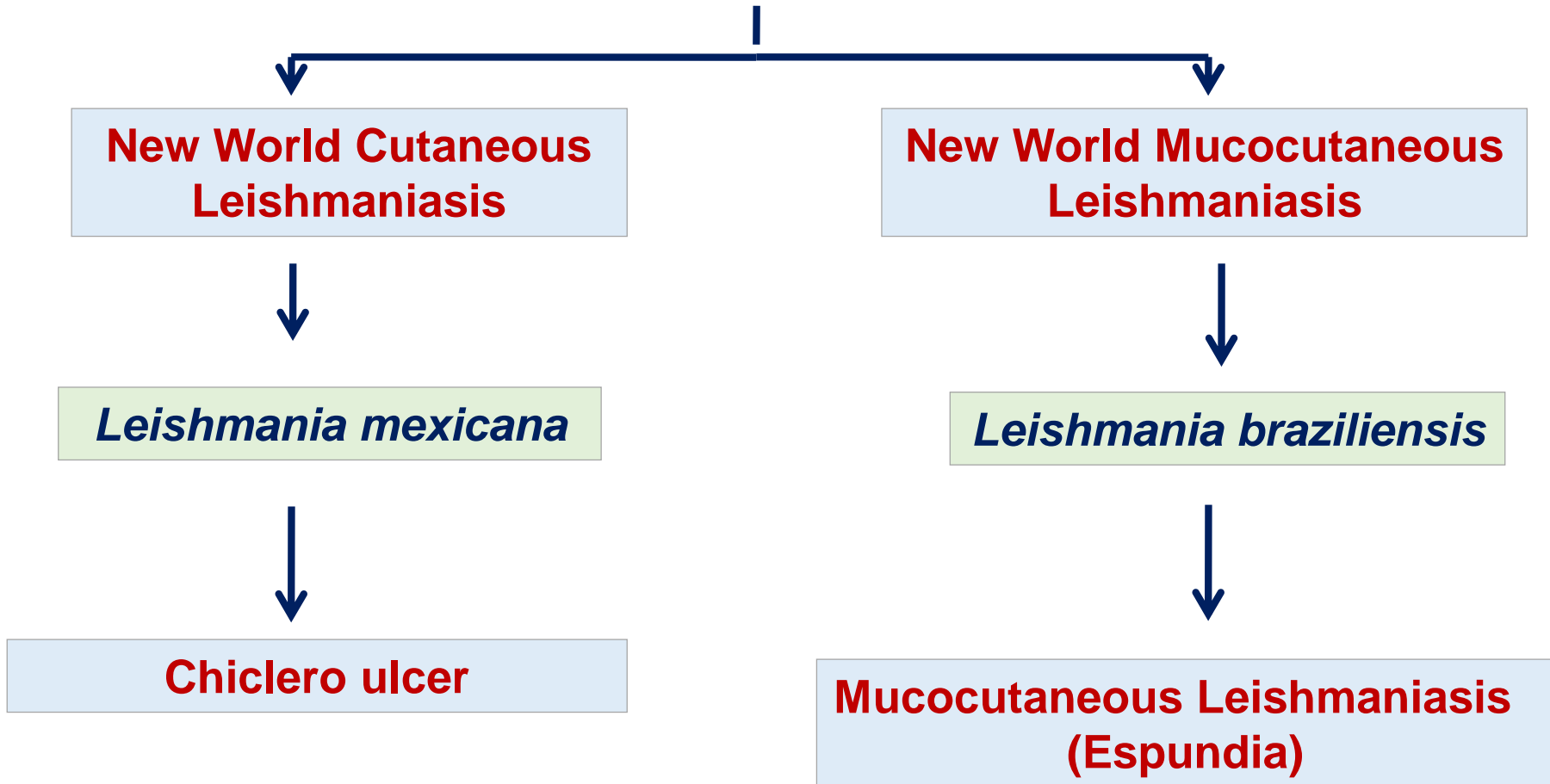


Chronic widely distributed lesions in immunosuppressed individuals





# New world (American) leishmaniasis



**New World Cutaneous  
Leishmaniasis**

*Leishmania mexicana*

**Chiclero ulcer**

**New World Mucocutaneous  
Leishmaniasis**

*Leishmania braziliensis*

**Mucocutaneous Leishmaniasis  
(Espundia)**



## Chiclero ulcer

### Caused by *L. mexicana*

- A small **single nodule** at the site of sand fly bite → ulcerates.
- Usually on the face & ear pinna → heals within 6 months.
- Ear lesion causes destruction of the cartilage of the ear pinna.
- Seen in chicleros who live in forests & collect gum from chicle trees.

## Espundia

### Caused by *L. braziliensis*

- Primary skin lesion:** Nodule in exposed regions → ulcerates.
- The ulcer with raised indurated margin → heals in scar in months.
- Secondary metastatic lesion:** The parasite migrates from the primary site to blood & lymph to mucocutaneous junctions.
- Sites:** nasal septum, lips, palate nasopharynx & larynx.
- Deformity & 2<sup>nd</sup> bacterial infection.
- Death from septicemia and bronchopneumonia.

## Chiclero ulcer



## Espundia





# Laboratory diagnosis

## Direct

**1-Scraping the edge of the ulcer or aspiration** by a needle or **biopsy** (not the base as contains pus and necrotic tissues) and examined by :-

- Direct smear stained by Giemsa or leishman.

**2- Culture on NNN medium** (amastigotes changes into promastigotes).

## Indirect

**1-Immunodiagnosis:**

- **Leishmanin test (Montenegro test).**
- **Serological tests:** Not useful for the diagnosis.

**2- PCR:** A reliable diagnostic test. than routine smear and culture and it used also for species differentiation.

# Treatment

## 1) Local

- Cryosurgery, curettage or local application of heat to raise the intra-lesional temperature to 37- 43 ° C for 12 hours as amastigote do not grow above 33 ° C.
- Surgical excision of the lesion.

## 2) Chemotherapy

- **Non-ulcerated lesion:** Intra-lesional injection of pentavalent antimony compounds.
- **Ulcerated lesion:** Should be treated with systemic pentavalent antimony compounds (ex. Pentostam).
- **Alternative drugs to pentostam:** Amphotericin B, imidazoles or Allopurinol.
- **Antibiotics** for secondary bacterial infection of lesions.



## **Case:**

- **A 19-year-old-woman, who had spent several months of the previous year as a student in Brazil, presented to the hospital complaining of ulcers on her lips and mouth as well as on her nasal mucosa. When she returned from Brazil the previous year, she had noted multiple skin lesions on her arm that had disappeared. A biopsy taken from ulcer edge showed macrophages containing small oval parasites about 2-3  $\mu\text{m}$**