

Leishmania

Leishmaniasis Is caused by a parasite called *Leishmania*

Other names and types of lesions caused by leishmania species

- 1- **Baghdad boils** A common name for an infection with *Leishmania tropica*; it is a cutaneous form of leishmaniasis presenting with pus-containing ulcers
- 2- **Bay sore** A common name for a cutaneous form of infection caused by *Leishmania mexicana*
- 3- **Chiclero ulcer** A form of cutaneous leishmaniasis caused by *L. mexicana*; it is commonly found in Belize, Guatemala, and the Yucatan peninsula in areas where **chicle sap** is harvested for making chewing gum
- 4- **Dum dum fever** A common name for the visceral leishmaniasis caused by *Leishmania donovani*
- 5- **Espundia** Another name for an infection resulting from *Leishmania braziliensis*, the principal cause of mucocutaneous disease in Central and South America, particularly in Brazil
- 6- **Forest yaws** Another name for an infection with *Leishmania guyanensis*, the principle cause of mucocutaneous leishmaniasis in the Guianas, parts of Brazil and Venezuela; also known as **pian bois**
- 7- **Kala-azar** Another name for the most severe form of visceral leishmaniasis caused by members of the *Leishmania donovani* complex
- 8- **Oriental sore** A common reference for the cutaneous leishmaniasis caused by the *Leishmania tropica* complex
- 9- **Pian bois** Another name for infection with *L. guyanensis*; also known as **forest yaws**
- 10- **Uta** A reference to mucocutaneous leishmaniasis in the **Peruvian Andes**.

Types of Leishmaniasis

1) *Leishmania braziliensis* complex :

Other names: Mucocutaneous leishmaniasis, **chiclero ulcer**, **espundia**, **forest yaws**, **pian bois**, **uta**.

Found in Mexico, Argentina, Panama, Colombia, the Peruvian Andes, Guiana, Brazil, Bolivia, Paraguay, Ecuador, and Venezuela.

Members of *Leishmania braziliensis* complex are *Leishmania braziliensis*, *Leishmania panamensis*, *Leishmania peruviana*, and *Leishmania guyanensis*.

This leishmanial complex referred to as **New World leishmaniasis** because of their geographic location in what is commonly considered **the New World**.

Laboratory Diagnosis

- **Microscopic examination** of **Giemsa-stained** preparations **biopsy of the infected ulcer** for identifying the **amastigotes** of *L. braziliensis* complex. **Promastigotes** may be present when the sample is collected immediately after introduction into the patient.
- **Culturing the infected material**, which often demonstrates the **promastigote** stage, and
- **Serologic testing** such as ELISA, and IFA.
- **Molecular diagnosis:** **Restriction analysis of kinetoplast DNA, a technique referred to as schizodeme analysis.**
- **Culture on NNN medium** demonstrates the promastigote stage of these organisms

Epidemiology: The *L. braziliensis* complex is composed of *L. braziliensis* (found from Mexico to Argentina), *L. panamensis* (found in Panama and Colombia), *L. peruviana* (found in the Peruvian Andes), and *L. guyanensis* (found in Guiana, parts of Brazil, and Venezuela), particularly in the rain forest regions, where **chicle sap** for chewing gum is harvested (known under these circumstances as **chiclero ulcer**).

Transmission is generally through the bite of the *Lutzomyia* or *Psychodopygus* sandfly and reservoir hosts, including **forest rodents** and **domestic dogs**

Life Cycle Sandflies of the genera *Lutzomyia* and *Psychodopygus* are responsible for transmitting the **pro- mastigotes** of the species of the *L. braziliensis* complex humans via a blood meal. After skin bite, the promastigotes invade the **reticuloendothelial cells** and transform into **amastigotes**, which actively reproduce, causing **tissue destruction**. Reproduction and invasion of additional cells then occur. Affecting skin and mucous membrane. **The amastigote serves as the infective stage for the sandfly.** On ingestion, during a blood meal of an infected human, the **amastigotes** transform back into **promastigotes** in the fly **midgut**. These **promastigotes** multiply and the resulting developed forms eventually migrate into the salivary gland of the fly, where they are ready to be transferred to a new human during a blood meal. Thus, the cycle repeats itself. .

Clinical Symptoms

Mucocutaneous Leishmaniasis. Symptoms occur within a **few weeks to months after transmission**. **Large ulcers in the oral or nasal mucosa** areas (**mucocutaneous**) develop in a number of these patients after the initial invasion of the **reticuloendothelial cells**. A **cutaneous (meaning affecting or relating to the skin)** lesion may heal on its own. However, untreated cases of mucosal lesions result in **destruction of the nasal septum**, lips, and nose. **Edema** and **secondary bacterial infections** may cause **disfigurement of the patient's face**. **Death** is usually attributed to a **secondary bacterial infection**.

Treatment :

- **Antileishmanial agent with antimony compounds (pentavalent antimonials).** However, *L. braziliensis* has shown an increased **resistance** to **pentavalent antimonials** such as sodium stibogluconate (**Pentosan**).
- Alternative treatment include **liposomal amphotericin B (Ambisome)** and **oral antifungal drugs** such as **fluconazole** (Diflucan), **ketoconazole** (Nizoral).

Prevention and Control

- Public awareness through **education programs** in endemic areas and exercising **personal protection** against contact with **sandflies** (e.g., **protective clothing, repellents, screening**) are **preventive measures** against infections with *L. braziliensis* complex members.
- Prompt **treatment and eradication of infected ulcers.**
- **Control of the sandfly population and reservoir hosts,**
- **Vaccine** against members of the *L. braziliensis* complex and other *Leishmania* spp. is ongoing, with some vaccines for animals (dogs) presently in experimental trials.

2) *Leishmania donovani* complex

- **Other names:** **Visceral leishmaniasis, kala-azar, dum dum fever.**
- Found in **Asia** including the **middle east** and **Iraq, North Africa** including **Egypt,** and **Central and South America.** This group is comprised of *L. donovani, Leishmania infantum,* and *Leishmania chagasi.*
- Referred to as **Old or New World,** depending on the **geographic location** of the species of *Leishmania* involved.

Laboratory Diagnosis

- The **Montenegro skin test** is a screening test used for screening large populations at risk for infections caused by *Leishmania* spp. Its reliability in detecting exposure to the organisms causing leishmaniasis is related to the patient's disease status.
- **Giemsa-stained slides of blood, bone marrow, lymph node aspirates, and biopsies** of the infected areas to check for **amastigote** forms.
- **Culturing of Blood, bone marrow, and other tissues;** these samples often show the **promastigote** forms.
- **Serologic testing** is available using IFA (indirect fluorescent antibody), ELISA (enzyme-linked immunosorbent assay), and DAT (direct agglutination test).
- **Molecular tools** such as **schizodeme analysis** (restriction enzymes analysis of kinetoplast DNA (kDNA).

Life Cycle: The life cycle is identical to that of *L. braziliensis*, with only two exceptions. **First**, the specific sandfly species vary with each of the three subspecies. **Second**, *L. donovani* primarily affects the visceral tissue of the infected human.

Epidemiology: The *L. donovani* complex is composed of *L. donovani*, *L. infantum*, and *L. chagasi* (Table below). *L. donovani* and *L. infantum* are known to be endemic in areas of the Middle East, including Iraq, Saudi Arabia, the United Arab Emirates, and Bahrain.

Subspecies	Geographic Distribution	Vector	Reservoir Hosts
<i>L. donovani chagasi</i>	Central America, especially Mexico, West Indies, South America	<i>Lutzomyia</i> sandfly	Dogs, cats, foxes
<i>L. donovani donovani</i>	Parts of Africa, India, Thailand, Peoples Republic of China, Burma, East Pakistan	<i>Phlebotomus</i> sandfly	India, none; China, dogs
<i>L. donovani infantum</i>	Mediterranean Europe, Near East, Africa; also in Hungary; Romania, southern region of former Soviet Union, northern China, southern Siberia	<i>Phlebotomus</i> sandfly	Dogs, foxes, jackals, porcupines

Clinical Symptoms

- Abdominal illness and **hepatosplenomegaly** (enlargement of the spleen and liver, **fever** and **chills**). The incubation period **2 weeks to 18 months**.
- **Diarrhea**, as well as **anemia**, may often be present.
- Additional symptoms, including **weight loss and emaciation**, occur following parasitic invasion of the liver and spleen.
- **Advanced stages of disease result in kidney damage** (e.g., **glomerulonephritis**, inflammation of the glomeruli of the kidney).
- **A characteristic darkening of the skin may be noted. This symptom is referred to by the common disease name, kala-azar, which means black fever.** Chronic cases usually lead to **death in 1 or 2 years**.

Treatment:

- **Liposomal amphotericin B (Ambisome)** is the drug of choice for treating visceral leishmaniasis.
- **Sodium stibogluconate (Pentosam)** is also an effective treatment for infections with *L. donovani* complex, but resistance has been demonstrated by organisms in India and the Mediterranean.
- Successful treatment has been accomplished with the use of **gamma interferon** combined with **pentavalent antimony**.

3) *Leishmania mexicana* complex

Other names: **New World cutaneous leishmaniasis**, **chiclero ulcer**, **bay sore**.

- Referred to as **New World** because of the geographic location in **Central** and **South America**.

Life Cycle Notes; Is similar to that of *L. braziliensis*. The vectors are sandfly *Lutzomyia*. And rodents reservoir host.

Epidemiology: The *L. mexicana* complex is composed of *L. mexicana*, *L. pifanoi*, *L. amazonensis*, *L. venezuelensis*, and *L. garnhami*. See the Table. Members of this complex are often transmitted by the bite of a *Lutzomyia* sandfly, with forest rodents serving as the reservoir host.

Subspecies	Geographic Distribution	Vector	Reservoir Hosts
<i>L. mexicana</i>	Belize, Guatemala, Yucatan Peninsula	<i>Lutzomyia</i> sandfly for all species comprising this complex	Forest rodents for all species comprising this complex
<i>L. pifanoi</i>	Amazon River Basin, Brazil, Venezuela		
<i>L. amazonensis</i>	Amazon River Basin, Brazil		
<i>L. garnhami</i>	Venezuelan Andes		
<i>L. venezuelensis</i>	Venezuela		

Clinical Symptoms

- **New World Cutaneous Leishmaniasis.** Approximately 40% of infections shows pus-containing ulcer affect the ear which is generally self-healing and can cause serious damage to the surrounding cartilage. Infected patients initially develop a small **red papule, located at the bite site**, which is typically 2 cm or larger in diameter and may cause **pruritis** (intense itching).
- **Diffuse cutaneous leishmaniasis (DCL)** In diffuse cutaneous infections with *L. pifanoi*, the initial lesion appears, ulcerates or disappears and, after a period of months to years, appears in local and distant areas from the bite site with **lepromatous- appearing lesions**. *L. amazonensis* infections have been known to progress to an **incurable diffuse cutaneous form of the disease**.

Treatment:

- **Pentavalent antimonials**, such as sodium stibogluconate (Pentosaam)
- **Antimony combined with pentoxifylline** taken orally three times a day for 30 days
- **Amphotericin B and liposomal amphotericin B** (Ambisome) also proven to be effective.

Prevention and Control: Similar to other forms

4) *Leishmania tropica* complex

Other names: Old World cutaneous leishmaniasis, **oriental sores**, **Delhi boils**, **Baghdad boils**, **dry or urban cutaneous leishmaniasis**.

Found in the **Mediterranean**, **Middle East**, **Armenia**, **Caspian region**, **Afghanistan**, **India**, **Kenya**, **Ethiopian highlands**, **southern Yemen**, **Turkmenistan deserts**, **Uzbekistan**, **Kazakhstan**, **northern Africa**, **the Sahara**, **Iran**, **Syria**, **Israel**, and **Jordan**.

- It is comprised of *L. tropica*, *Leishmania aethiopica*, and *Leishmania major*. This leishmania complex and the diseases for which its organisms are the causative agent may
- Referred to as **Old World leishmaniasis**.

Laboratory Diagnosis

- **Microscopic examination** of Giemsa-stained slides of aspiration of fluid underneath the ulcer bed for the typical amastigotes.
- **Culture** of the ulcer tissue may also reveal the promastigote forms.
- **Serologic tests**, such as IFA testing, are available.
- **Schizodeme analysis**.

Life Cycle: Identical to that of *L. braziliensis*. All three of the *L. tropica* subspecies are transmitted by the *Phlebotomus* sandfly. *L. tropica* complex primarily attacks the human **lymphoid tissue of the skin**.

Clinical Symptoms

- **Old World Cutaneous Leishmaniasis.** Infected patients initially develop a **small red papule** 2 cm or larger in diameter, located at the bite site with **intense itching**.
- **Diffuse cutaneous leishmaniasis (DCL)** occurs especially on the limbs and face when an immune response fails to take place. **Thick plaques** of skin, along with multiple lesions or nodules, usually result.

Epidemiology: Details in the table below

Subspecies	Geographic Distribution	Vector	Reservoir Hosts
<i>L. aethiopia</i>	Highlands of Ethiopia, Kenya, perhaps Southern Yemen	<i>Phlebotomus</i> sandfly for all species comprising this complex	Rock hyrax
<i>L. major</i>	Former Soviet Union, Iran, Israel, Jordan, parts of Africa, Syria (esp. in rural areas)		Gerbils, other rodents
<i>L. tropica</i>	Mediterranean, parts of the former Soviet Union, Afghanistan, India, Kenya, Middle East (especially in urban areas)		Possibly dogs

Treatment

- As with the other leishmaniasis, an effective treatment of *L. tropica* complex is sodium stibogluconate (**Pentosan**).
- The use of **steroids**, **application of heat** to the infected lesions,
- **Meglumine antimonate** (Glucantime), pentamidine, and oral ketoconazole may be indicated for treating *L. tropica* complex infections.
- **Paromomycin ointment** may also be given to aid in healing.

Prevention and Control: Similar to other forms