



TEAM443  
MICROBIOLOGY

# Leishmaniasis

Dr. Mona & Dr. Ibrahim



# Objectives

**No objectives were found**

Any future corrections will be in the editing file, so  
please check it frequently

## Color Index:

Main text

Important

Doctor Notes

Males slide

Females slide

Extra



# Introduction

Classifications of Parasites			Female Slides
Class	Protozoa	Helminths	
<b>Features</b>	<ul style="list-style-type: none"> <li>○ Unicellular</li> <li>○ Single cell for all functions</li> </ul> <p>No sexual stage, replicate by binary fission</p>	<ul style="list-style-type: none"> <li>○ Multicellular</li> <li>○ Specialized cells</li> </ul> <p>- They are like human, have systems: Respiratory, Reproductive.</p> <p>- As long as there is reproductive system so there will be sexual stage in their life cycle</p>	
<b>Types</b>	<ol style="list-style-type: none"> <li><b>Amoebae:</b> move by pseudopodia</li> <li><b>Flagellates:</b> move by flagella               <ul style="list-style-type: none"> <li>- Intestinal flagella e.g Giardia &amp; Entamoeba histolytica</li> <li>- Blood hemoflagellate e.g Trypanosoma</li> <li>- Tissue &amp; visceral flagella e.g leishmania.</li> </ul> </li> <li><b>Ciliates:</b> move by cilia</li> <li><b>Apicomplexa (Sporozoa)</b> tissue parasites</li> </ol>	<ol style="list-style-type: none"> <li><b>Roundworms (Nematodes):</b> <ul style="list-style-type: none"> <li>- Elongated, cylindrical, unsegmented</li> </ul> </li> <li><b>Flat worms</b> <ul style="list-style-type: none"> <li>- <b>Trematodes:</b> leaf-like, unsegmented</li> <li>- <b>Cestodes:</b> tape-like, segmented</li> </ul> </li> </ol> <p>○ Mnemonic: trematodes = tree = leaf like Cestodes = cm = tape</p>	



## Leishmaniasis (Male slides only)



Leishmania is a genus of trypanosomatid protozoa, which causes vector-borne parasitic disease called leishmaniasis



It is spread by the bite of Sand flies of the genus Phlebotomus in the Old World, and of genus Lutzomyia in the New World



Leishmaniasis is the second-largest parasite killer in the world (after malaria) and is endemic in many parts of Africa, Asia and South America



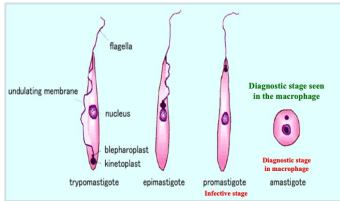


# Life Cycle of Leishmania (Female slides only)

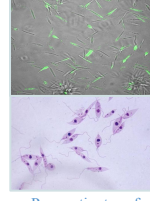
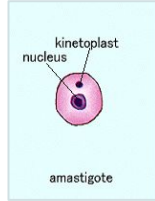
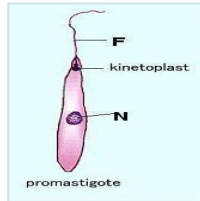
Leishmaniasis is transmitted by the bite of infected female sandflies (vector) ★★ -blood sucking-

The sandflies inject the **infective stage (promastigotes) ★**, then the macrophages will engulf them and transfer them to **★ amastigotes (the diagnostic stage)** within macrophages (1)

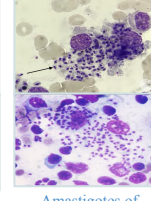
Leishmania parasite **survive within the macrophages** (amastigote stage) in the human body as **intracellular parasites**, cell mediated immunity determines the host response to infection & clinical manifestations of the disease.



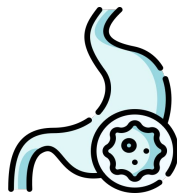
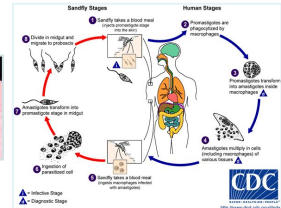
Different stages of Hemoflagellates



Promastigotes of Leishmania



Amastigotes of Leishmania

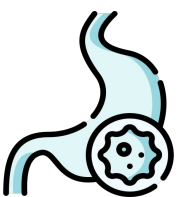


# Leishmania Parasites & Diseases

© Leishmaniasis comes in three forms: cutaneous, visceral, and mucocutaneous. Different species of the Leishmania parasite are associated with each form. Experts believe that there are about 20 Leishmania species that can transmit the disease to humans.

(\* = Endemic in Saudi Arabia) (2) :

Disease	Species
Cutaneous leishmaniasis ( <b>Oriental sore</b> )***	<ul style="list-style-type: none"> <li>○ <b>Leishmania tropica*</b></li> <li>○ Leishmania aethiopica</li> <li>★ ★ <b>Leishmania major*</b> (more in SA)</li> <li>○ Leishmania Mexicana</li> </ul>
Mucocutaneous leishmaniasis In the mouth & nose	<ul style="list-style-type: none"> <li>○ Leishmania Braziliensis in Brazil</li> </ul>
Visceral leishmaniasis ( <b>Kala azar</b> )***	<ul style="list-style-type: none"> <li>○ <b>Leishmania donovani*</b></li> <li>○ <b>Leishmania infantum*</b></li> <li>○ Leishmania Chagasi</li> </ul> <p style="text-align: center;">Found in SA</p>



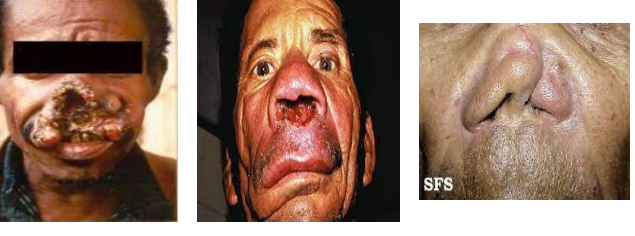


# Treatment of leishmaniasis

Antiparasitic drugs, such as amphotericin B (Ambisome), treat this condition. Your doctor may recommend other treatments based on the type of leishmaniasis you have.



# Leishmania Parasites & Diseases

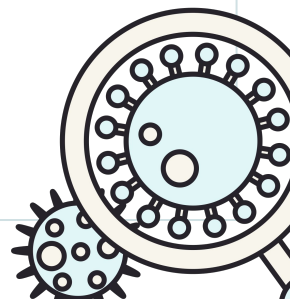
Disease	Cutaneous leishmaniasis	Mucocutaneous leishmaniasis
<p>Male Slides</p> <p><b>Overview</b></p>	<p>Cutaneous leishmaniasis causes ulcers on your skin. It's the most common form of leishmaniasis. Treatment may not always be necessary depending on the person, but it can speed healing and prevent complications.</p>	<p>A rare form of the disease, is caused by the cutaneous form of the parasite and can occur several months after skin ulcers heal. With this type of leishmaniasis, the parasites spread to your nose, throat &amp; mouth. This can lead to partial or complete destruction of the mucous membranes in those areas. Although mucocutaneous leishmaniasis is usually considered a subset of cutaneous leishmaniasis, it's more serious. It doesn't heal on its own &amp; always requires treatment.</p>
<p><b>Clinical Types</b></p>	<p>★ <b>known as Oriental sore</b>★ classical self limited ulcer</p> <ul style="list-style-type: none"> <li>○ <b>Leishmania major</b>: *human* &amp; Zoonotic cutaneous leishmaniasis (dogs, rodents): wet lesions with severe reaction. ★ Commonest in SA &amp; more dangerous because it's spread by both human &amp; animal so harder in prevention ★</li> <li>○ <b>Leishmania tropica</b>: Anthroponotic (human only) cutaneous leishmaniasis: Dry lesions with minimal ulceration.</li> </ul>	<p><b>L. Brasiliense's (In Brazil more not here)</b></p>
<p><b>Clinical presentation (3)</b></p>	<ul style="list-style-type: none"> <li>○ This starts as a painless papule on exposed parts of the body (at the site of Sand fly bite), generally the face which enlarges. The lesion ulcerates after a few months producing an ulcer with an indurated margin.</li> <li>○ In some cases (<b>L.tropica</b>): the ulcer remains dry and heals readily (<b>dry-type-lesion</b>)</li> <li>○ In some other cases (<b>L.major</b>): the ulcer may spread with an inflammatory zone around , these known as (<b>wet-type-lesion</b>) which heal slowly.</li> </ul>	<ul style="list-style-type: none"> <li>○ The lesion starts as a pustular swelling in the mouth or on the nostrils. The lesion may become ulcerative after many months and then extend into the nasopharyngeal mucous membrane.</li> <li>○ Secondary bacterial infection is very common with destruction of the nasal cartilage and the facial bone.</li> </ul>
<p><b>Diagnosis</b></p>	<ul style="list-style-type: none"> <li>○ <b>The parasite can be isolated from the *edge (margin) of the *oriental sore ★ (ulcer)</b></li> <li>○ Skin test: a diagnostic methods, known as Leishmanin test (Montenegro Test) is useful.</li> <li>★ Smear: gold standard Giemsa stain-microscopy for LD bodies (**Leishman-Donovan bodies**, amastigotes) in the ★ macrophages.</li> <li>○ Skin biopsy: microscopy for LD bodies or culture in NNN medium for finding promastigotes</li> </ul>	 <p>NNN medium</p>
<p><b>Treatment</b></p>	<ul style="list-style-type: none"> <li>○ No treatment self-healing lesions</li> <li>○ Medical: Pentavalent antimony (Pentostam), Amphotericin B, Antifungal drugs, +/- Antibiotics for secondary bacterial infection.</li> <li>○ Surgical: Cryosurgery, Excision, Curettage</li> </ul> <p>Cutaneous ulcers will often heal without treatment. However, treatment can speed healing, reduce scarring &amp; ↓risk of further disease. Any skin ulcers that cause disfigurement may require plastic surgery.</p>	<p>These lesions don't heal naturally. They always require treatment. Liposomal amphotericin B and paromomycin can treat mucocutaneous leishmaniasis.</p>
<p><b>Pictures</b></p>		







1. اول شيء لازم نعرف ان ال sandfly تقرص الأماكن المكشوفة مثل الوجه أو الأرجل أو اليد. طبعًا وهي تقرص تبدأ تدخل macrophage بمحاولة promastigotes بأعداد كبيرة، وبعدها يبدأ جهاز المناعة الاول (innate immunity) ألا وهو ال macrophage انه يمسك ال promastigotes ويقتلها، لكن ال promastigotes عشان تحمي نفسها بتروح تدخل بداخل ال macrophage وتحول نفسها إلى amastigotes عشان ما تموت وتبدأ تقاوم جهاز المناعة وتكبر وتتكاثر الى ما تنتهي ال macrophage
2. will found in kharaj, jazan & iraq and they came with ulcer in exposed area like hand & face
3. If there is ulcer in right hand, does this ulcer transmitted and infect other hand? NO cause it's amastigotes (non infectious)
4. © The tests that used in the diagnosis of all the 3 types of leishmania are the SAME, the different is in the **site** of taking the sample
  - In cutaneous & mucocutaneous: from the edge of the ulcer
  - In visceral leishmaniasis from the bone marrow commonly© imagine that NNN medium is the same as sandfly, so if biopsy was taken to culture in NNN medium, we will see promastigotes (normal life cycle of sandfly is to convert to promastigotes)

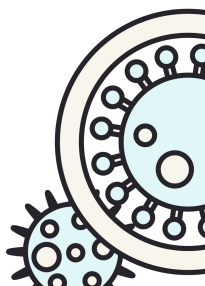




# Summary

## Leishmania

<b>Life cycle</b>	<ul style="list-style-type: none"> <li>○ Vector: <b>Infected Female Sandflies</b></li> <li>○ Transmission: by the bite of infected female sandflies</li> <li>○ Infective stage: promastigotes</li> <li>○ Diagnostic stage: amastigotes <b>within macrophage</b></li> <li>○ <b>Life cycle story:</b> infected female sandflies bites a person → inject promastigotes → macrophages engulf them → transfer them to amastigotes → survive in macrophages as intracellular parasites</li> </ul>			
<b>Disease</b>	<b>Cutaneous leishmaniasis (Oriental sore)</b>		<b>Mucocutaneous leishmaniasis</b>	<b>Visceral leishmaniasis (Kala azar)</b>
<b>Species</b>	<b>Leishmania major</b>	<b>Leishmania tropica</b>	<b>Leishmania Braziliensis</b>	<ul style="list-style-type: none"> <li>○ <b>Leishmania donovani</b></li> <li>○ <b>Leishmania infantum</b></li> </ul>
<b>Overview</b>	<ul style="list-style-type: none"> <li>○ Human &amp; Zoonotic transmission (<b>harder in prevention</b>)</li> <li>○ <b>Commonest in SA &amp; more dangerous</b></li> </ul>	Anthroponotic (human only)	-	<ul style="list-style-type: none"> <li>○ <b>Leishmania infantum</b> mainly affect children</li> <li>○ <b>Leishmania Donovanii</b> mainly affects adults</li> </ul>
<b>Clinical presentation</b>	<ul style="list-style-type: none"> <li>○ cause ulcer which is <b>wet</b>-type-lesion with severe reaction</li> <li>○ Heal slowly</li> </ul>	<ul style="list-style-type: none"> <li>○ cause ulcer which is <b>dry</b>-type-lesion with minimal ulceration</li> <li>○ Heal readily</li> </ul>	May cause destruction of nasal cartilage & facial bone	<ul style="list-style-type: none"> <li>○ fever, malaise, and sweating</li> <li>○ Splenomegaly, hepatomegaly, <b>hepatosplenomegaly</b></li> <li>○ Weight loss &amp; Anaemia</li> </ul>
<b>Diagnosis</b>	<ul style="list-style-type: none"> <li>○ The parasite can be isolated from the edge of the oriental sore</li> <li>○ Culture in NNN medium for finding promastigotes</li> <li>○ <b>Gold standard</b> Giemsa stain-microscopy for LD bodies (Leishman-Donovan bodies, amastigotes) in the macrophages.</li> <li>○ Skin test: leishmanin test (Montenegro Test)</li> </ul>			<p><b>1. Parasitological diagnosis:</b>  <b>The specimen:</b></p> <ol style="list-style-type: none"> <li>1. <b>Bone marrow aspirate</b></li> <li>2. Splenic aspirate</li> <li>3. Lymph node</li> <li>4. Tissue biopsy</li> </ol> <p><b>The tests:</b></p> <ol style="list-style-type: none"> <li>1. Microscopy (amastigotes)</li> <li>2. Culture in NNN medium (Promastigotes)</li> </ol> <p><b>2. Immunological Diagnosis:</b></p> <ol style="list-style-type: none"> <li>1. Specific serologic tests: DAT, ELISA, IFAT</li> <li>2. Skin test: leishmanin test (Montenegro Test)</li> </ol>







# MCQs

<b>Q1. Leishmaniasis is transmitted by:</b>			
A- Dog bite	B- fecal-oral route	C- female sandflies bites	D- eating undercooked beef
<b>Q2. To diagnose leishmaniasis you have to look for:</b>			
A- promastigotes	B- amastigote	C- trypomastigote	D- epimastigote
<b>Q3. The most common cutaneous leishmaniasis specie present in Saudi Arabia:</b>			
A- Leishmania tropica	B- leishmania major	C- leishmania infantum	D- leishmania Brasiliense's
<b>Q4. The sandflies inject the infective stage of leishmania witch is :</b>			
A- promastigotes	B- amastigote	C- trypomastigote	D- epimastigote
<b>Q5. Human and Zoonotic cutaneous leishmaniasis that would cause wet lesions with severe reaction :</b>			
A- Leishmania tropica	B- leishmania major	C- leishmania infantum	D- leishmania Brasiliense's
<b>Q6. In which method of the following we could diagnose Cutaneous and mucocutaneous leishmaniasis:</b>			
A- Stool sample	B- bone marrow aspirate	C- blood CBC	D- isolate the organism from the edges of the ulcer
<b>Q7. a 7-years old boy present to the clinic with fever, malaise and weight loss. Upon examination, you noticed a distended abdomen, witch of the following species would cause these symptoms:</b>			
A- Leishmania tropica	B- leishmania major	C- leishmania infantum	D- leishmania Brasiliense's



SAQ

1

Q: What is the symptom of visceral leishmaniasis?

A:

- fever, malaise, and sweating
- Splenomegaly, hepatomegaly, hepatosplenomegaly
- Weight loss
- Anaemia

2

Q: How to diagnose visceral leishmaniasis?

A:

**1. Parasitological diagnosis:**

- Microscopy for Bone marrow aspirate to look for macrophage containing amastigotes
- Culture in NNN medium to see promastigotes

**2. Immunological Diagnosis:**

- Serology (e.g. ELISA)



TEAM 443  
MICROBIOLOGY

## Team leaders

Aishah Boureggah    Aroub Almahmoud    Maryam Alghannam    Nazmi M Alqutub

## Team Members

Mohammd Alqutub

Raghad Almuslih

Khalid Alsobei

Afnan Alahmari

Lama Alotabi

Wajd Almutairi

Sultan Albaqami

Zahra Alhazmi

Nourah Alarifi

Moath Alhudaif

Almas Almutari

Sarah Alajaji

Aban Basfar

Reema Almotairi

Alhawraa Alawami

Mohammed Alarfaj

Reema Algarni

Shahad Alzaid

Faris Alzahrani

Farah Abukhalaf

Danah Almuhausen

Abdulrahman Almusallam

Remaz Almahmoud



Areej Alquraini

Zeyad Alotaibi

Aleen Alkulyah



Layan Al-Ruwaili

Luay Alhudaithy

Rafan Alhazzani

Haya Alzeer

Nazmi A Alqutub

Reuf Alahmari

Raseel Almutairi

Rahaf Alshowihi

Reena Alsadoni