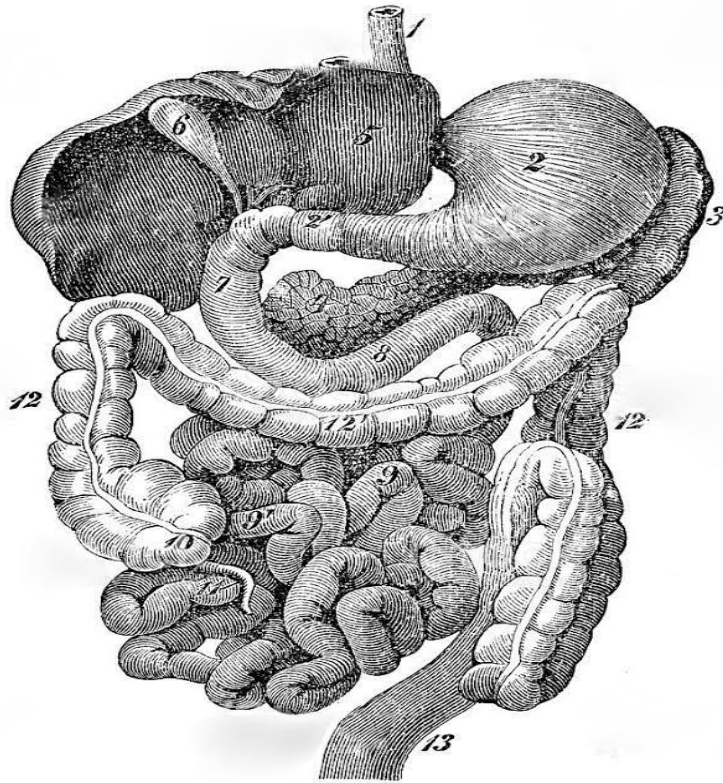


Microbiology

435's Teamwork
GastroIntestinal & Nutrition Block



- Kindly check our [Editing File](#) before studying the document.
- Please contact the team leaders for any suggestion, question or correction.
- Pay attention to the statements highlighted in **red**.
- Extra explanations are added for your understanding in **grey**.
- **Footnotes color code:** General | **Females** | **Males**.
- **color code:** **Female's notes** | **Male's notes**.

Revised by

خولة العماري & هشام الغفيلي



Haemoflagellates: Leishmaniasis & Trypanosomiasis

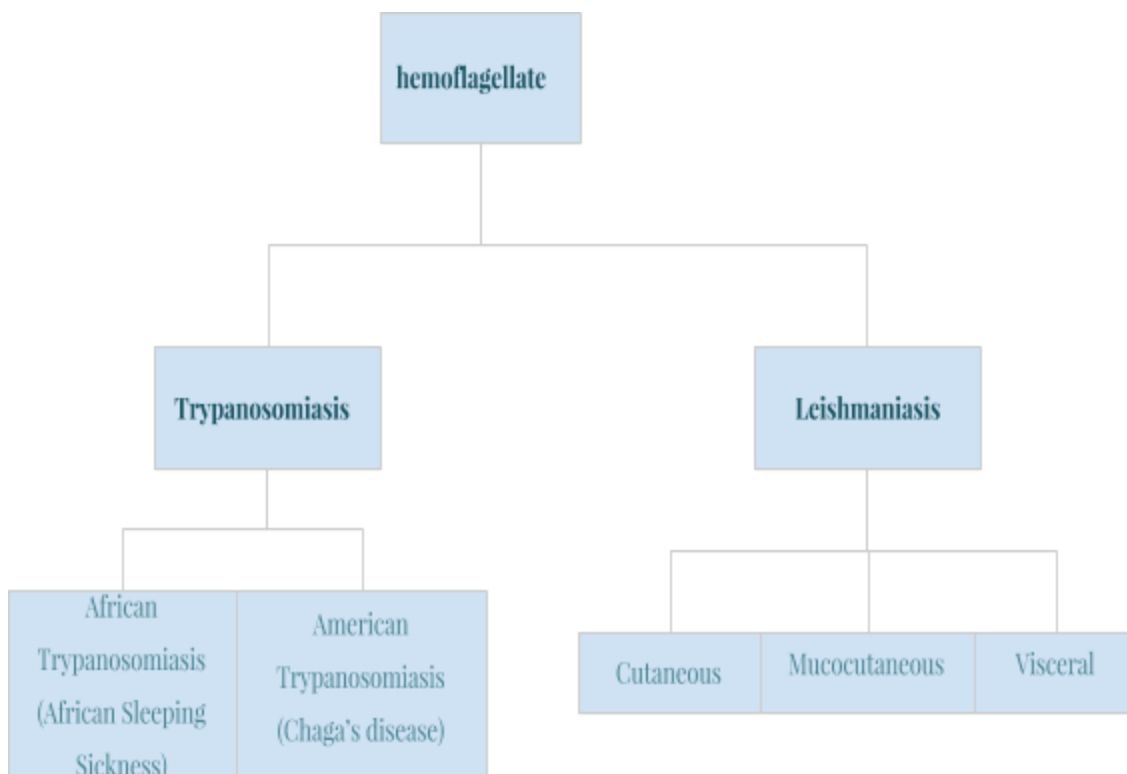
Resources: Dr mona badr's Slides.

Learning Objectives:

By the end of this lecture, you should know the...

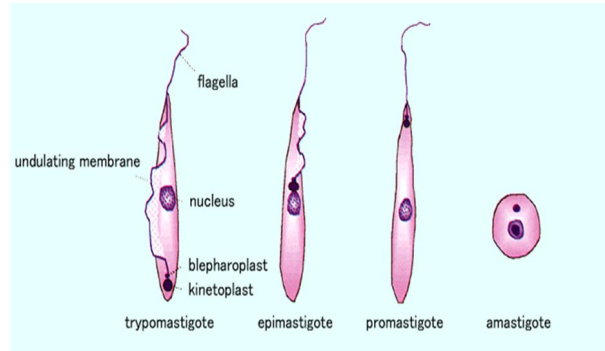
1. Know different stages of Leishmania parasites
 2. Describe life cycle of Leishmania parasites
 3. Discuss what diseases caused by Leishmania parasites and what is endemic in Saudi Arabia
 4. Geographical distribution of Leishmania in the world either cutaneous or visceral
 5. Leishmaniasis
 6. Know what are the vectors of Leishmania
 7. Discuss clinical types of Leishmaniasis
 8. Know uncommon types of the diseases
 9. How Leishmaniasis is diagnosed in the labs
 10. What is the best treatment for Leishmaniasis
-

Lecture Outline:



Different Stages of Haemoflagellates:

In the stages of parasite growth, the flagellae starts from the beginning in trypomastigotes, then it starts from the middle in epimastigotes, then it starts from the end in promastigotes (يكون عندها فلاجيلا بنهايتها), and there is no flagella in amastigotes (also called leishmania body).



Leishmaniasis

Life Cycle of Leishmania:



Sandfly bites human and gives him promastigote, then it will be phagocytosed by macrophages. So the macrophage is the cell infected by leishmania. The promastigote immediately becomes amastigote once it is ingested by macrophages. Then they replicate until cell explode and go to other macrophages.

When a sandfly bites the human again gives him promastigote and takes the macrophage filled with amastigotes يعني الي نستنتجه انه

Sandfly gives promastigote and takes amastigote من جسمي. Amastigote is diagnostic for leishmania, we look for it in the macrophage. هذا اهم شي تعرفوه بالسايكل

Infective stage: promastigotes

Diagnostic stage: amastigotes

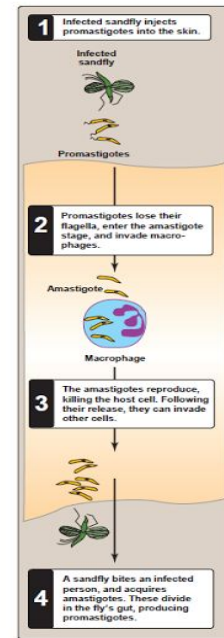


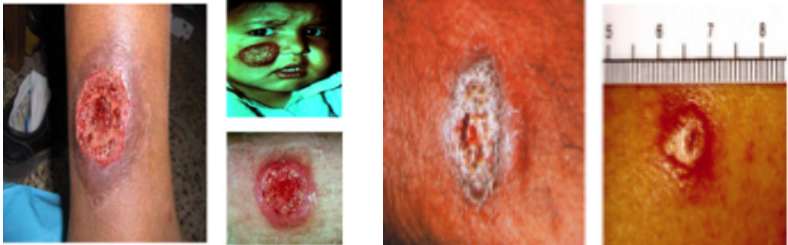
Figure 21.13
Life cycle of *Leishmania*.

Leishmania Parasites and Diseases: (لازم تعرفونها كلها)

Cutaneous Leishmaniasis	Mucocutaneous Leishmaniasis	Visceral Leishmaniasis
<p><i>Leishmania tropica</i>* <i>Leishmania major</i>*¹ <i>Leishmania aethiopica</i> <i>Leishmania mexicana</i></p>	<p><i>Leishmania braziliensis</i></p>	<p><i>Leishmania donovani</i>* <i>Leishmania infantum</i>* <i>Leishmania chagasi</i></p>

* endemic in Saudi Arabia.

1. Cutaneous leishmaniasis:

clinical types of cutaneous leishmaniasis	
Common types	
<i>Leishmania major</i>	<i>Leishmania tropica</i>
	<p>(oriental sore)²</p> <p>ب نساآكم عنها تنتمي لاي نوع؟</p> <p>cutaneous caused by leishmania Tropica. هو نوع من ال</p>
<p>Starts as a painless papule نقطة on exposed parts of the body, generally the face. The lesion ulcerates after a few months producing an ulcer with an indurate عميق وله حواف margin. In some cases the ulcer remains dry and heals readily (dry-type-lesion). In other cases the ulcer may spread with an inflammatory zone around, these known as (wet-type-lesion) which heal slowly.</p> <p>الي ابيكم تعرفون انها تبدأ بنقطة حمراء عاد على حسب مناعة المريض اذا ضعيفه بتصير wet lesion اذا قوية بتصير dry lesion</p>	
	
<p>Right; ulcerated cutaneous tissue lesion. We can see ulcerated cutaneous tissue in cutaneous leishmaniniasis ³ in figure</p>	

2. Muco-cutaneous leishmaniasis

(*Leishmania braziliensis*⁴)

affects mucous tissue and cutaneous tissue.

The lesion starts as a **pustular swelling**⁵ in the mouth or on the nostrils **حوالين المناخير**.
 It may become **ulcerative** after many months and then extend into the **naso-pharyngeal mucous membrane**.

Secondary infection is very common with destruction of the nasal cartilage and the facial bone.



³ هي تحب الخدود، وأكثر شي موجودة في العراق

² الألسر الشرقي

⁴ من اسمها بتعرف انها موجودة فقط بالبرازيل

⁵ تورم بثري

3. Visceral leishmaniasis:

Leishmania donovani*

Leishmania infantum*

Leishmania chagasi



Visceral Leishmaniasis (kala-azar)			
<p>· There are geographical variations, ايش الي يصير تقوم هالبرسايت تدخل جسمي تسبب احمرار بسيط جدا بجلدي ثم تروح للاحشاء اكثر شي الكبد و الطحال ثم تقعد تتكاثر فيها فيكبر حجم هذه الاعضاء (فيزرا يعني حاجه بالجى اى والاحشاء) 6</p> <p>· The disease is called kala-azar 6</p> <p>· Leishmania infantum mainly affect children</p> <p>· Leishmania donovani mainly affects adults</p> <p>· The incubation period is usually 4-10 months.</p> <p>· Early symptoms: generally low grade fever with malaise and sweating.</p> <p>· Later stages: the fever becomes intermittent الحرارة المتقطعه هي مايميزها and there could be liver or spleen enlargement or hepatosplenomegaly because of the hyperplasia of the lymphoid –macrophage system.</p> <p>· Untreated disease can be fatal</p>			
Presentation			
Fever	Splenomegaly, OR hepatomegaly	Hepatosplenomegaly اهم شي	Weight loss
Cough	Anemia	Epistaxis	Diarrhea



Diagnosis of	
cutaneous and muco-cutaneous leishmaniasis	Visceral Leishmaniasis
Parasitological diagnosis مهم اهم من الاميونو	
The parasite can be isolated from the margin of the ulcer	Visceral disease is more difficult to diagnose, requiring liver, spleen, or bone marrow biopsy
<ul style="list-style-type: none"> ● Smear: Giemsa stain (microscopy for LD bodies “amastigotes”).⁷ ● biopsy: culture in NNN medium for promastigotes⁸. 	
Immunological Diagnosis	
<ul style="list-style-type: none"> ● Specific serologic tests: Direct Agglutination Test (DAT), ELISA, IFA Indirect fluorescent antibody ● a diagnostic skin test known as: Leishmania test (montego test) for survey of populations and follow-up after treatment.⁹ 	

⁶ The term "kala-azar" comes from India where it is the Hindi for black fever.

⁷ ناخذ سمير من حواف القرحة او النخاع العظم ونحط عليه giemsa stain ثم نطلع عليه تحت المجهر بحثا عن amastigotes

⁸ بناخذ خزعه من حواف القرحة او نخاع العظم او الطحال ونزرعها في ميديا اسمها NNN عشان نطلعنا promastigote (ال nnn medium كاتها جسم الساند فلاي)

⁹ للمناطق الموبوءه بنعملها leishmania test زي التبركولين تيست حق التي بي

Trypanosomiasis

Types of trypanosomiasis:

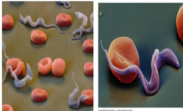
1. African Trypanosomiasis (African Sleeping Sickness)
2. American Trypanosomiasis (Chaga's disease)

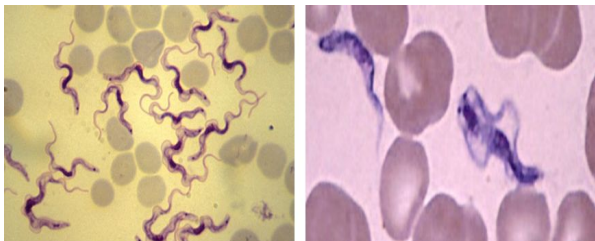


1- African sleeping sickness (African Trypanosomiasis):

كان ياماكان في قديم الزمان كانوا الامريكان يروحون افريقيا ويقشون كميه كبيره من الافريقان يركبونهم السفينه عشان يستعبدونهم بامريكا وفي الطريق كانوا يفتشون واحد واحد اي واحد يلاحظون عليه انتفاخ اسفل رقبته من وري يقولون هذا عنده (Winterbottom's sign) فيرمونه من السفينه للبحر... هااو لبيشششش هالتسلط ليش يرمونهم؟؟ بتستتجون السبب اذا قريرتم الكلام تحت

1- African sleeping sickness (African Trypanosomiasis)

Causing agent	Trypanosoma brucei 
Life cycle	<p>These parasites are injected into humans by the bite of the tsetse fly, producing a primary lesion, or chancre¹⁰. The organism then spreads to lymphoid tissue (mainly occipital lymph node > enlargement) and reproduces extracellularly in the blood. Later, the parasite invades the central nervous system → Daytime sleep → coma</p> <p>-Sometimes, wild animals can be infected by the tsetse fly and they act as reservoirs. In these animals, they do not produce the disease, but the live parasite can be transmitted back to the normal hosts</p> <p>(zoonotic). الحيوانات يحملونه يعدون غيرهم بس مايتضررون</p> <p>Infective stage: trypomastigotes (in the blood)</p> <p>Diagnostic stage: trypomastigotes</p> <p>يعني تسي تيسي فلاي بتعطيني (بعيد الشر عني) <i>trypomastigotes</i> وبتاخذ مني <i>trypomastigotes</i></p>



في شي ظريف هنا ان طائر التسي تسي ماياخذ من جسمي الا التريباماستيقوت الدبه والقصيره أما الطويله والنحيقه ماتتبعًا (:)

¹⁰ Painless ulcer

Pathology and Clinical Picture

• All patients diagnosed with African Trypanosome must have their CSF examined by lumbar puncture.

1. A primary reaction occurs at the site of inoculation of trypanosome.

Skin Stage: chancre which resolve in 2-3 weeks. قرحة بالجلد بسيطة ويتروح



2. **Systemic Haemato-lymphatic stage: intermittent fever**, headache and generalized lymphadenopathy **mainly in the cervical and sub-occipital region (Winterbottom's sign)**, anaemia, generalized organ involvement. بيجيمك سؤال

Winterbottom sign characterized by ?Trypanosoma **brucei**



3. **Central nervous system stage (CNS):** Meningoencephalitis.

In typical case: daytime sleep, psychological changes, tremors, convulsions, finally coma.



لو سألتكم (african trypanosoma affect mainly ?csf)



2- American trypanosomes (Chaga's disease):

Figure: Reduviid (Triatomine) **bug**.



American trypanosomes (Chaga's disease¹¹)



Causing agent	<i>Trypanosma cruzi</i> cause Chaga's disease
Life cycle	infective&diagnostic stage الونفس الBUG هنا الناقل هنا الناقل لكن باختلاف الافريقي
Pathology and Clinical Picture	<p>- T. cruzi causes cutaneous stage and produces focal lymphangitis and oedema at the site of parasites entry (chagoma).</p> <div style="text-align: center;">  </div> <p>ايكم تعرفون ان شاكل ديزيز تآثر بالعين والقلب, لما تكون بالدم اسمها trypomastigote لكن لما تدخل الانسجة خصوصا جفن العين والقلب بتقعد رجلها ويبصير اسمها amastigote</p> <p>- After that parasites (trypomastigote) enter the bloodstream and find their way mainly on the face near the eyelids, it produces a swelling of the eye and temporal region with conjunctivitis (ROMANA'S sign), and into cells mainly cardiac muscle cells they become (amastigote).</p> <div style="text-align: right;">  </div> <p>- The most constant feature of the cardiac disease is cardiomyopathy, in severe cases can lead to partial or complete heart block which may lead to cardiac failure, so it CAUSES CARDIAC DAMAGE.</p>

Diagnosis

- Blood film. trypomastigote؟ عشان نشوف مين؟
 - Serology: IFAT
 - Xenodiagnoses: feeding bugs on a suspected cases
- يقومون بقة نظيفه مافيه اي مرض بندخلها بيد المريض عشانن نتأكد اذا لقينا فيها بعدين
 trypomastigote البق معناته هذا الشخص كان مصاب

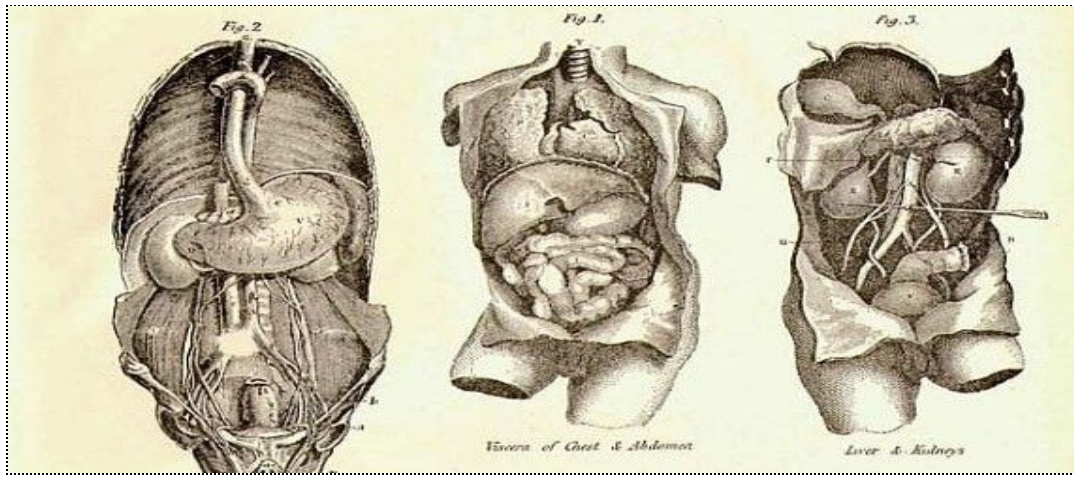
¹¹ ارسمو جنب chaga's disease قلب كيبصير لانه mainly يأذي القلب

SUMMARY

انتبهو تری بنسألكم عن النواقل لكل مرض (احفظوها على الألوان يرتقالي تراب، أفريكان اسود وهكذا)	
disease	vector
Leishmaniasis	Sand fly
African Trypanosomiasis	Tse tse fly
American Trypanosomiasis	bug

Leishmaniasis	Cutaneous	<p>Leishmania major*</p> <p>Leishmania tropica*</p> <p>Leishmania aethiopica</p> <p>Leishmania mexicana</p>		<p>Diagnosis:</p> <ul style="list-style-type: none"> - Isolation - Leishmania test (montego test) - Smear: microscopy by Giemsa stain (amastigotes). - Biopsy: culture in NNN stain (promastigotes).
	Muco-cutaneous	Leishmania braziliensis	Pustular swelling --> ulcerative --> extend to naso-pharyngeal mucous membrane.	<ul style="list-style-type: none"> - Biopsy: culture in NNN stain (promastigotes).
	Visceral	<p>Leishmania infantum*</p> <p>Leishmania donovani*</p> <p>Leishmania chagasi</p>	<p>L. infantum: children</p> <p>L. donovani: adults</p> <ul style="list-style-type: none"> - Incubation period: 4-10 months - Early symptoms: low-grade fever - Late stages: intermittent fever, and liver or spleen enlargement or both. 	<p>Presentation:</p> <ul style="list-style-type: none"> - Fever, cough, splenomegaly, hepatomegaly, hepatosplenomegaly, anemia, epistaxis, diarrhea, weight loss. <p>Diagnosis:</p> <ul style="list-style-type: none"> - parasitological: bone marrow aspirate (golden standard) by microscopy or culture in NNN medium. - Immunological: Specific serologic tests: DAT, ELISA, IFAT. And skin test (leishmanin test).
Trypanosomiasis	African Trypanosomiasis (African Sleeping Sickness)	Trypanosoma brucei r	<ul style="list-style-type: none"> - First stage: Skin stage (chancre) occurs at the site of entry, resolve in 2-3 weeks. - Second stage: Systemic Haemato-lymphatic stage: intermittent fever, headache, generalized lymphadenopathy mainly in the cervical and sub-occipital region (Winterbottom's sign), anaemia. - Third stage: CNS stage: Meningoencephalitis, daytime sleeping, 	<p>Lab Tests:</p> <ul style="list-style-type: none"> - All patients must have CSF examined

Trypanosomiasis (cont.)			tremors, convulsions and finally coma.	
	American Trypanosomiasis (Chaga's disease)		<ul style="list-style-type: none"> - T. cruzi causes cutaneous stage and produces focal lymphangitis and oedema at the site of parasites entry (chagoma). - Mainly near the eyelids, it produces a swelling of the eye and temporal region with conjunctivitis (ROMANA'S sign). - bloodstream → trypomastigote - tissues → amastigote - The most constant feature is cardiomyopathy (HEART). 	Diagnosis: <ul style="list-style-type: none"> - Blood film - Serology: IFAT - Xenodiagnoses: feeding bugs on a suspected cases



إِنَّا كُلُّ شَيْءٍ خَلَقْتَهُ بِقَدْرِ ٤٩

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Heartful thanks to our phenomenal team members

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