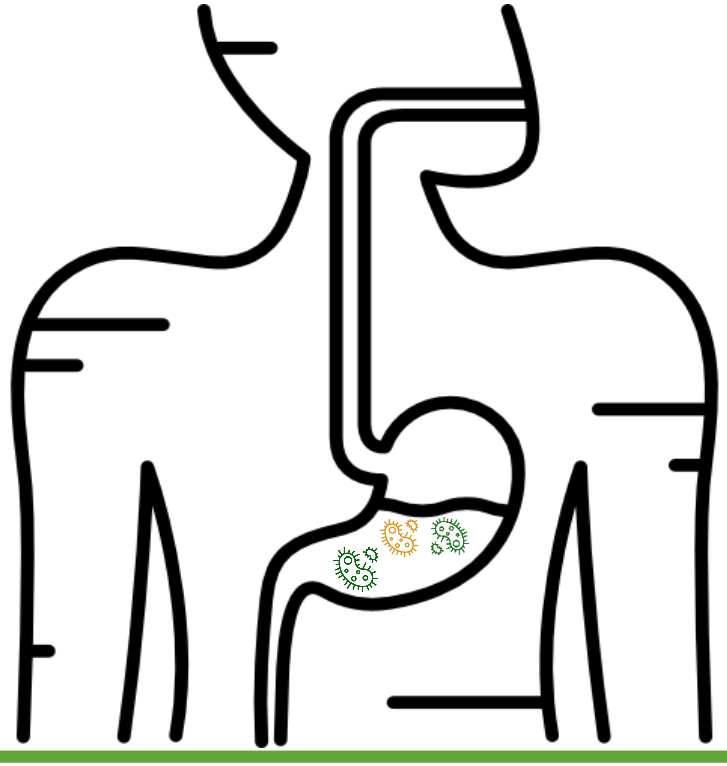
MEDICINE
KING SAUD UNIVERSITY

MICROBIOLOGY436



تمت المراجعة
شوق الأحمري & عبدالعزيز العنقري

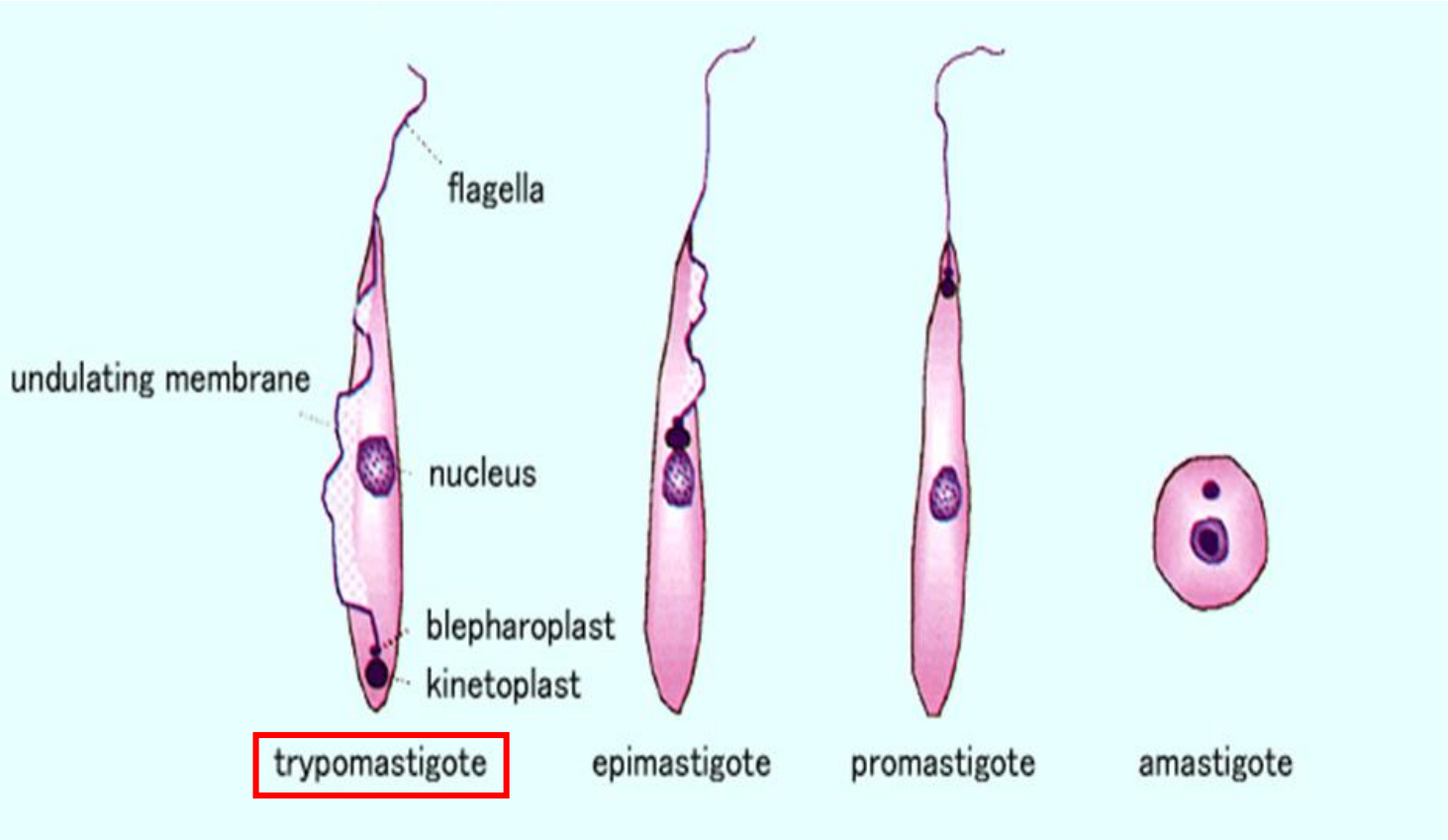
LECTURE: Trypanosomiases

Editing File

- Important
- Doctor's notes
- Extra explanation
- **Only F** or **only M**

"لا حول ولا قوة إلا بالله العلي العظيم" وتقال هذه الجملة إذا داهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به .

Different stages of Haemoflagellates

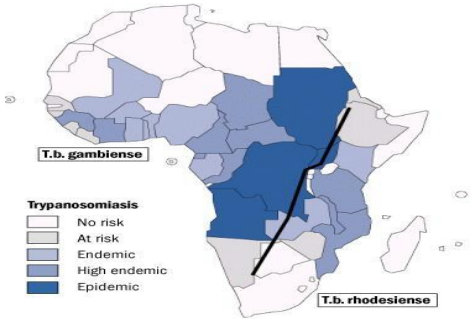


Mastigote = Flagella

Trypanosomiasis

- There are two types of trypanosomiasis that affect humans, they are divided according to their geographical location :

1-African sleeping sickness (mainly affects CNS)		**2-Chagas' disease in central and south America** (mainly affects the heart)
African trypanosomiasis, or sleeping sickness : is caused by Trypanosoma brucei parasites in Africa and is transmitted by the tsetse fly(vector).		American trypanosomiasis, or Chagas disease: is caused by Trypanosoma cruzi parasites in Latin America and is transmitted by the 'kissing' bug.
Trypanosoma brucei rhodesiense: East Africa, Humans and wild and domestic animal reservoirs	**Trypanosoma brucei gambiense:** West and Central Africa, mainly human infection	**Trypanosma cruzi:** cause Chagas' disease.



What is African sleeping sickness?

African trypanosomiasis is a parasitic disease transmitted by the tsetse fly. It gets its nickname ‘sleeping sickness’ because symptoms can include a disturbed sleep pattern	
intermediate host	Infection occurs through the bite of infected tsetse flies
definitive host	Humans , domestic cattle and wild animals are the main reservoir host for Trypanosoma

T. gambiense: causes a chronic illness	**T. rhodesiense:** causes a more acute illness.

Transmission:	1. Trypanosoma are transmitted from human to human through the bite of the tsetse fly which is only found in rural parts of Africa. 2. However, trypanosomes can also be transmitted from mother to child as the parasite can cross the placenta in the blood and infect the baby while it is still in the womb. 3. Contaminated needles can also contribute to the spread of trypanosomes, but this is rare.
Diagnosis	• Diagnosis relies on recognition of the trypomastigote in peripheral blood during fever, sternal bone marrow, lymph node aspirates and CSF. Motile organisms may be visible in the buffy coat . • Serological testing is also common as IF and ELIZA. • PCR.
Treatment	• For early infection: pentamidine / suramin • For late infection : eflornithine (Diflouromethylornithine- DFMO)

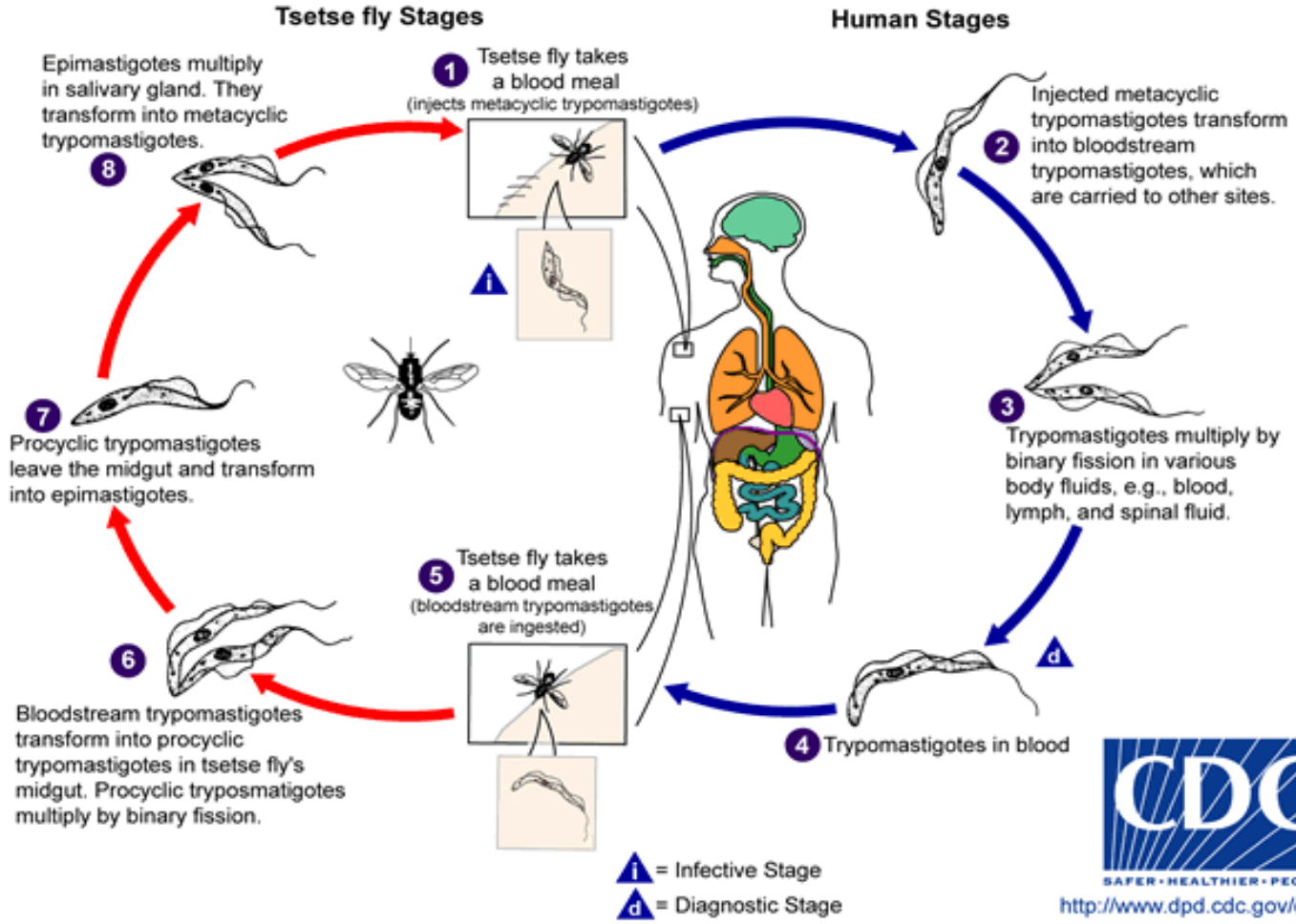
Dr said not important

Trypanosome life cycle:

- The trypanosome parasite is first introduced into the mammalian host as trypomastigotes when a tsetse fly takes a blood meal and secretes parasite-filled saliva into the host's skin.
- Once in the bloodstream the trypomastigotes multiply in the blood, lymph or spinal fluid .

Trypomastigote is both the infective and diagnostic stage!

Tsetse fly intermediate host



Pathology and clinical picture

1. **A primary reaction:** occurs at the site of inoculation of *Trypanosoma*skin skin stage**:** chancre[1] which resolve in 2-3 weeks.
2. **Systemic Haemato-lymphatic stage:**
    1. intermittent fever
    2. headache
    3. generalized lymphadenopathy mainly in the cervical and sub occipital region (**Winterbottom' sign**) (very important!)
    4. Anaemia
3. **Central nervous system stage (CNS):**

    This stage begins when the trypanosome parasites cross from the blood-brain barrier into the spinal fluid ,infecting the CNS including the brain, result in change in behavior ,confusion ,poor coordination ,difficulties with speech and disturbance of sleep (sleeping during day and insomnia at night.
    (Development of the disease more rapid in *Trypanosoma brucei rhodesiense*)

Chancre skin stage

Winterbottom's stage

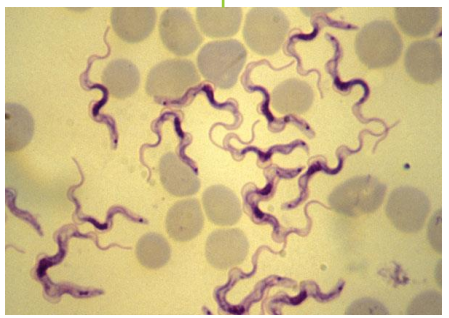
3rd stage CNS: CNS involvement in typical case there is daytime sleeping, psychological changes, tremors, convulsions and finally coma. Without treatment, the disease is invariably fatal.

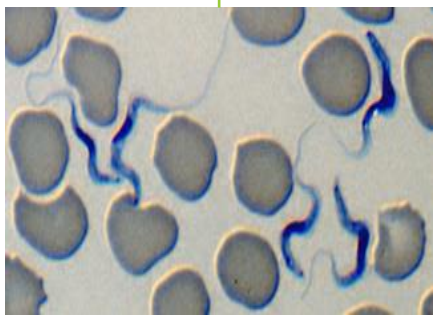
[1]Dermatitis.

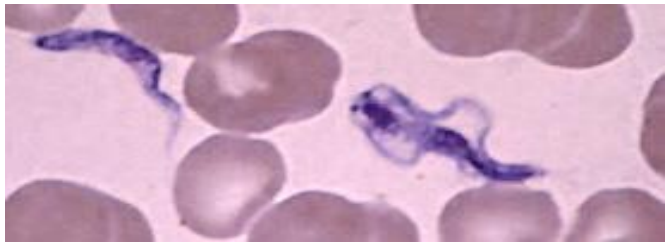
To summarize 1st stage: chancre. 2nd stage: fever and Winterbottom's sign. 3rd stage: CNS involvement.

CSF lumbar puncture

Trypanosoma







Can be stained with giemsa or wet microscopic examination

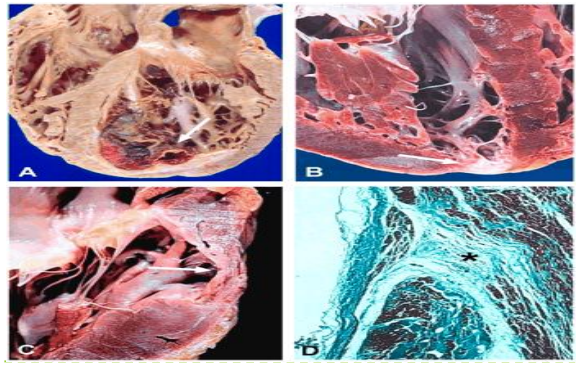
Animal reservoir hosts for African sleeping sickness

American trypanosomes Chaga's disease: Acute stages: Chagoma and Romana's sign. Chronic stage: Cardiomyopathy.

- American trypanosomiasis, is a tropical parasitic disease caused by the Trypanosoma cruzi.
- It is spread mostly by insects known as "kissing bugs .
- The human disease occurs in two stages: an acute stage and chronic stage.
- In the early stage, symptoms are typically either not present or mild, and may include fever, swollen lymph nodes, headaches, or local swelling at the site of the bite (chagoma) (cutaneous stage).
- The most recognized marker of acute Chagas disease is called Romaña's sign, which includes swelling of the eyelids on the side of the face near the bite wound or where the bug feces were deposited or accidentally rubbed into the eye.
- The parasites produce focal lymphangitis and oedema at the site of parasites entry (chagoma) after that parasites (trypomastigote) enter the blood stream and find there way ,mainly on the face near the eyelids ,it produces a swelling of the eye and temporal region with conjunctivitis (ROMANA'S sign) (very important) , and also find their way mainly the cardiac muscles cells and RES[2]. 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.

Heart damage due to American trypanosomiasis:

About two-thirds of people with chronic symptoms have cardiac damage, including dilated cardiomyopathy , which causes heart rhythm abnormalities and may result in sudden death.

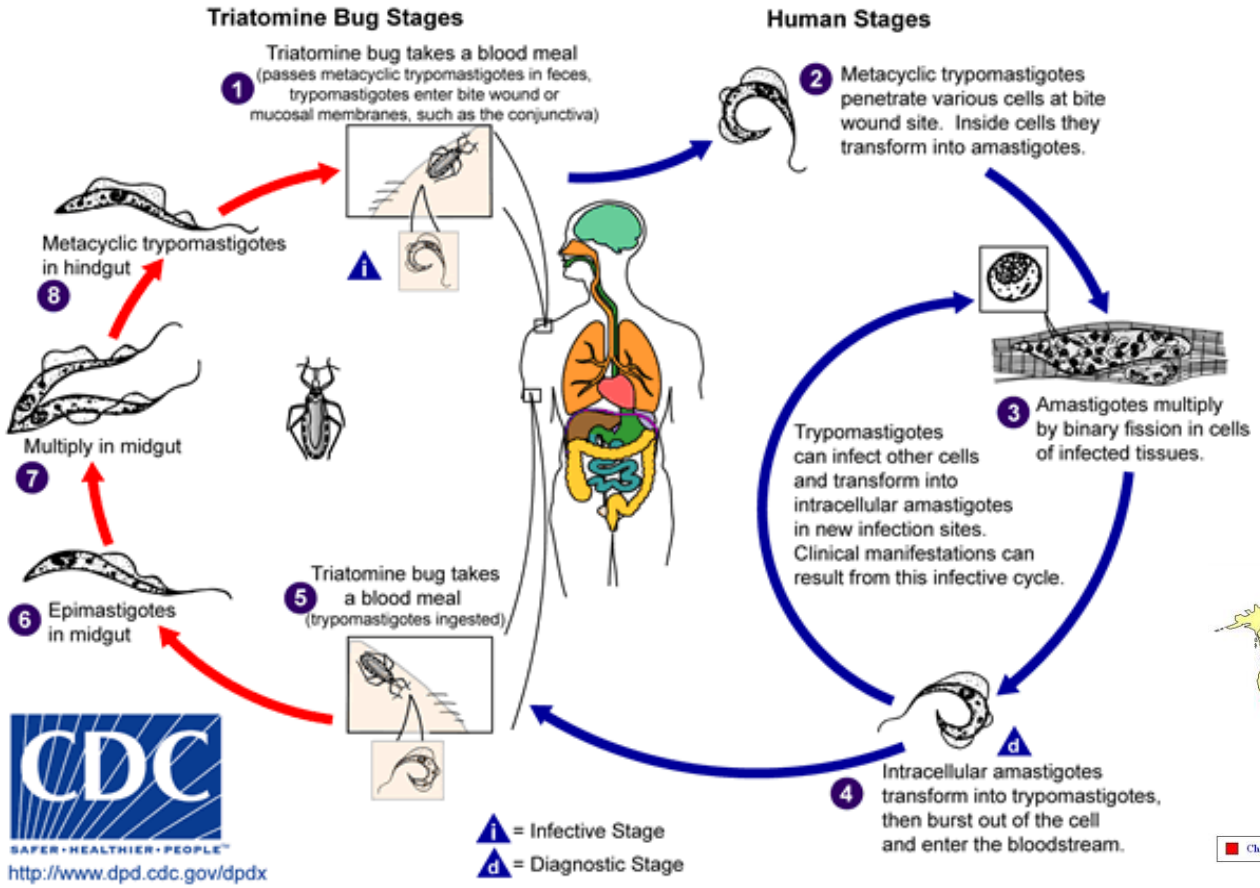


[2]Reticuloendothelial system.

To summarize: 1st stage: Chagome. 2nd stage: Romana's sign. 3rd stage: Cardiac disease.

AMERICAN TRYPANOSOMIASIS: LIFE CYCLE OF *Trypanosoma cruzi*

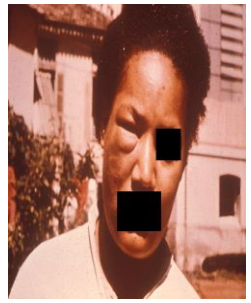
- Parasite when free in blood stream in form (TRYPTOMASTIGOT)
- but in the tissue it become in form of (Amastigote).



Reduviid (Triatomine) bug

T.cruzi causes cutaneous stage (chagoma)

Ocular lesion (Romana's sign)



American trypanosomes :Chaga's disease

- T. cruzi causes a chronic illness with progressive myocardial damage leading to:
  - ✓ cardiac arrhythmias
  - ✓ cardiac dilatation
  - ✓ gastrointestinal involvement leading to mega-oesophagus and megacolon.
- T. cruzi causes acute illness in children, which is followed by chronic manifestations later in life. , intracellular amastigotes destroy the intramural neurons of the autonomic nervous system in the intestine and heart, leading to megaintestine and heart aneurysms
- If left untreated, Chagas disease can be fatal, in most cases due to heart muscle damage.

Diagnosis:	• Microscopical examination of Giemsa –stained blood film. • Serology: IFAT • Xenodiagnosis[3]: feeding bugs on a suspected cases. • PCR used to detect trypomastigotes.
TREATMENT(not important)	• benznidazole • NITROFURAZONE

[3]They bring normal bugs and let them feed on human infected with the disease then they check the bug to confirm the diagnosis.

QUIZ:

1. **Which of the following is the diagnostic stage of sleeping sickness?**
   a) Amastigote b) trypomastigote c) promastigote
2. **Which of the following is the infective stage of Chagas disease?**
   a) Amastigote b) trypomastigote c) promastigote
3. **which of the following cause Acute trypanomiasis?**
   a) T. Rhodesiense b) T. Gambiense c) T. Cruzi
4. **T. Cruzi produce …….. At the site of entry.**
   a) Chancre b) Chagoma c) Romana's sign
5. **African man visited the clinic complaining of swelling in the cervical and sub-occipital region. What is his diagnosis?**
   a) Chagas disease b) sleeping sickness c) neither of those
6. **Which of the following parasites can cause cardiac failure?**
   a) T. Rhodesiense b) T. Gambiense c) T. Cruzi
7. **Which stage of T. Cruzi can be found in the host's tissue?**
   a) Amastigote b) trypomastigote c) promastigote
8. **Which of the following parasites produce " Winterbottom sign "?**
   a) T. rhodesiense b) T. Gambiense c) Both
9. **Which of the following is the vector of T. Gambiense ?**
   a) Testes fly b) Sand fly c) Triatomine

1. B
2. b
3. A
4. B
5. B
6. C
7. A
8. C
9. A

SUMMARY:

	Trypanosomiasis	
	African Sleeping Sickness	*Latin America = **Chaga's Disease***
Species	Trypanosoma **gambiense** = chronic Trypanosoma **rhodesiense** = acute	Trypanosoma **cruzi**
Vector	Tsetse fly (through its saliva)	Kissing/Triatomine bug (through its fesces)
Pathology	1st → chancre (skin)	1st → chagoma (skin)
	2nd → Winterbottom (lymph)	2nd → romana's sign (eye)
	3rd → CNS (coma)	3rd → CVS (failure) + GIT
Diagnosis	Definitive host: humans, domestic cattle and wild animals	
	Diagnostic & Infective: trypomastigote	
	Trypomastigote in blood or CSF (if CNS involved) + GEMSA stain + PCR+ IF + ELIZA (Note: trypomastigote in blood but turns into amastigote in tissue)	

THANK YOU FOR CHECKING OUR WORK, BEST OF LUCK!

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Doctors slides