

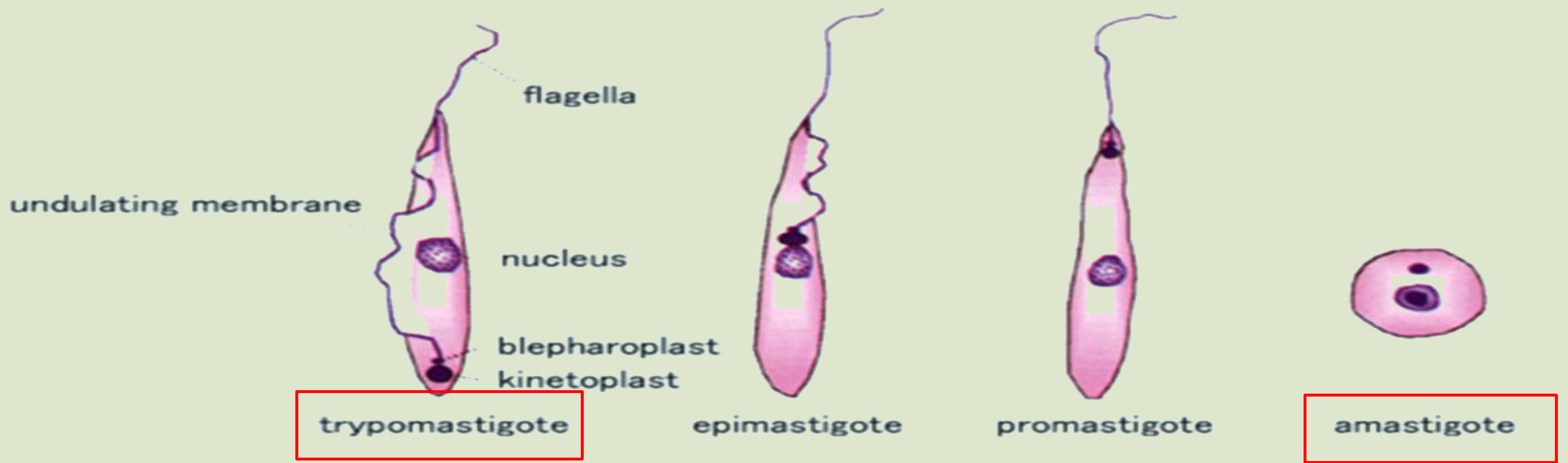


TRYPANOSOMIASIS

PARASITIC INFECTION OF GIT





Different stages of Hemoflagellates



- Trypomastigote
 - The flagella extends from the beginning of the parasite till the end and its visible
- Amastigote
 - Put around itself a cover to hide in the tissue

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

	African trypanosomiasis (sleeping sickness)	American trypanosomiasis (Chaga's disease)
What causes it	1. Trypanosoma brucei gambiense <ul style="list-style-type: none"> i. In Western & Central Africa ii. Chronic slow onset 2. Trypanosoma brucei rhodesiense <ul style="list-style-type: none"> i. In Eastern & Southern Africa ii. Acute fast onset 	Trypanosoma cruzi in Latin America
Reservoir	<ul style="list-style-type: none"> - Rhodesiense: game animals & livestock - Gambiense: humans 	
Transmitted by (Intermediate host)	Tsetse fly 	Kissing bug 
Treatment (dr said not impt)	<ul style="list-style-type: none"> - For early infection: Pentamidine & Suramin. - For late infection: Eflornithine (Difluoromethylornithine-DFMO) 	Benznidazole & Nitrofurazone.



African Trypanosomiasis (Sleeping Sickness)

General Info.

- 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**.
- Infection occurs through the bite of infected **tsetse flies (intermediate host)**. Humans, domestic cattle and wild animals are the main reservoir host for Trypanosoma (definitive host).
- T. gambiense causes a chronic illness.
- T. rhodesiense causes a more acute illness.

Transmission?

- Trypanosoma are transmitted from human to human through the bite of the tsetse fly which is only found in rural parts of Africa.
- 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? .
- Contaminated needles can also contribute to the spread of trypanosomes, but this is rare.

Life Cycle

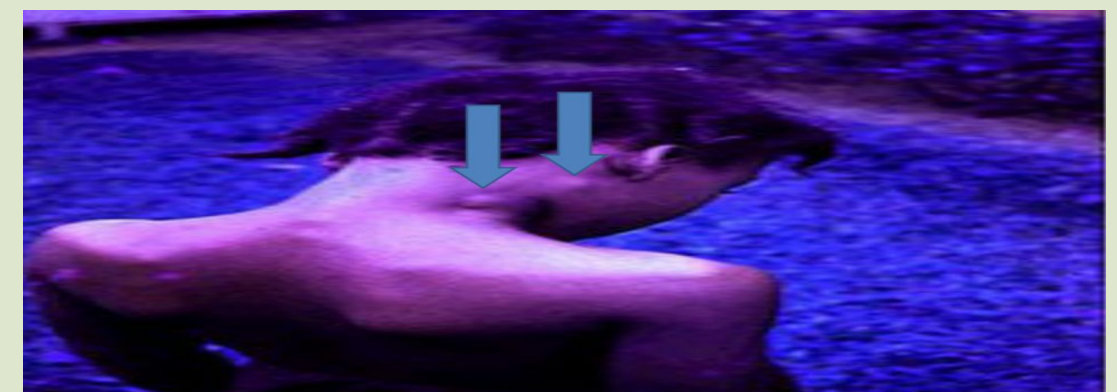
- The trypanosome parasite is first introduced into the mammalian host as trypomastigotes when a tsetse fly takes a blood meal and **secretes parasite-filled saliva into the host's skin**.
- Once in the bloodstream the trypomastigotes multiply in blood, lymph or spinal fluid .

Pathology & Clinical Picture

1. A primary reaction occurs at the site of inoculation of trypomastigotes, skin stage, **chancre** which resolve in 2-3 weeks.
2. Systemic Haemato-lymphatic stage: intermittent fever, headache & generalized **lymphadenopathy** mainly in the cervical & suboccipital region (**Winterbottom's Sign**) & anemia .
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 psychological changes, change in behavior, confusion, poor coordination, difficulties with speech, disturbance of sleep (daytime sleep: sleeping during day and insomnia at night) tremors, convulsions & finally coma. Without treatment, the disease is invariably fatal.



Chancre skin stage



Winterbottom's stage

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 . (S-shape trypomastigote)
- Serological testing is also common as IF and ELIZA.



American Trypanosomiasis (Chaga's Disease)

General info.

- A tropical parasite disease caused by *Trypanosoma cruzi*
- **Transmission: kissing bug**
- **Infected and diagnostic stage: Trypomastigote (takes its blood meal then defecates)**

Life Cycle

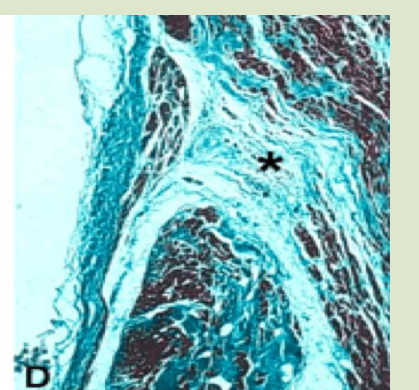
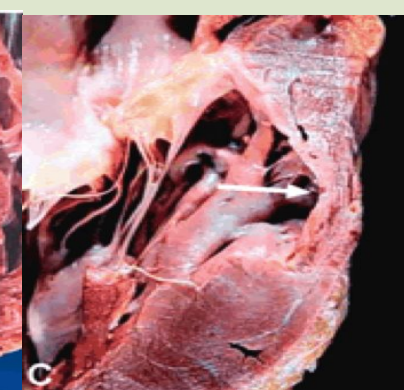
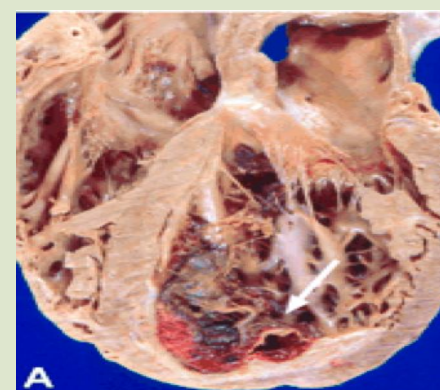
- The parasites produce focal lymphangitis and oedema at the site of parasites entry (**chagoma**)₁
 - After that parasites (trypomastigote) enter the bloodstream:
- 1. Find their way mainly on the face near the eyelids → it produces a swelling of the eye & temporal region with conjunctivitis (**Romana's sign**)₂
- 2. Also find their way mainly the cardiac muscles cells → the most constant feature of the cardiac disease is cardiomyopathy₃, in severe cases can lead to partial or complete heart block which may lead to cardiac failure.
- **NOTE: Parasite when free in blood stream in form (Trypomastigote), but in the tissue it become in form of (Amastigote).**



1



2



4

Symptoms

Acute 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**).
- 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.

Chronic Stage

- *T. cruzi* causes a chronic illness with progressive myocardial damage leading to cardiac arrhythmias and cardiac dilatation, and gastrointestinal involvement leading to megaesophagus and megacolon.
- *T. cruzi* causes acute illness in children, 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.

Complication

- **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.

Diagnosis

- Microscopical examination of Giemsa – stained blood film. (C-shape trypomastigote)
- Serology: IFAT
- Xenodiagnosis: feeding bugs on a suspected cases.
- PCR used to detect trypomastigotes.



Doctor's Notes

African Trypanosomiasis (sleeping sickness)

Caused by?

1. Trypanosoma brucei **rhodesiense** (east & south africa) → **fast onset & acute illness**
 - a. Primary reservoir? Livestocks & game animals (animals hunted for sport or food like sheep, deer & goat)
2. Trypanosoma brucei **gambiense** (central & western africa) → **slow onset & chronic illness**
3. Primary reservoir? Humans

Definitive host? Humans, domestic cattle and wild animals

Transmitted by? Tsetse fly (intermediate host)

Transmission?

- Mainly:
 - The fly comes to bite you and its saliva is full of the trypanosoma → when it bites it makes an open-like area on the skin → then it **vomit its saliva** on the area so the parasite now is inside your body
- Rarely:
 - From the mother to the baby through the placenta bc the parasite can cross it.
 - Contaminated needles

Infective stage? Trypomastigote

Diagnostic stage? Trypomastigote in the blood

Life cycle?

- After getting bitten by the tsetse fly → trypomastigote will enter the body and once it reaches the bloodstream → multiply in lymph nodes and go to the spinal fluid → when another uninfected tsetse fly comes and bites the same infected person it will get the parasite and become infected

Clinical picture?

1. Primary skin stage: the infected person will have **chancre** (like dermatitis)
2. Systemic haemato-lymphatic stage: reaches the blood and cause
 - a. Intermittent fever (فيقر تروح وتجي)
 - b. **Winterbottom's Sign** → lymphadenopathy (nodes enlargement) in the cervical and suboccipital regions
3. CNS stage: when it crosses BBB it causes changes in behavior, **sleep disturbance** (sleep all the day & insomnia during the night) & lastly if not treated it will result in **coma and death**

Diagnosis?

1. **Detecting the trypomastigote in the bloodstream and CSF**
2. Serology



Doctor's Notes

American Trypanosomiasis (chaga's disease)

Caused by? Trypanosoma cruzi

Transmitted by? Kissing bug

Life cycle?

- After getting bitten by the **kissing bug** → it will make an open-like area in the skin → **defecate it feces** inside your body → trypomastigote enter your body → on the same skin area it will cause **skin lesion (chagoma)** → trypomastigotes will also penetrate different cells → **inside the cell** they hide and they become **amastigotes** and multiply within the cell → some amastigotes will leave the cell & when they reach the bloodstream they become trypomastigotes again → when another uninfected bug bite me it will take the trypomastigotes

Clinical picture?

1. At the site of parasite entry → **chagoma**
2. Travels to the face mainly the eyelid and cause swelling & conjunctivitis (ocular lesion) → **Romana's Sign**
3. The trypomastigote likes to go to three places; **mainly cardiac muscles & GIT, but could also go to the CNS**
 - o The trypomastigote goes into the cardiac muscle → becomes **amastigote in the cells** → undergoes many binary fission and damage the cells → cause **dilated cardiomyopathy**
 - o In GIT the same but cause **megacolon & megaesophagus**

Stages?

- Acute: early stage, swollen lymph nodes, chagoma & romana's sign (swelling of the eyelids)
- Chronic: when it reaches the heart, GIT and CNS

Case: A patient is having American trypanosomes, we took a biopsy of the heart muscle (tissue) what are we going to find? Amastigote

Diagnosis?

1. Detecting trypomastigote in the bloodstream
2. Detecting amastigote in the tissue (biopsy)
3. Serology
4. Xenodiagnosis: bring an uninfected bug and place it on the suspected person, when it bites the person they take the bug and if the person was infected it will have trypomastigote inside
5. PCR



Trypanosomiasis

1- African trypanosomiasis

Cause	Sleeping sickness	
Transmitted by	Mainly: tsetse fly (intermediate host)	
	Or mother to child as the parasite can cross the placenta	
Caused by	Trypanosoma brucei	
Either by	T. Brucei gambiense	T. Brucei rhodesiense
Features	<u>Slow</u> onset <u>chronic</u> trypanosomiasis.	<u>Fast</u> onset <u>acute</u> trypanosomiasis.
Primary reservoir	Humans	Game animals and livestock
Definitive host	Humans	
Life cycle	Tsetse fly secretes parasite-filled saliva into the host's skin "trypomastigotes" - in the bloodstream the trypomastigotes multiply in the blood lymph or spinal fluid .	
Infective stage	Trypomastigotes	
Diagnostic stage		
Clinically	<p>1-primary reaction occurs at the site of inoculation of trypomastigotes : chancre.</p> <p>2-Systemic Haemato-lymphatic stage: intermittent fever and generalized lymphadenopathy mainly in the cervical and suboccipital region (Winterbottom's sign).</p> <p>3-CNS stage : Parasites in the spinal fluid, result in psychological changes and disturbance of sleep (sleeping during day and insomnia at night)</p>	
Diagnosis	<p>1-detection of trypomastigote in blood, sternal bone marrow, lymph node aspirates and CSF.</p> <p>2-Serology: IF and ELIZA.</p>	
Treatment	<ul style="list-style-type: none"> For early infection: pentamidine - suramin For late infection: eflornithine (diflouromethylornithine - dfmo) 	

2- American trypanosomiasis

Cause	Chagas disease	
Transmitted by	Kissing bug	
Caused by	Trypanosoma cruzi	
Infective stage	Trypomastigotes	
	Acute phase	chronic phase
Clinically	<ul style="list-style-type: none"> At the site of parasites entry: chagoma. when trypomastigote enter the bloodstream it goes to the face near the eyelids: ROMANA'S sign (produces a swelling of the eye and temporal region with conjunctivitis) 	<ul style="list-style-type: none"> Two-thirds of people with chronic symptoms have cardiac damage, including dilated cardiomyopathy About one-third of patients develop digestive system damage, resulting in dilation of the digestive tract (megacolon and megaesophagus),
Diagnosis	<p>Microscopically: Giemsa –stained blood film.</p> <p>Serology: IFAT</p> <p>Xenodiagnosis and PCR</p>	
Diagnostic stage	<p>★ Parasite when free in blood stream in form of trypomastigot</p> <p>★ Parasite in the tissue it become in form of Amastigote.</p>	
Treatment	Benznidazole - Nitrofurazone	



MCOs:

1- Which of the following cause slow onset chronic disease?

- A- Trypanosoma rhodesiense.
- B- Trypanosoma cruzi.
- C- Trypanosoma gambiense.

2-Which of the following parasite can cause cardiac failure ?

- A- Trypanosoma gambiense.
- B- Trypanosoma cruzi..
- C- Trypanosoma rhodesiense..

3- A medical report of a new Nigerian driver ,who just started working in Riyadh, shows lymphadenopathy in the cervical and suboccipital region. What does this called? what is the most likely pathogen ?

- A- Winterbottom sign, Trypanosoma cruzi.
- B- Romann's sign, Trypanosoma gambiense.
- C- Winterbottom sign, Trypanosoma gambiense.
- D- Romann's sign, Trypanosoma cruzi.

4-Which of the following do you expect to see in someone how got infected by kissing bug?

- A- Chancre.
- B- Winterbottom sign.
- C- Romann's sign.

5-What is the diagnostic stage of African Trypanosomiasis?

- A- Cyst stage.
- B- Trypomastigotes.
- C-Amastigotes.

6- What is the intermediate host in African Trypanosomiasis?

- A- Human.
- B- kissing bug.
- C- tsetse fly.
- D- Triatomine.

SAQ:

3-C
2-B
1-C

- A 28 years old male. Just came back from Brazil. Have been experiencing headache and swelling of the eye. After some examination you found some type of parasite.

1- What is the most likely parasite?

Trypanosoma cruzi

2-What is your diagnosis?

Chaga disease.

2- if the patient enters the chronic stage of the disease what do you expect to see?

cardiac damage, including dilated cardiomyopathy or digestive system damage, resulting in dilation of the digestive tract (megacolon and megaesophagus)

3- What further test would you order ?

Microscopically: Giemsa –stained blood film.

Serology: IFAT

Xenodiagnosis and PCR

3-If you took biopsy from one of the affected areas what would you find?

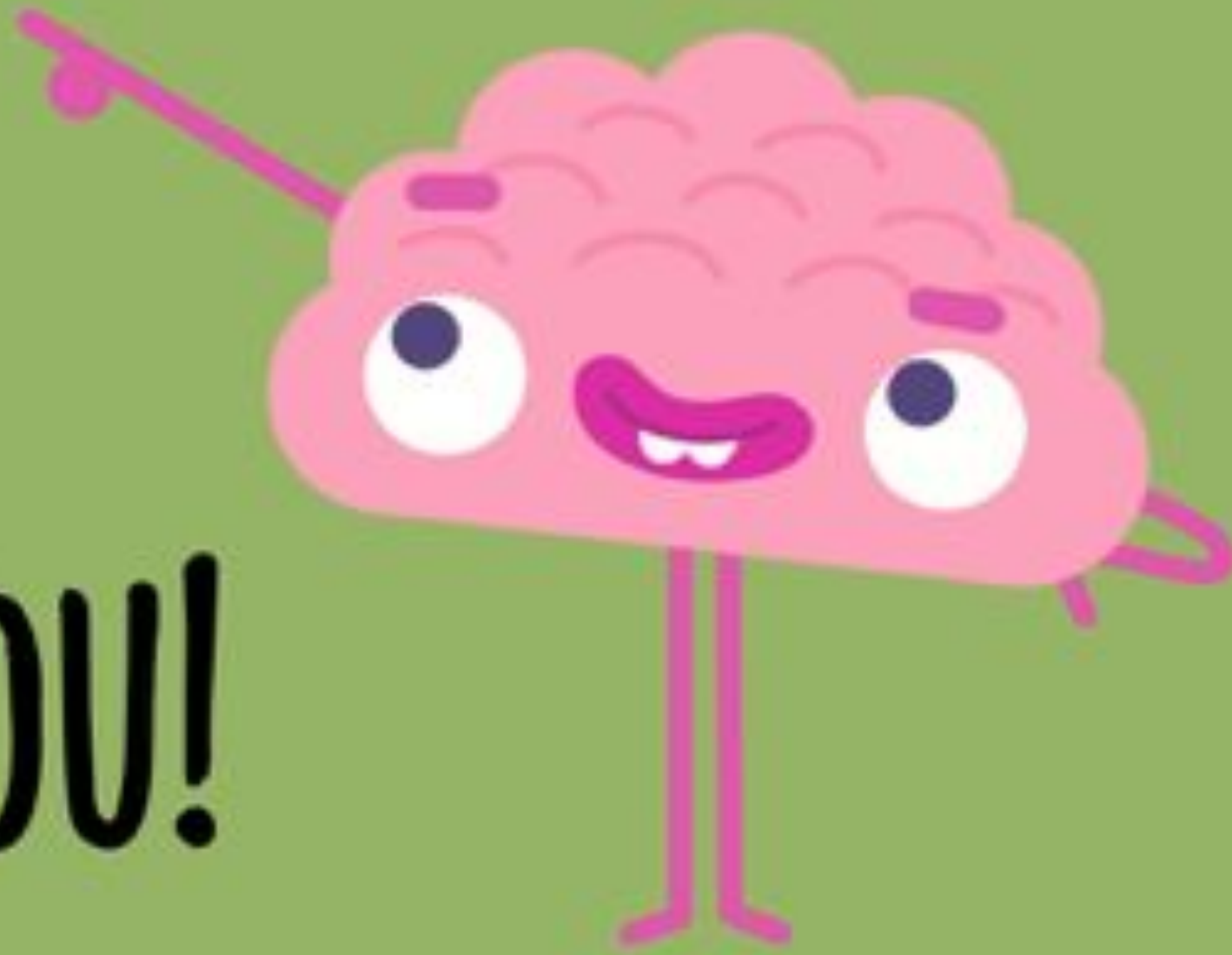
Amastigote

4- Treatment?

Benznidazole - Nitrofurazone



SPECIAL THANKS TO GHADAH AL-QARNI



THANK YOU!



TEAM LEADERS:

ALANOUD AL-MANSOUR & KHALED AL-OQEELY

TEAM MEMBERS:

LAYAN AL-WATBAN
REEM AL-QARNI
SARA AL-SULTAN

Designed by:
Aseel Badukhon (:

