الكلية: الطب

القسم او الفرع: الاحياء المجهرية

المرحلة: الثالثة

أستاذ المادة: د. ميساء إبراهيم محمد

اسم المادة باللغة العربية: طفيليات

اسم المادة باللغة الإنكليزية: Parasitology

اسم المحاضرة الثانية باللغة العربية: التريبانوسومات

اسم المحاضرة الثانية باللغة الإنكليزية :Trypanosomes

Trypanosomes are haemoflagellates that reside in peripheral blood and tissues of their host.

They can be classified as:

Human trypanosomes

(Trypanosoma cruzi and Trypanosoma brucei).

Animal trypanosomes

.

Trypanosoma spp. Require more than one host to complete their life cycle, transmitted through blood feeding invertebrates (insects).

Two major patterns are related to whether the trypanosome is belongs to the salivarian or stercorarian subgroups.

➢Stercorarian trypanosomes: infective forms which develop in the faeces of the insect vector and enter the vertebrate host by contamination of the bite area.

➢Salivarian trypanosomes: infective forms which develop in the mouth parts or salivary glands and enter the vertebrate host by inoculation during biting. This is also known as the anterior station development.

American trypansomiasis "Chagas disease"

American trypanosomiasis is a vector-borne infection caused by the protozoan parasite trypanosoma cruzi. Also called chagas disease, it is found only on the american continent.

The parasite alternately infects triatomine insects (reduviid, assassin or "kissing"bugs)

life cycle

□ Host: T. Cruzi passes its life cycle in two hosts: humans and vector reduviid bugs.

□ Infective form: metacyclic trypomastigote form is the infective forms, found in feces of reduviid bugs.

In humans, T. cruzi exists in two forms:

1. Amastigotes :- are intracellular parasite found in reticuloendothelial cells of spleen, liver, lymph node, bone marrow, and myocardium. They are also found in cells of epidermis and striated muscles.

2- Trypomastigotes are extracellular and found in peripheral blood.

Morphology

Trypomastigote form:

• It is spindle shaped; measures around 20 µm and appears as C or U shaped.

• It consists of a central nucleus and large kinetoplast situated posteriorly from which flagellum originates and traverses the whole body as undulating membrane and comes out from the anterior end as free flagellum.

• It doesn't multiply and it is the infective stage of the parasite (metacyclic trypomastigote)

T. cruzi trypomastigote

Structure of T. cruzi trypomastigote

Amastigote Form

It is round to oval, 26 µm in
size having a large nucleus,
rod shaped kinetoplast and
axoneme but no flagella.
***It is the multiplying form**
of the parasite.

Average incubation period is around 1 week.
T. Cruzi causes American Trypanosomiasis (chagas disease) which can be acute or
chronic type.
1- Acute chagas disease: it is characterized by:
Chagoma:an erythematous subcutaneous nodule is formed at the site of deposition
of bug's feces. It is painful, commonly occurs on face and may take 2–3 months to resolve.
Romana's sign: when the parasites enter through conjunctiva, there occurs an unilateral painless edema of the eyelid and conjunctivitis.
2- Chronic chagas disease
Chronic chagas' disease manifests years or even decades after the initial Infection.
It occurs due to multiplication of the parasites in the muscles (skeletal, cardiac and
GIT) and nervous tissue.

Lab. Diagnosis

□ Diagnosis by detection of trypomastigotes in the blood or the presence of T. cruzi-Specific antibodies in serum to indicate acute or chronic infection, respectively.

□ The shape of T. cruzi appear as U or C shape in blood film.

□ In chronic infection these specimens can be cultured in vitro in liquid medium (NNN medium) or by growth within uninfected insect vectors (xeno-diagnosis)

Xenodiagnosis: A method of diagnosis in which a vector is fed on a suspected case and is later examined for the presence of the parasite.

Lab. diagnosis

□ Trypomastigotes may be seen in cerebrospinal fluid (CSF) in central nervous system infections; also the amastigote stage parasite may be seen in histopathology specimens from affected organs.

□ Molecular Methods (PCR) is available that detects T. cruzi specific kinetoplast or nuclear DNA in blood. It is more sensitive than microscopy and serology for the diagnosis of chronic disease. -It can detect as low as one trypomastigote per 20mL of blood.

T. cruzi Trypomastigote forms in blood sample

T. cruzi Trypomastigote forms in cerebrospinal fluid

CSF (Leishman, 40X)

African Trypanosomes (Sleeping Sickness)

□ Human african trypanosomiasis (HAT), "Old World trypanosomes"

□ It is caused by the flagellate protozoan Trypanosoma brucei, which exists in

2 morphologically identical subspecies:

●Trypanosoma brucei gambiense , causes chronic infections in west and central africa "West african sleeping sickness" which can persist up to 10years.

●Trypanosoma brucei rhodesiense , is more prevalent in eastern africa and mostly results in acute human infections "East african sleeping sickness" that can be lethal within a few months.

Host:

T. brucei passes its life cycle in two hosts:

1. The vertebrate host is man and other animals.

2. Invertebrate host is the tsetse fly (genus glossina). Both male and female flies bite man and serve as vectors.

Infective form: the metacyclic trypomastigote forms are found in salivary gland of tsetse fly.

Signs & Symptoms

First stage:

In the first stage the parasite is found in the peripheral circulation, but has not yet invaded the central nervous system.

(Hemolymphatic stage)

Symptoms include:

● Headaches

●Aching muscles and joints

● Fever

● Swollen lymph nodes all over the body

● Swollen, red, painful nodule at site of fly bite (primary chancre) - resolves 2-3 weeks

Winterbottom's sign - swollen lymph nodes along back of neck in child with early trypanosomiasis

Chronic disease phase

In the second stage, the parasite crosses the blood-brain barrier and infects The central nervous system. (Neurological phase)

Laboratory diagnosis

Direct microscopy

Specimen: useful samples are multiple blood samples (due to periodic release of trypomastigotes in blood), chancre fluid, CSF, lymph node aspirate and bone marrow aspirate.

• Blood sample examination:

● Wet mounting: it is done to demonstrate highly motile trypomastigotes.

● Thin and thick films: smear is fixed and stained with giemsa stain to visualize the trypomastigote forms

• Molecular Methods (PCR)

Trypanosoma brucei rhodesiense trypomastigotes, blood smear, Giemsa stain, 1,000x

Laboratory Diagnosis

Antibodies from Serum and CSF:

● Card agglutination test for trypanosomes (CATT) for T. brucei gambiense has been developed for field use and mass screening. This is highly sensitive (96%) but less specific.

● Recently, newer methods like ELISA using indirect fluorescent

antibody (IFA) test are available to aid in the diagnosis but they have variable sensitivity and specificity.

Animal inoculation.

Card agglutination test for T. brucie

Morphological differences between T. cruzi and T. brucie is (PCR and real time PCR).