Examination for Third YearMalaysian Students
Course Title:Medical Parasitology
Date:6-7-2015
Term:Final Examination
Time Allowed: 3 hours
Total Assessment Marks: 75 MARKS

Tanta University
Faculty of Medicine
Department of Parasitology

MODEL ANSWER

1) Write short notes on:

1- Pathogenesis and clinical picture of paragonimiasis.

Pathogenesis:

1- The developed cyst has fibrotic wall surrounded by congested, oedematous and collapsed lung tissues. When cysts open into a bronchus, eggs appear in sputum.

1- The lesions may be suppurative or non-suppurative.

2- The number of worms in man rarely exceeds 10 (may be due to immunity).

Clinical picture:

1-Pulmonary type: "commonest type"

-Endemic haemoptysis: low grade fever, chronic cough with blood-stained sputum especially in the morning and pleurisy.

2-Abdominal type:

-Due to presence of aberrant worm and the development of cysts in viscera. Cysts in intestinal wall lead to abdominal pain, tenderness, rigidity and blood- stained diarrhea containing eggs.

-Cysts may be found in: liver, spleen, kidney, testes and prostate.

3-Subcutaneous type: creeping eruption.

4-Glandular type: fever with lymph node enlargement.

5-Cerebral type: focal epilepsy, paralysisor paresis of varying degrees and visual disturbances.

2- Direct laboratory diagnosis of strongyloidiasis.

1) **Stool examination:**direct stool smears or sedimentation technique to find characteristic rhabditiform larvae. Filariform larvae may also be found in stool sample. The larvae must be differentiated from those of hookworm (table II-3).
2) **Entero-test** (duodenal capsule test), duodenal aspiration, or biopsy. Eggs, larvae, or even adults can be detected.
3) **Baermann's Technique:**this procedure is designed to isolate and concentrate larvae from stool (larvae migrate from the stool sample to warmed water and are detected in the centrifuged sediment).
4) **Stool Culture**: *Strongyloides* larvae may be present in the stool in very small numbers, so culture methods may be needed.Since *Strongyloides* can reproduce outside the host, this technique may not require special media but only storage of a thick suspension of suspected stool for 48 hours produces free-living adults. Charcoal culture and agar plate culture methods may be needed to provide better media for rapid reproduction of the free living adults.
5) **Extra-intestinal specimens:** in hyperinfective and disseminated strongyloidiasis, larvae can be found in sputum, bronchoalveolar lavage, urine, ascitic fluid, intestinaland skin biopsy, and cerebrospinal fluid.

3- Complications of *plasmodium falciparum* infection:

1- malignant malaria due to adhesion phenomena: Infected RBCs containing trophozoites and schizonts clump together and stick to the endothelium of the blood vessels leading to sequestration of these infected RBCs forming thrombi. This will block the blood vessels leading to ischemia or anoxia of the affected organs. This will lead to damage of the surrounding tissue resulting in pernicious syndrome in which the clinical manifestations are variable according to the affected organs and the degree of ischemia and tissue damage as follows:

- **Cerebral malaria:** there is loss of consciousness (with or without seizures) that rapidly progresses to coma.
- **The lungs:** pulmonary oedema.
- **The kidney:** degeneration of the tubules leads to anuria and renal failure.
- **The intestine:** blockage of intestinal capillaries causes sloughing of intestinal epithelium leading to dysentery or profuse diarrhea in severe cases.
- **Algid malaria:** Collapse and peripheral circulatory failure due to thrombosis in suprarenal glands or generalized vascular thrombosis and haemorrhage in abdominal viscera.
- **The heart:** partially blocked myocardial capillaries with foci of degeneration.
- **The eyes:** thrombosis of retinal vessels results in retinal haemorrhages.
- **The placenta:** on the maternal side, blockage of sinusoids with parasitized erythrocytes results in slowing of the circulation and ischemia. This leads to abortion, intrauterine growth retardation and low birth weight as well as an increase in maternal morbidity and mortality.

2- Black water fever: It is an acute massive intravascular haemolysis. It results from repeated inadequate quinine treatment in patients chronically exposed to *P. falciparum* infection. It usually occurs during the malarial paroxysm and is characterized by fever, severe haemolytic anaemia, jaundice, haemoglobinaemia and haemoglobinuria with dark red or black urine. Blocking of the kidney tubules may lead to anuria, renal failure and death.

II- Complete the following statements:

1- ***Parafossarulus*.**
2- ***Semisulcospira*spp.**
3- **Trophozoite**
4- **Mature oocyst**
5- **Plague**, **Endemic typhus)**.
6- ***Leishmania* spp.**, **Sand fly fever**, **Oroya fever**

7- &8 -***Taeniasolium, T. Saginata, Trichinellaspiralis***

8- ***Diphyllobothriummansoni***

9- ***Multicepsmulticeps.***

III) Give the reason(s) of: 10marks

1) *Capillariaphilippinensis*s one of the most virulenthelminths of human due to:

1. The worms repeatedly penetrate mucosa of the small intestine and reenter the lumen, especially jejunum, leading to progressive damage of mucosa and submucosa.
2. The parasite can multiply to huge numbers in the intestine (hyperinfection).

2) Rhodesian trypanosomiasis is more dangerous than Gambian trypanosomiasis due to:

	Gambian trypanosomiasis(Chronic West African sleeping sickness)	**Rhodesian trypanosomiasis** (Acute East African sleeping sickness)
Reservoir host:	No reservoir host	Antelopes & other wild game animals and cattle
Duration of the disease:	Chronic course: Several months to years.	Acute course: the patient usually dies before CNS invasion due to toxaemia and myocarditis
Parasitaemia:	Low	High
Prevention and control:	1. Treatment of people in endemic areas. 2. Control of vector. 3. Protection against *Glossina* bite.	The same, but difficult due to: a) R. hosts are wild animals in forest. b) *Glossinamorsitans* is difficult to be controlled as its habitat is in Savana forests.

3) Elephantiasis in bancroftianfilariasis.

It develops slowly, usually follows years of continuous filarial infection and it may be preceded by repeated acute inflammatory attacks.

Lymphatic obstruction results from:

1) Fibrosis following the cellular reaction occurring due to the repeated acute inflammatory attacks.
2) The coiled worms or the proliferative granulation tissue after its death.
3) Repeated long-term secondary bacterial infections.

Lymphatic obstruction leads to:

1) Chronic lymphatic oedema; frequently affects the legs and external genitalia or the arms and breasts. Oedema is non-pitting and irreversible with limb elevation.
2) The high protein content of the lymph stimulates the growth of connective tissue of the skin and subcutaneous tissue. Gradually, over a period of years, the affected part becomes thickened, rough and fissured (**elephantiasis**).
3) Extensive lymph varices, which may rupture in the renal pelvis or urinary bladder resulting in passage of milky white urine (**chyluria**), or in the cavity of the tunica vaginalis (**chylocele**), or in the peritoneal cavity (**chylous ascites**).
4) Hydrocele: chronic accumulation of fluid in tunica vaginalis of scrotum.

IV) Name only <u>two</u> parasites that: 5 marks

1) **Can be treated by spiramycin:**toxoplasmosis and cryptosporidiosis
2) **Can be demonstrated by lymph node biopsy:**

Wuchereriabancroft.Burgiamalayi, T.cruzi, L. donovani,

*Toxoplasma**Toxocara*spp., *Onchocerca*, sparganum

3) **Can diagnosed by coproantigen detection:** *cryptosporidiosis, giardiasis, amoebiasis, trichinosis,taeniasis, fascioliasis.*

4) **Can be transmitted by autoinfection:** *H. nana,Taeniasolium, Capillariaphilippinensis, Strongyloidesstercoralis, E. histolytica, Giardia lamblia, B.coli, Cryptosporidium, Leishmaniatropica*

5) **May cause jaundice:**

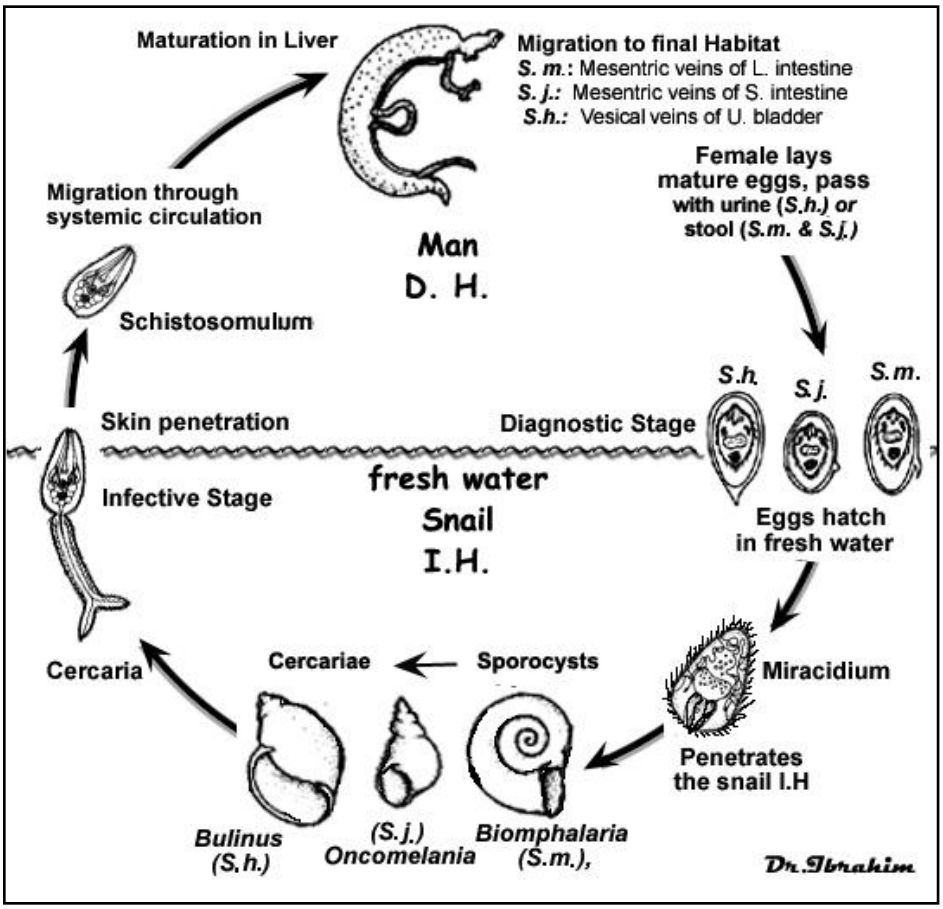
-Obstructive: *Fasciola* spp. (chronic stage), hydatid cyst, *Ascaris*, *Trichostrongylus*, *Giardia lamblia*, *Cryptosporidium.*

-Haemolytic: *Plasmodium* spp., blackwater fever.

- **Hepatocellular**: *Fasciola* spp. (acute stage), *S. mansoni* and *S.japonicum* (late stage).

V) Mention one of the parasitological uses of the following: 5 marks

1) **Pyrethrum:**kill adult mosquitoes
2) **Ivermectin.:** *Strongyloidesstercoralis*,filariasis, cutaneous larva migrans, scabies
3) **Xenodiagnosis.**Chagas' disease, Visceral Leishmaniasis:.Babesiosis: Toxoplasmosis:.Trichinosis:
4) **Skin biopsy.**Onchocerciasis: Microfilariae in skin snip., Cutaneous Leishmaniasis and Post-kala-azar dermal leishmaniasis, Early stage of African *Trypanosomiasis*, Acute Chagas' disease (American *Trypanosoma)*, Cutaneous amebiasis, Scabies.
5) **Primaquine**Radical curein *P. vivax*and *P. ovale***.**



VI) Draw labeled diagrams for the following: 15 marks

1) Life cycle of *Schistosomajaponicum*

2) The diagnostic stage (s) of :-

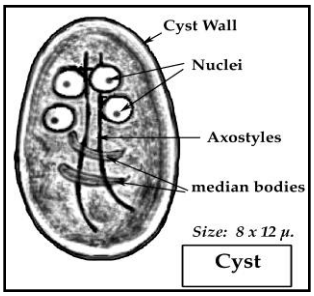
a) *Enterobiusvermicularis.*

Egg:

- **Size:**50 × 20 µm.
- **Shape:** oval, plano-convex (D-shaped), has a shell composed of 2 layers and covered by thin albuminous sticky layer.
- **Colour:** colourless.
- **Content:** contains a fully developed larva.

b) *Giardia lamblia.*

A) Cyst: in formed stool

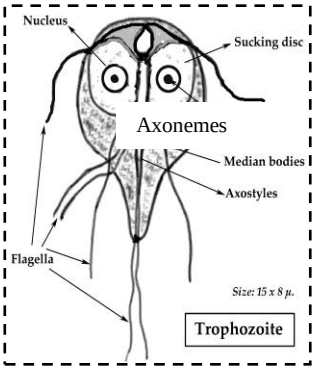


(1) Size: 12 × 8 µm.

(2) Oval with a well-defined cyst wall. Its contents shrink from the cyst wall giving an impression of a double wall.

(3) Has 4 nuclei grouped at one pole, axonemes, median bodies and remnants of flagella.

(B) Trophozoite in acute stage and in loosestool



(1) Bilaterally symmetrical with average size of 15 × 8 µm.

(2) Pear-shaped with rounded anterior end and tapering posterior end.

(3) Convex dorsally and flat ventrally with ovoid bilobed concave sucking disc occupying the anterior ¾ of the ventral surface (for attachment).

(4) Two (anteriorly-situated) ovoid vesicular nuclei with central karyosome.

(5) Four pairs of flagella with a motility similar to a falling leaf.

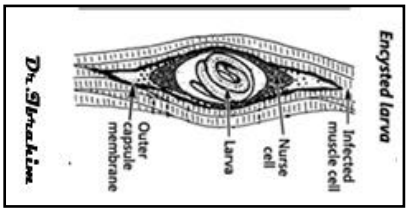
(6) Two central axonemes of ventral flagellae (previously described as axostyles) in the middle traversing the body longitudinally

(7) Two rod-shaped parabasal bodies (median bodies) just posterior to the sucking disc across the axostyles.

3)The infective stage (s) of*:-*

a)*Trichinellaspiralis.*

is enclosed in a blunt lemon-shaped capsule of muscle fibre, about 0.5 mm in length. It



measures 1000 μm long and lying coiled in its capsule.

b)*Toxoplasma gondii.*

1- Trophozoite: It is 5×3 μm, crescent or ovoid in shape. The nucleus is towards the rounded end.	
2- Pseudocyst: When the trophozoites invade any cell, they multiply rapidly **(tachyzoites)** giving a cell containing up to 100 tachyzoites with no true cyst wall.	
3-True cyst: It is rounded, 10-200 μm in diameter with a well defined cyst wall. It contains several thousands of slowly dividing trophozoites**(bradyzoites).** It might be present in any tissue cell but mostly in muscle, heart, nervous tissue and eye. They remain viable in tissues for several years.	

4- Oocyst: It is 12 × 10 µm, shed with the stool of cats. Oocysts are immature, non-infective when freshly passed. The oocyst needs 1-5 days in the soil for sporulation to give the infective **mature or sporulated oocyst** containing two sporocysts each with four sporozoites (disporocystic-tetrazoic oocyst). Sporozoites are morphologically similar to trophozoites.	

VII) Case(1) 7.5 marks

a) What are the suspected parasitic disease and the causative parasite?

A case of hydatid disease.

b) How can you confirm the diagnosis?

***Laboratory:**

A) Direct:

- **Cyst puncture and aspiration** of fluid for the detection of scolices may be done, but it is a risky process and may lead to leakage of fluid and anaphylactic reaction.

B) Indirect:

- **Intradermal test (Casoni test):** 0.2 ml of sterilized diluted hydatid fluid is injected intradermally. An erythematous wheel is formed in about 15 minutes in positive cases. This test is little used now and has been replaced by serological tests.
- **Serological diagnosis:**

i. Detection of antibodies by:

- Indirect haemagglutination (IHA).
- Enzyme linked immunosorbent assay (ELISA).
- Immunoelectrophoresis (IEP).
- Indirect immunofluorescence(IFA)

ii.**Detection of circulating antigen or immune complexes** which is more specific and useful for detection of viability of the cyst.

***Other investigations:**

- **PCR techniques** for biopsied specimens help in identification and differentiation of the type of hydatid cyst .
- Blood examination reveals high eosinophilia.
- **Imaging procedures:**

- X-ray may show the outline of the cyst together with a fluid level. Calcified cysts are usually detected.
- Abdominal ultrasonography is excellent in the detection of abdominal cysts.
- CT and MRI are very helpful in the detection of extrahepatic cysts.

N.B. Serology, PCR and imaging procedures are the most useful methods used for diagnosis of hydatid disease.

c) How can you treat this case?

Treatment:

1- Surgical removal of the cyst when possible, taking care to avoid puncture and leakage of fluid. Careful aspiration of fluid and sterilization of the cyst should be done before removal.

2- PAIR technique: Percutaneous aspiration of hydatid fluid followed by injection of scolicide solution like chlorhexidine, hydrogen peroxide or ethanol, which destroy the germinal layer and scolices. The fluid is then reaspirated 5 minutes later i.e. puncture, aspiration, injection of scolicide and reaspiration.

3- Drug therapy: When surgery is impossible, high doses of mebendazole or albendazole (up to 400 mg twice daily) for one month may be used and may be repeated after 14 days. Praziquantel may be used in combination with mebendazole. Drugs may be also used preoperatively.

d) Enumerate other three parasites that may infect the liver?

Helminths: *Fasciola*spp.,*Schistosomamansoni*and *S. japonicum,* Hydatid cyst, visceral larva migrans.

Protozoa: *Entamoebahistolytica*(amoebic liver abscess), *Plasmodium* spp., *L. donovani*, African trypanosomes, *T. cruzi*, *Toxoplasma* (congenital infection).

VIII) Case (2) 7.5 marks

a) What are the suspected parasitic disease and the causative parasite?
A case of*Negleriafowleri* infection.

b) Discuss the mode of infection?

-Swimming in contaminated water (containing trophozoite or flagellate form).

-Rarely inhalation of the cysts in dust.

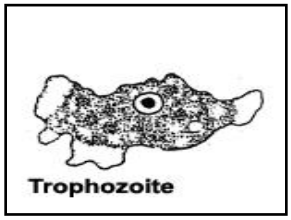
*Naegleria*trophozoites invade the CNS through nasal mucosa → cribriform plate → olfactory nerve → olfactory pulp → base of the brain → penetrate the dura mater and enter the substance of the brain, multiply by binary fission, lyse and ingest cerebral tissue→ cerebral inflammation.

c) How can you confirm the diagnosis?

1- CSF examination to detect trophozoites.

2- Culture of CSF on non-nutrient agar seeded with *Escherichia coli.*

3- Intranasal inoculation of CSF in mice.


Trophozoite

III) Other investigations: PCR.

4- Enumerate other three that can be diagnosed by C.S.F. examination?

1- African trypanosomes

2- T. cruzi

3- Toxoplasma gondii.

4- *Entamoebahistolytica*(amoebic brain abscess when ruptures in CS space)

IX- Choose the correct answer: 10 Marks

1-	**D**

2-	**B**
3-	**A**
4-	**B**
5-	**C**
6-	**D**
7-	**D**
8-	**A**
9-	**B**
10-	**D**