

Al-Mustaqbal University college
Department of pharmacy



2st Class, 2st Semester

PARASITOLOGY

Lab 4

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MALARIA

- causative agent = ***Plasmodium species***
 - 4 human *Plasmodium* species

P. falciparum – *Pf*----- Quartan malaria
P. vivax – *Pv*----- Falciparum malaria
P. ovale – *Po*----- Black water fever
P. malariae - *Pm*----- Tertian malaria

*Infective form: Sporozoite

*Period of one erythrocytic stage:

P.V 48h; *P.M* 72h; *P.F* 36-48h

malaria

Taxonomical classification of malaria

Kingdom:	Protista
Subkingdom:	Protozoa
Phylum:	Apicomplexa
Class:	Sporozoasida
Order:	Eucoccidiorida
Family:	Plasmodiidae
Genus:	<u>Plasmodium</u>
Species:	<u>falciparum</u> , <u>malariae</u> , <u>ovale</u> , <u>vivax</u>

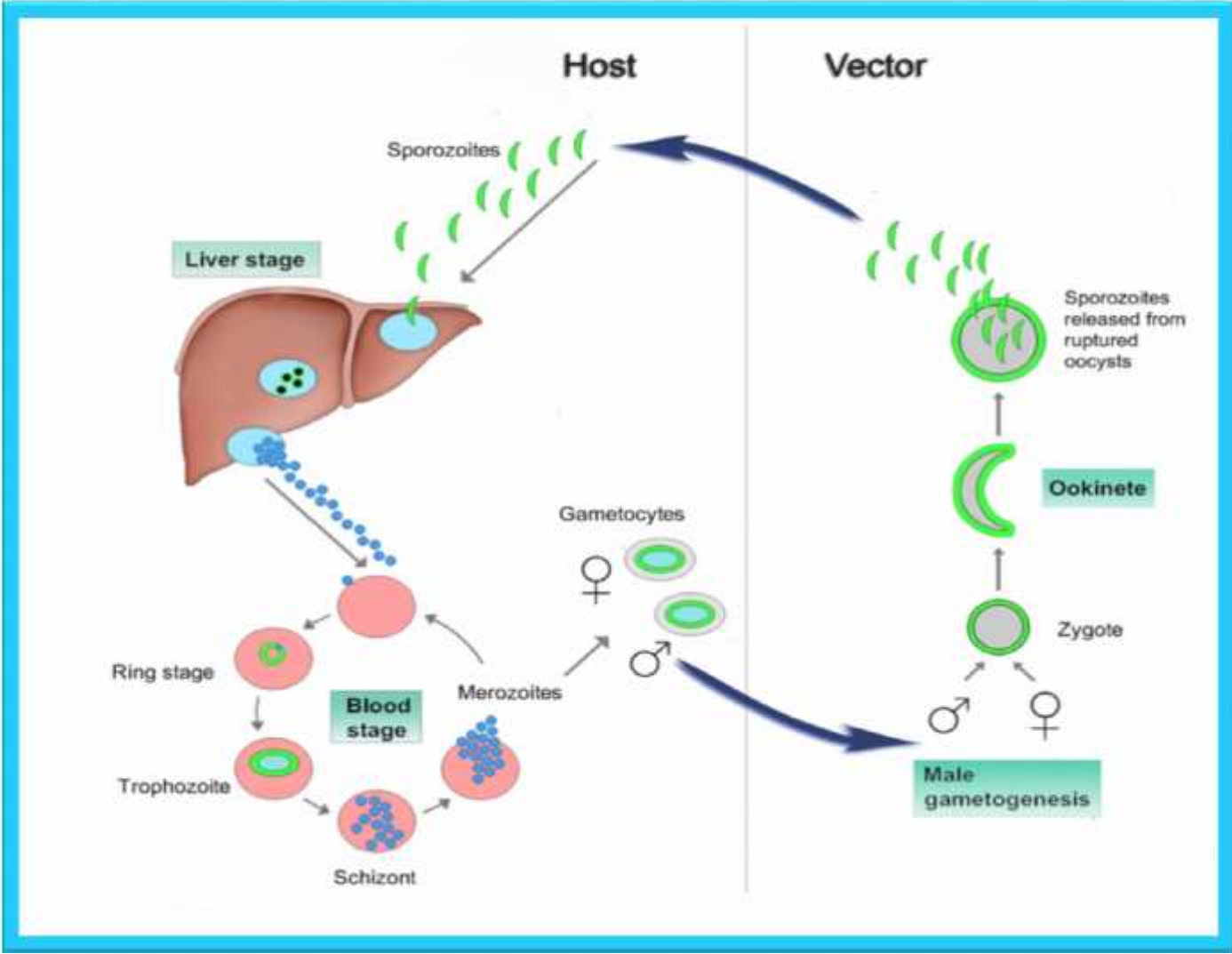
A bite from an infective female *Anopheles* mosquito.



Anopheles must be infected through a previous blood meal taken on an infected person to transmit malaria

Life Cycle

- transmitted by *Anopheles* mosquitoes
- **sporozoites** injected with saliva
- **sporozoites** invade liver cells
- undergo an **asexual replication**
- 1000-10,000 **merozoites** produced





Scanning electron micrograph of *Plasmodium*-infected red blood cells. One cell has burst open, releasing merozoites

Physical symptoms:

1- Fever: Fever can be very high from the first day. Temperatures of 40°C and higher are often observed. Fever is usually continuous or irregular. Classic periodicity may be established after some days.

2- Hepatomegaly: The liver may be slightly tender.

3- Splenomegaly: Splenomegaly takes many days, especially in the first attack in nonimmune children. In children from an endemic area, huge splenomegaly sometimes occurs.



4-Anemia: Prolonged malaria can cause anemia, and malarial anemia causes significant mortality.

5- Jaundice: With heavy parasitemia and large-scale destruction of erythrocytes, mild jaundice may occur. This jaundice subsides with the treatment of malaria.

6- Dehydration: High fever, poor oral intake, and vomiting all contribute to dehydration.

Diagnosis

1. Parasitological diagnosis: 2. Immuno-diagnosis

Parasite; Species; Density

*Thin blood films (species identification)

*Thick blood films

*Specific antibody detection

*Antigen detection

*Specific DNA or RNA detection

Treatment

* **Chlorquine and quinine**

* anti-erythrocytic stage drugs.

* **Primaquine and pyrimethamine**

* anti-exoerythrocytic stage drugs.

Toxoplasma gondii

- Worldwide
- Zoonotic parasite; Toxoplasma is an **opportunistic** pathogen.
- Infects animals, cattle, birds, rodents, pigs, and sheep, and humans.
- Causes the disease **Toxoplasmosis**.
- Intracellular parasite.
- Final host (Felidae family, cat)
- Intermediate host (mammals)

Toxoplasmosis

1. **All parasite stages are infectious.**
2. **Risking group:** Pregnant women, meat handlers (food preparation) or anyone who eats the raw meat

Taxonomical classification of Toxoplasma gondii

Kingdom: Protista
Subkingdom: Protozoa
Phylum: Apicomplexa
Class: Sporozoasida
Order: Eucoccidiorida
Family: Sarcocystidae
Genus: Toxoplasma
Species: gondii

Cats (Mainly domestic and wild cats)

- Definitive (final) host. Domestic cats, who pick up the organism from eating infected rodents.
- Asexual and sexual division is intracellular.
- Oocysts in feces.

Humans (Mammals)

- Intermediate host..
- Asexual tissue cycle.
- Motile, disease producing phase = tachyzoites.
- Non-motile “slow” phase in tissue cyst = bradyzoites.

Toxoplasma gondii

All parasite stages are infectious.

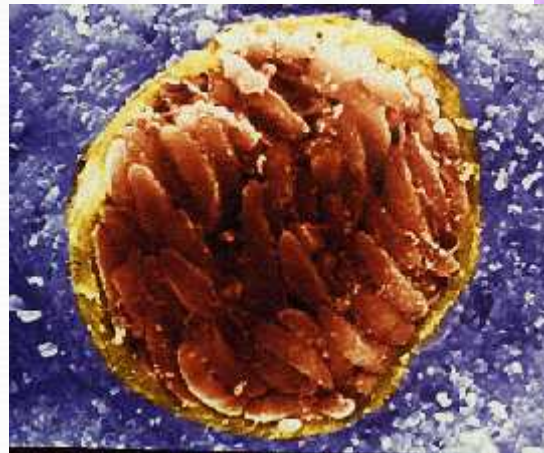
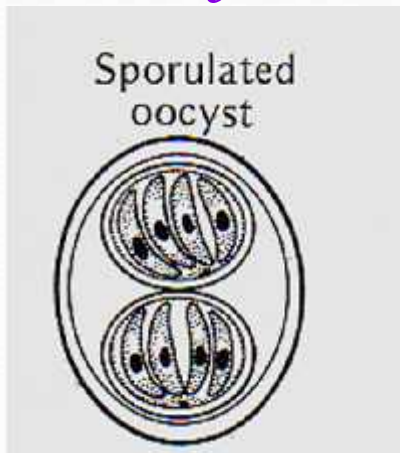
1. TACHYZOITES

2. TISSUE CYSTS

3. BRADYZOIT

4. OOCYSTS

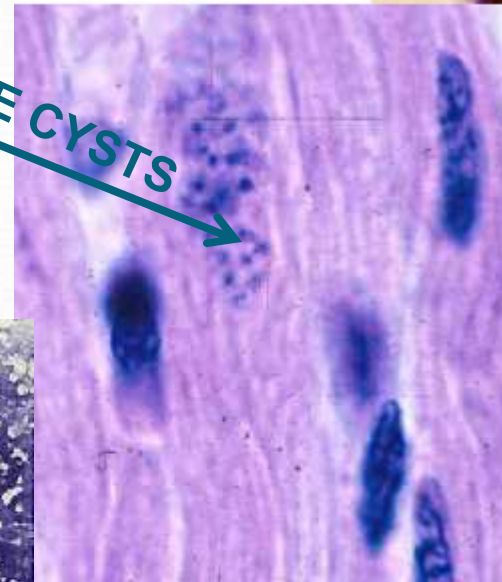
Oocysts



Tachyzoites



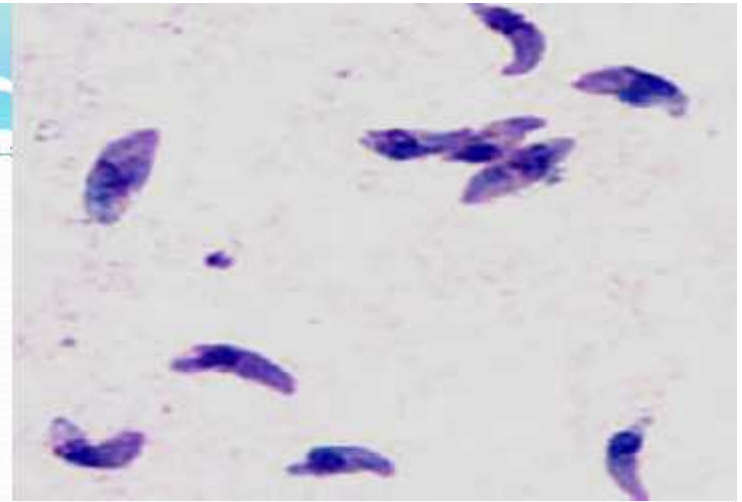
TISSUE CYSTS



Bradyzoites

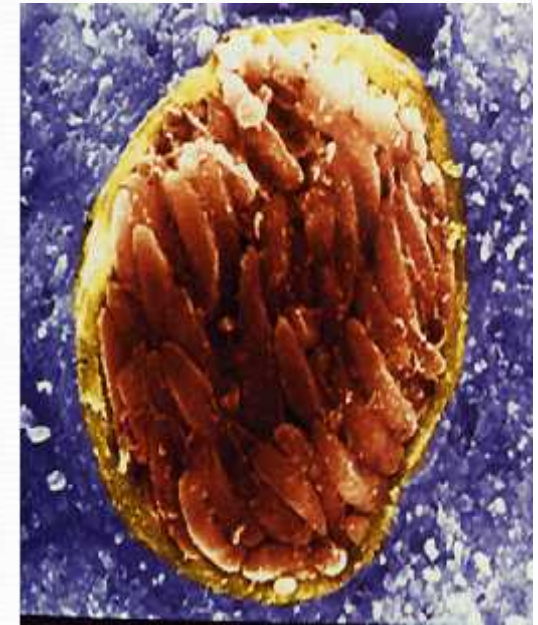
Tachyzoite stage

- Rapidly growing stage observed in the early stage of infection.
(Acute phase) habits in the body fluid.
- Crescent-shaped. One end is more pointed than the other subterminal placed nucleus.
- Asexual form.
 - Multiplies by endodyogeny.
 - It can infect phagocytic and non-phagocytic cells.



Bradyzoites

- Are **slow-growing** stage inside the tissue cysts.
- Bradyzoites mark the **chronic** phase of infection.
- Bradyzoites are **resistant to low pH and digestive enzymes** during stomach passage.



- [REDACTED]
- Bradyzoites are released in the intestine and are highly infective if ingested.

Oocysts in the feces of cat

- Cat ingests tissue cysts containing bradyzoites.
- Gametocytes develop in the small intestine.
- Sexual cycle produces the oocyst which is excreted in the feces.
- Oocysts appear in the cat's feces 3-5 days after infection by cysts.
- Oocysts require oxygen and they sporulate in 1- 5 days.



Sources of infection:

_ Contaminated water or food by oocysts from undercooked meat.

Ingestion of tachyzoites and bradyzoites (cysts) in flesh of infected host.

_ Mother to fetus.

_ Organ transplant (rare).

_ Blood transfusion (rare).

Disease: Toxoplasmosis

- 1) Acquired toxoplasmosis
 - Mild lymphatic inflammation
- 2) Congenital toxoplasmosis