Lecture (2)

Malaria

Objectives:

- Not given

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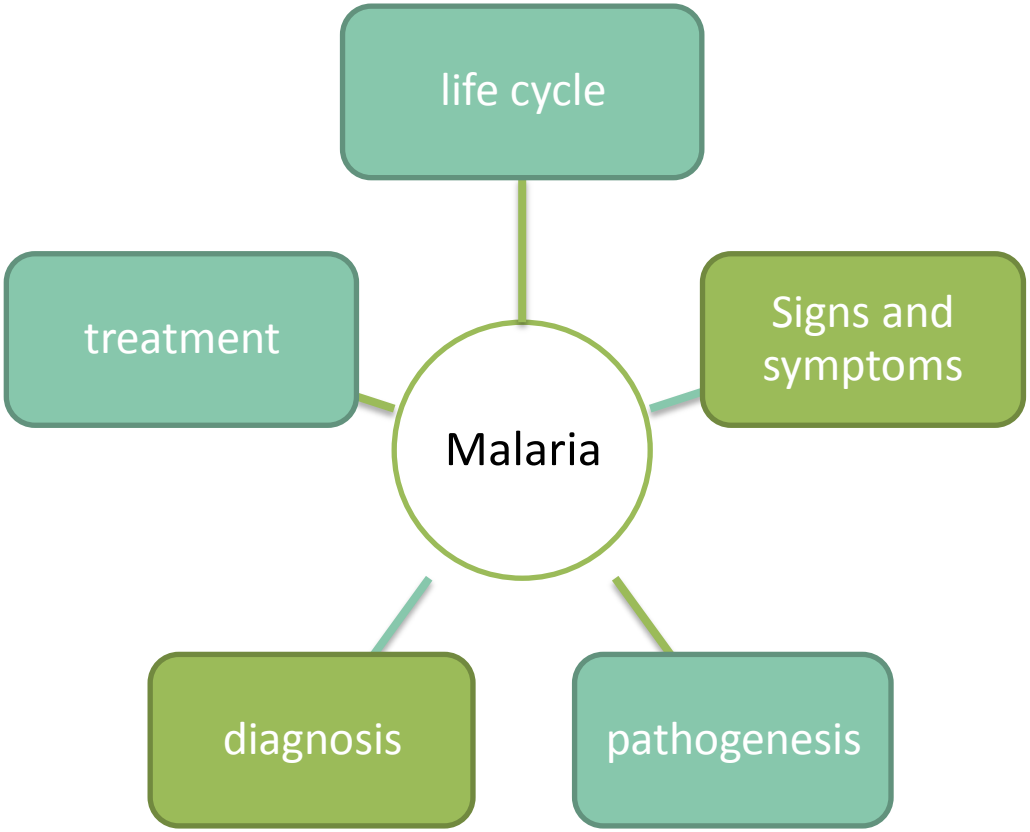
MIND MAP
(Malaria)



Four species of malaria:

-**Plasmodium falciparum:** malignant quotidian*,tertian* or **irregular*** malaria (most dangerous)
-**Plasmodium vivax:** benign tertian* malaria
-**Plasmodium ovale :** benign tertian* malaria
-**Plasmodium malariae:** quartan* malaria

*NOTE: different species of malaria burst RBCs in different time interval
Tertian: occurs every 48 hours (every other day)
Quartan: occurs every 72 hours
Quatidian: Occurs everyday
e.g. P. Vivax and P.ovale produce chills followed by fever then sweats every 48 h → tertian malria

Malaria life cycle:

Taken from microbiology made ridiculously simple, it's same as what doctors mentioned .

1. Sporozoites swim out of the **anopheles mosquito** sucker and into human blood stream
2. Exo-erythrocytic(hepatic)cycle: Sporozoites will transform to merozoites

- Merozoites will lead to liver cell burst → releasing merozoites to blood stream "invade RBC and other liver cells"

3. Erythrocytic cycle: Merozoites will invade RBCs → trophozoites (ring stage) → Schizont"contain merozoites" → rupture RBCs "in this stage stimulation of immune response, **manifested as chills followed by fever then sweats"** → released merozoite invade other RBC
4. Some merozoites change into Gametocytes → taken by anopheles mosquito (sexual stage)

- P. Vivax and P.ovale preduce hypnozoites in liver which can grow years later causing relapsing malaria
- The infective stage: Sporozoites
- The diagnostic stage: Gametocytes or during the ring stage.
- Malaria transmitted by **anopheles mosquito**

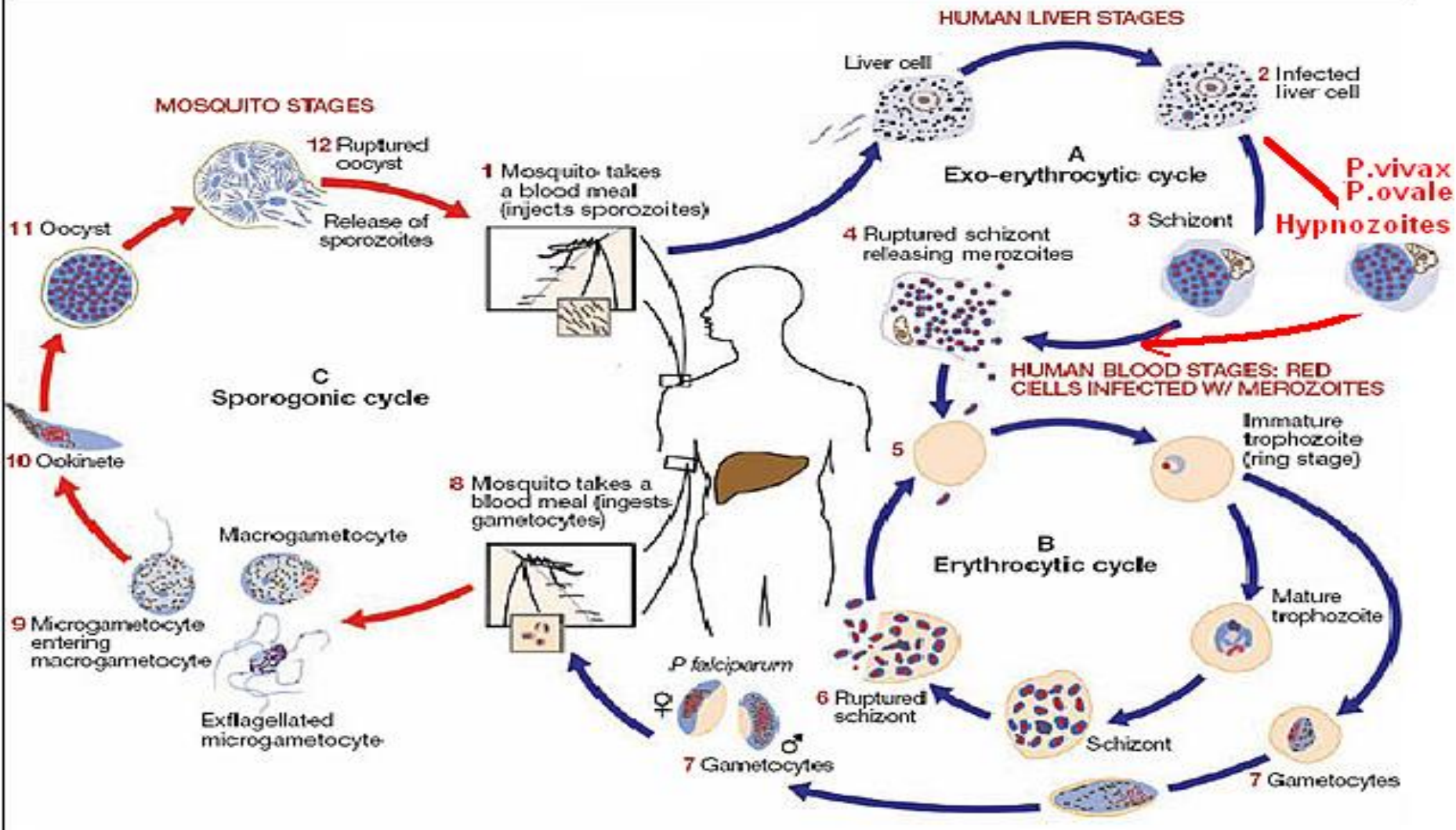
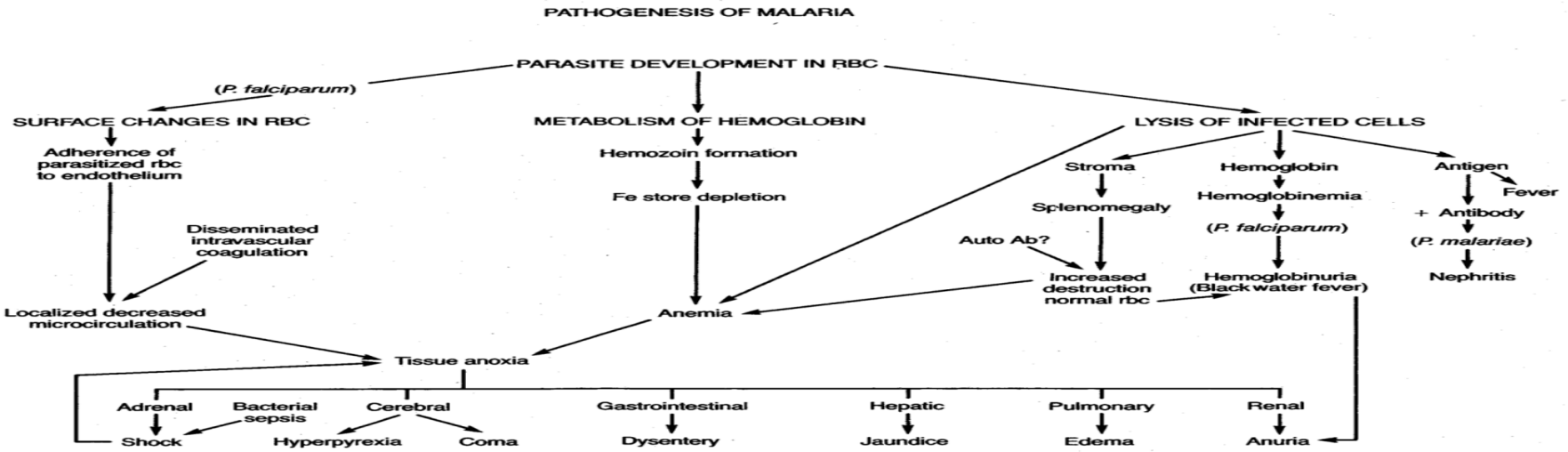


Figure 1—Malaria parasite life cycle. A malaria-infected female Anopheles mosquito inoculates sporozoites into the human host. Sporozoites infect liver cells and mature into schizonts, which rupture and release merozoites that infect red blood cells. Ring-stage trophozoites mature into schizonts, which rupture, releasing merozoites. Some parasites differentiate into sexual erythrocytic stages (gametocytes). Parasites in the blood are responsible for the clinical manifestations of the disease. Adapted from the CDC.



Pathogenesis

- Anemia (due to lysis of RBC and metabolism of hB)
- Impairment of microcirculation (due to sticky RBCs) affect all organs
- Anemia + Impairment of microcirculation → tissue anoxia

Clinical picture

- **Acute Disease:** Cerebral Malaria → Death "acute will happen to non immune patient which means he never been exposed to malaria"
- **Chronic Disease :**
  - Chronic AsymptomaticInfection :"in patient had been exposed to malaria before "usually in endemic areas ""
    Infection → Anemia →Developmental Disorders; Transfusions → Death
  - During Pregnancy Placental Malaria:
    Low Birth weight →Increased Infant Mortality

Signs and symptoms

Malarial Paroxysm "attack"

1-Chills (cold stage)	2-Fever (hot stage)	3-Sweating (sweating stage)
•feeling of intense cold •vigorous shivering •lasts 15-60 minutes	•intense heat •dry burning skin •throbbing headache •lasts 2-6 hours	•profuse sweating •declining temperature •exhausted and weak → sleep •lasts 2-4 hours

Complicated malaria (severe malaria)	Uncomplicated malaria
symptomatic malaria in a patient with P. falciparum asexual parasitaemia with one or more of the following complications: • **Cerebral malaria** • **Severe normocytic anaemia,** • **Acute pulmonary oedema** • **Haemoglobinuria** in (G6PD) • Haemoglobinuria associated with malaria called (black water fever) • Generalised convulsions • Hypoglycaemia • Metabolic acidosis with respiratory distress • Acute renal failure • adult respiratory distress syndrome Abnormal bleeding • Jaundice • Circulatory collapse • shock • septicaema(algid malaria) • Hyperparasitaemia • Fluid and electrolyte disturbances	Symptomatic infection with malaria parasitemia • without signs of severity • and/or evidence of vital organ dysfunction.

Common methods for parasitological diagnosis of malaria:

1. Light microscopy: the gold standard for diagnoses of malaria.

It advantages:

- Parasite density
- Species diagnosis Monitoring
- Response to treatment

2. Rapid diagnostic tests (RDTs): detecting circulating malaria antigens.

Treatment of malaria:

Blood Schizontocides:

- **Chloroquine**
- Sulfadoxine/Pyrimethamine
- **Quinine**

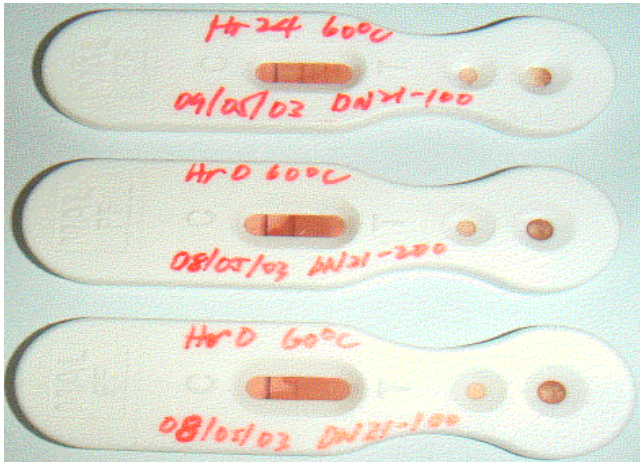
Primaquine drug for:

1-Gametocyide stage "prevent the spreading"

2-Tissue Schizontocides

3-Anti-relapse

4- Sporontocides



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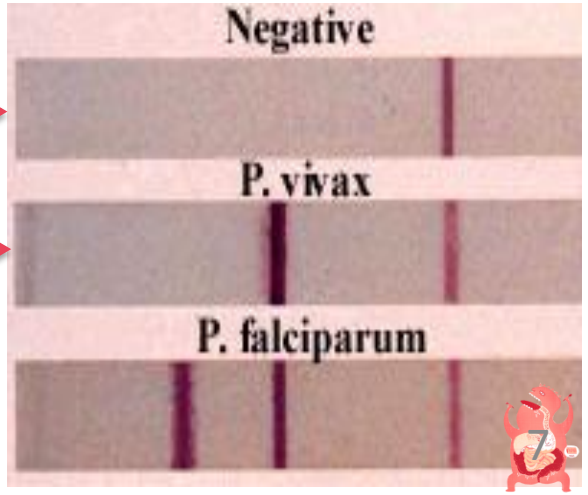
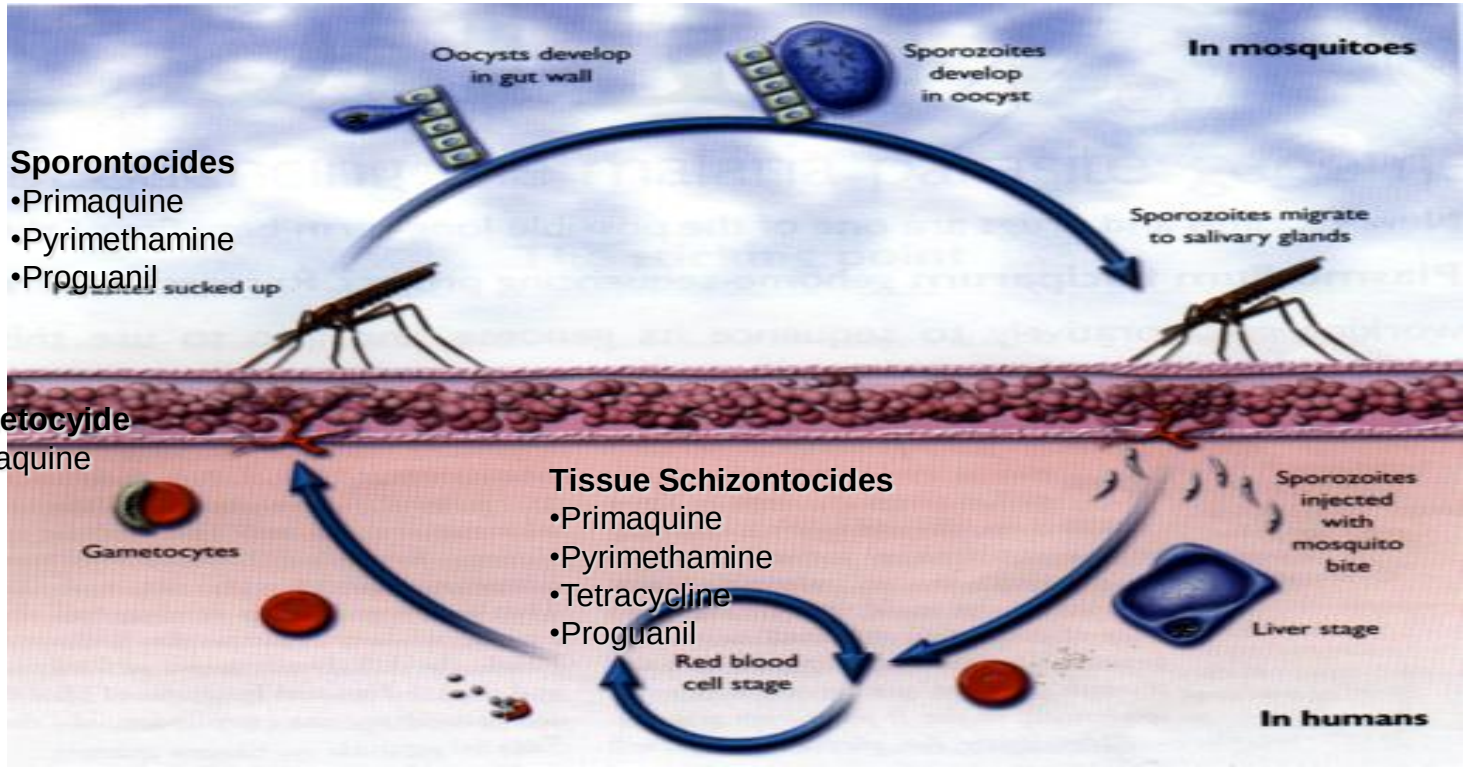


Not important

ACTION OF ANTIMALARIAL DRUG IN THE DIFFERENT LIFE STAGES OF THE MALARIA PARASITE

Sporontocides
- Primaquine
- Pyrimethamine
- Proguanil

Gametocyide
Primaquine



Blood Schizontocides
- Chloroquine
- Sulfadoxine/Pyrimethamine
- Quinine
- Quinidine
- Artemisinins

SUMMARY:

-The infective stage for malaria is Sporozoites

-Plasmodium falciparum is the most dangerous and common pathogen of malria

-Complicated malaria (severe malaria): symptomatic malaria in a patient with P. falciparum asexual parasitaemia with complications

-Uncomplicated malaria : Symptomatic infection with malaria parasitemia without signs of severity and/or evidence of vital organ dysfunction

-Light microscopy: the gold standard for diagnoses of malaria

-Rapid diagnostic tests (RDTs): detecting circulating malaria antigens.

-Primaquine used to treat malaria in :
1-Gametocyide stage 2-Tissue Schizontocides
3-Anti-relapse 4- Sporontocides

QUESTIONS

1-which one of the following is the Most pathogenic cause for malria i**s:**

A. Plasmodium falciparum
B. Plasmodium vivax
C. Plasmodium ovale
D. Plasmodium malariae

2- Rapid diagnostic tests (RDTs) used to :

A. To know Parasite density
B. know the response of treatment
C. To detect circulating malaria antigens
D. know Species diagnosis Monitoring

3- patient comes to the hospital with a fever recurring every 72 hours (3 days). Which of the following is the most likely pathogen?

A. Plasmodium ovale
B. Plasmodium malariae
C. Plasmodium falciparum
D. Plasmodium vivax

4- which one of the following is the infective stage for malaria?

A. embryonated egg
B. Filariform larva
C. Sporozoite
D. trophozoites

Qs	1	2	3	4
Answer	A	C	B	C

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