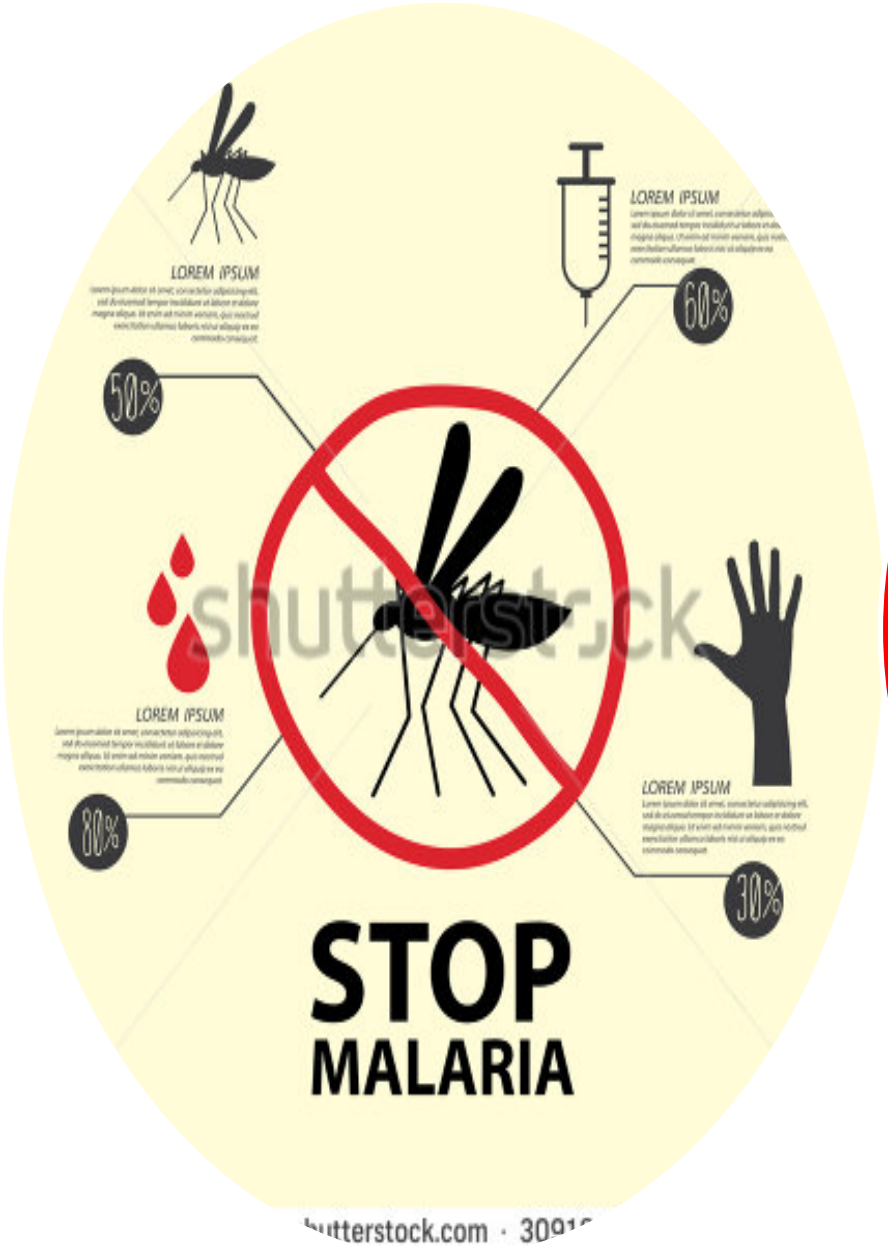


Malaria
Lecure
--10

Hazem .K. Al-Khafaji

Topics:

Definition.
Epidemiology
Etiology.
Pathology.
Clinical features.
Complications.
Diagnosis.
Treatment.
. Prevention

Definition

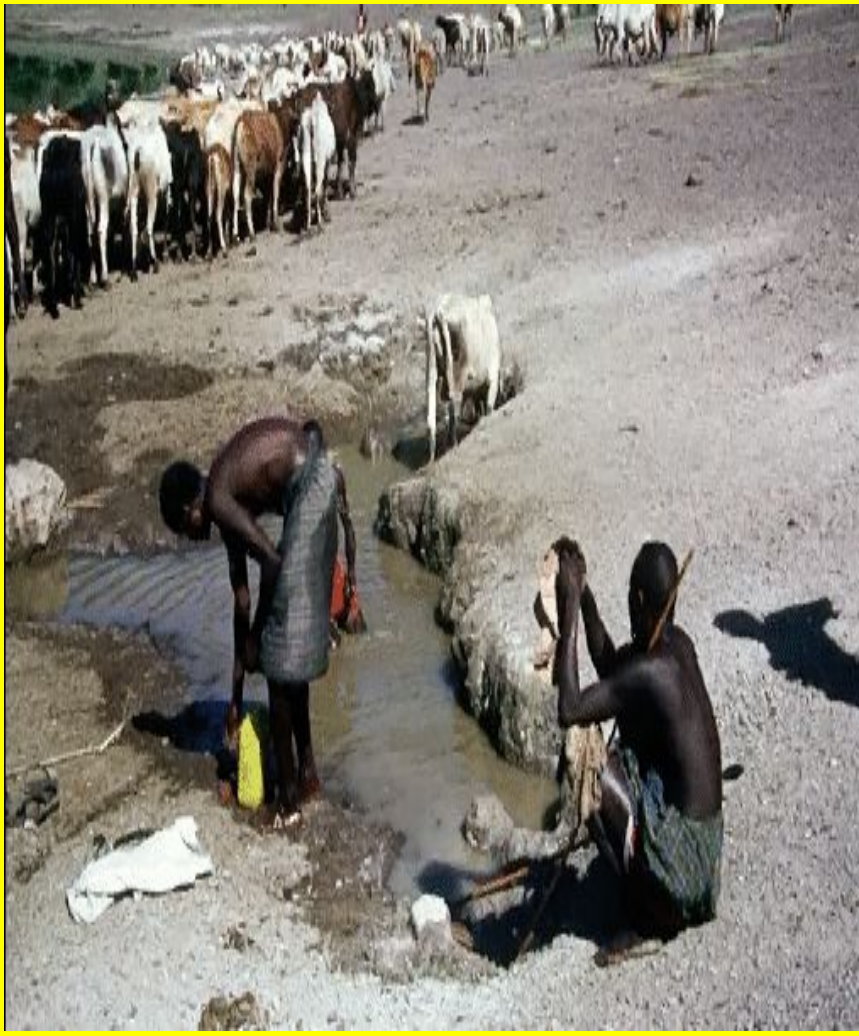
Malaria is protozoan disease produced by intra-erythrocytic parasites of the genus *Plasmodium(vivax,ovale,malariae & falciparum)* transmitted to human being by insect of female anopheles mosquito,characterized by recurrent fever and chills associated with the synchronous lysis of infected red blood cells. It is endemic mostly in sub-Saharan Africa & responsible for about 1 million .deaths annually in children less than 5 years old

Epidemiology

INCIDENCE

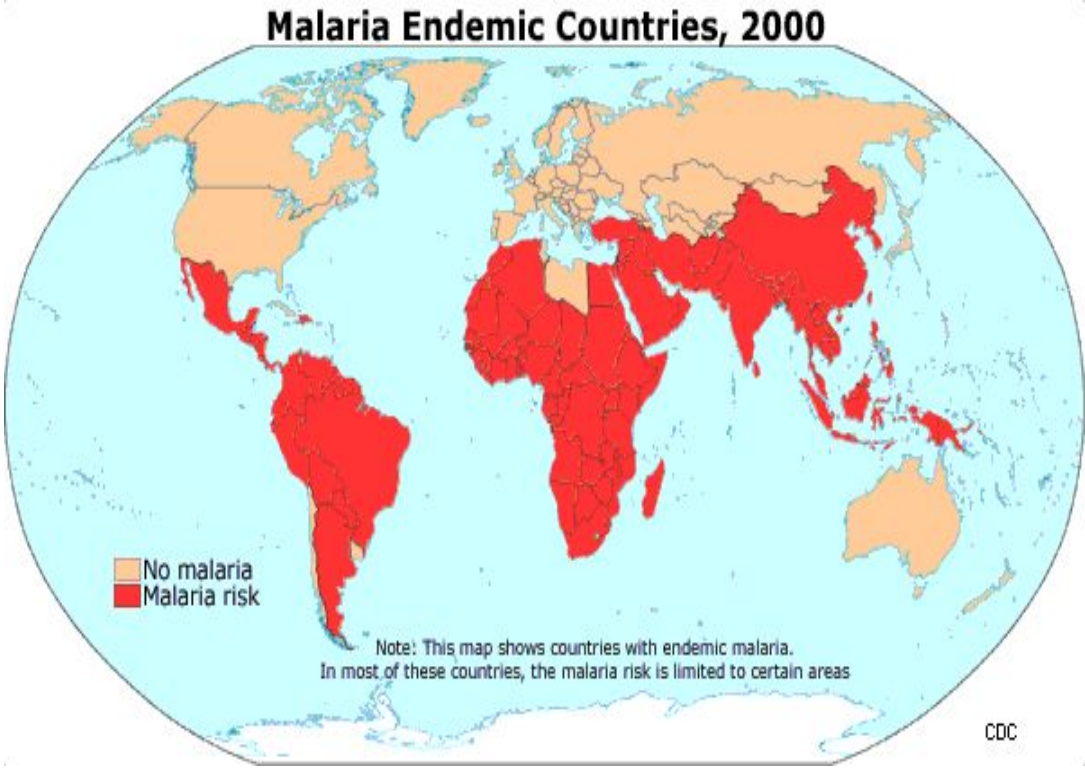
PREVALENCE

RESURGENCE



Geographical Distribution of Malaria

Although previously widespread, today malaria is confined mainly to Africa, Asia and Latin America. About 40% of the world's population is at risk of malaria. It is endemic in 91 countries, with small pockets of transmission occurring in a further 8 countries.



Malaria is transmitted by the female anopheles mosquito. Factors which affect mosquito ecology, such as temperature and rainfall, are key determinants of malaria transmission. Mosquitoes breed in hot, humid areas and below altitudes of 2000 meters. Development of the malaria parasite occurs optimally between 25-30°C and stops below 16°C.

Malaria has actually increased in sub-Saharan Africa in recent years. The major factor has been the spread of drug-resistant parasites. Other important factors include the persistence of poverty, HIV/AIDS, mosquito resistance to insecticides, weak health services, conflict and population migration.

Malaria in Iraq

- Malaria control campaign started in Iraq in 1957.
- This made the country largely free of the disease. Since 1999 following the 1st gulf war, Iraq has been affected by serious epidemic that started in 3 autonomous governorates. There were about 49,840 malaria cases in 1995.
- In 2011, the minister of health announced that Iraq in now free of ??malaria

RESURGENCE

Resurgence of malaria in north of Iraq had been reported during last few years , although no reliable reports about the incidences of the disease ,but malaria should be kept in your .mind

Species	Major features
P. falciparum	▪ The most important species as it is responsible for 50% of all ma cases worldwide and nearly all morbidity and mortality from se malaria ▪ Found in the tropics & sub-tropics
P. vivax	▪ The malaria parasite with the widest geographical distribu ▪ Seen in tropical and sub-tropical areas but rare in Africa ▪ Estimated to cause 43% of all malaria cases in the world
P. ovale	▪ This species is relatively rarely encountered
P. malariae	▪ Responsible for only 7% of malaria cases ▪ Occurs mainly in sub-tropical climates

Plasmodium

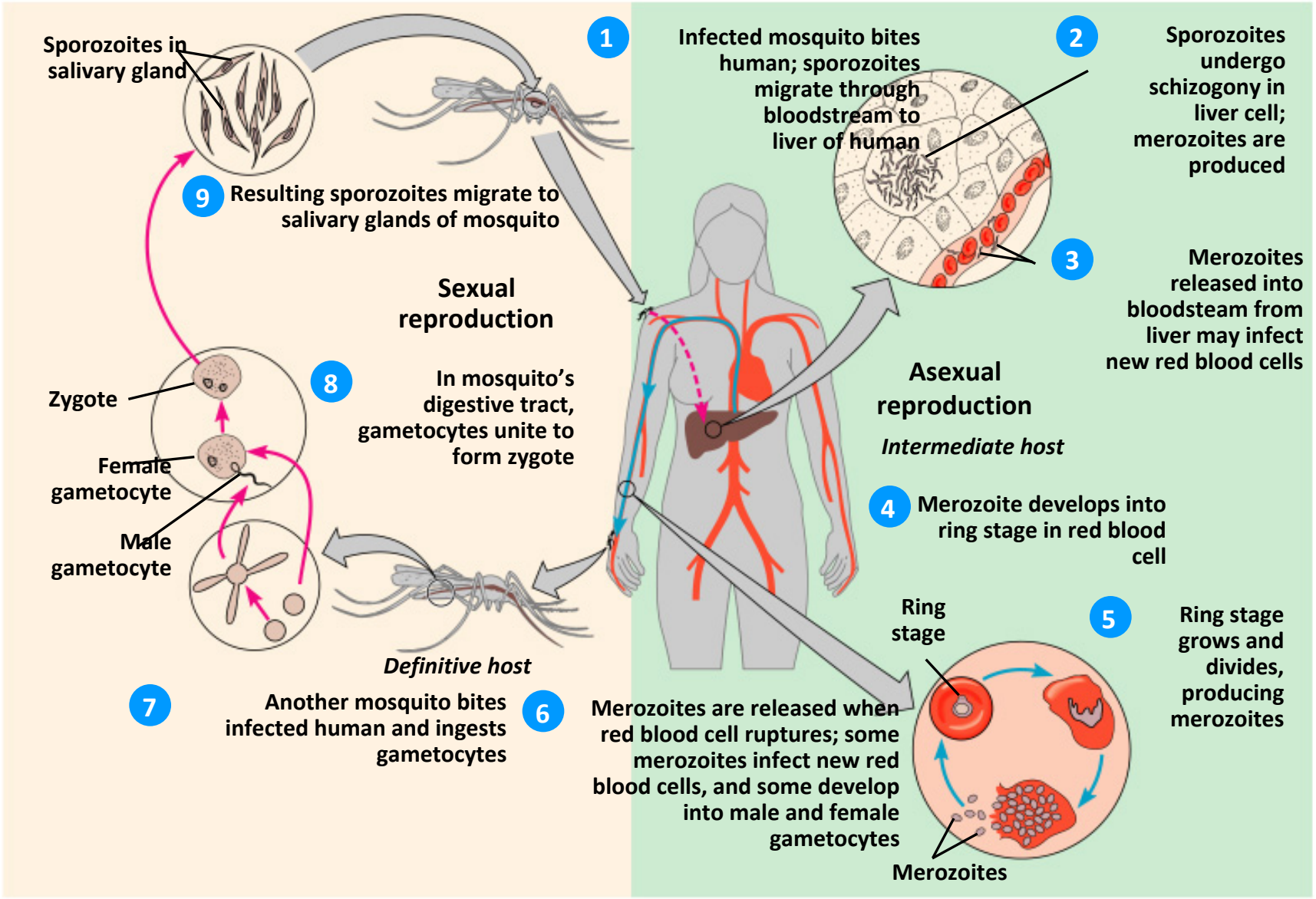


Figure 12.19

Life cycle of the malaria parasite

Important note: some parasites remain dormant in the liver as *hypnozoites* . They are the parasites that cause relapsing malaria (in .*P. vivax* or *P. ovale* infection)

:Important notes

.P.vivax invade RBC with duffy blood group-1

P.falciparum invade RBC of all ages, they can even -2 invade more then 20% of RBCs. But they not grow well in RBC contain Hb F,C or S

Clinical features

Following a bite by an infected mosquito, many people do not develop any signs of infection. If infection does progress, the outcome is one of three depending on the host and parasite factors enumerated in the :previous slides

Asymptomatic parasitaemia ("clinical-1 immunity")
Acute, uncomplicated malaria-2
Severe & complicated malaria-3

Asymptomatic parasitaemia

This is usually seen in older children and adults who have acquired natural immunity to clinical disease as a consequence of living in areas with high malaria endemicity. There are malaria parasites in the peripheral blood but no symptoms. These individuals may be important reservoirs for disease .transmission

Some individuals may even develop anti-parasite immunity so that they do not .develop parasitaemia following infection

Simple, uncomplicated malaria

This can occur at any age but it is more likely to be seen in individuals .with some degree of immunity to malaria

Clinical features of un-complicated malaria

Diarrhoea – more commonly seen in young children and, when vomiting also occurs, may be misdiagnosed as viral gastroenteritis

Convulsions – commonly seen in young children. Malaria is the .leading cause of convulsions with fever in African children

Pallor – resulting mainly from the haemolysis. duces the

.Jaundice – mainly due to haemolysis

Anorexia

Cough

Headache

Malaise

Muscle aches

Splenomegaly

Tender hepatomegaly

Children with malaria waiting to be seen at a malaria clinic in the south western part of Nigeria. Identifying children with severe malaria, and giving them prompt treatment, is a major challenge when large .numbers attend clinics

The periodicity of malaria fever

Most patients with malaria have recurrent fever and chills at 48-hour intervals for *P. vivax* and *P. ovale* and at 72-hour intervals for *P. malariae* . Patients with *P. falciparum* infection typically have irregular fever and chills and rarely present with a regular 48-hour cycle of symptoms despite the 48-hour erythrocytic cycle of the asexual parasite. Typical paroxysms thus occur every

2^{nd} day or more frequently in *P. falciparum* ("sub-tertian" malaria)

3^{rd} day in *P. vivax* and *P. ovale* ("tertian" malaria)

4^{th} day in *P. malariae* infections, ("quartan" malaria)

Severe and complicated malaria

Nearly all severe disease and the estimated >1 million deaths from malaria are due to *P. falciparum*. Although severe malaria is both preventable and treatable, it is frequently a fatal .disease

The following are 8 important severe manifestations of :malaria

Cerebral malaria
Severe malaria anaemia
Hypoglycaemia
Metabolic acidosis

Acute renal failure
Pulmonary oedema
Circulatory collapse, shock
Blackwater fever

Cerebral malaria

The most well-known severe manifestation of malaria
unarousable coma persisting for more than one hour with asexual forms of *P. falciparum* in the peripheral blood
***other common causes of encephalopathy excluded**
Occurs most commonly in young children although non-immune adults are also at risk
Cerebral malaria can rapidly progress to death, even with .appropriate treatment. Case fatality is between 20-30%

The illness may start with drowsiness and confusion and then progress to coma. The loss of consciousness is often preceded by repeated convulsions. Retinal haemorrhages .may be seen on fundoscopy

A 4 year old boy who was deeply comatose and had persistent deviation of the eyes

The most well-known severe manifestation of parasitic disease unarousable coma persisting for more than one hour.
?What is the name of this complication & the causative parasite

Diagnosis

Malaria is a multisystem disease. It presents with a wide variety of non-specific clinical features: there are no pathognomonic symptoms or signs. Many patients have fever, general aches and pains and malaise and are initially misdiagnosed as having .”“flu

***P. falciparum* malaria can be rapidly progressive and .fatal**

Prompt diagnosis saves lives and relies on clinical .assessment

The diagnosis of malaria should be considered in any unwell person who has been in a malarious area recently

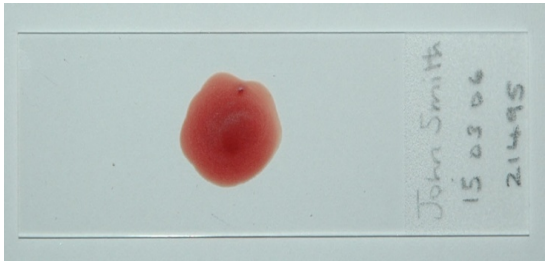
Investigations

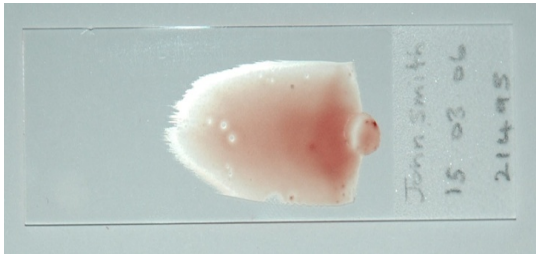
Blood Film Examination:Giemsa - stained

Thick and thin blood films (or "smears") have remained the gold standard for the diagnosis of malaria. The films are stained and examined by .microscopy

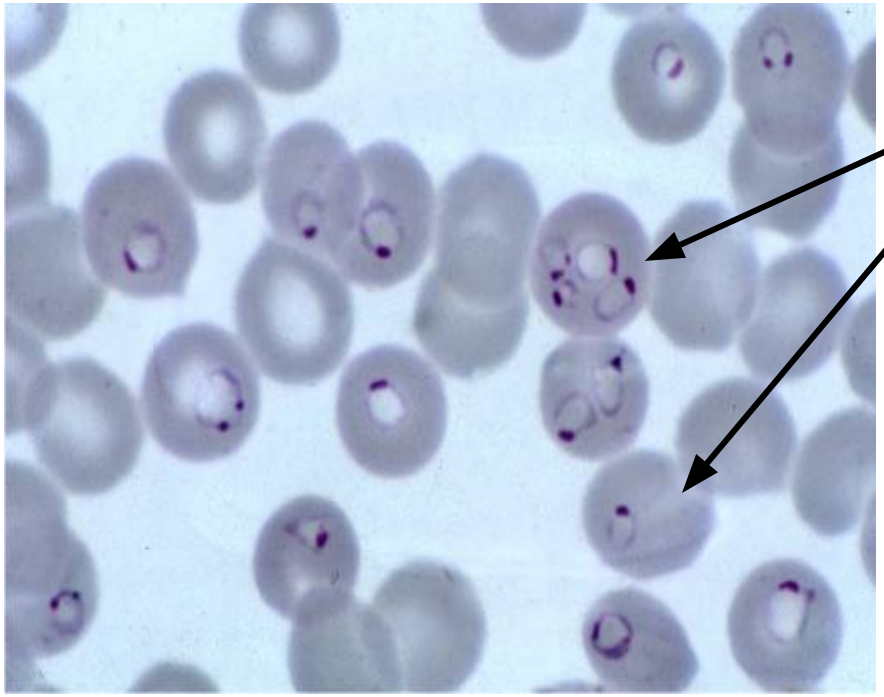
Thick blood film - Used for detecting malaria: a larger volume of blood is examined allowing detection of even low levels of parasitaemia. Also used for determining parasite density and monitoring the .response to treatment

Thin blood film – Gives more information about the parasite morphology and, therefore, is used to identify the particular infecting species of .Plasmodium

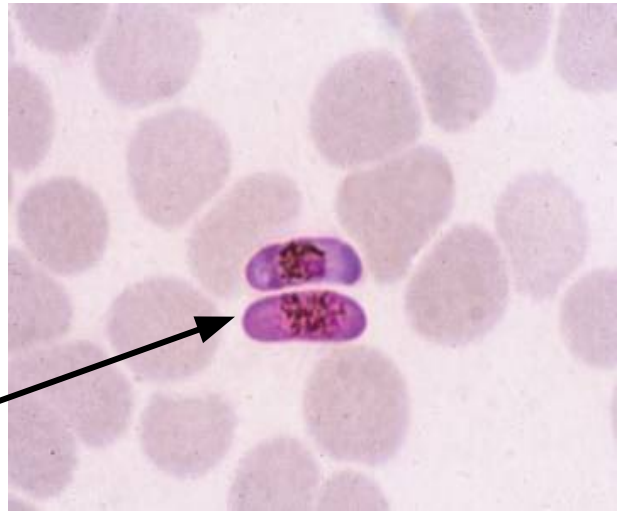




Appearance of *P. falciparum* in thin blood films



Ring forms or trophozoites; many red cells infected – some with more than one parasite



Gametocytes (sexual stages); After a blood meal, these forms will develop in the mosquito gut

Other methods of diagnosis of malaria

These are not routinely used in clinical practice & should be : used with thin & thick blood film. They include

Immunochromatographic test: p -1 .Specific & sensitive for P.falciparum

PCR based techniques. Detects DNA -2 or mRNA sequences specific to Plasmodium. Sensitivity and specificity high but test is expensive, takes several hours and requires .technical expertise

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TREATMENT

Successful treatment of patients with malaria depends primarily on effective antimalarial drugs, but it also depends on supportive measures: as

Infusion of glucose&monitoring of the blood glucose level -1 is important because hypoglycemia is a common cause of coma and because both quinine and quinidine stimulate the .release of insulin

Steroids are contraindicated in cerebral malaria because -2 .they prolong the duration of coma

Admission to the intensive care unit in case of severe -3 .pulmonary oedema or acute circulatory collapse

.Dialysis in case of acute renal failure -4

PREVENTION

CHemoprophylaxis -1

Doxycycline and atovaquone-proguanil are good choice. The advantage of doxycycline is that it reduces the frequency of traveler's diarrhea; its disadvantages include the need for daily dosing, photosensitivity reactions.usually taken during .exposure & 4 weeks after leaving

.Eradication of mosquitoes -2

THANK YOU

next lecture

Infection caused by helminths