MALARIA

- Caused by intracellular parasite – Plasmodium

- Worldwide infection – affects 500 million people …kills 1 million annually

- 4 species

a) P. Falciparum(most dangerous)
b) P. Vivax
c) P. Ovale
d) P. Malariea

- Transmitted by the female anopheles mosquito.
- Found widely in Asia , Africa , South America
- Rare cases through blood transfusion have occurred.

- P.VIVAX, P.MALARIEA,P,OVALE – low level of parasitemia , mild anemia , rarely can cause spleenic rupture and nephrotic syndrome.

- P.FALCIPARUM – High level of parasitemia , severe anemia , cerebral symptoms , renal failure, pulmonary oedema , death

- SPOROZOITE FROM MOSQUITO SALIVA

- INVADE LIVER – MULTIPLY WITHIN LIVER

- HEPATOCYTE RUPTURES RELEASING MORE THAN 30000 MEROZIOTES INTO CIRCULATION

- INFECTS RBC'S - GROWS IN MEMBRANE BOUND VACUOLES

- FROMS A TROPHOZOITE FOLLOWED BY A SCHIZONT

- EVENTUALLY FORMING A MEROZIOTE WHICH RUPTURES THE RBC AND INFECTS OTHER RBC'S

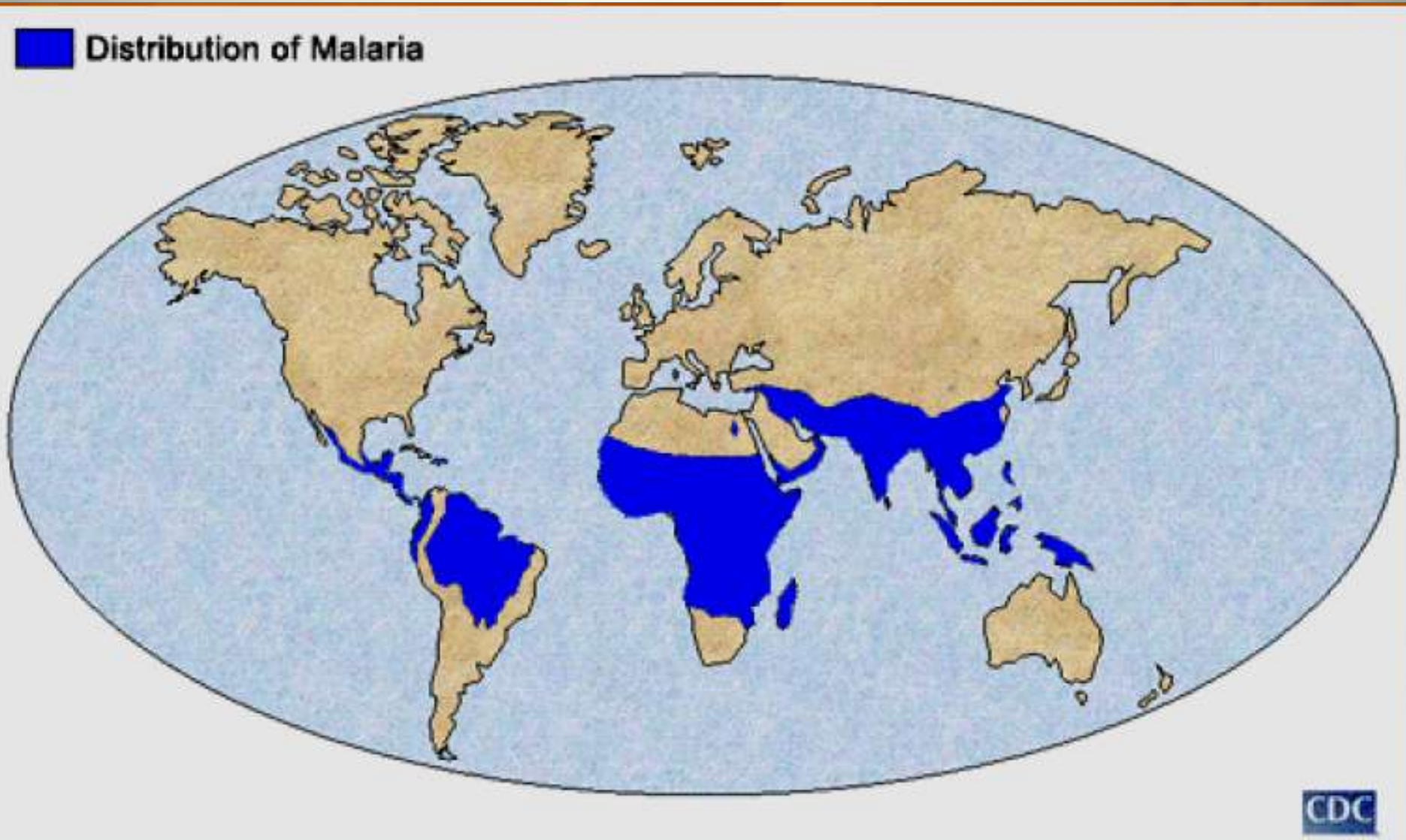
- SOME PARASITES DEVELOP INTO GAMETOCYTES WHICH INFECTS MOSQUITO DURING ITS BLOOD MEAL

WHY IS P.FALCIPARUM MORE PATHOGENIC?

- Infects RBC's of any age – leading to a high parasitic burden.(others only infect the young and old) – leads to profound anemia.
- Cause the RBC's to clump together – block's circulation – ISCHEMIA… this is what causes cerebral malaria
- Stimulates high cytokine level secretion – supress RBC production , increase fever , induce expression of endothelian receptors which induce sequestration

Why are some people resistant?

- Genetic alteration in RBC's – Eg : Sickle cell trait – confers resistance to Plasmodium(parasites grow poorly and die due to low oxygen concentration)
- **distribution of HbS – similar to P.Falciparum –evolutionary selection ?
- Repeated prolonged exposure – stimulates immune response.


Distribution of Malaria
CDC

Low-income countries	Deaths in millions	% of deaths
Lower respiratory infections	1.05	11.3%
Diarrhoeal diseases	0.76	8.2%
HIV/AIDS	0.72	7.8%
Ischaemic heart disease	0.57	6.1%
Malaria	0.48	5.2%
Stroke and other cerebrovascular disease	0.45	4.9%
Tuberculosis	0.40	4.3%
Prematurity and low birth weight	0.30	3.2%
Birth asphyxia and birth trauma	0.27	2.9%
Neonatal infections	0.24	2.6%

CLINICAL FEATURES

- Incubation period : 12-35 days
- Clinical features

- Tachycardia , tachypnoea
- Chills , malaise , fatigue, diaphoresis
- Headache , cough , anorexia
- Nausea , vomiting , abdominal pain , diarrhoea
- Arthralgia & Myalgia
- Other signs include spleenomegaly , pallor

- Ix may reveal …. Parasitemia in smears , elevated transaminases , anemia ,thrombocytopenia , mild coagulopathy & an elevated urea and creat.

Severe Malaria

- May be seen by hyper-parasitemia in smears (5-10% RBC's may be infected)
- ACS
- RDS
- Circulatory collapse
- Metabolic acidosis
- Renal failure
- Hepatic failure
- Coagulopathy
- Severe Anaemia
- Hypoglycemia

“Tertian Malaria”

(P.falciparum, P.ovale and P.vivax)

fever occurs every third day.

“Quartan Malaria”

(P. malariae)

fever occurs every fourth day.

“P.ovale and P.vivax”

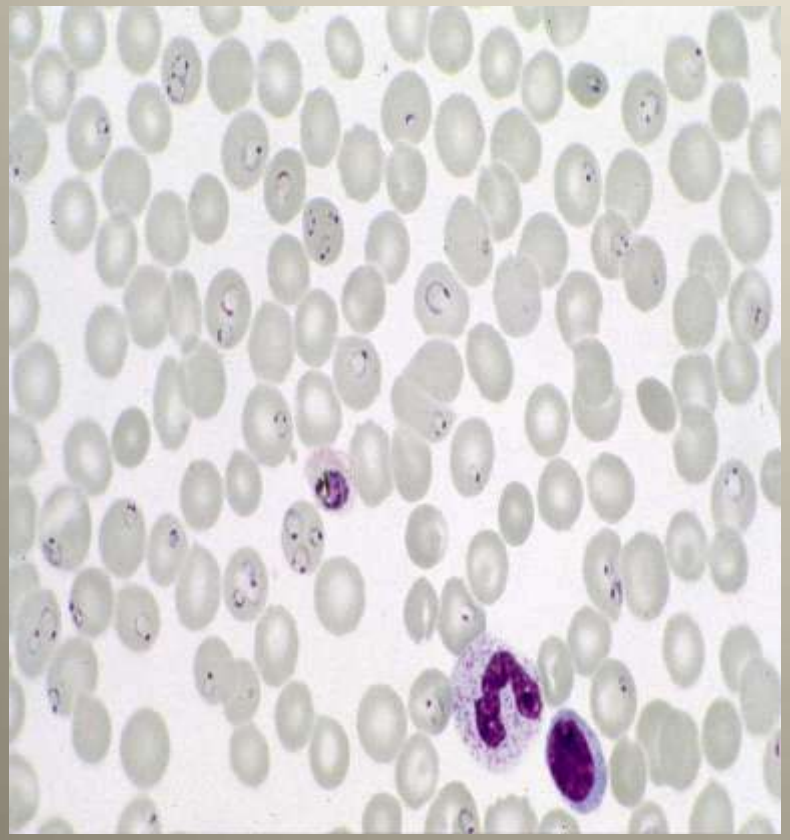
can cause chronic malaria,

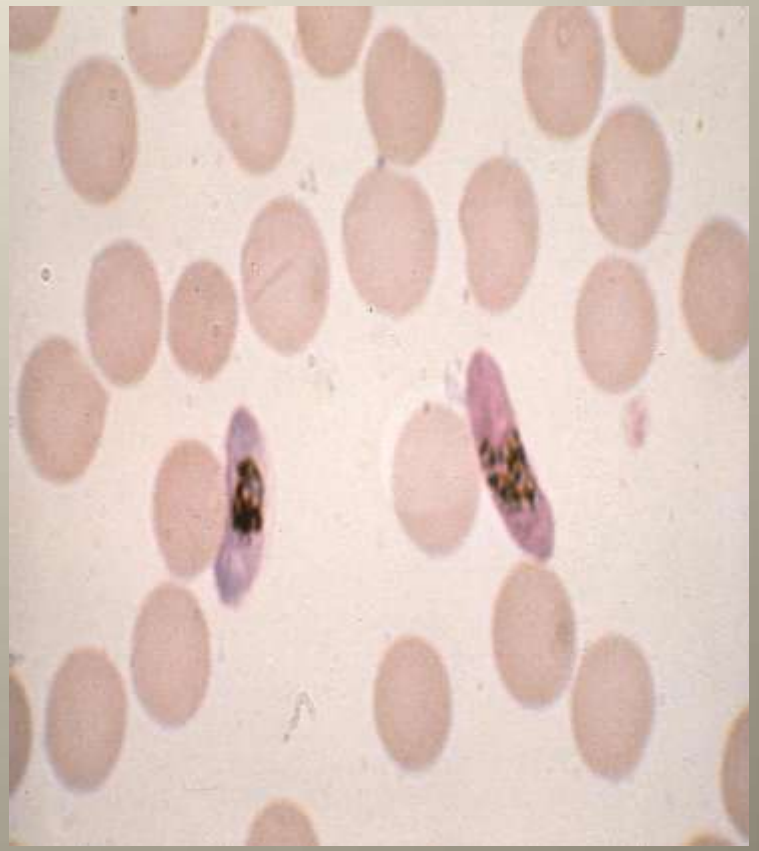
reappearing after months or years

due to latent parasites in liver

DIAGNOSIS

- GOLD STANDARD – Thick and thin film





Diagnosis

- ICT
  - This is a rapid immunoassay very similar to a pregnancy test
  - It is actually two tests. One which is extremely sensitive for a falciparum specific antigen and another less sensitive panmalarial antigen
  - As such it can rule out falciparum but not the others
  - Click here for a discussion of malaria test from Royal Perth Hospital

PROPHYLAXIS

- 500 mg chloroquine phosphate (300 mg base) orally on the same day each week starting 2 weeks prior to exposure

  If unable to start 2 weeks before exposure, an initial loading dose of 1 g chloroquine phosphate (600 mg base) may be taken orally in 2 divided doses, 6 hours apart.

  Suppressive therapy should continue for 8 weeks after leaving the endemic area.

TREATMENT

- If we know the patient is presenting from a known area of chloroquine sensitivity….RX should start with this drug

- 60 kg or more: 1 g chloroquine phosphate orally at once, followed by 500 mg chloroquine phosphate orally at 6, 24, and 48 hours; represents a total dose of 2.5 g chloroquine phosphate (1.5 g base) in 3 days

If Chloroquine resistance is expected?

- Use Artemisinin derivatives

- Artesunate + Mefloquine
- Artesunate + sulfadoxine/pyrimethamine

- Efficacy to the drug is measured by a reduced parasite count on day 3 on smear.

- Quinine is used as a last resort as it has lots of side effects. – hypoglcaemia and arrhythmia particularly