MALARIA & BABESIOSIS
Malaria is a serious disease caused by parasitic protozoa (Plasmodia). The infection is spread by the bite of infected... anopheles mosquitoes and is prevalent throughout the tropics. Malaria causes severe, and in some cases, fatal complications affecting the kidney, brain and blood.

The causative agents of malaria are Plasmodia spp.

- **Plasmodium falciparum**: causes malignant tertian malaria, the most severe type and the predominant type in the tropics.
P. vivax: causes benign tertian malaria, the most widely distributed form and predominant type in temperate areas.

P. malariae: causes quartan malaria

P. ovale: causes a type of tertian malaria in West Africa and is relatively uncommon.

Manifestation of malaria:

**Cold stage....Fever stage...Wet stage.....**

**Life cycle & Pathogenesis:** The female Anopheles mosquitoes transmit the infection. The life cycle of Plasmodia is complex with a sexual (sporogony) cycle occurring in the mosquitoes and two asexual (schizogony) phases in the human, initially in the liver and then in the
blood. The liver cycle in the human involves the production of merozoites that can either enter new liver cells to repeat the cycle of production, or can enter red blood cells (RBC). The liver phase may persist in P. falciparum.

The asexual stage in RBC consists of several distinct forms that are detected in the blood films in diagnosis. Episodes of fever occur when further merozoites are released from the red blood cells. The intervals between the bouts of fever depend on the length of time the plasmodia take to complete the asexual cycle in the blood.
Some merozoites in RBC develop into male and female gametocytes which are ingested by mosquitoes to complete the cycle. Partial immunity from previous infections, and the sickle cell trait, decreases the severity of infection.

- The CNS is affected in two ways by malaria:
  - Cerebral malaria, which is severe and may be fatal, is characterized by widespread changes in cerebral function from capillary plugging caused by P. falciparum.
Mild cerebral symptoms from general tissue anoxia can occur in malaria from other species. Cerebral malaria presents with severe headache and high fever, rigors, disturbed consciousness, altered behaviour, impaired intellect, hallucination, fits.

♦ Confirmatory tests:

Thick and thin films of blood are stained by Leishman or Giemsa stains. Thick and thin blood films show the malaria parasite (MP) in various forms:
- **Ring forms** (trophozoites) commonly seen as small round structures with a clear centre and a chromatin dots at one side............
- Rosettes, which are schizonts containing daughter merozoites
- Gametocytes (not commonly seen). Each species has specific morphology.......**Thin film allows for speciation of Plasmodia spp.... **

  Immunochromatographic method is now popular in diagnosis, (RDT)***........

- **Clinical syndromes**: Acute malaria is a medical emergency.
Chemotherapy: This varies with Plasmodia species, the severity of illness and the state of immunity and chemoprophylaxis. Chloroquine, mefloquin and quinine are used, and recent WHO or health Department recommendations must be followed, eg., Artemisinins. Primaquin is active against the liver cycles for eradication after acute treatment in non-endemic areas.

Control: This depends on mosquitoes control, protection from biting,(treated net, mosquito repellent cream), and chemoprophylaxis in the non-immune during and after visits to endemic areas.
BABESIOSIS

Babesiosis is basically a haemolytic anaemia, associated with fever, weakness, jaundice, and hepatosplenomegaly. The haemolytic process may involve other mechanisms beside simple rupture of RBC by the causative agents. The incubation period can often be prolonged (7-16 days), or more.

Causative agent:

The Babesia genus is the causative agent of babesiosis e.g B. microti, B. bigemina.
Morphology & life cycle:

B. microti appear as small rings within the RBC, very much like P. falciparum, with a darkly staining nucleus and very little cytoplasm. The morphology of different species is variable: pear-shaped or like maltese cross.

Asexual multiplication by binary fission occurs in the RBC, with production of merozoites to invade new cells. THERE ARE NO KNOWN SEXUAL STAGES.
The tick is the vector, e.g Ixodes dammini.

When taken up by the tick, there is a complex cycle of multiplication, resulting in the presence of the parasites in salivary gland.

The parasite invades the RBC and resemble malaria.

Diagnosis:

A history of exposure to ticks and residence in endemic areas are helpful in suggesting the possibility of babesiosis. Diagnosis of active infection can only be made by demonstrating the parasites in the blood, by
stained smears or by inoculation of 2mls of blood into a hamster.

The IFA test may be helpful in identifying recent past infections when parasitaemia is no longer present.

♦ Treatment: Because the parasite invades the RBC and resembles malaria, chloroquine has been used to treat babesiosis. However, Berenil and pentamidine show some effect against B. microti where chloroquine failed.
Fig. 1 Plasmodium life cycle.
Fig. 25. Morphological forms of malaria parasites.
Plate 5.43 *P.falciparum.* a Trophozoites and gametocytes in thin film. b Young schizont (rare), and trophozoites. c Many trophozoites, gametocyte, and white cells containing pigment in Fields stained thick film. d Thick film from patient with sickle cell disease and falciparum malaria. Note, blue stippling in background (reticulocytosis) and nucleated red cell nucleus (above trophozoite).