

IDENTIFICATION AND DIAGNOSIS OF MALARIA

DIAGNOSIS


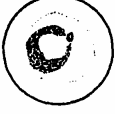
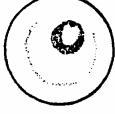
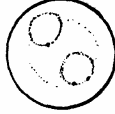

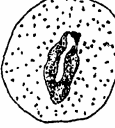



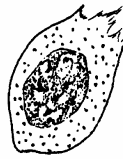



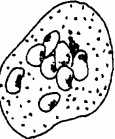
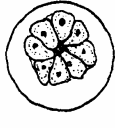

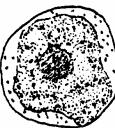
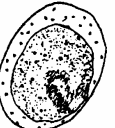
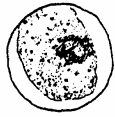


- symptoms: fever, chills, headache, malaise
- history of being in endemic area
- splenomegaly, anemia
- microscopic demonstration of parasite in thin or thick blood smear
- antigen detection (ParaSight-F, OptiMal)

Differences between *Plasmodium* Species

- blood-stage morphology
- minor life cycle variations
 - hypnozoite stage (*vivax*, *ovale*)
 - sequestration (*falciparum*)
- host erythrocyte preference
 - immature erythrocytes (*vivax*, *ovale*)
 - senescent (*malariae*)
 - no preference (*falciparum*)
- disease and clinical manifestations

| Key Morphological Differences Between Human <i>Plasmodium</i> Species in Blood Smears | | | |
|--|---|--|---|
| falciparum | vivax | ovale | malariae |
| <ul style="list-style-type: none"> • numerous rings • smaller rings • no trophozoites or schizonts • crescent-shaped gametocytes | <ul style="list-style-type: none"> • enlarged erythrocyte • Schüffner's dots • 'ameboid' trophozoite | <ul style="list-style-type: none"> • similar to <i>P. vivax</i> • compact trophozoite • fewer merozoites in schizont • elongated erythrocyte | <ul style="list-style-type: none"> • compact parasite • merozoites in rosette |

Key Morphological Differences in Blood Smears

| | vivax | ovale | malariae | falciparum |
|--------------------|---|---|--|---|
| Ring Stage |  |  |  |  |
| Trophozoite |  |  |  |  |
| Schizont |  |  |  |  |
| Segmenter |  |  |  |  |
| Gametocytes |  |  |  |  |
| | | | |  |

sequestered

The ring forms of all four species are very similar and difficult to distinguish. *P. falciparum* rings tend to be a little smaller and more numerous than the other species. The presence of a large number of rings in the absence of more mature stages, as well as multiply-infected erythrocytes, is highly suggestive of *P. falciparum*. Erythrocytes infected with *P. vivax* and *P. ovale* are enlarged and exhibit Schüffner's dots as the rings mature into trophozoites. The trophozoites of *P. vivax* are often amoeboid, whereas *P. ovale* tends to be more compact. The *P. malariae* trophozoite is very compact and the host erythrocyte is not enlarged. Mature asexual forms of *P. falciparum* are rarely found in the peripheral circulation. The typical number of merozoites produced per schizont is: *P. vivax* 14-20 (up to 24), *P. ovale* 6-12 (up to 18), *P. malariae* 8-10 (up to 12), and *P. falciparum* 16-24 (up to 36). *P. falciparum* exhibits crescent-shaped gametocytes whereas the other species are all round to oval. *P. vivax* and *P. ovale* gametocytes are in enlarged erythrocytes with Schüffner's dots and are difficult to distinguish from each other. *P. malariae* gametocytes do not modify the host erythrocyte. Gametocytes can be distinguished from trophozoites by their large size (nearly filling the erythrocyte) and a single nucleus. Mature microgametocytes tend to stain lighter than macrogametocytes and have a more diffuse nucleus.