

# *Plasmodium*

PLASMODIUM VIVAX (BENIGN TERTIAN MALARIA)	PLASMODIUM OVALE	PLASMODIUM MALARIAE (QUARTAN MALARIA)	PLASMODIUM FALCIPARUM (MALIGNANT TERTIAN MALARIA)	PLASMODIUM KNOWLESI (SIMIAN MALARIA) THE FIFTH HUMAN MALARIA
The most widespread form of malaria			The worst Highest mortality rate	
Infects only the <b>reticulocytes</b> (young cells)	Infects only the <b>reticulocytes</b> (Young cells)	Tend to infect <b>old</b> cells	Invades <b>all</b> ages & sizes of RBCs.	Invades <b>all</b> ages of RBCs
Secondary or dormant schizogony Hypnozoites Tend to relapse (often within 1 year or up to more than 5 years later)	Dormant schizogony Hypnozoites Tend to relapse			
48-hour cycle	48-hour cycle	72-hour cycle (long incubation period)	36-48-hour cycle	24-hour cycle
Enlarged RBCs	Enlarged RBCs with fimbriated edges (oval)	Normal RBCs size	All sizes of RBCs	All sizes of RBCs >> most are normal
Schüffner dots (true stippling) after 8-10 hours	Schüffner dots in the beginning	No stippling, No schüffner dots	No schüffner dots Maurer dots (Large, single, bluish)	Faint clumpy dots later in the cycle
Delicate ring	Smaller ring than P.vivax	Thick ring, large nucleus	Multiple rings/cell Delicate rings Rings have 2 chromatin dots and show Applique'/Accole' forms	Multiple ring (2-3) Delicate ring 2-3 dots of chromatin Applique forms
		Trophozoite tends to form bands across the cell	Crescent-shaped gametocytes <b>(Banana 🍌)</b>	- Band form trophozoite commonly seen - Gametocytes round, tend to fill the cell
Mature schizont contains 12-24 merozoites	Mature schizont contains 8 merozoites	Mature schizont contains 6-12 merozoites		Mature schizont contains 16 merozoites, no rosettes
<ul style="list-style-type: none"> <li>• Splenomegaly occurs during the first few weeks of infection, and the spleen will progress from being soft and palpable to hard, with continued enlargement during a chronic infection.</li> <li>• If the infection is treated during the early phases, the spleen will return to its normal size.</li> </ul>	P. ovale and P. vivax infections are clinically similar, P. ovale malaria is usually less severe with a lower fever and a lack of typical rigors, tends to relapse less frequently, and usually ends with spontaneous recovery	<ul style="list-style-type: none"> <li>• <b>Proteinuria</b> is common in P. malariae infections and may be associated with clinical signs of nephrotic syndrome.</li> <li>• With a chronic infection, kidney problems result from deposition within the glomeruli of circulating antigen antibody complexes.</li> <li>• <b>A membrane proliferative type of glomerulonephritis</b> is the most common lesion seen in quartan malaria.</li> </ul>	<ul style="list-style-type: none"> <li>• Severe or fatal complications can occur at any time and are related to the obstruction of vessels in the internal organs.</li> <li>• <b>Blackwater fever</b> is a complication of malaria that is a result of red blood cell lysis, releasing hemoglobin into the bloodstream and urine, causing discoloration.</li> <li>• <b>Cerebral malaria</b> is considered to be the most serious complication and the major cause of death with P. falciparum.</li> <li>• <b>Extreme fevers</b>, 41.7° C (107° F) or higher, may occur in an uncomplicated malaria attack or in cases of cerebral malaria. Without vigorous therapy, the patient usually dies.</li> <li>• A decrease in the ability of the RBCs to change shape may lead to plugging of the vessels Also, only P. falciparum causes cytoadherence, a feature that is associated with severe malaria</li> </ul>	The infections are often misdiagnosed as the relatively benign P.malariae; however, infections with P.knowlesi can be fatal
			• Schizogony occurs in the spleen, liver, and bone marrow rather than in the circulating blood.	Early stages mimic P.falciparum ; later stages mimic P.malariae

- The vector: female anopheline mosquito.
- Incubation period for all is from 1 week to 5 weeks.
- The fever that comes on the third to fourth day has 3 stages (cold stage with chills and rigors >> hot stage >> sweating stage).
- Therapy:
  - Quinolines are used to treat all malaria species EXCEPT P. falciparum, they have resistance to Quinolines (instead patients infected with P. falciparum take artemisinins).
  - But we **cannot** use hydroxychloroquine alone Because it works on the active motile reproducing form only, they don't treat the hypnozoites.

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