

# Microbiology

## Blood Parasites

435's GIT SAQs and OSPE

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- ❖ This document includes males and females doctor notes. In addition to the original practical material, we added the most important theoretical aspects, you can skip it if you want!
- ❖ Remember that the cases usually change in the exam, therefore, please avoid pure memorization and do not skip a statement unless 100% understood.

**Important** **Doctor's note** **Theoretical** **Practical** **Edited**

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With sincere appreciation to Ali Alzahrani and Rawan Aldhuwayhi

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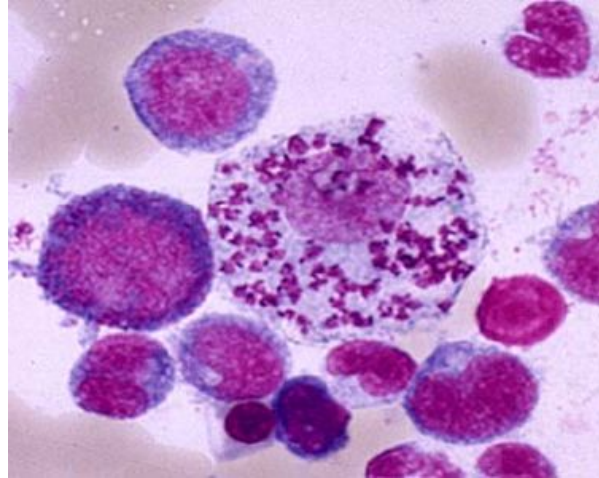
## Leishmaniasis

<b>Definition</b>	Leishmaniasis is a disease caused by protozoan parasites of the genus <i>Leishmania</i> and spread by the bite.
<b>Types</b>	<ol style="list-style-type: none"> <li>1. <b>Cutaneous:</b> <i>Leishmania tropica</i> and <i>Leishmania major</i>.</li> <li>2. <b>Mucocutaneous:</b> <i>Leishmania braziliensis</i>.</li> <li>3. <b>Visceral:</b> <i>Leishmania donovani</i> and <i>Leishmania infantum</i>.</li> </ol>
<b>Pathogenesis</b>	Sandfly bite → Gives promastigote → Promastigote get phagocytosed by macrophages → Promastigote transforms to amastigote → Replicates in the macrophage → Macrophage explode → Other macrophages get infected.
<b>Infective Stage</b>	Promastigote.
<b>Diagnostic Stage</b>	Amastigote.
<b>Presentation</b>	<ol style="list-style-type: none"> <li>1. <b>Cutaneous:</b> Starts as a painless papule on the face and the lesion ulcerates after a few months.</li> <li>2. <b>Mucocutaneous:</b> Starts as a pustular swelling in the mouth or on the nostrils and become ulcerative after many months.</li> <li>3. <b>Visceral:</b> <b>Anemia, intermittent fever and <u>hepatosplenomegaly</u>.</b></li> </ol>
<b>Diagnosis</b>	Parasitological microscopy.

## Malaria

<b>Definition</b>	Life-threatening blood disease caused by parasites transmitted to humans through the bite of the <i>Anopheles</i> mosquito. Once an infected mosquito bites a human and transmits the parasites, those parasites multiply in the host's liver before infecting and destroying red blood cells.
<b>Pathogen</b>	Plasmodium Species.
<b>Cell Infected</b>	Hepatocytes → RBCs.
<b>Presentation</b>	<b>Anemia and Intermittent fever.</b>
<b>Diagnosis</b>	Parasitological microscopy and Rapid Diagnostic Test (RDT).

# 1. Leishmania



Amastigote stage in a bone marrow smear

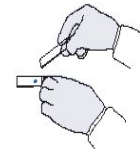
# 2. Malaria

## Parasitological methods for diagnosing malaria:

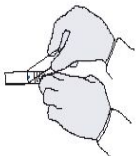
1. Laboratory light microscopy (thin and thick blood film).
2. Rapid diagnostic test (RDT).

1  
Whenever possible, use separate slides for thick and thin films.

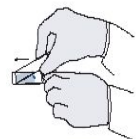
2  
Thin film (a): Bring a clean spreader slide, held at a 45-deg angle, toward the drop of blood on the specimen slide.



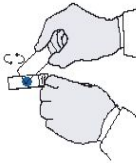
3  
Thin film (b): Wait until the blood spreads along the entire width of the spreader slide.



4  
Thin film (c): While holding the spreader slide at the same angle, push it forward rapidly and smoothly.



5  
Thick film: Using the corner of a clean spreader slide, spread the drop of blood in a circle the size of a dime (diameter 1–2 cm). Do not make the smear too thick or it will fall off the slide (you should be able to read newsprint through it).



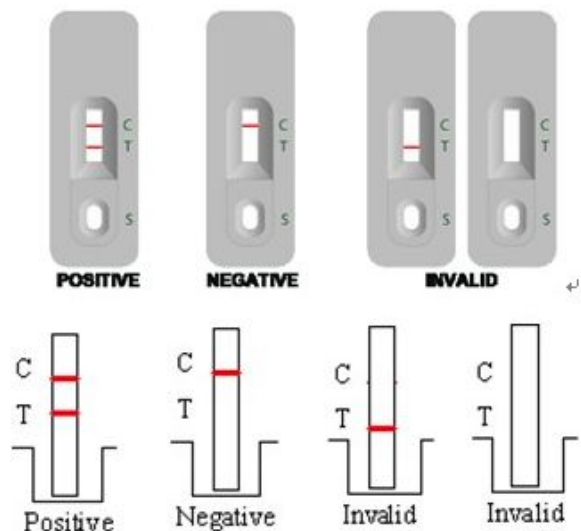
6  
Wait until the thin and thick films are completely dry. Fix the thin film with 100% (absolute) methanol. Do not fix the thick film.



7  
If both the thin and thick films must be made on the same slide, fix only the thin film with 100% (absolute) methanol. Do not fix the thick film.



8  
When the thin and thick films are completely dry, stain them. Thick smears might take ≥1–2 hours to dry. Protect unstained blood smears from excessive heat, moisture, and insects by storing in a covered box.



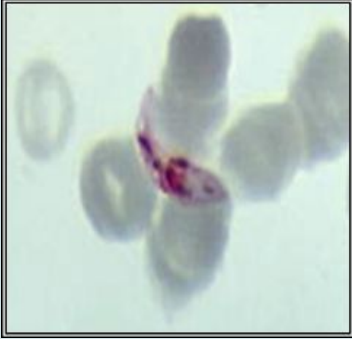
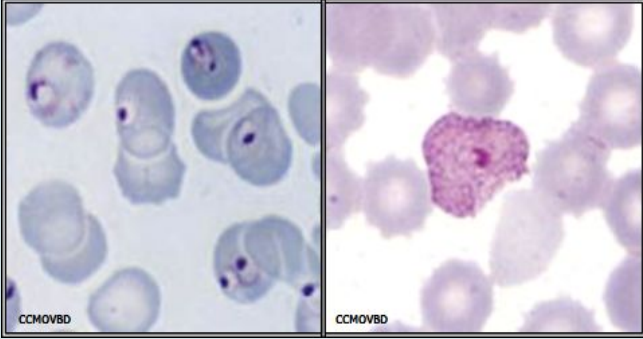
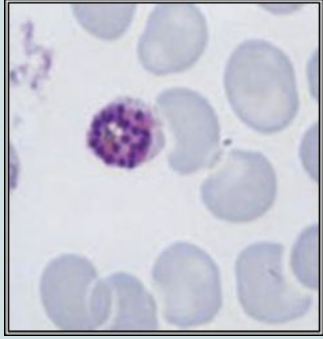
Blood film (thin and thick)













Rapid Diagnostic Test (RDT)

The images are only for illustration and the procedure is not required

# A. Laboratory

## Three developmental stages seen in blood films

		
<p>Gametocyte (<b>banana shaped</b>)</p>	<p>Trophozoite (<b>ring shaped</b>)</p>	<p>Schizont</p>

	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. malariae</i>	<i>P. ovale</i>
Rings				
Schizonts				
Gametocytes				

Species are difficult to identify, so when you are asked about the pathogen, just write *Plasmodium* and specify the stage.

Pictures may change in the exam, the most important thing is to diagnose malaria, mention *Plasmodium*, and identify the stage.

## B. Rapid diagnostic test

- Detects malaria antigen.
- Products come in a number of formats:
  - Plastic cassette.
  - Card.
  - Dipstick.
  - Hybrid cassette-dipsticks.

### Malaria P.f. RDT Results

#### NEGATIVE RESULTS



Wait 15 minutes  
before reading  
results.

#### POSITIVE RESULTS



#### INVALID RESULTS \*

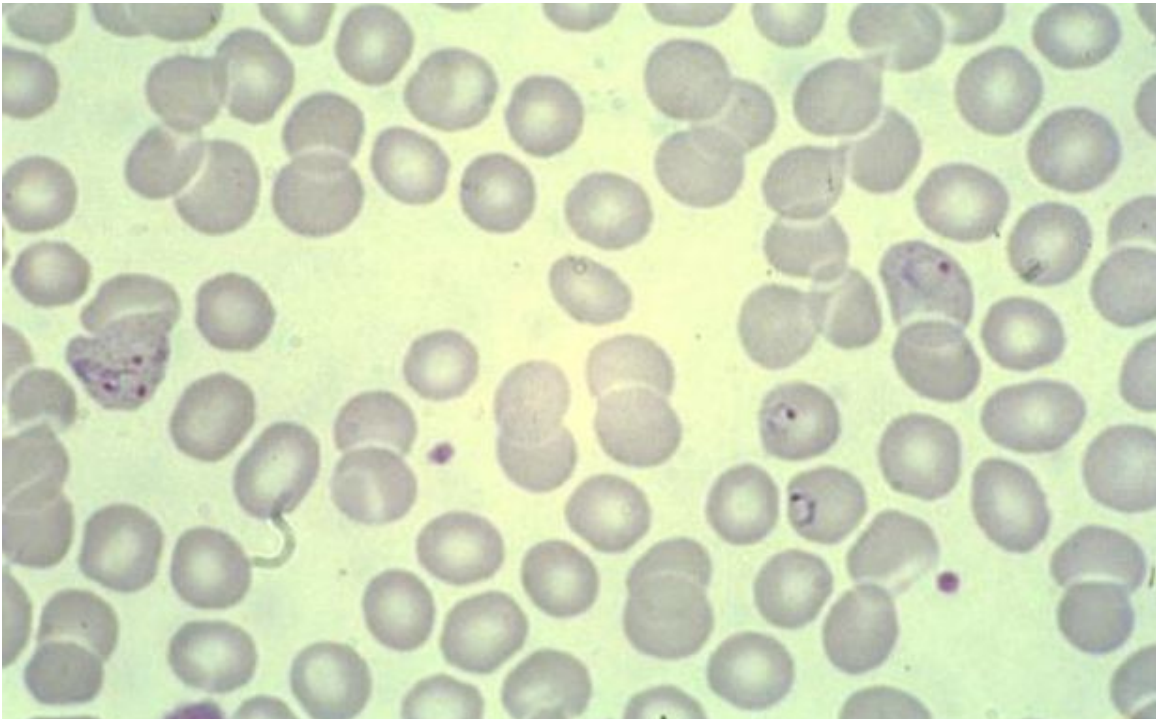


\* No Control Lines (repeat tests)

## CASE - 1

A 25 year-old male from India came to Saudi Arabia 3 months ago. Today, he was admitted in KKUH with a history of severe anaemia and intermittent high grade fever for the last two months.

He is not responding to antibiotics.



**Q1:** What is your diagnosis?

Malaria.

**Q2:** What is the most possible pathogen?

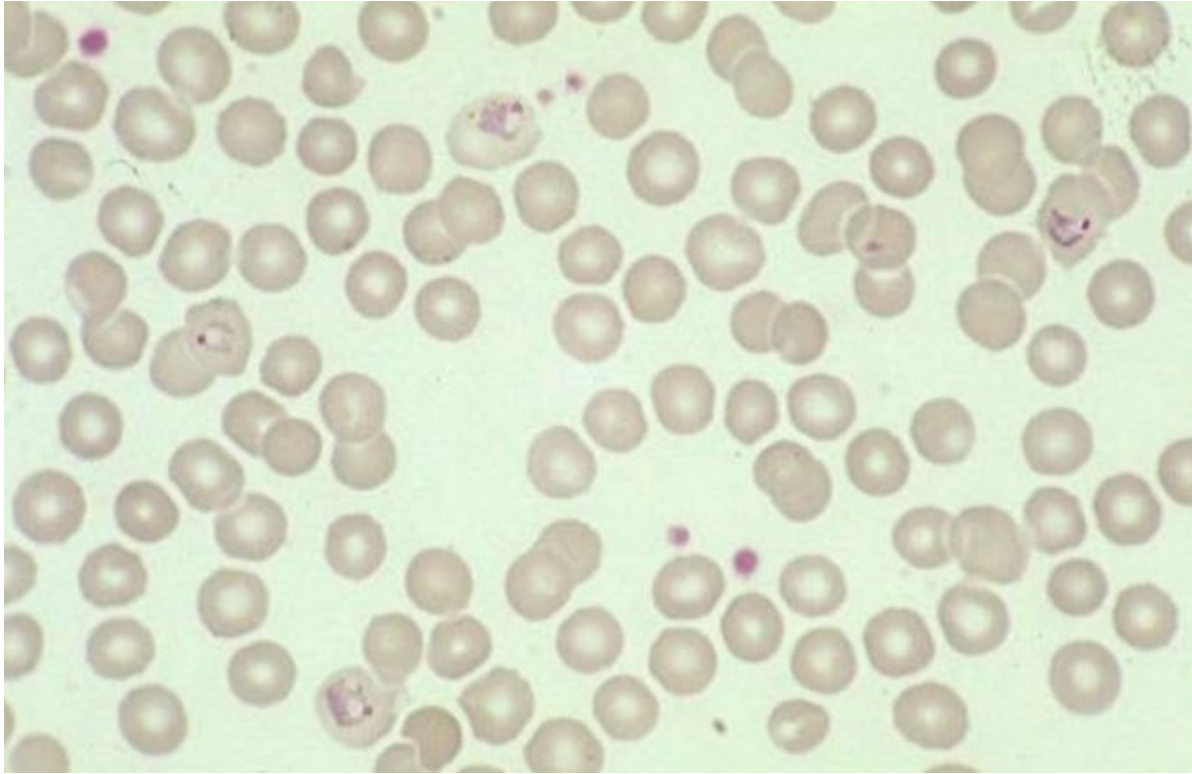
Plasmodium Vivax.

**Q3:** At what stage are the parasites?

Ring (Trophozoite) stage.

## CASE - 2

A 35 years old businessman makes frequent trips to Thailand. Today, he was admitted in KKUH emergency department with intermittent fever.



**Q1:** What is your diagnosis?

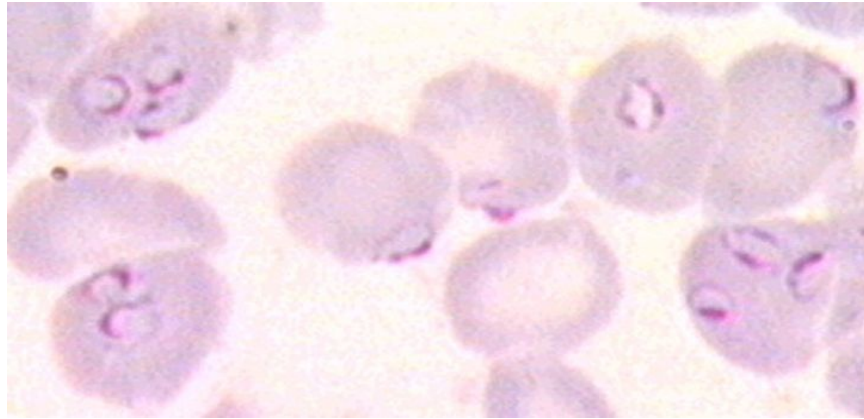
Malaria.

**Q2:** What is the most possible pathogen?

Plasmodium Vivax.

## CASE - 3

A student in KSU returned from a vacation in Africa three weeks ago. Today, he was admitted in KKUH emergency department with intermittent fever and loss of consciousness.



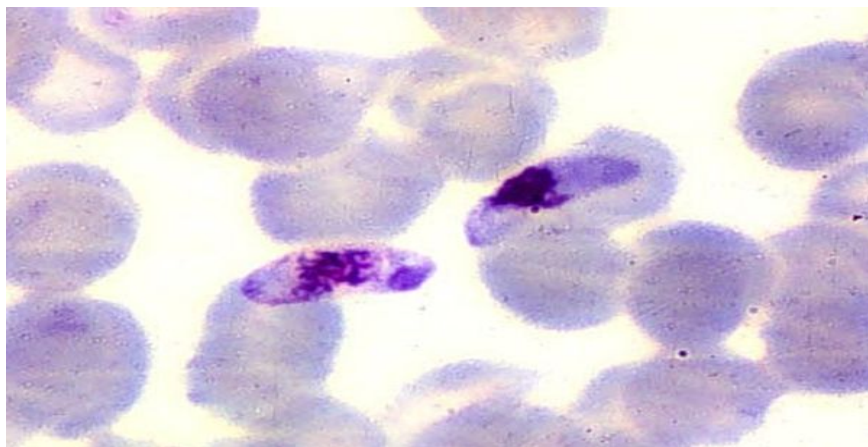
**Q1:** What is your diagnosis?

Malaria.

**Q2:** What is the most possible pathogen?

Plasmodium Falciparum.

**The patient was then treated with schizontocidal antimalarial drugs, a follow-up blood film is shown.**



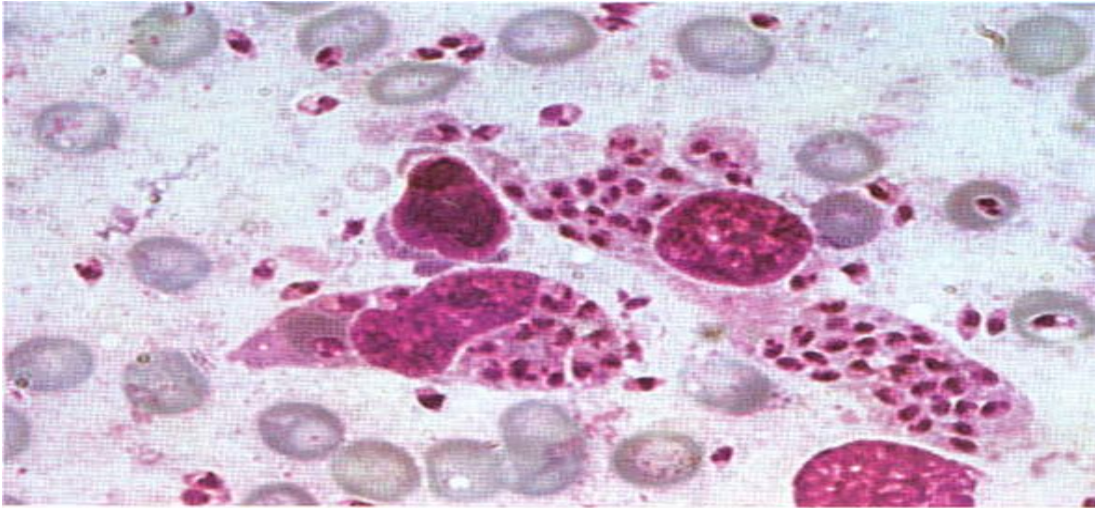
**Q3:** Are there any parasites? And if so, at what stage are they?

Yes, Plasmodium falciparum at the gametocyte stage.



## CASE - 4

A 7 year old child was admitted to KKUH emergency department presented with anemia, hepatosplenomegaly and fever. He did not respond to antimalarials and antibiotics.



**Q1:** Are there any parasites in the bone marrow smear? And if so, at what stage?

Yes, Leishmania at the amastigote stage.

**Q2:** What is the type of cells seen in the image above?

The cells are large, hence, not RBCs but MACROPHAGES.