

# MALARİA

Dr.Mücahit Avcil

- ⦿ This presentation is most important one of this congress
- ⦿ Because ...

- ⦿ Approximately 55% of the world's population is exposed to the infection
- ⦿ its toll mainly on the young (<5 years old) and the pregnant

- ⦿ >500 million persons develop malaria, and 1.5-2.7 million persons die
- ⦿ The incidence of malaria is increasing despite aggressive worldwide eradication efforts.
  - the mosquito vector is becoming more resistant to insecticides
  - *P. falciparum* is becoming more resistant to antimalarial medication

- ◉ Malaria is the world's third deadliest
- ◉ The disease accounts for 40 percent of public-health costs in sub-Saharan Africa, and the severe flu-like symptoms keep adults out of the workforce



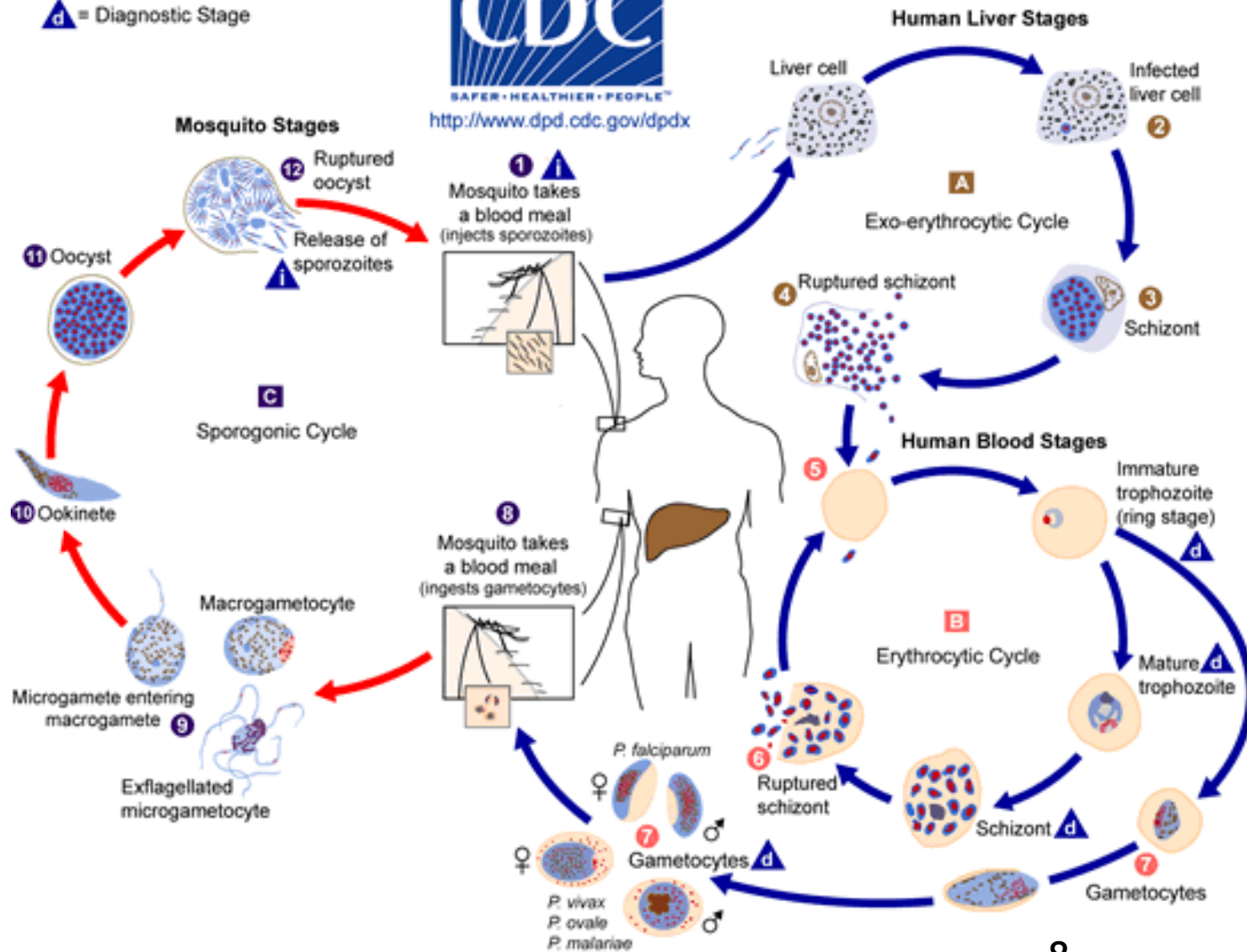
○ Five species of the genus *Plasmodium* infect humans:

- *P. vivax*,
- *P. ovale*,
- *P. malariae*,
- *P. falciparum*,
- and a new species *P. knowlesi*

i = Infective Stage  
d = Diagnostic Stage



<http://www.dpd.cdc.gov/dpdx>





# Our patient with malaria

- ◉ Malaria has become a very uncommon disease in Turkey
- ◉ 03.06.20013
- ◉ 23 years old, male (oğuz)
- ◉ Impaired general condition and fever
- ◉ He was working in equator, 15 days ago he came back.



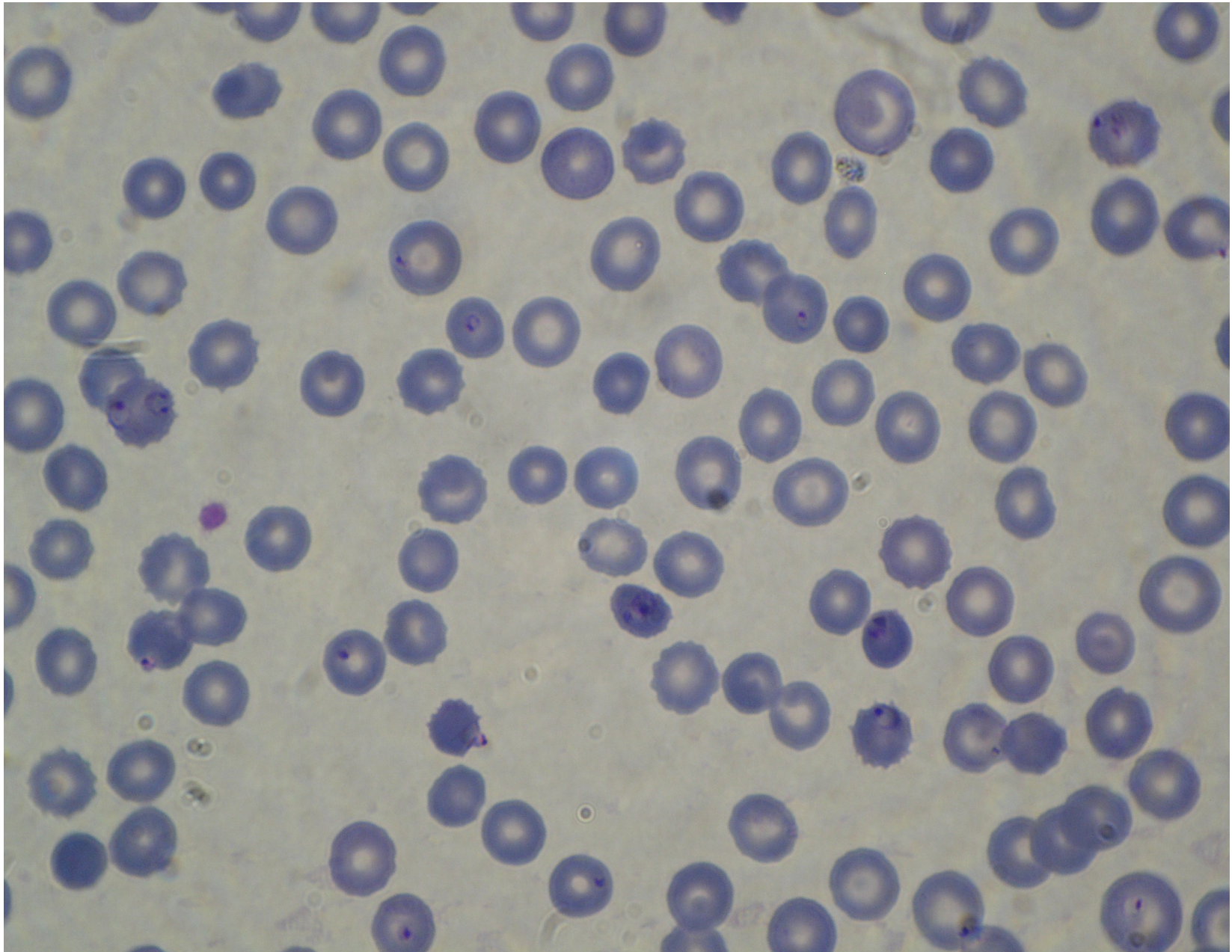
- ⦿ He was lethargic and has disorientate speeches
- ⦿ Body temperature was 40.5° C,
- ⦿ Blood pressure was 83/32 mmHg, pulse 96 and HR 109 beats/min

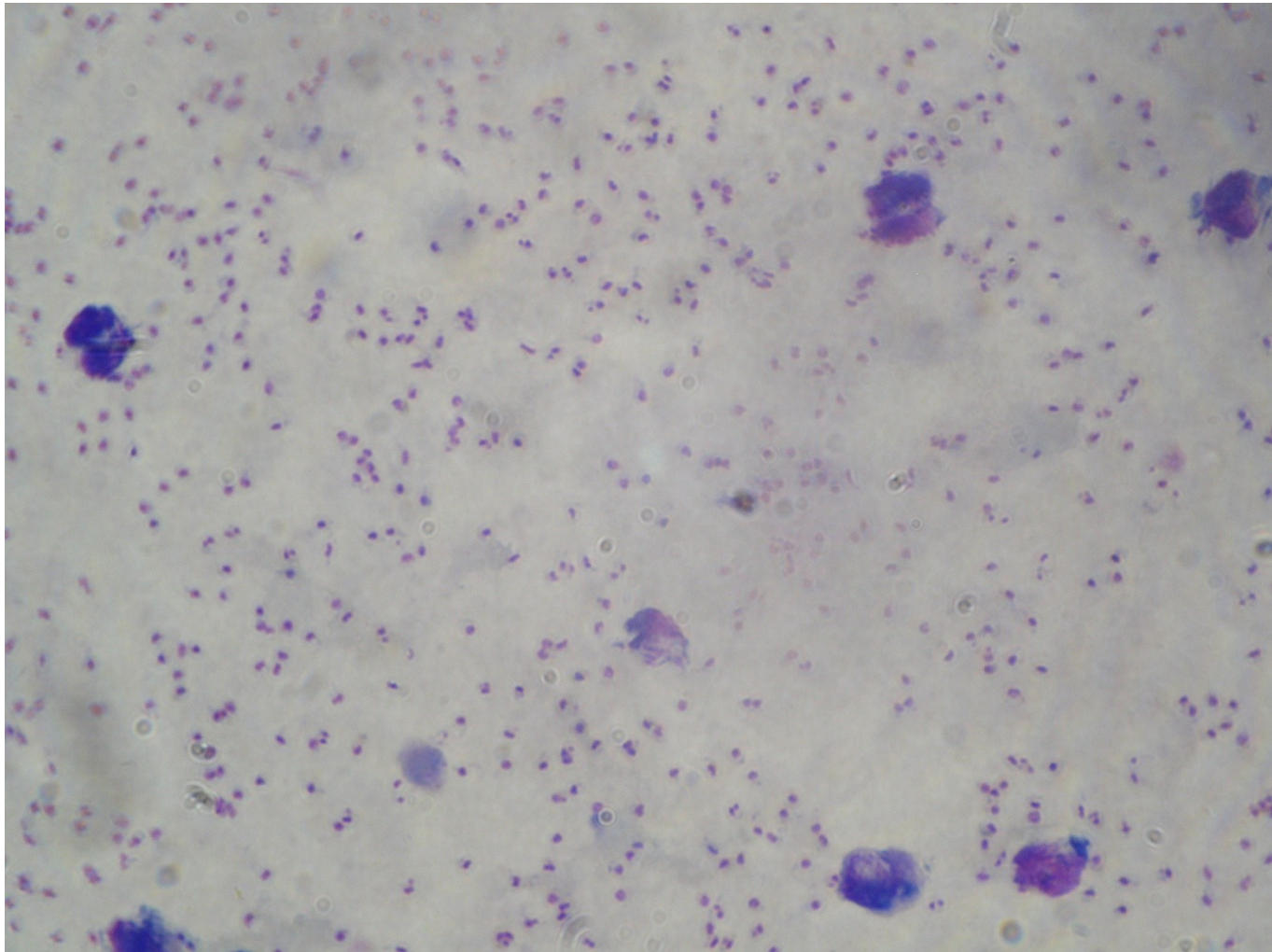
- ◉ Cardiac examination revealed normal heart sounds
- ◉ The lungs were clear to auscultation.
- ◉ There was significant **splenomegaly**
- ◉
- ◉ .

## Laboratory results were as follows:

- ⊙ C-reactive protein 144 mg/l,
- ⊙ haemoglobin 8.9 mmol/l,
- ⊙ thrombocytes  $20 \times 10^9/l$ ,
- ⊙ leucocytes  $5.8 \times 10^9/l$ ,
- ⊙ glucose 87 mg/dl
- ⊙ creatinine 1.17
- ⊙ D bilirubin 1.31
- ⊙ Fibrinogen 222
- ⊙ D-dimer >5000

- ◉ Ultrasound of the abdomen showed an enlarged spleen of 19.5 cm.
- ◉ The chest X-ray was normal.
- ◉ A blood smear was performed and showed ring-shaped trophozoites consistent with *Plasmodium falciparum* (PF) with a parasite density of >30% and the presence of schizonts
- ◉ We had got no rapid antigen detection test





The patient was admitted to our intensive care unit because of tachypnoea, hypotension, fever and high parasite burden





- ◉ Conclusion of evaluation: the patient was in shock and had signs of cerebral malaria, and little respiratory distress, there was no disseminated intravascular coagulation and acute renal failure.

- ◉ We started red cell exchange transfusion and plasma exchange immediately because of patient's hyperparasitemic condition ( $>30\%$ )
- ◉ We could not start any antimalarial medication at that night except **doxycycline(PO)**

- ◉ The day after we can find Choloroquine
- ◉ But it was a P. Falciparum parasitemia, probably Choloroquine resistance
- ◉ Patients third day in emergency intensive care unit, we could find artesunate from infectious diseases departement of the ministry of health

- ◉ 10 days later after admission, he has discharged.(14.06.1013)
- ◉ Oğuz was severe *P.falciparum* malaria with multiple complications, treated with **artesunate (IV) + doxycycline(PO)** in conjunction with both exchange transfusion and plasmapheresis, had a successful outcome



Mosquitoes that spread malaria like the same exotic places you do. [Travelsafely.com](http://Travelsafely.com)

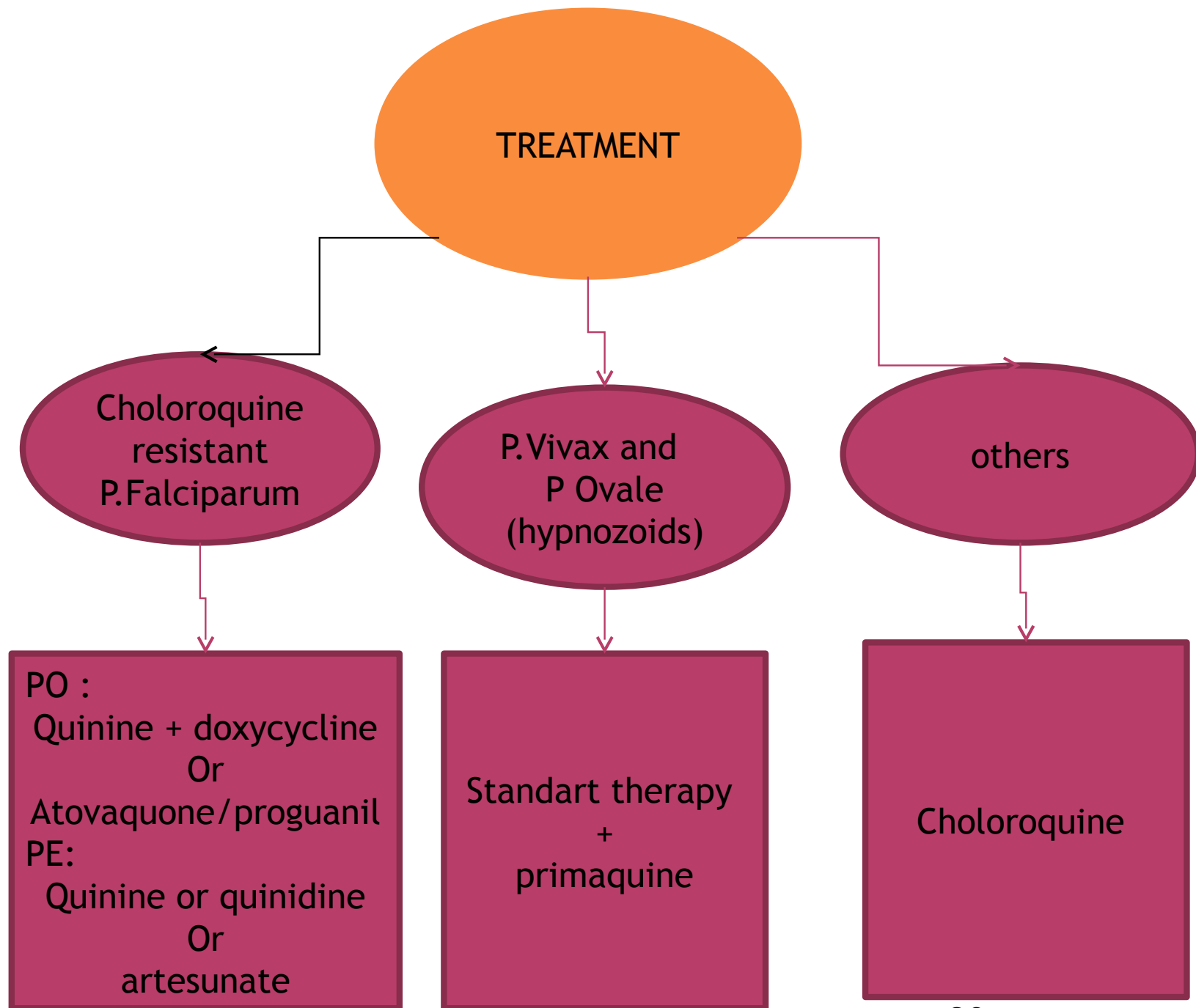
# diagnosis

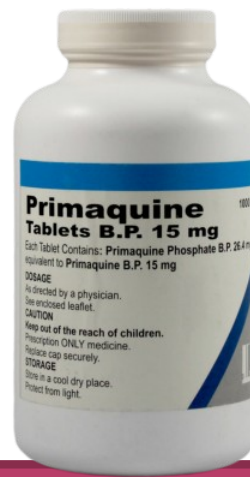
- ◉ You need;
  - ◉ High index of suspicion
  - ◉ microscope
- 
- Light microscopic examination of thick and thin blood films is the “gold standart” modality
  - we have to view several slides to make to diagnosis if the parasite burden is small

- ⦿ Blood smears are stained with Giemsa or Wright stains
- ⦿ Even if the parasite is not visualised in the smear treatment is nevertheless indicated if the disease is suspected

# treatment

- ◉ Combination therapy is nearly standard
- ◉ Treatment options varies according to plazmodium type





PO :  
Quinine + doxycycline  
Or  
Atovaquone/proguanil  
PE:  
Quinine or quinidine  
Or  
artesunate

Standart therapy  
+  
primaquine

Choloroquine



# Quinine and related agents

# Chloroquine

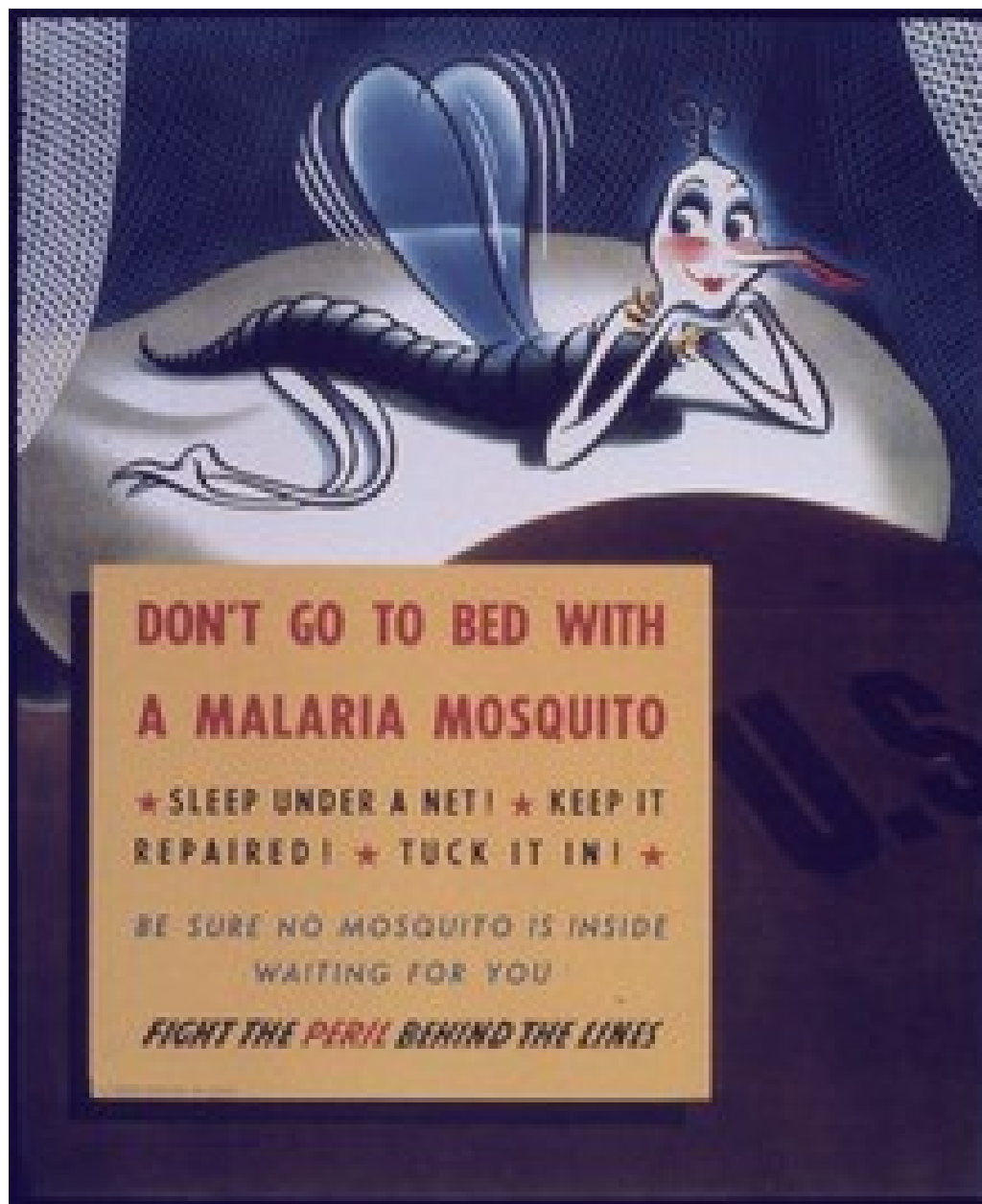
# Artemisinin and derivatives

# Other drugs

- ◉ Amodiaquine
- ◉ Pyrimethamine
- ◉ Sulfonamides
- ◉ **Mefloquine** (developed during vietnam war)
- ◉ **Atovaquone** (malarone)
- ◉ **Proguanil** (1945 british antimalarial r.group)
- ◉ Primaquine
- ◉ **Halofantrine** (1960, expensive)
- ◉ **Doxycycline**

# Prevention

- ◉ chemoprophylactic drug
  - Atovaquone-proguanil
  - Mefloquine
  - Doxycycline
- ◉ mosquito nets
- ◉ Insect repellents
- ◉ Vaccines directed against various antigens of the malaria parasite are currently in trials.



**DON'T GO TO BED WITH  
A MALARIA MOSQUITO**

★ SLEEP UNDER A NET! ★ KEEP IT  
REPAIRED! ★ TUCK IT IN! ★

BE SURE NO MOSQUITO IS INSIDE  
WAITING FOR YOU

*FIGHT THE PERIL BEHIND THE LINES*

- ◉ A pyrethrum-containing insect spray should be used
- ◉ An insect repellent containing *N,N*-diethyl-*m*-toluamide (DEET) in concentrations no higher than 35% should be applied to exposed skin.
- ◉ Newer formulations of DEET exist with polymer encapsulation and sustained-release properties and provide long-acting protection at lower concentrations of DEET.

# What's NEW in malaria

1. Vaccine studies
2. New antimalarial drugs
3. Anti-mosquito studies

# What's NEW in malaria-1

- ⦿ These preventative methods are good, but an effective vaccine is essential for controlling malaria.“

Joe Cohen



inducing cytotoxic T-lymphocytes that can destroy the infected liver cells

MHC molecule expression on the surface of erythrocytes

Another approach would be to attempt to block the process of erythrocyte adherence to blood vessel walls

Another approach is to target the protein kinases preventing the gametocytes from producing multiple sporozoites in the gut wall of the mosquito

More than 30 of these antigens are currently being researched by teams all over the world

The viral vectored vaccine, targeting a full-length *P. falciparum* reticulocyte-binding protein homologue 5 (PfPRH5) was found to induce an antibody response

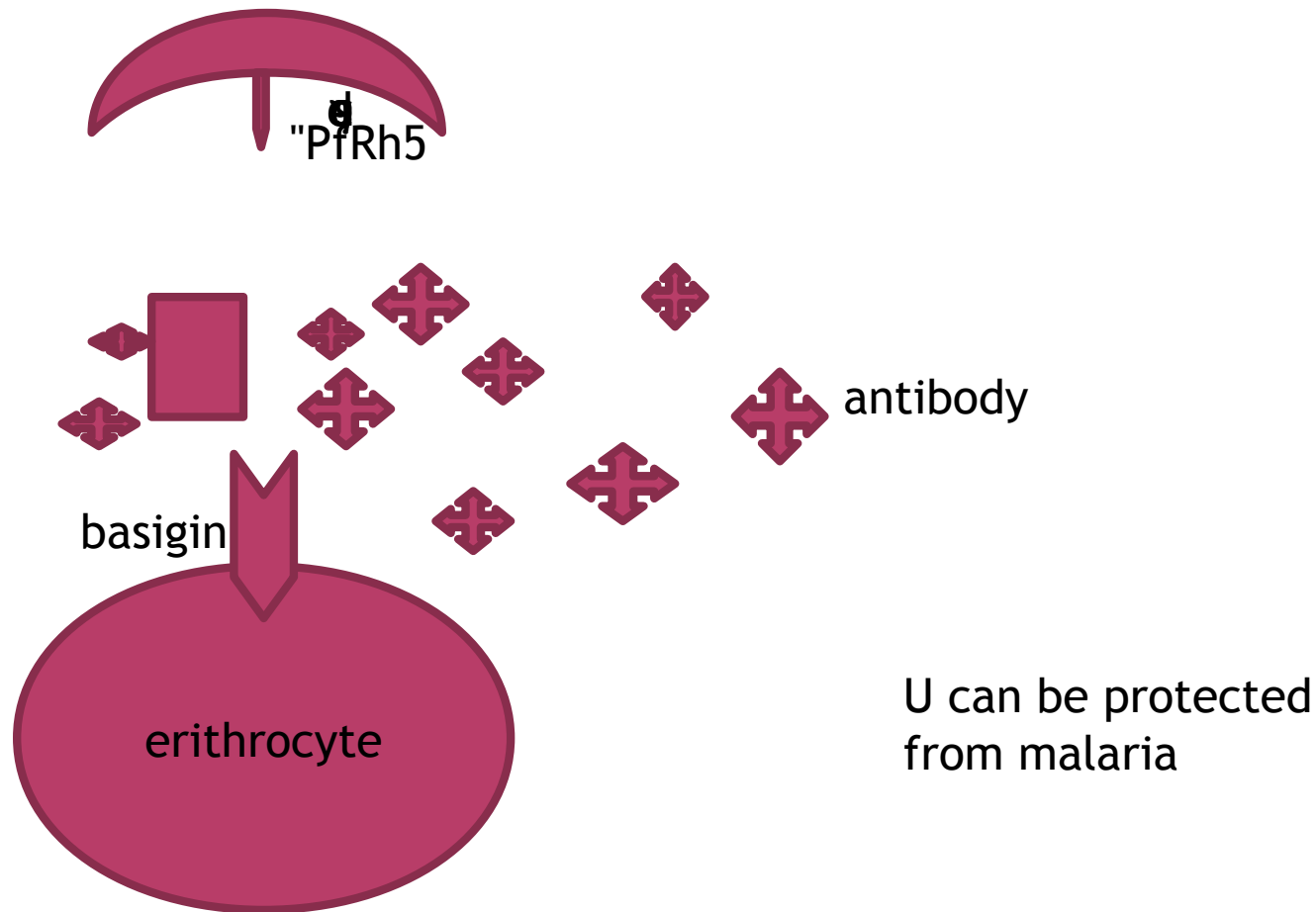
Some adjuvants can direct the vaccine to the specifically targeted cell type—e.g. the use of Hepatitis B virus in the RTS,S vaccine to target infected hepatocytes

RTS,S is the most recently  
developed recombinant vaccine

It is being developed  
by PATH and GlaxoSmithKline (GSK) with  
support from the Bill and Melinda Gates  
Foundation

Efficacy in young children by 50 percent

# What's NEW in malaria-1



# What's NEW in malaria-2

- ◉ Kelly Chibale (from cape town university) study on aminopyridine
- ◉ This new drug killed the parasites instantly, even those that are resistant to other anti-malarial drugs

# What's NEW in malaria-3

- ⦿ Radiation treatment that effectively makes some male mosquitoes sterile—which could have a drastic effect on mosquito populations.

# What's NEW in malaria-3

- ◉ Mosquitoes generally feed on nectar, but when it's time to breed the females need protein
- ◉ To digest blood, mosquitoes need to produce a certain enzyme in their guts
- ◉ Researchers simply switched off the genes that lead to the production of those enzymes
- ◉ If researchers can find a way to get their special recipe into a small molecule that could be sprayed on mosquito netting or packed into a pill, the next meals for many mosquitoes could be their last.

# What's NEW in malaria-3

- New insect repellent is 'thousands of Times' more effective than DEET

# What's NEW in malaria-3

- ◉ In a new study, researchers sprayed mosquitoes with a fungus that had been modified to deliver compounds that target the malaria parasite

◉ New Laser Zaps Mosquitoes in SlowMotion.mp4