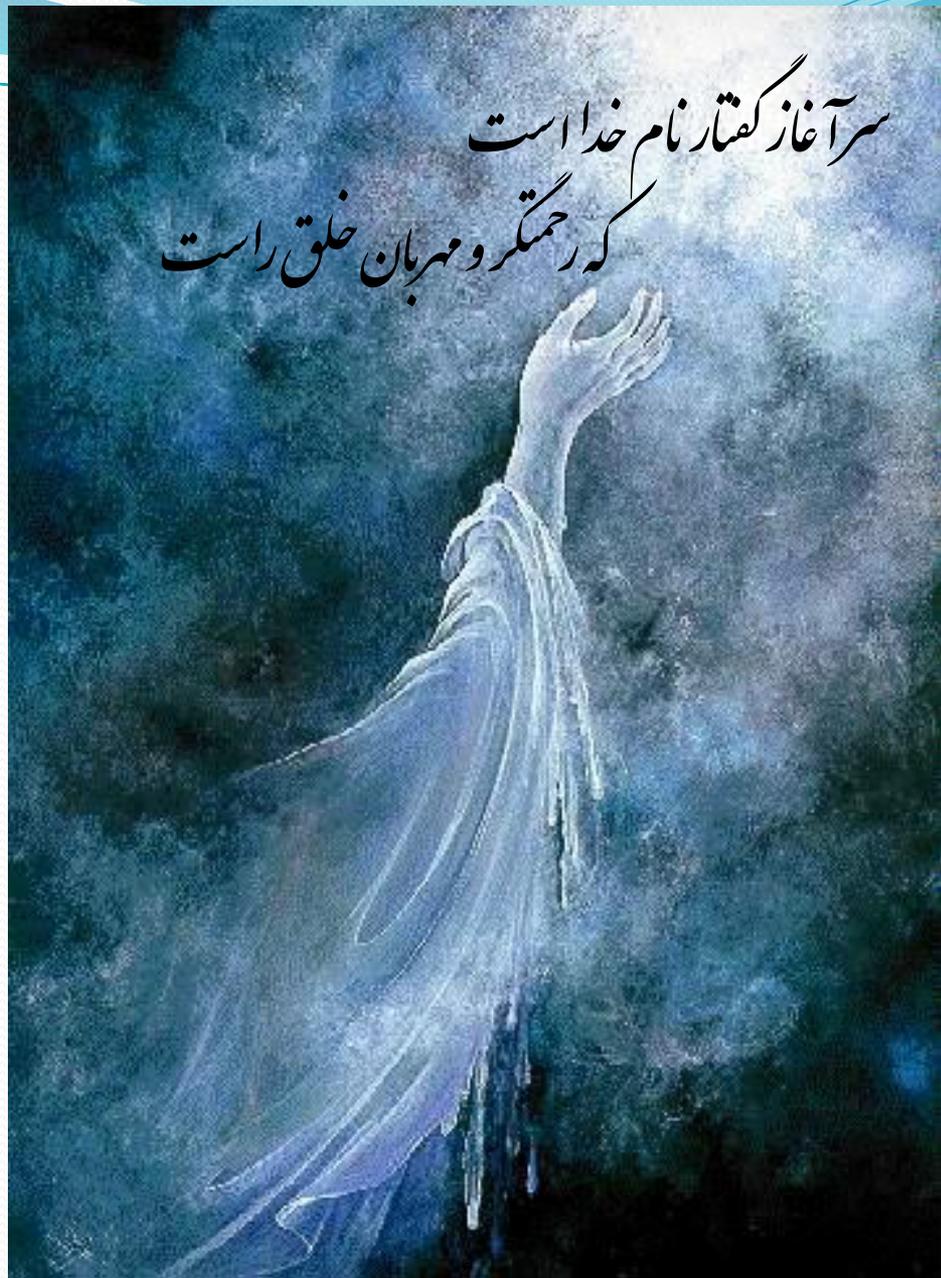


کلمه باقرت (ع)

همچنین چنین است که دست دارید درباره شما بگویند
درباره مردم بگویند

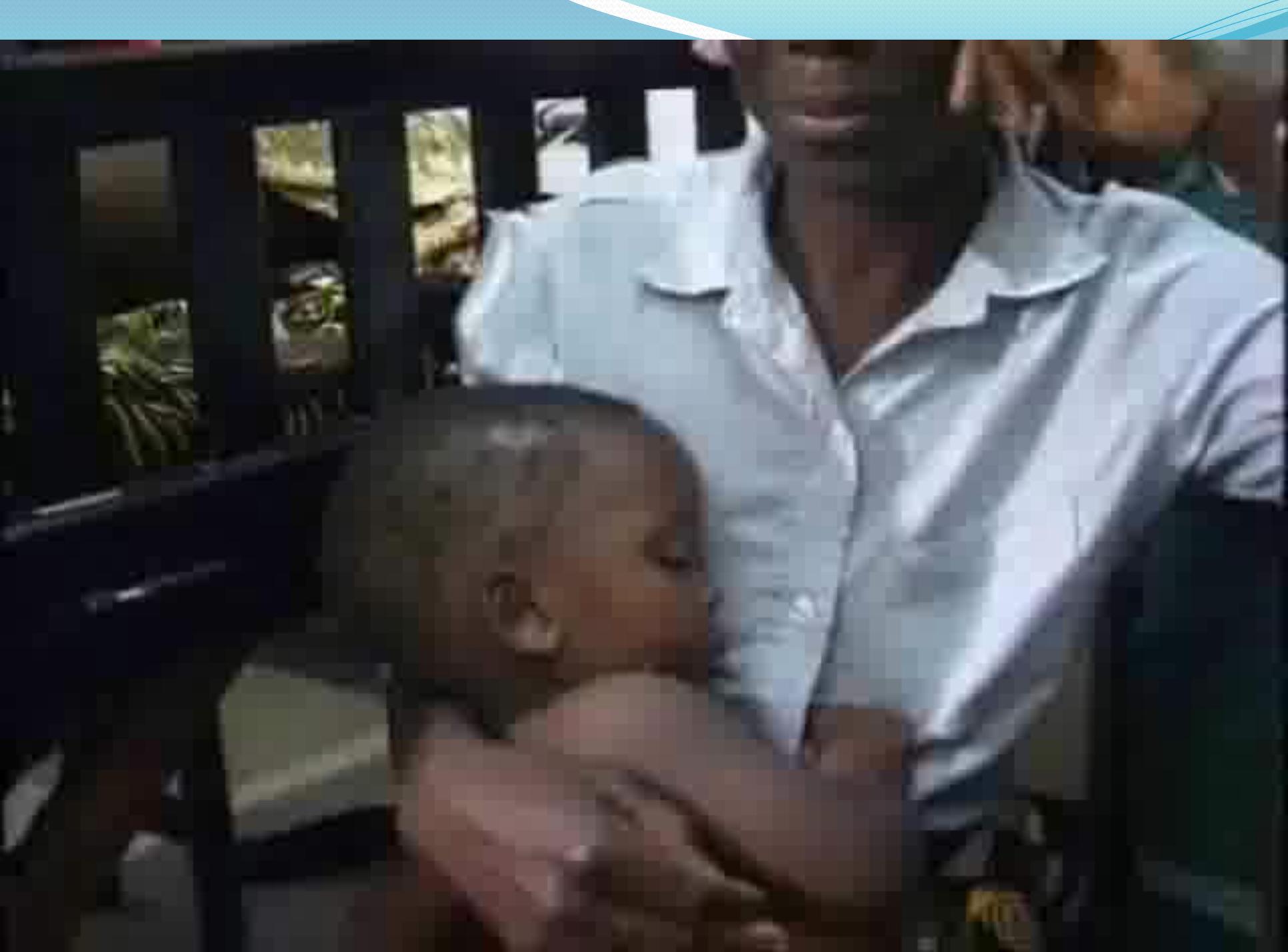


سر آغاز کفایت نام خدا است
که رحمتگر و مهربان خلق راست

سید طباطبائی

MALARIA

www.ProteinLounge.com







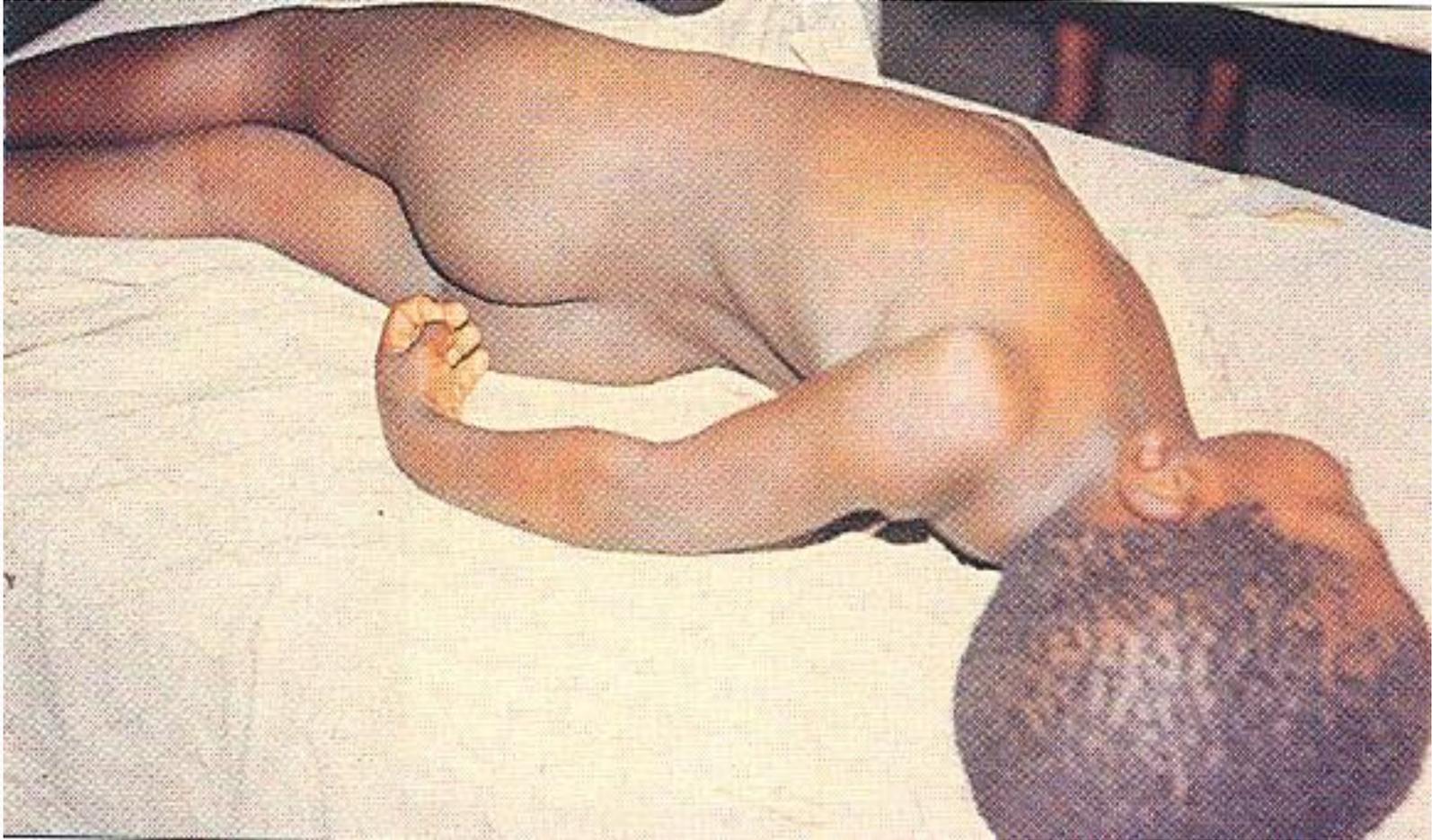








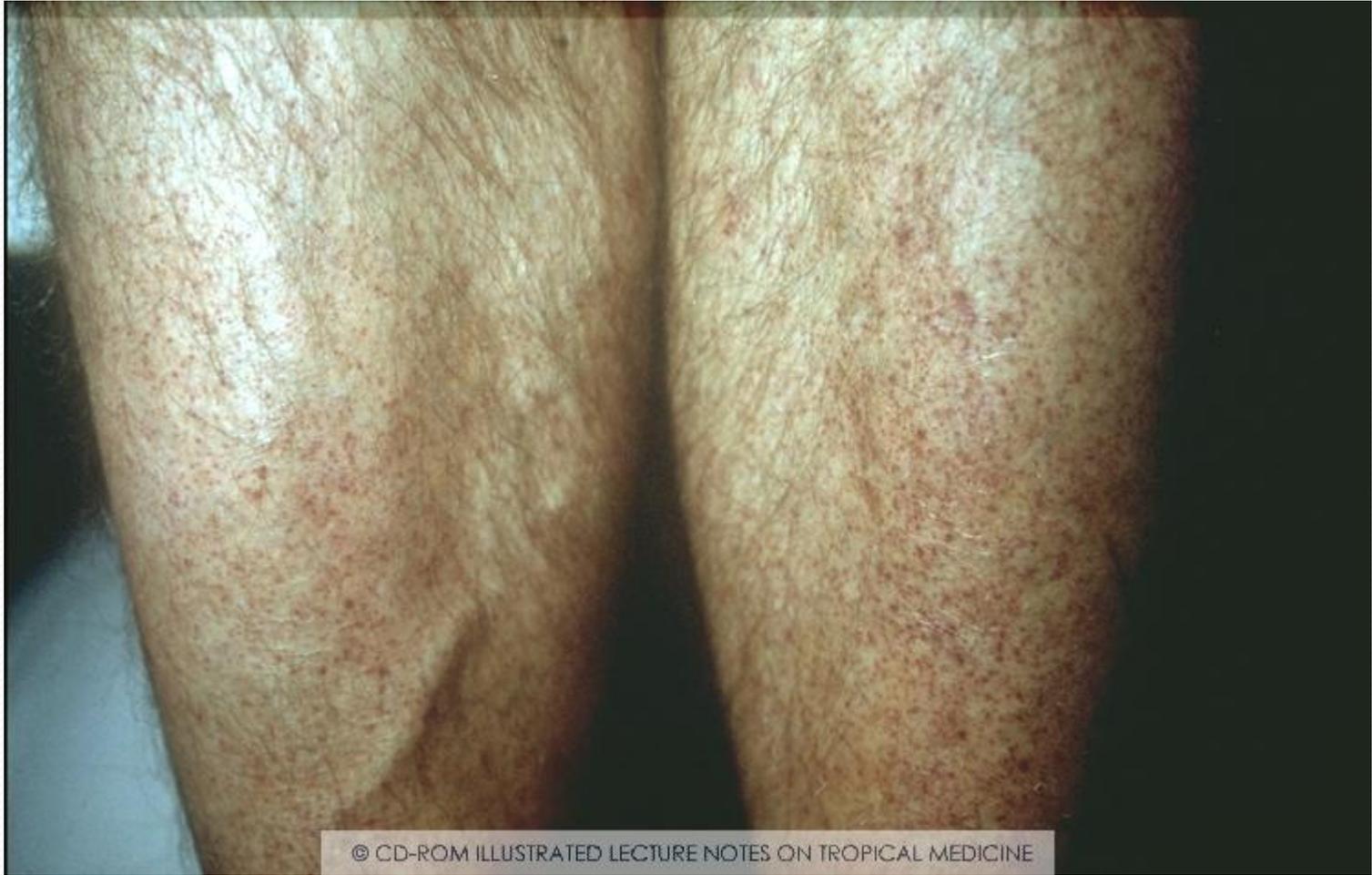




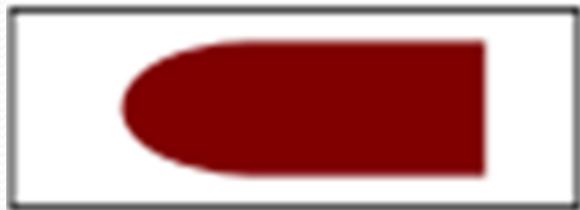
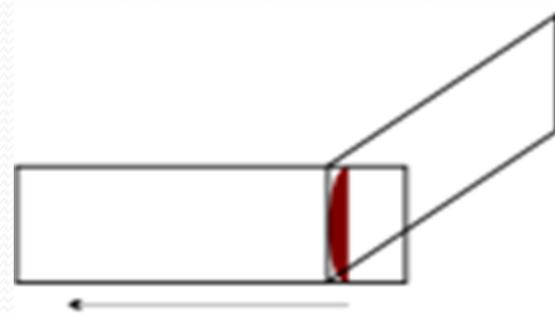
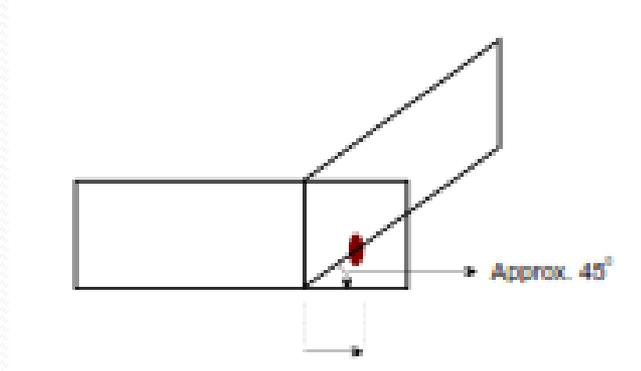
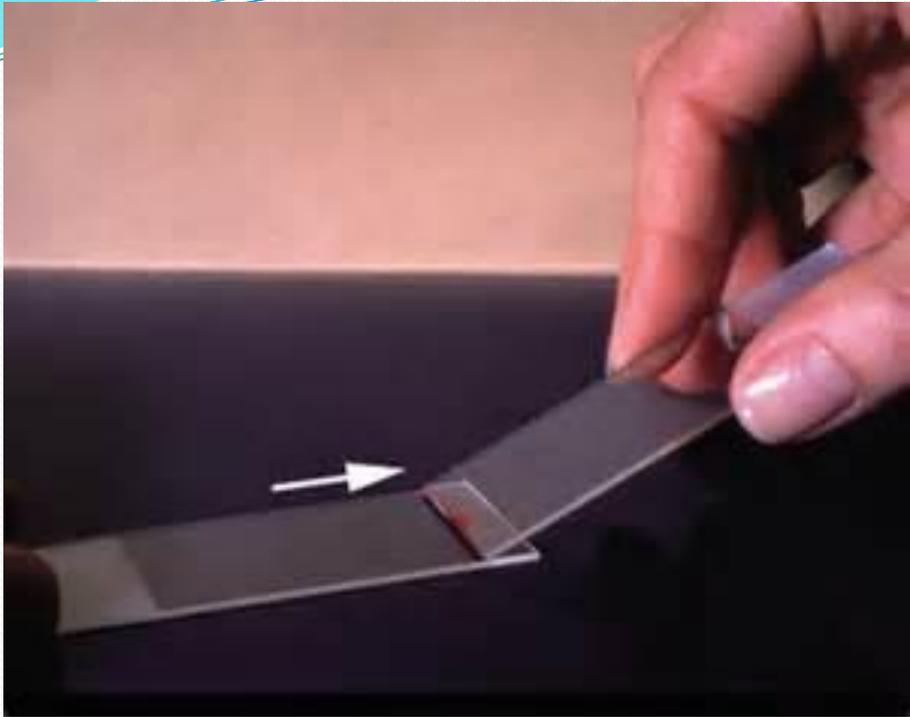


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تقدم به دانشجویمان خوب و عزیز



- Classification(Traditionall)

- Protozoa

- Worms

- Arthropoda

- KINGDOM PROTISTA (Single-celled eukaryotic)

- Traditionally

- Locomotion

i. Flagella (Mastigophora)

ii. No obvious (Sporozoa)

iii. Pseudopodia (Sarcodina)

iv. Locomotion by cilia (Ciliophora)

■ Definition

▲ Acute and chronic disease

➤ shaking chills, high fever, heavy sweating.

➤ Anemia and splenomegaly in cases suffering

A parasitic diseases caused by plasmodium species.

▲ Transmitted by the bite of female anopheline mosquitoes

□ Vertical transmission (mother to fetus occurs)

History and now

- ❑ One of the oldest known diseases.
 - ❑ recorded for nearly 6000 years, in China.
 - ❑ Hippocrates described a fever Tertian & quartan
- Malaria : bad air, Paludism
- A life-threatening parasitic disease
- ❑ No effective vaccine: immunity is a result of multiple infections

MALARIA



- 40% of the world's population is at risk
- Around 100 million people are affected
- At least 600,000 deaths annually.
 - 90% occur in Sub-Saharan Africa,.
- It is one of the major public health concerns

- Genus Plasmodium (infecting reptiles, birds, and mammals)

- Phylum Sporozoa

- specific stages of the life cycle,
- an apical complex
- specialized organelles (conoid, polar rings, micronemes)

- Class Coccidea Order Haemosporida

■ Etiology

▲ **Four species of plasmodium cause malaria in human.**

➤ **P. falciparum**

➤ **P. vivax,**

➤ **P. ovale**

➤ **P. malariae**

➤ **p. knowlesi**

Each species has its own morphologic, biologic, pathogenic & clinical characteristics.

▲ Life cycle of plasmodium

complex cycle development

● Two hosts :

□ Vertebrate **humans**

★ asexual reproduction(schizogony)

★ intermediate host

□ In Vertebrate **female anopheles**

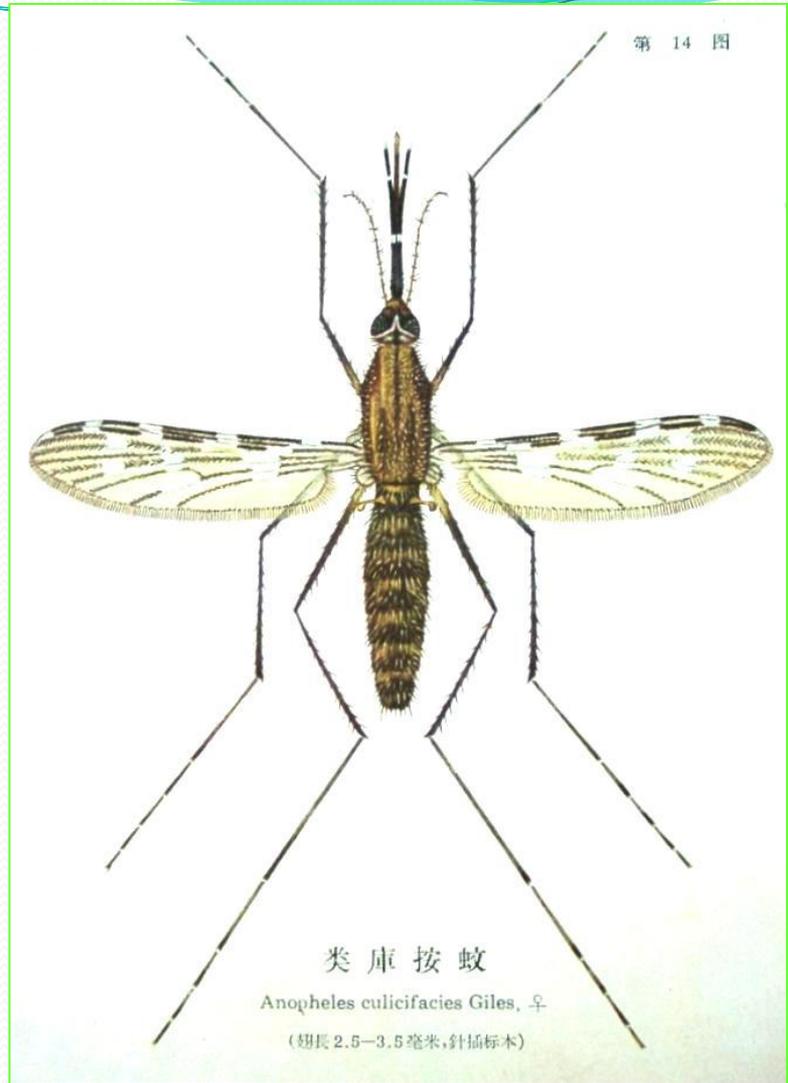
★ sexual reproduction(sporogony)

★ final host

Life cycle of plasmodium

• sexual reproduction(sporogony)

- Female Anopheles picks up gametocytes
- Females are attracted to their hosts by a variety of stimuli,
 - exhaled carbon dioxide & host odor
- gametocytes are released from erythrocytes
- macro & micro gametes(exflagellation, 8 thread-like)
- zygote – ookinete – oocyst-sporozoites(salivary 1-3wek)



Anopheles mosquito

Life cycle of plasmodium

- **Asexual reproduction in human (schizogony)**

□ **exoerythrocytic phase**

- **Infective sporozoite (< 1h) invades a hepatocyte**
- **pre-erythrocytic schizont,**
- **thousand merozoites(1-2 weeks)**

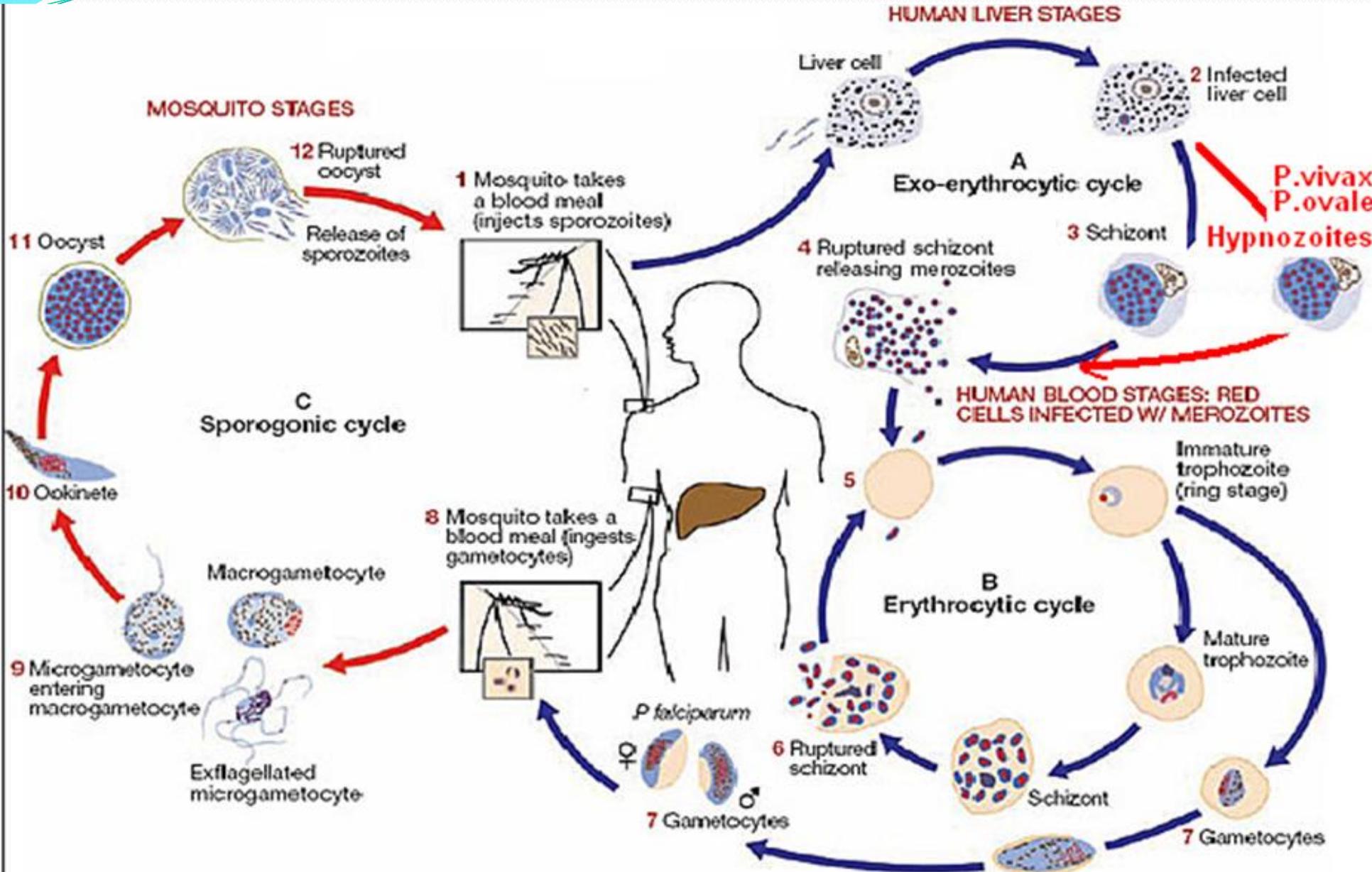
- **erythrocytic phase**
- ring form trophozoite schizont(merozoites)
 - RBC rupture(Periodic paroxysm)

- release merozoites

- parasite debris, pigments & metabolites

□ Gametocytes

- Round (P. v, P. o and P.m) Maturation 3 or 4 days
- elongated or crescent-shaped (P. f) Maturation 10 days



- pigment or hemozoin(absent in the ring stage)
 - Accumulate in the liver and spleen, for many years.
- changes of the RBC membrane(knobs or caveolae).
- in the cytoplasm of the red cell of vacuoles or clefts
 - Maurer's clefts in *P. falciparum*
 - Schtiffner's dots in *P. vivax* ,
 - Ziemmann stippling(*P.m*)

- relapses:

- P. vivax and P. ovale

- dormant parasites or 'hypnozoites.'

- bradysporozoites (3-6 moth)

- delayed relapses (In more temperate climates)

- Recrudescences (secondary waves of parasitemia)

- P. Falciparum & P. malariae

- long-term survival of erythrocytic stages

- sequestration' site, a low undetectable level,

- The basis for this latent survival of parasites has not,

Interaction of parasite and host cell

- **INVASION OF THE ERYTHROCY**
 - *P. falciparum*, can invade erythrocytes of all ages
 - *p. vivax* immature RBC
 - *P. malariae* a predilection for senescent red cells
 - *P. ovale* (Duffy-negative type)

■ Clinical manifestations

Incubation period

□ P. vivax P. ovale	13~15 days
□ P. malariae	24~30 days
□ P. falciparum	7~12 days

Prodromal period

- nonspecific (malaise, Headache, Fatigue)
- poor appetite....

CLINICAL ASPECTS

- **Typical form**
- **The cold stage(15-60 min)**
 - violent rigors ,high core temperature,
 - cold dry skin /rapid, low-volume pulse.
- **The hot stage (2-6 h)**
 - unbearably hot(40-41°C) skin is flushed,
 - severe throbbing headache, pulse rapid ,full
 - confusion,delirium.
- **The sweating stage.**

- Intermittent period(interval of attack)

➤ by the length of asexual erythrocytic cycle:

P. vivax and P. ovale , about 48 hrs---

paroxysm attack every other day;

P. malariae, about 72 hours

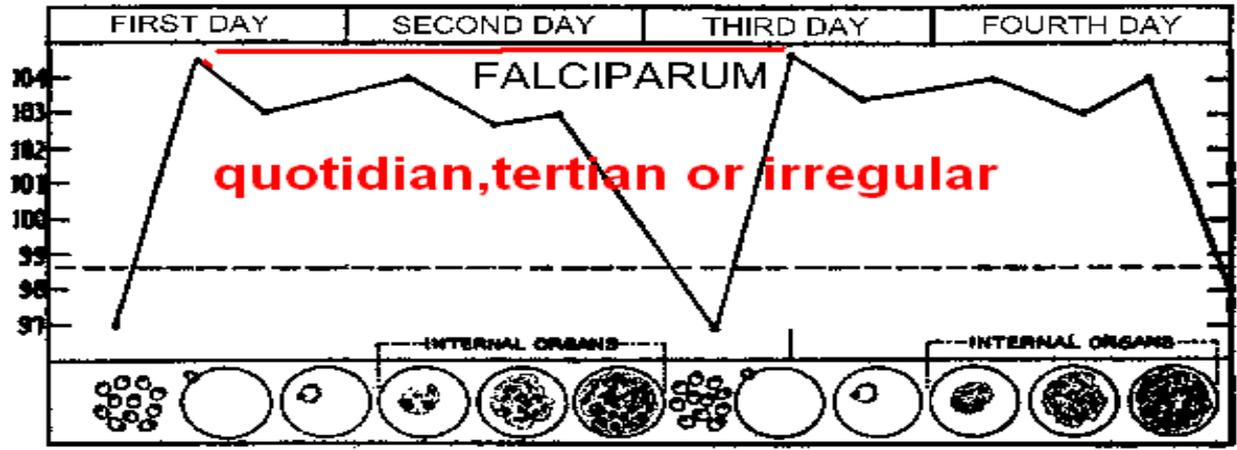
paroxysm attack every three days

P. falciparum , 36-48 hours;

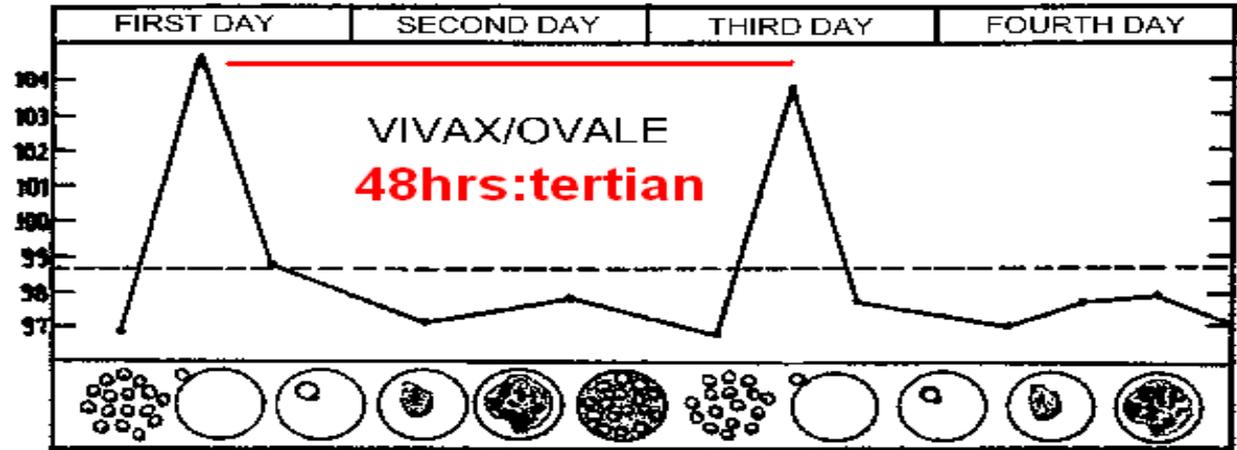
paroxysm attack every 36 to 48 hrs

In early stage of paroxysm, intermittent period may irregular.

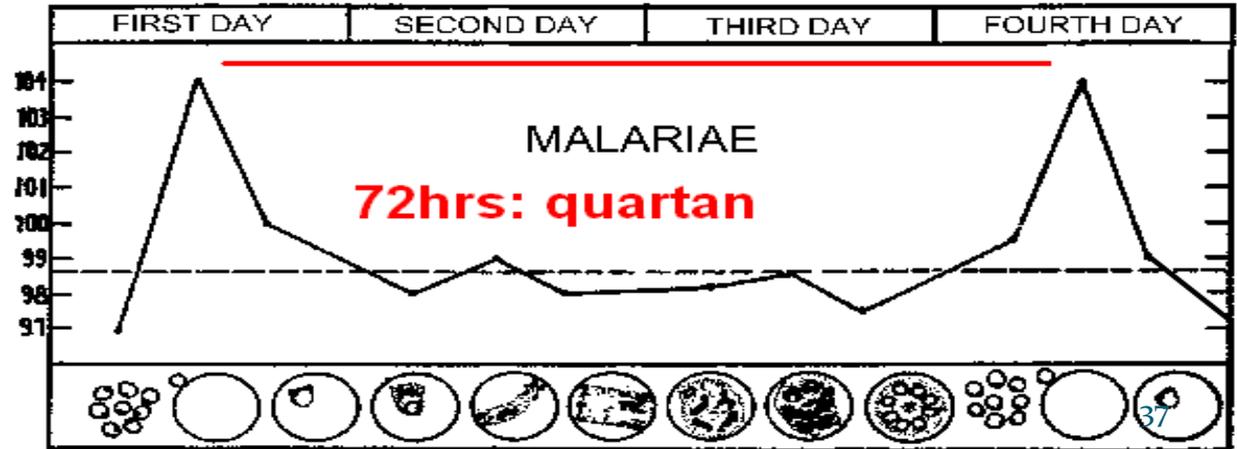
Plasmodium falciparum::



Plasmodium vivax,
Plasmodium ovale



Plasmodium malariae\:



Clinical manifestations

➤ *P. vivax/ p. ovale* (benign tertian)

- Fever Classic
- Platelet life span is 10 to 3 days
- improved or, the intensity is low (12 to 18 moths)
- Chronic malaria (Malaria cachexia)

❑ *P.malariae* ('quartan Malaria)

- ❑ recrudescences, which can occur up to 52 years after
- ❑ Nephropathic syndrome(children < 15 years of age)

Clinical manifestations

- *P. falciparum* (malignant tertian)
- In nonimmune people (medical emergency)
 - benign illness to a catastrophic and fatal.
- The symptoms are nonspecific
 - headache, pains in the back and limbs, simulating influenza, anorexia, nausea, and a feeling of chill
- Fever is very common (continuous, remittent. not tertian)
- manifestations of severe *falciparum* malaria

□ ANEMIA

Excess removal of noninfected and infected RBC
impaired production of new RBC in the bone
marrow.

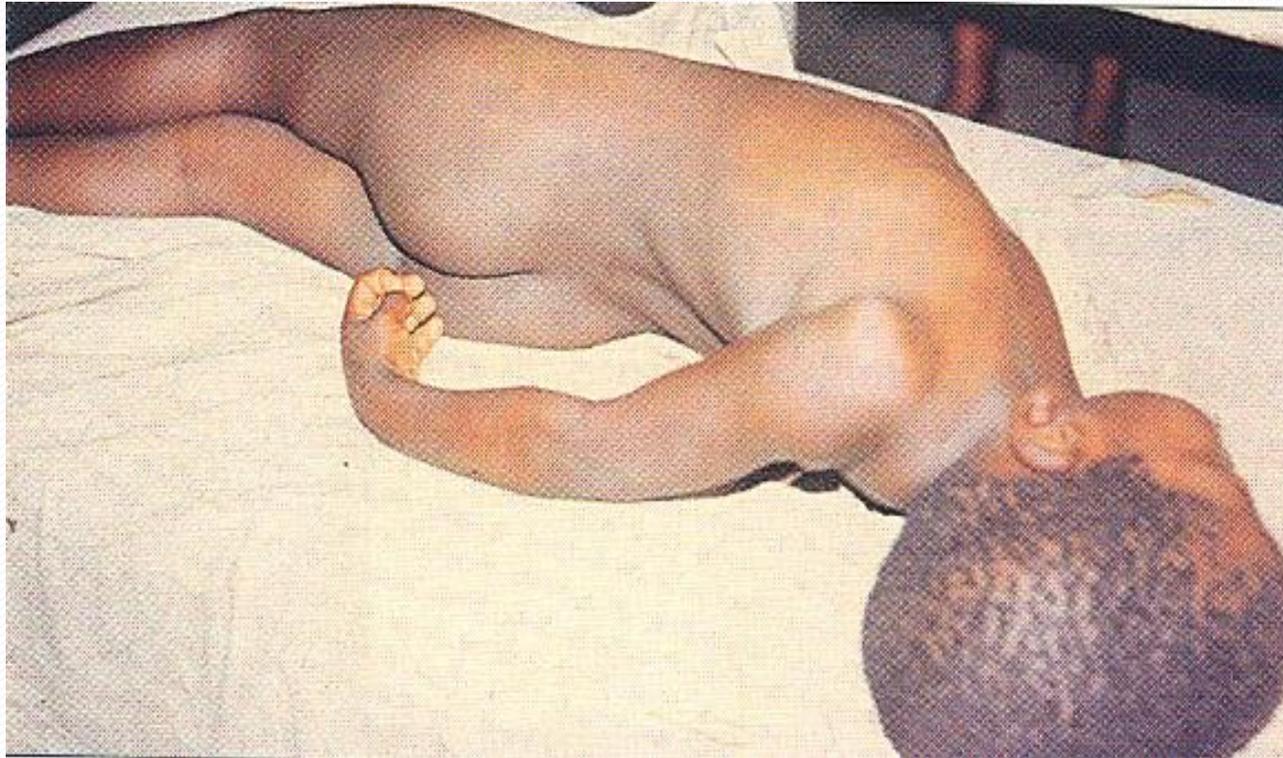
The intravascular lysis



**Child with severe
malaria anaemia and
no other malaria
complication**

Complications of malaria :

Cerebral malaria



Opisthotonos in an unrousably comatose child with cerebral malaria. The cerebrospinal fluid cell count was normal

- Hypoglycemia (coma and convulsions)
- Pulmonary edema (mortality of over 50 %)
 - increase in respiratory rate, dyspnea, Crepitations.
- **Algid malaria**
 - gastrointestinal tract and visceral arteries
 - Patient's skin cold, wet and sticky;
 - range short of breath , low blood pressure
 - Vomiting, severe diarrhea, dysentery blood

Complications

- Hemolytic urinemic syndrome(**black water fever**)
 - ✓ Hemolysis of red blood cell mass
 - ✓ patients with G-6-PD deficiency,
 - ✓ heavy infection with *P. falciparum*
 - ✓ atypical immune response during reinfection
 - ✓ Incomplete treatment with quinine
 - ✓ creation of antibodies against red blood cells

Differences between severe malaria in adults & children

• Sign or symptom	Adults	Children
✓ Cough	Uncommon	Common
✓ hypoglycemia(Pretreatment)	Uncommon	Common
✓ Convulsions	Common	Very common
✓ Jaundice	Common	Uncommon
✓ Pulmonary edema/	Common	Rare
✓ Renal failure	Common	Rare

genotypes that are resistant to malaria

- blood groups: group O protection against severe malaria)
- Duffy antigen (receptor for *P. vivax*)
- Hemoglobin F (α_2/γ_2) /S ,C &E
- G6PD(46% protected severe malaria, children & pregnant)
- Thalassemia

- **Malaria of strata**

- I local transmission(indigenous)

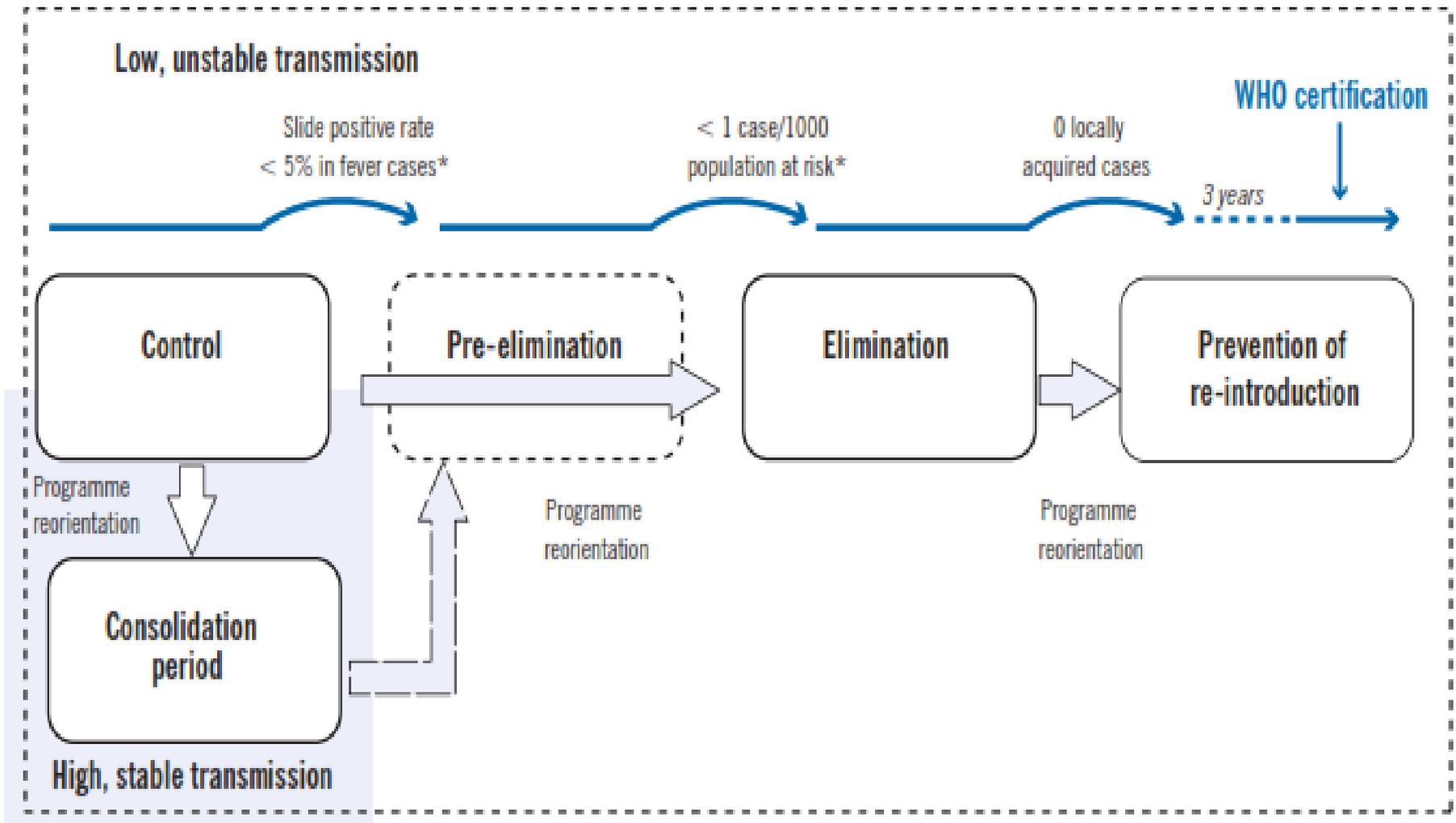
- II areas of incoming with Potential transfer

- III areas of incoming with out Potential transfer

- IV areas of no reported cases of malaria in the last three years

- Tehran, Fars, Isfahan&Qom are the most imported

Figure 5.3 Programme phases from malaria control to elimination



Source: reference (1)

* These milestones are indicative only: in practice, the transitions will depend on the malaria burden that a programme can realistically handle (including case notification and case investigation).

- Malaria is a major disease of the past in Iran
- in 1307-1311,
 - half of the workers died (industrial construction or road)
 - Khuzestan & the Caspian coast, 30 to 40% mortality
- the number of positive cases during the study, 81- 86
 - 13000-25000
 - 2010:3031 (P.Vivax: 2,610 cases (86.11%))
- Most case (95% in 86 year)
 - Sistan & Baluchestan, Hormozgan & southern karman
 - ✓ 15% of patients Foreign

How can we prevent contact between people and mosquitoes?

- Insecticides
- larval nests
- Mosquito nets(ITN)
- Long clothing
- Behavior
- Avoid mosquito habitat
- Screens on houses



□ Goal of eliminating malaria(horizon 1400)

➤ At present local distribution&transmission of disease in 35 city

➤ Stop local transmission of disease.

➤ Rapid detection (24 hours after symptoms)

➤ Treatment within 24 h after diagnosis

• Maintain spraying in at least 80% of the population100%
control of larvae

• Increased use of mosquito nets

• households living in areas of insecticide

• emphasis on at-risk pregnant women and children under 5 years

Classification of anti-malaria drugs

❖ Schizontocide

- Secondary Tissue Schizontocide(Primaquin)
- Blood Schizontocide
(Quinine,Chloroquine,Artesunate)

❖ Sporontocide :Pyrimethamine, proguanil

❖ Gametocytocide:Primaquin

cautious G6PD, prohibited in progenies)

- ❖ (Quinine, Chloroquine except P.f)

- Sulfonamides
- Tetracyclines/Clindamycin/Doxycyclin
 - incomplete blood Schizontocidal
 - Only be used to other drugs
 - Fancidar (sulfadoxine+ Pyrimethamine)
 - Used in patients resistant to chloroquine(P.f)
- Artesunate + lumefantrine (Coartem)
- atovaquone & proguanil (Malarone)

■ Diagnosis

▲ Epidemiological data(living ,traveling,...)

➤ ▲ Clinical manifestations

▲ Laboratory findings

➤ Thick and thin smear

• Rapid malaria diagnostic tests(RDTs)

• PCR/Serology ELISA



Treatment

- Chloroquine : : 4/4/2 for 3 days
 - Clinical treatment P.v
 - Treatment Basic P.m
- Primaquin (Treatment Basic P.v) 1 tablet/14 days
- No response
 - Line2 :Primaquin + Artesunate

- P.f (Uncomplicated)

- Artesunate 2 tablet /3 days +Fansidar 3 tablet (Single dose)

- P.F &P.v

- Coartem

- P.f (complicated)

- If the patient is able to eat a single dose Fansidar
- intravenous injections Artesunate and referral to health facility
- Intravenous Quinine (quite, 4 h) No Intramuscular

Areas of chloroquine resistant *P. falciparum*:

Mefloquine	1 tablet weekly	250mg (228 in USA)
Doxycycline	1 tablet/capsule daily	100mg
Malarone (atovaquone & proguanil)	1 tablet daily	250mg atovaquone & 100mg proguanil



وز عالم تنگ تابه یقین یک نفس است
کز حاصل عمر ما، همین یک نفس است

از منزل کفر تا به دین یک نفس است
این یک نفس عزیز را خوش بیدار

خام