



New perspectives in malaria diagnostics

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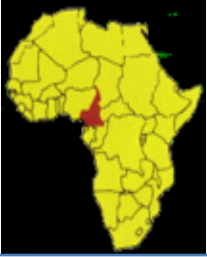
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The context

- *Recent developments in diagnostic testing present new opportunities for malaria surveillance systems.*
- *As malaria control measures expand and the proportion of fevers due to malaria falls rapidly, **it becomes increasingly important to track confirmed malaria cases**, so that resources can be targeted to areas where problems remain and progress in malaria control is accelerated.*

**Source: Disease surveillance for malaria elimination:
an operational manual. WHO – RBM, 2012**



DOUALA

Douala



Biggest town of the CEMAC zone
6 countries in Central Africa

Population 2,446,945^[1] (2012 est.)

HEALTH COVERAGE

- World (WHO, 2012)
 - 14 medical doctors /10 000 inhabitants
 - 28 nurses and mid-wives/10 000 inhabitants
 - 30 hospitals beds/10 000 inhabitants
- Africa (WHO, 2012)
 - 02 medical doctors /10 000 inhabitants
 - 09 nurses et mid-wives/10 000 inhabitants
- Cameroon (MoH, 2010)
 - 01 medical doctors /10 000 inhabitants
 - nurses and mid-wives/10 000 inhabitants
 - 13 hospitals beds/10 000 inhabitants



**Less prevention
Weaknesses in HR
and Equipment**

MALARIA IN CAMEROON

- First cause of morbidity and mortality
- 41% of morbidity
- 50% of hospitalizations
- 24% of death in hospital
- 40% of infant mortality
- 1st cause of absenteeism in school and at work

The vector

Anopheles gambiae

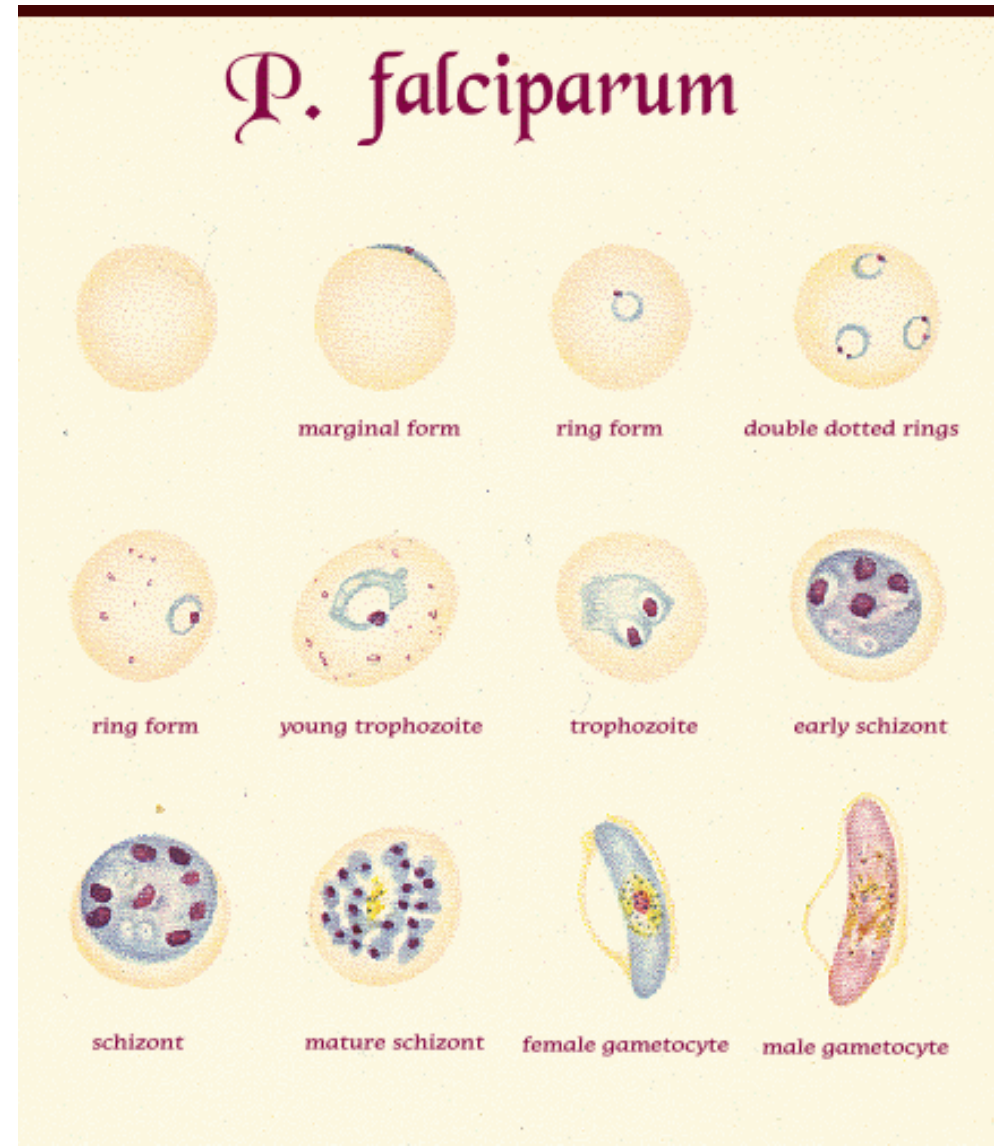


- The most common vector in Douala
- Active period 10 PM – 5 AM
- Night peaks between 1 & 2 AM
- 61.17 infective bites /human /year.

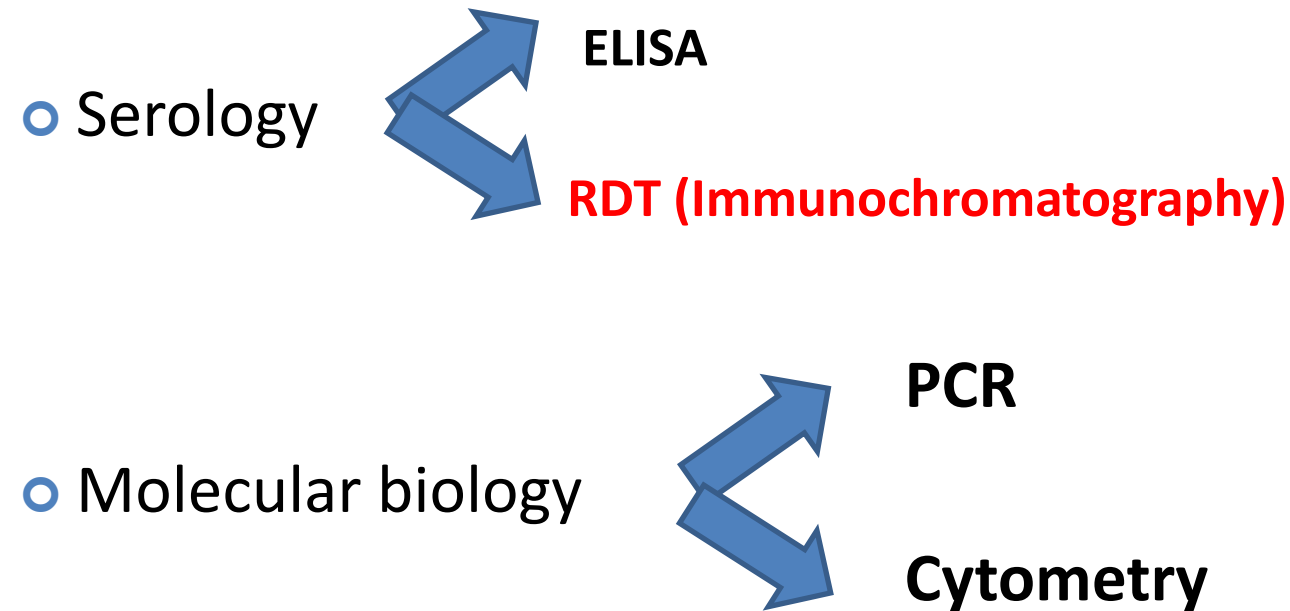
The parasite

Plasmodium falciparum

- Predominant in Douala
 - Resistance against chloroquine established
- Since the 90s
- High gametocytemia during treatment



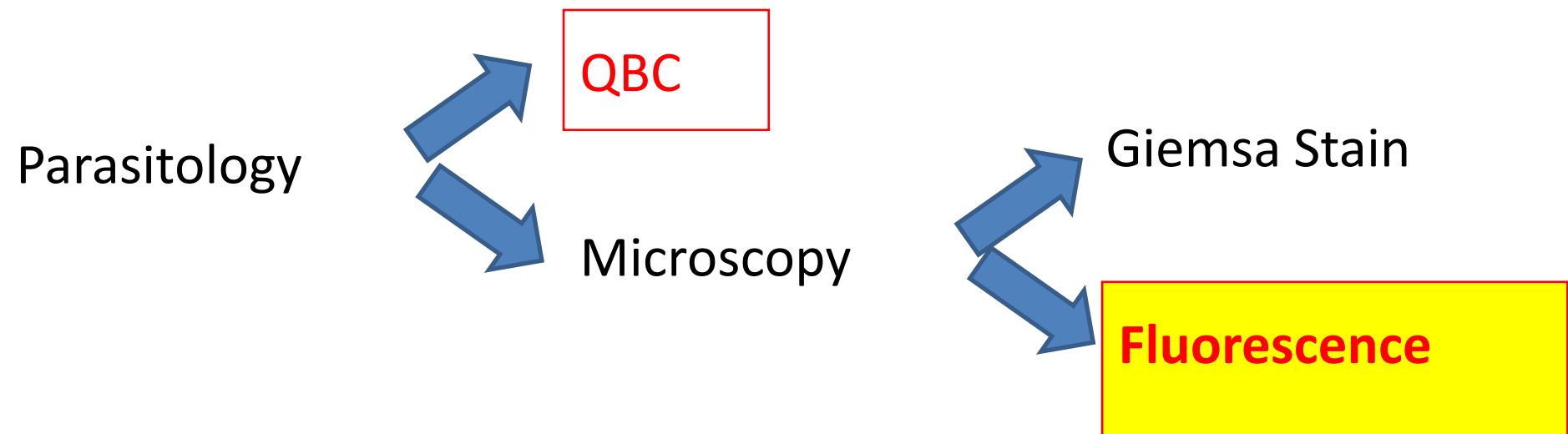
DIAGNOSTICS



Research



DIAGNOSTICS



Less expensive, rapid, detection of symptomatic/asymptomatic cases

Ref: Universal Access to Malaria Diagnostic Testing :
An Operational Manual
© World Health Organization 2011

Clear criteria for a 'suspected malaria case' should be established to identify patients who should be tested for malaria, adapted to the national situation.

Patients in whom antimalarial treatment failure is suspected should be tested by microscopy.

Treatment of patients with severe febrile illness should be initiated immediately, even before diagnostic testing for malaria.

Microscopy is the preferred diagnostic test for these patients.

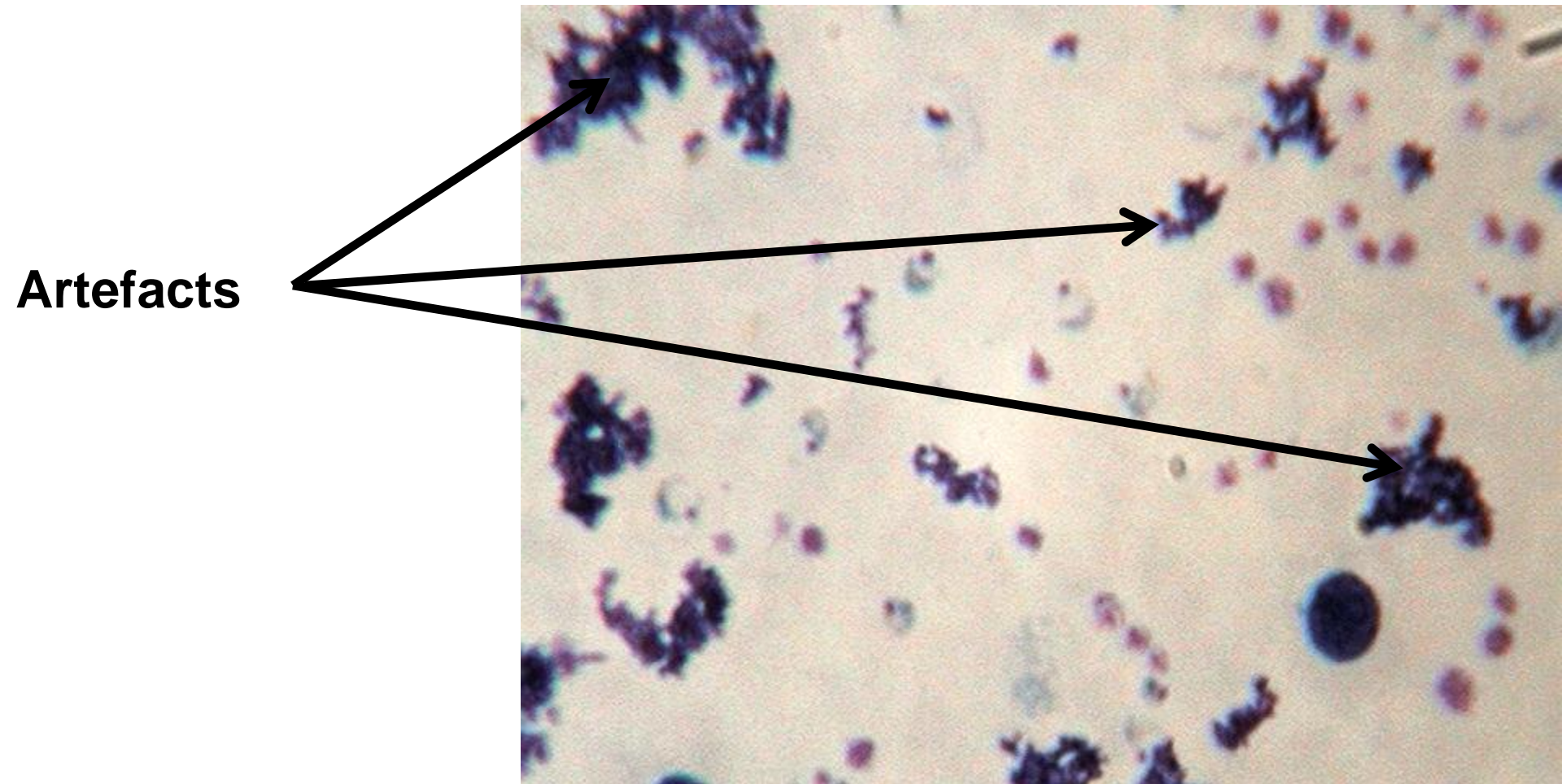
In health facilities with microscopy where the workload exceeds laboratory capacity, the use of RDTs for diagnosis of fever episodes may relieve the burden.

Ref: Universal Access to Malaria Diagnostic Testing :
An Operational Manual
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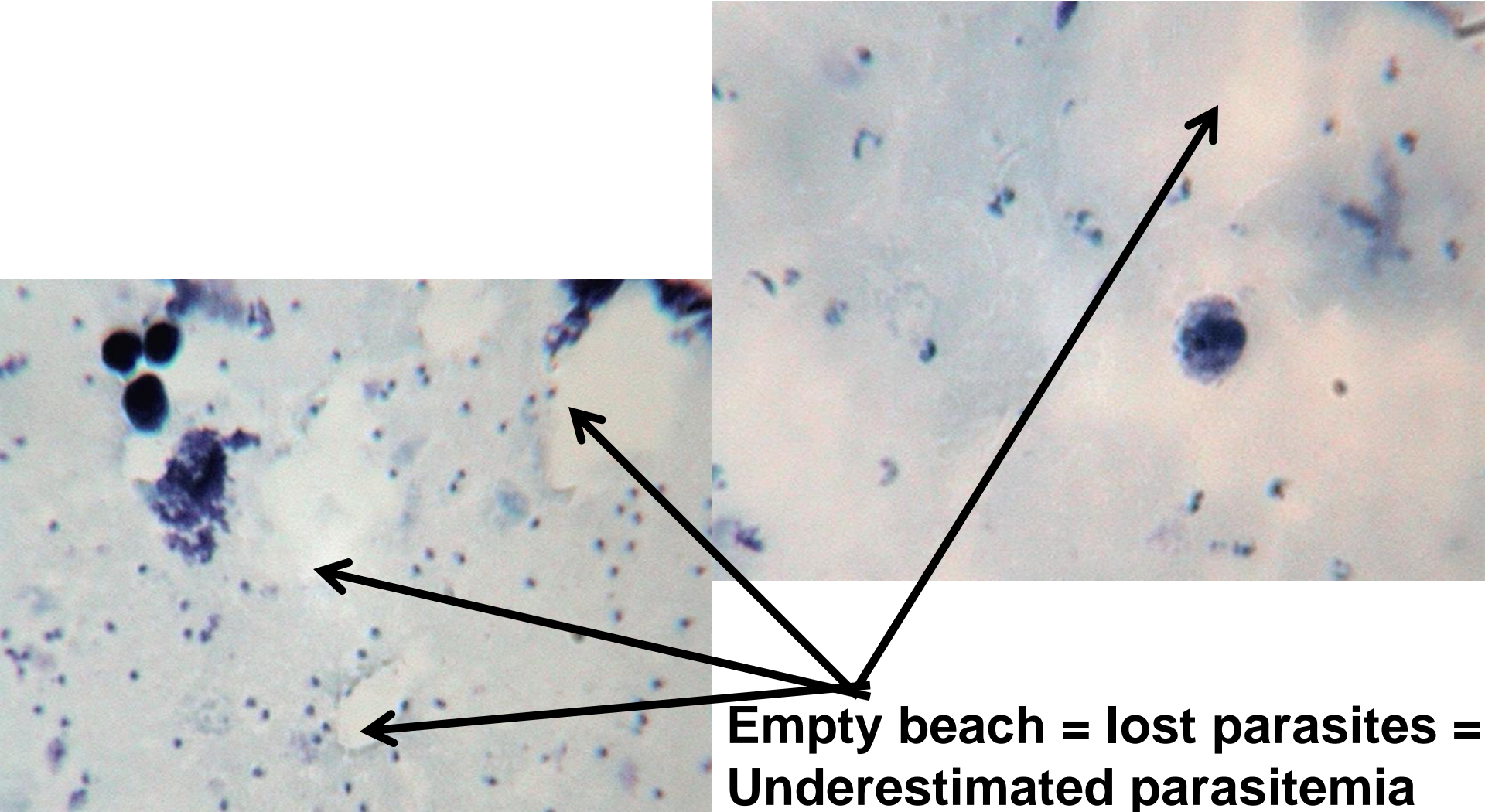
Microscopy and RDTs both show adequate performance in the diagnosis of malaria in febrile patients.

Each test has characteristics that make it useful in particular clinical situations or settings. Therefore, in most countries, both are needed.

Parasites after Giemsa stain

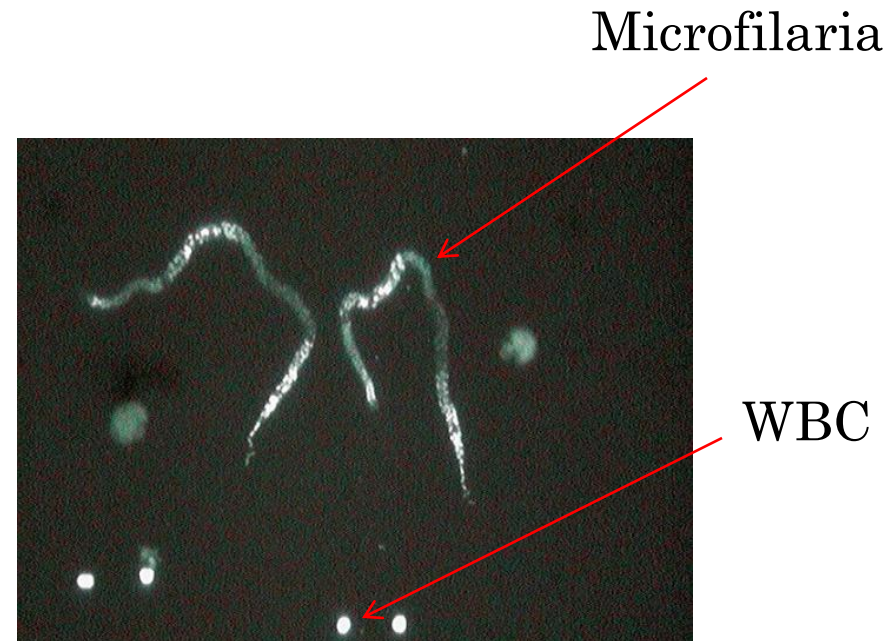
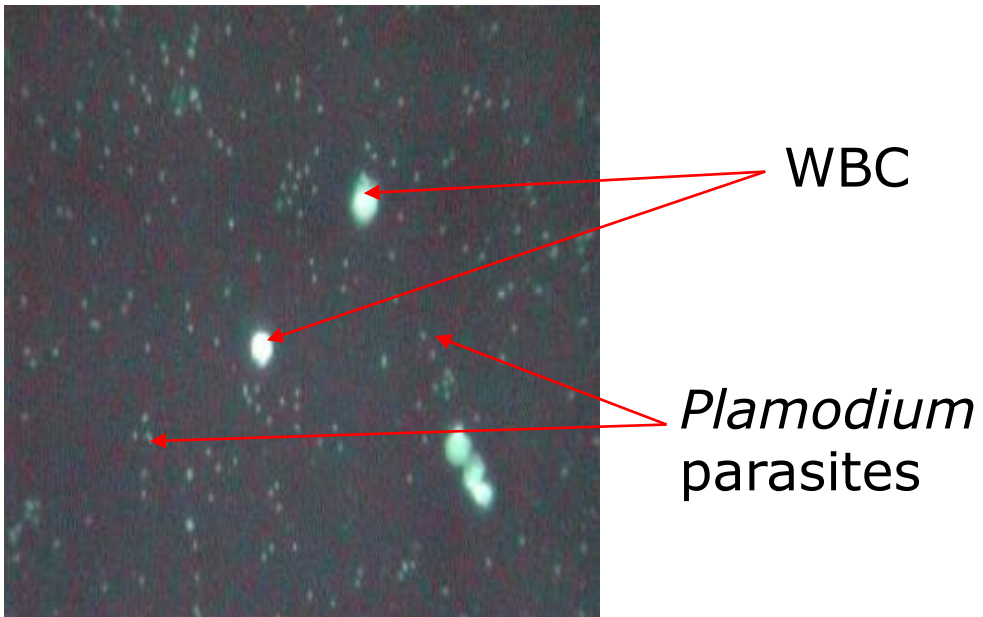


Parasites after Giemsa stain



Blood parasites

Results



Malaria screening in schools

Investigation in 4 primary schools

FIELD WORK

- Questionnaire

- Microscopy

3 microscopists 300 tests/in 8 hours

1min 36s / Test

- Production of results and reporting



METHODOLOGY

Characteristics of the LED fluorescence microscope
CyScope®

- **UV (wavelength 365 nm) excitation**
- **White light**
- Achromate Objectives: 20x, 40x, 100x
- Powered by rechargeable battery
- **6 hours of energy autonomy**
- **Option CCD camera** (visualization slides on PC with Windows™ interface)



METHODOLOGY

Rapid Diagnostic Tests with CyScope fluorescence microscope for malaria and other parasites



Step 1

Sample BLOOD
STOOL
URINES



Step 2

Deposit on slide and cover
with coverslip



Step 3

Observe under
microscope

Ecole Maternelle et Primaire Bilingue

« La Bonté » Nylon - Brazzaville

Less unhealthy environment

Prevalence = 19%



Groupe Scolaire Bilingue « La Clarté »

Nylon - Barcelone

Prevalence = 49%



Ecole Maternelle et Primaire Bilingue

« Le Messie » Ndog-Passi II

Prevalence = 72%



Ecole Evangélique de la Carrière Ndog-Passi II

Prevalence = 77%





Coalition de la Communauté des Affaires contre le SIDA,
la Tuberculose et le Paludisme

Fight against malaria in communities and enterprises in Douala

Sponsored by ExxonMobil Foundation

OBJECTIVE

Evaluation of the intervention in enterprises and communities

Activity	Partners	Sponsors
Sensitization Distribution of LLINs and Indoor spraying in 2011-2012	 <p>Coalition de la Communauté des Affaires contre le SIDA, la Tuberculose et le Paludisme</p>	
Parasitological Screening October 2012 - July 2013		



Malaria impact in an enterprise in Douala

Rationale: High burden/cost of malaria

RBM, 2011:

- Direct Cost: clinical care and control
- Indirect Cost: absenteeism, low productivity

Study period: February 2013 (Malaria screening)
September 2014 (Retrospective study)

Study site: CHOCOCAM (Tiger Brands Company)



Sensitization in 2011
+ Distribution of LLINs in 2012
+ Screening in 2013

CHOCOCAM

TIGER BRANDS



326
permanent
workers

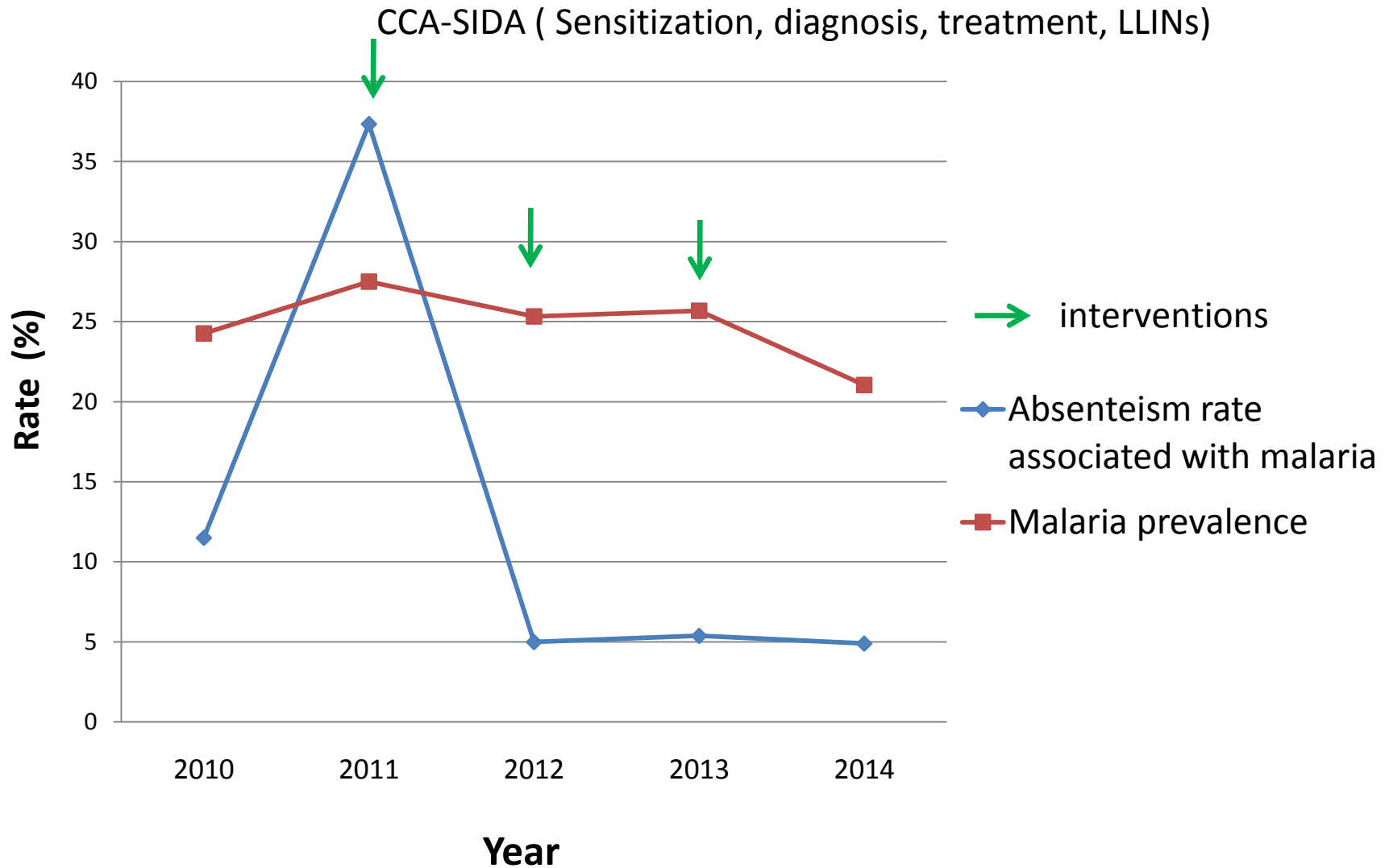


Preliminary data on malaria screening in an enterprise

	Number of people screened in 5 hours
Negative	120
Positive	44
Total	164
Prevalence	26,83 %

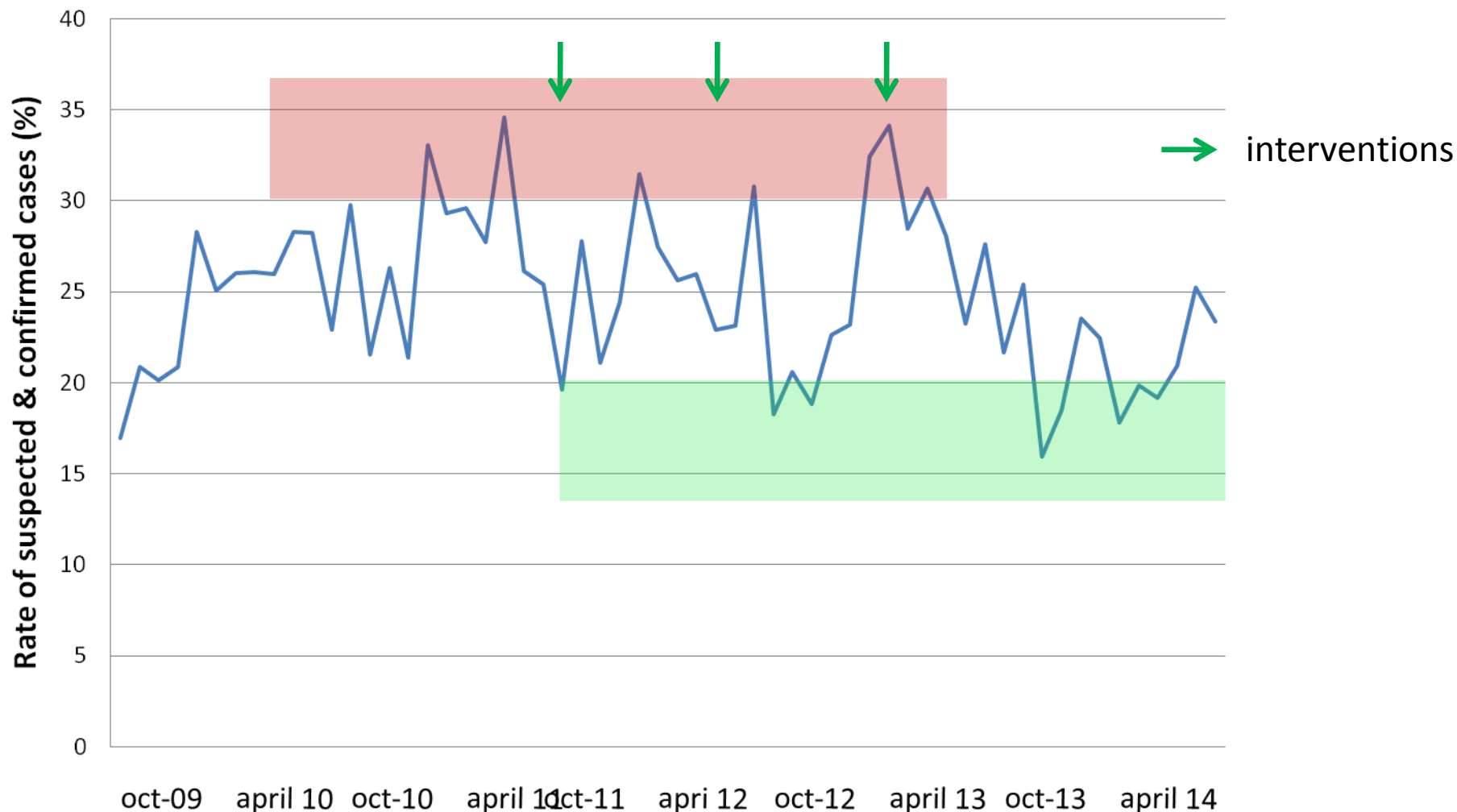
- Endemic area  Balance between individual immunity and parasite growth (Rogier *et al.*, 2003).

- Prevalence and Absenteeism rates associated with malaria

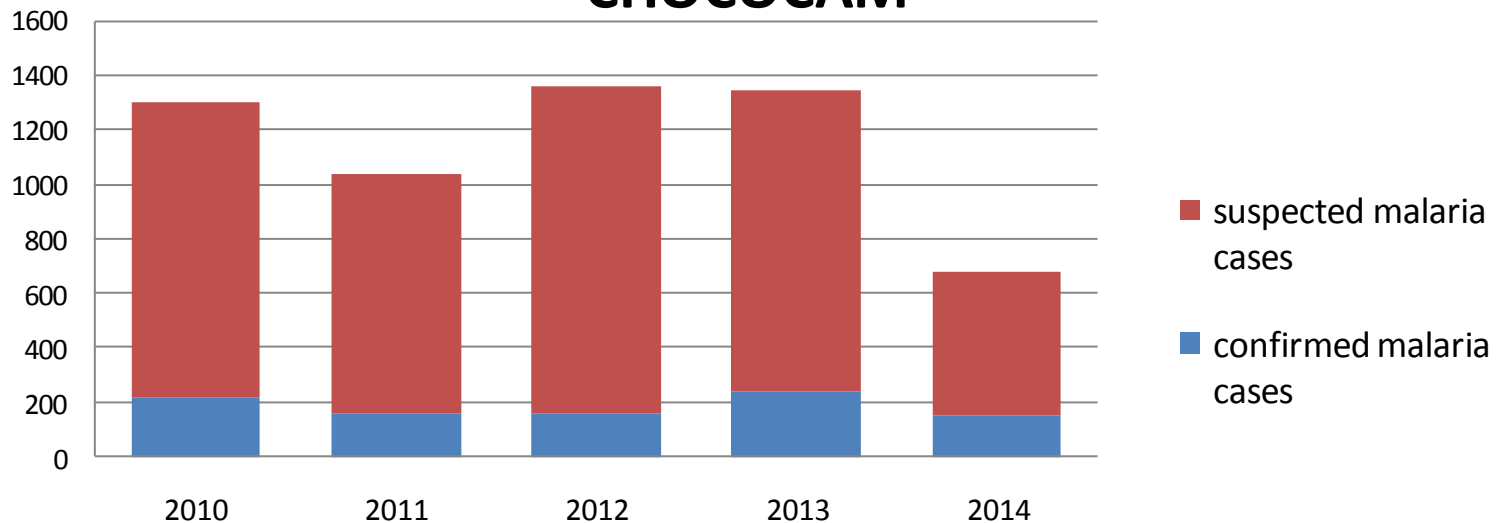


Evolution of malaria prevalence in CHOCOCAM

malaria/other diseases (%)



Number of malaria cases per year in **CHOCOCAM**



- Suspected malaria represents 80% of malaria cases
- Rapid diagnosis can permit detection and cure of employees, reduce absenteeism and prevent severe malaria

Malaria impact in enterprise

Ratio = External Clinical care/ monthly salary

	Simple malaria	Severe malaria
Mean cost of external clinical care US\$	26	75,2
Monthly salary US\$	260	260
Ratio	0,10	0,29

- CHOCOCAM: external clinical care represents 10 to 29 % of monthly salary
- Ghana: 81,56 % (Asanté *et al.*, 2003).



Screening communities





Malaria prevalence in urban settings in Douala

	Bali	Bonamikano	Dikollo-Bali	Bonandoumbe	Mabanda	Sodiko	Total
Positive	302	153	131	221	472	419	1698
Negative	507	173	189	239	664	843	2615
Total	809	326	320	460	1136	1262	4313
Prevalence	37.33%	46.93%	40.94%	48.04%	41.55%	33.20%	39.37%

FLUORESCENCE MICROSCOPY IN APPLIED FIELD RESEARCH

MASS SCREENING IN RURAL SCHOOLS





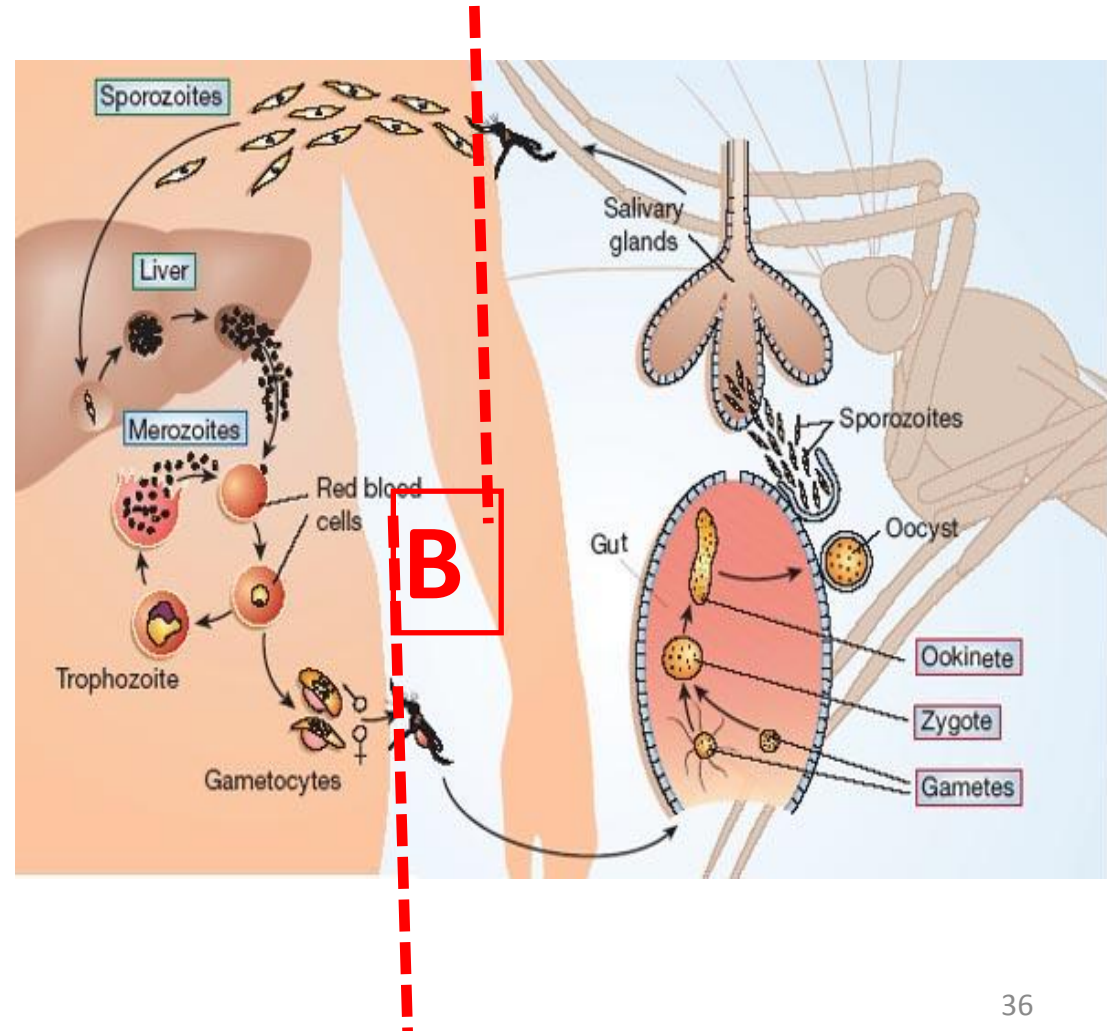
MASS SCREENING IN RURAL COMMUNITIES



Contribution for malaria elimination strategies

1 - Why not treat systematically ?

2 - Why not protect systematically?



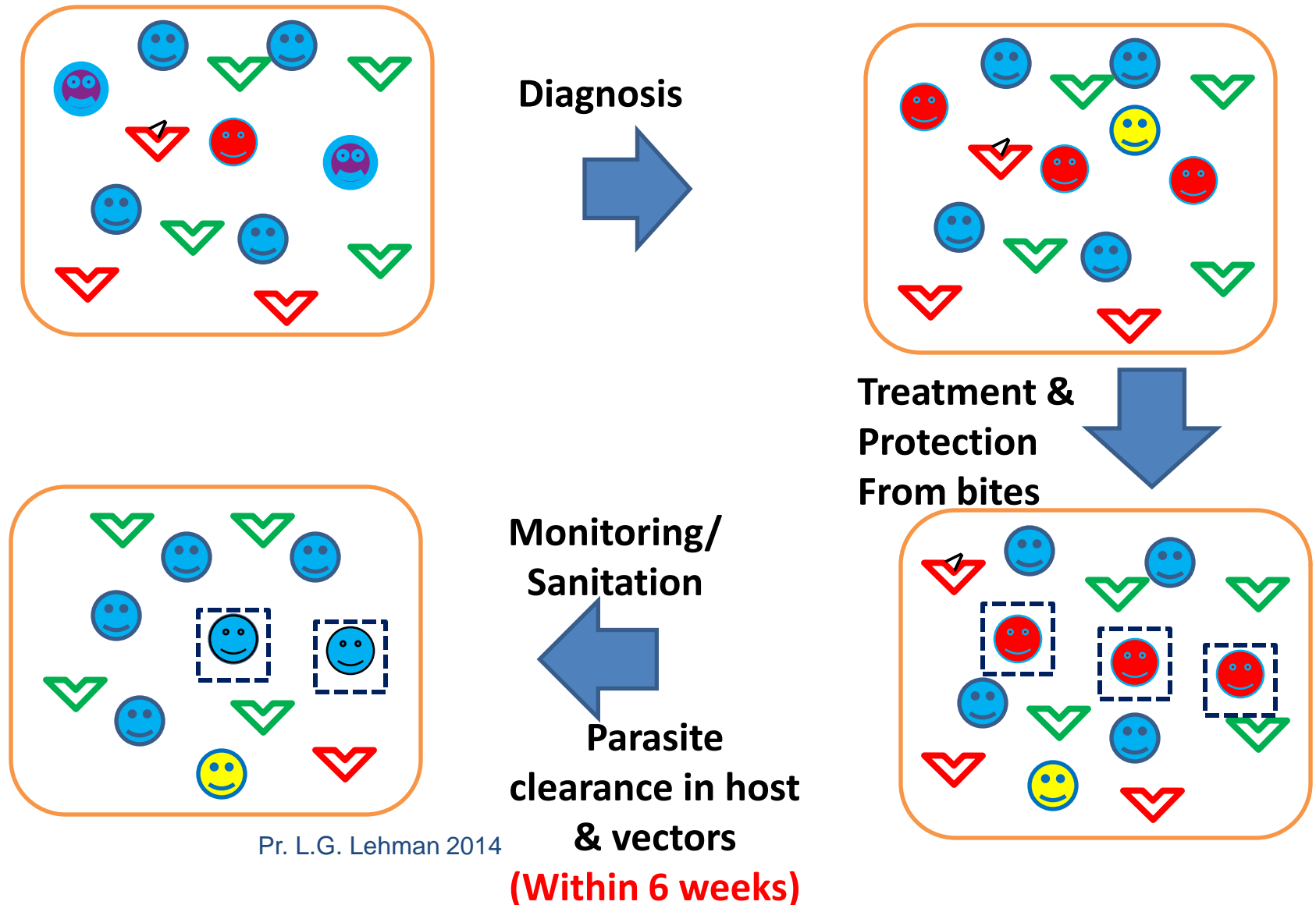


Diagnosis-Treatment-Barrier (DTB) Approach

*Presence of **P**arasites \Rightarrow **P**rotection from bites*

Every positive case is a parasite reservoir, which must be closely protected against Anopheles bites for about 6 weeks

Humanisation et Concept D+T+B



Our global approach for malaria elimination



&



Conclusive remarks

In Cameroon

- Asymptomatic malaria is highly prevalent in Douala and should be considered for elimination

The DTB approach specifically targets positive cases and might reduce prevention costs as compared to Intermittent Preventive Treatment



Conclusive remarks

In General

1. Rapid detection of asymptomatic malaria cases is feasible in endemic areas using fluorescence microscopy
2. Surveillance of malaria and NTDs can be combined in urban and rural settings using the CyScope
3. Mass diagnosis should precede treatment-protection actions for malaria elimination strategies in highly endemic areas
4. Private enterprises can efficiently undertake measures to fight against malaria

Synergy : Sensitization & use of LLINs



***Unprotected
hospitalized patient***



Hope for amelioration in education (and health?)

- 31th October 2014: Reception of 202 classroom in North-West Cameroun.
- Japanese International Cooperation Agency (JICA) Since 1997:
 - 1553 classrooms in 122 primary schools
 - 52 latrines blocks
 - 104 Millions US\$





Coalition de la Communauté des Affaires contre le SIDA,
la Tuberculose et le Paludisme



ExxonMobil

THANKS

CHOCOCAM

TIGER BRANDS

