

Human Peripheral Blood Lymphocytes in Adults  
from Thailand with Naturally Acquired  
*Plasmodium falciparum* and *Plasmodium vivax*

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**OBJECTIVE :** To describe the proportions of T, B and Fc receptor bearing lymphocytes circulating in patients during infection with malaria and fourteen days after initiation of treatment.

**BACKGROUND :** Although interest in the cellular aspects of the immune response to malaria dates back many years, to the present there exists a void in our knowledge within this area. A study of the circulating lymphocytes in malaria patients was undertaken to provide basic data in this field. The technique used in this study employed sheep red cell rosettes to identify subclasses of lymphocytes (1). In addition, B lymphocytes were also characterized by staining for cell surface immunoglobulin (2).

**METHODS :** The heparinized blood of malaria patients infected with *P. falciparum* or *P. vivax* was processed by ficoll-hypaque centrifugation to isolate circulating mononuclear cells (3). The percentage of circulating T lymphocytes was identified by rosette formation with sheep erythrocytes (E rosettes) at 5 minutes, 1 hour and 18 hours. The percentage of Fc receptor lymphocytes was determined by sheep red cell/anti-sheep red cell (EA rosette) adherence. The proportions of circulating B lymphocytes were evaluated by sheep red cell/anti-sheep cell/complement (EAC rosette) complexing and by lymphocyte staining with fluorescein labelled (FITC) anti-human immunoglobulin.

**RESULTS :** Lymphocytes from 49 malaria patients were studied in the course of this work. It was found that during infection there was a marked suppression in the percentage of circulating T lymphocytes as compared with control values (Table 1). These results were highly predictable regardless of incubation time. The proportion of Fc receptor cells were essentially unchanged. There was a clearcut elevation in the percentage of circulating B cells as shown by both the EAC and the FITC techniques. Overall leukocyte kinetics were also monitored by white cell counts and by differential counts.

The lymphocytes of 5 returning *vivax* cases and 3 returning *falciparum* cases were studied by these techniques 14 days after the initiation of anti-malarial therapy (Table 2). The data indicated a general pattern which was similar to that of the active infection. A manuscript on this work is in preparation.

This project is complete.

REFERENCES :

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Table 1. Lymphocyte Rosette and FITC Values of Malaria Patients

Lymphocyte Origin	E Rosette Cells (%)			EA Rosette Cells (%)	EAC Rosette Cells (%)	FITC Cells (%)	
	5 minute incubation	1 hour incubation	18 hour incubation				
<i>Plasmodium falciparum</i>	Range	19-39	27-50	44-59	3-8	20-30	17-29
	Mean	29	41	52	5	25	24
	S.D.	± 5.0	± 4.7	± 2.3	± 1.7	± 2.7	± 7.1
<i>Plasmodium vivax</i>	Range	20-38	31-50	45-62	3-8	20-29	16-26
	Mean	29	41	54	5	24	22
	S.D.	± 5.0	± 4.8	± 3.3	± 1.5	± 2.6	± 2.7
Normal controls	Range	36-52	49-63	60-66	2-7	14-17	9-18
	Mean	41	54	63	5	16	15
	S.D.	± 4.0	± 4.3	± 1.6	± 1.3	± 1.0	± 2.3

Table 2. Lymphocyte Rosette and FITC Values of Returning Cases

Lymphocyte Origin	E Rosette Cells (%)						EA Rosette Cells (%)		EAC Rosette Cells (%)		FITC Cells (%)	
	5 minute incubation		1 hour incubation		18 hour incubation		A	C	A	C	A	C
	A <sup>†</sup>	C <sup>†</sup>	A	C	A	C	A	C	A	C	A	C
<i>Plasmodium falciparum</i>	24-32	27-42	33-39	39-55	50-52	50-61	3-4	2-4	24-27	17-26	21-27	17-24
Mean	28	33	38	44	51	54	4	3	25	22	23	21
S.D.	+ 4.0	+ 7.9	+ 5.0	+ 9.3	+ 1.0	+ 5.8	+ 0.6	+ 1.0	+ 1.5	+ 4.6	+ 3.2	+ 3.6
<i>Plasmodium vivax</i>	21-30	21-34	32-42	31-45	54-56	51-60	4-6	3-5	20-24	21-26	19-26	18-24
Mean	25	28	37	40	55	55	5	4	21	23	21	21
S.D.	+ 3.9	+ 5.3	+ 3.7	+ 5.6	+ 0.8	+ 3.4	+ 0.9	+ 0.9	+ 1.6	+ 2.1	+ 2.8	+ 2.7
Normal* Controls	36-52	49-63	60-66	2-7	14-17	9-18						
Mean	41	54	63	5	16	15						
S.D.	+ 4.0	+ 4.3	+ 1.6	+ 1.3	+ 1.0	+ 2.3						

\* Same normal control group as indicated in Table 1

+ Values for active infection

† Values for convalescent stage