

LOW MONOCYTE TO NEUTROPHIL RATIO IN PERIPHERAL BLOOD ASSOCIATED WITH DISEASE COMPLICATION IN PRIMARY *PLASMODIUM FALCIPARUM* INFECTION

Piyatida Tangteerawatana¹, Srivicha Krudsood², Naowarat Kanchanakhan³, Marita Troye-Blomberg⁴ and Srisin Khusmith⁵

¹Department of Microbiology, Faculty of Medicine, Srinakharinwirot University, Bangkok; ²Department of Tropical Hygiene and Hospital for Tropical Diseases, Faculty of Tropical Medicine, Mahidol University, Bangkok; ³Malaria Research Program, College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand; ⁴Department of Molecular Biosciences, The Wenner-Gren Institute, Stockholm University, Stockholm, Sweden; ⁵Department of Microbiology and Immunology, Faculty of Tropical Medicine, and Center for Emerging and Neglected Infectious Diseases, Mahidol University, Bangkok, Thailand

Abstract. Immunity to malaria can be acquired but only after repeat exposures to polymorphic *Plasmodium*. However, the development of clinical outcomes during *P. falciparum* infection is not clearly understood. This study elucidated whether monocytes, neutrophils and pro/anti-inflammatory cytokines were associated with clinical outcomes in single infection and prior repeated malaria infections. Two hundred and seventy-nine patients with complicated and uncomplicated malaria were investigated. Peripheral blood IFN- γ , TNF- α and IL-10 levels were measured by ELISA, and monocytes and neutrophils by an automated cell counter. On admission, in patients with uncomplicated malaria prior repeated infections, absolute neutrophil counts were positively and monocyte to neutrophil ratio negatively correlated significantly with parasitemia ($r = 0.358, p = 0.000$; $r = -0.356, p = 0.000$, respectively), while those with single infection absolute monocyte counts and monocyte to neutrophil ratio were significantly correlated negatively with IFN- γ ($r = -0.381, p = 0.001$; $r = -0.393, p = 0.000$, respectively), and positively with TNF- α levels ($r = 0.310, p = 0.007$; $r = 0.227, p = 0.017$, respectively). In sharp contrast, in complicated malaria with single infection extremely high IFN- γ and IL-10 levels but significantly low percent monocyte counts and monocyte to neutrophil ratio were seen. After 7 days of treatment, absolute monocyte counts and monocyte to neutrophil ratio were significantly increased, while absolute neutrophil counts significantly decreased ($p = 0.000, 0.000$, and 0.001 , respectively), similarly after 28 days of treatment ($p = 0.008, 0.000$ and 0.000 , respectively). These results suggest different functions of monocytes, neutrophils and pro/anti-inflammatory cytokines in complicated and uncomplicated malaria with single *P. falciparum* infection or

Correspondence: Dr Srisin Khusmith, Department of Microbiology and Immunology, Faculty of Tropical Medicine, Mahidol University, 420/6 Ratchawithi Road, Bangkok 10400, Thailand.

Tel: 66 (0) 2354 9100-13 ext 1594; Fax: 66 (0) 2643 5583

E-mail: srisin.khu@mahidol.ac.th

prior repeated infections in the context of disease severity. Low monocyte to neutrophil ratio may be regarded as a risk factor in developing complication in primary malaria infection.

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