

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Occlusion of Small Vessels by Malaria-Infected Red Blood Cells¹

HUAN LEI, Brown University, DMITRY FEDOSOV, Forschungszentrum Juelich, BRUCE CASWELL, GEORGE KARNIADAKIS, Brown University — We use dissipative particle dynamics (DPD) method to study malaria-infected red blood cells (i-RBC). We have developed a multi-scale model to describe both static and dynamic properties of RBCs. With this model, we study the adhesive interaction between RBCs as well as the interaction between the Plasmodium falciparum (Pf)-parasitized cells and a vessel wall coated with purified ICAM-1. In this talk, we will discuss the effect of the Pf-parasitized malaria cell on the flow resistance of the blood flow at different parasitemia levels. The blood flow in malaria disease shows high flow resistance as compared with the healthy case due to both the stiffening of the i-RBCs (up to ten times) as well as the adhesion dynamics. For certain sizes of small vessels, the malaria-infected cells can even lead to occlusion of the blood flow, in agreement with recent experiments.

¹Supported by NIH R01HL094270.

George Karniadakis
Brown University

Date submitted: 03 Aug 2010

Electronic form version 1.4