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Sensing of poorly deformable red blood cells by the human spleen: Implication on the pathophysiology of several hematological diseases

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Splenic entrapment of red blood cells (RBCs) with reduced deformability has been long recognized to contribute to pathogenesis of several RBC disorders and *Plasmodium falciparum* malaria. Squeezing of RBCs through splenic inter-endothelial slits is the ultimate process during which their mechanical properties are most stringently sensed. As a consequence, RBCs with reduced deformability are retained in the cords, and eventually destroyed by red pulp macrophages. RBC deformability is influenced by three principal parameters, namely intracellular viscosity, cell membrane viscoelasticity and surface area -to -volume (S/V) ratio. Several hemolytic RBC disorders are accompanied with the defect of at least one of these parameters. However, the quantitative relationship between the extent of alteration and splenic retention of affected RBCs is poorly understood. This presentation will summarize our recent investigations addressing this issue using ex vivo perfusion of normal human spleen with RBCs harboring asexual stage of *P. falciparum* (Pf-RBCs) or healthy RBCs exposed to varying concentrations of chemicals to induce a dose-dependent loss of cell surface area with reduced S/V ratio or RBCs with increased membrane rigidity. To confirm the mechanical process of their splenic entrapment, Pf-RBCs or chemical exposed RBCs were perfused in parallel through ex vivo human spleen and through a microfiltration system that mimics the mechanical filtering function of the human spleen. The implication of the results for understanding the heterogeneity of RBC membrane disorders will be discussed.

Biography

Innocent Safeukui received his Ph.D. in Health-Biology at the University Medical School of Bordeaux II in 2004. He received postdoctoral training at the University Medical School of Bordeaux II (2004-2005) and Institut Pasteur of Paris (2005-2010). He is currently Research Scientist at University of Notre Dame (Kasturi Haldar Lab). His principal field of research is malaria. He has authored or co-authored 26 articles in peer-reviewed scientific journals and has reviewed several research manuscripts of different journals.

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