Abstract Submitted
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Mechanosensing Dynamics of Red blood Cells JIANDI WAN, Rochester Institute of Technology — Mechanical stress-induced deformation of human red blood cells (RBCs) plays important physiopathological roles in oxygen delivery, blood rheology, transfusion, and malaria. Recent studies demonstrate that, in response to mechanical deformation, RBCs release adenosine-5'-triphosphate (ATP), suggesting the existence of mechanotransductive pathways in RBCs. Most importantly, the released ATP from RBCs regulates vascular tone and impaired release of ATP from RBCs has been linked to diseases such as type II diabetes and cystic fibrosis. To date, however, the mechanisms of mechanotransductive release of ATP from RBCs remain unclear. Given that RBCs experience shear stresses continuously during the circulation cycle and the released ATP plays a central role in vascular physiopathology, understanding the mechanotransductive release of ATP from RBCs will provide not only fundamental insights to the role of RBCs in vascular homeostasis but also novel therapeutic strategies for red cell dysfunction and vascular disease. This talk describes the main research in my group on integrating microfluidic-based approaches to study the mechanosensing dynamics of RBCs. Specifically, I will introduce a micro?uidic approach that can probe the dynamics of shear-induced ATP release from RBCs with millisecond resolution and provide quantitative understandings of the mechanosensitive ATP release processes in RBCs. Furthermore, I will also describe our recent findings about the roles of the Piezo1 channel, a newly discovered mechanosensitive cation channel in the mechanotransductive ATP release in RBCs. Last, possible functions of RBCs in the regulation of cerebral blood flow will be discussed.

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