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MODELING BLOOD FLOW BY TAKING EXPLICITLY RED BLOOD CELLS INTO ACCOUNT

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This talk will focus on modeling and simulation of blood flow by taking into account explicitly the major blood component, namely the red blood cells (RBC), their mutual interactions and their interaction with blood vessel walls. We briefly recall recent major recent progress on dynamics under flow for a single RBC. Then collective effects will be studied showing non-standard rheological properties in blood mirco-circulation as well as the formation of stable RBC rouleaux mediated by plasma proteins. It is found that even under high mean shear rates and within physiological ranges of fibrinogen concentrations, RBC clusters persist. Formation of stable large enough clusters should strongly affect RBCs entrance in capillaries and impede oxygen delivery. RBCs aggregation is generally known to increase microvascular flow resistance and consequently reduce blood perfusion to the organs. Finally, recent results on the effect of glycocalyx on hemodynamics will be discussed.

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