

Multi-scale modelling of blood rheology in sickle cell disease

Freya Bull

Sickle cell disease (SCD) is a haematological disorder, caused by a genetic mutation, in which mutant haemoglobin molecules can polymerise under low-oxygen conditions, altering the biophysical properties of the red blood cells. These cell-level differences then result in changes in the whole-blood rheology -- and those rheological properties are in turn linked to the pathophysiology of SCD. Ongoing experimental work indicates that SCD blood exhibits increased frictional and viscous resistances to flow. Our work investigates the contribution of elevated red blood cell friction to the whole-blood rheology, utilising mathematical modelling and numerical simulation to develop descriptions of cell-cell interactions within blood flow.