Red Blood Cell deformation under extensional flow in the microchannel

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Investigating the response of Red Blood Cell (RBC) to the mechanical stress in shear or extensional flow is meaningful in both clinical and rheological point of view. There have been many studies investigating RBC deformation in shear flow, but study under extensional flow is not common. In this study, we control the magnitude of extensional flow in the microchannel and investigate the response of RBC. Microchip was fabricated by molding polydimethylsiloxane (PDMS) upon a silicon master. RBC suspended in polyvinylpirrolidone (PVP) solution was inputted into the microchannel and the images were captured during the flow. To figure out the characteristics of flow field in the microchannel, computer simulation was carried out and the results were compared with the images. It was observed that the RBC could be elongated more easily where the extensional flow is dominant.