

Deformation of Vesicles Flowing Through a Capillary

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Giant vesicles are closed, deformable membranes which can be a useful model when trying to understand the fluid mechanics and rheology of cell suspensions, such as blood. The flow of giant vesicles through cylindrical capillaries is experimentally investigated. Vesicles (20–50 microns in diameter) are deflated with reduced volumes between 0.8 and 1. Both interior and exterior fluids are sugar solutions with viscosities close to 1 cP. Vesicles are aspirated into a capillary tube with a diameter close to the vesicle size and a constant flow rate is imposed. Significant deformation of the membrane occurs, with vesicle shapes such as ellipsoids, bullet shapes or parachute shapes. We quantitatively investigate the deformation as a function of velocity, reduced volume and confinement. The mobility of vesicles (ratio of their velocity to the average velocity of the carrier fluid) is also studied and consequences on flow resistance is discussed.

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