Numerical calculation of drag force on hemi-ellipsoidal endothelial cell

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Vascular endothelial cells are an interface between blood vessel walls and blood flow, and play important roles in physiological functions. Spatially, the interaction between endothelial cell and shear stress on its surface is an important fact to find the mechanism of cardiovascular disease such as coronary sclerosis, angina pectoris or atherosclerosis. Flaherty et al.(1972) studied the relationship between orientation or elongation of endothelial cell nuclei and blood flow pattern using a canine artery. After their report, many experimental (in vivo or in vitro) and numerical results have been reported.

In my report, I calculated the drag force caused by blood shear stress on the surface of hemi ellipsoidal shaped endothelial cells. And the minimum drag shape of constant volume endothelial cell is obtained from these numerical calculations. From these results, it is speculated that the endothelial cell adjusts its shape in a way to minimize the drag force exerted by the shear stress.