

Numerical analysis of margination of a cancer cell in microcirculation

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In hematogenous metastasis, a cancer cell adheres to the blood vessel wall, and invades healthy tissues where it grows and divides. To establish the initial contact to the wall, the cancer cell must migrate toward the wall and this process is called margination. A deformable cell tends to migrate toward the center of the channel. Previous studies on white blood cell (WBC) margination have suggested that the interaction with red blood cells (RBCs) is a key factor in margination. However, a cancer cell is in general, larger than a WBC, which may cause a difference in the interaction behavior. The objective of this study is to clarify the detailed interaction between a cancer cell and RBCs in microcirculatory blood flow. We numerically investigate the effect of channel diameter, cell deformability and volume fraction of RBCs on the margination of cancer cells.

Keywords: Margination, Cancer cell, Microcirculation, Lattice-Boltzmann method, Finite element method