Immune cells in an obstacle park

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We study how migration and search efficiency of immune cells is influenced by spatial arrangement of obstacles. We focus on the topographical influence of the environment on cell migration in absence of a chemical gradient and visualize the migration of ameoboid cells in pillar parks with different pillar densities. The pillars are periodically arranged on square and triangular lattice sites. In experiments, a microfluidic device is designed to track the neutrophil cells in quasi-2D environments whose thickness vary from 3.5 to 6 micrometers. Our device consists of monosispersed pillars.

We calculate the mean first passage time and dynamical properties of the cells in different densities and configurations of pillars and compare the results with numerical simulations to understand the mechanism underlying cell migration strategies.