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Research from University of Arizona in microelectromechanical systems provides new insights
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Life Science Weekly

"The attachment kinematics of cancer cells under hydrodynamic loading in antibody-functionalized microchannels has been studied. Epithelial-cell-adhesion-molecule antibodies are immobilized on
the microchannel surface for specific capture of the target cancer cells from homogeneous cell suspensions,” scientists writing in the Journal of Microelectromechanical Systems report (see also ). "The specific interaction between the cancer cell receptors and the immobilized antibodies under static conditions is demonstrated. The capture efficiency of the target cells from homogeneous suspensions under applied hydrodynamic flow field has been investigated, revealing a characteristic shear stress. Applying a lower stress allows the capture of most target cells, while the capture efficiency drops sharply with an increasing shear stress. The captured cells are spatially distributed along the microchannel; both the velocity and the distance travelled by cells prior to capture are measured. The characteristic time and length scales for cell capture are determined, and a log-normal statistical distribution is proposed to describe the observations. Furthermore, a first-order kinetic model for receptor-ligand bond formation provides a rough estimate of the cell adhesion rate constant. Under a low shear stress, the on-rate is much higher than the off-rate, allowing capture of most loaded cells,” wrote L.S.L. Cheung and colleagues, University of Arizona.

The researchers concluded: "The off-rate constant increases exponentially with an increasing shear stress, such that above the characteristic stress level, most loaded cells avoid capture. [2010-0038].”


Additional information can be obtained by contacting L.S.L. Cheung, University of Arizona, Dept. of Aerosp & Mech Engineering, Arizona Cancer Center, Institute BIO5, Tucson, AZ 85721, USA.

The publisher of the Journal of Microelectromechanical Systems can be contacted at: IEEE-Institute Electrical Electronics Engineers Inc., 445 Hoes Lane, Piscataway, NJ 08855-4141, USA.

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