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Abstract:

Adhesion and rolling on vessel walls are two processes which are relevant for the homing of hematopoietic cells. Especially in the case of acute leukemia, one key in successful therapy is the homing of the hematopoietic stem cells (HSC) to the bone marrow after transplantation. We investigated the interaction of HSC with the hyaluron binding motive and quantitatively studied the interaction of different leukemic cells with synthetic polysaccharide surfaces. For the experiments we applied a microfluidic shear force assay recently developed in our group [1]. Leukemic Jurkat and Kasumi-1 cells lacking CD44-expression showed no adhesion or rolling on the polysaccharides whereas CD44 expressing leukemic cells KG-1a, HL-60, and K-562 attached and rolled on hyaluronan. We find that at weak flow cells have a poor tendency to adhere and only if shear forces above a threshold are present, adhesion is mediated. While this effect is well known for leukocytes on hyaluronan expressing feeder layers, it is the first demonstration that the mechanism also occurs in leukemic progenitor cells towards synthetic hyaluronan coated surfaces. We also extended the study to hematopoietic progenitor cells and saw for the first time that also HPCs with high degree of stemness show a flow induced interaction with hyalurons.

[1] C. Christophis, M. Grunze, A. Rosenhahn, Phys. Chem. Chem. Phys. (2010) 12, 4498

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