Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary material (ESI) for RSC Advanced

Microfluidic device performing on flow study of serial cell-cell interactions of two cell populations

Margaux Duchamp[a], Thamani Dahoun[a,], Clarisse Vaillier[a], Marion Arnaud[b], Sara Bobisse[b], George Coukos[b], Alexandre Harari[b], and Philippe Renaud[a]

[1] Laboratory of Microsystems LMIS4, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
[2] Department of Oncology, Lausanne University Hospital, Ludwig Institute for Cancer Research, University of Lausanne, Lausanne CH-1066, Switzerland.

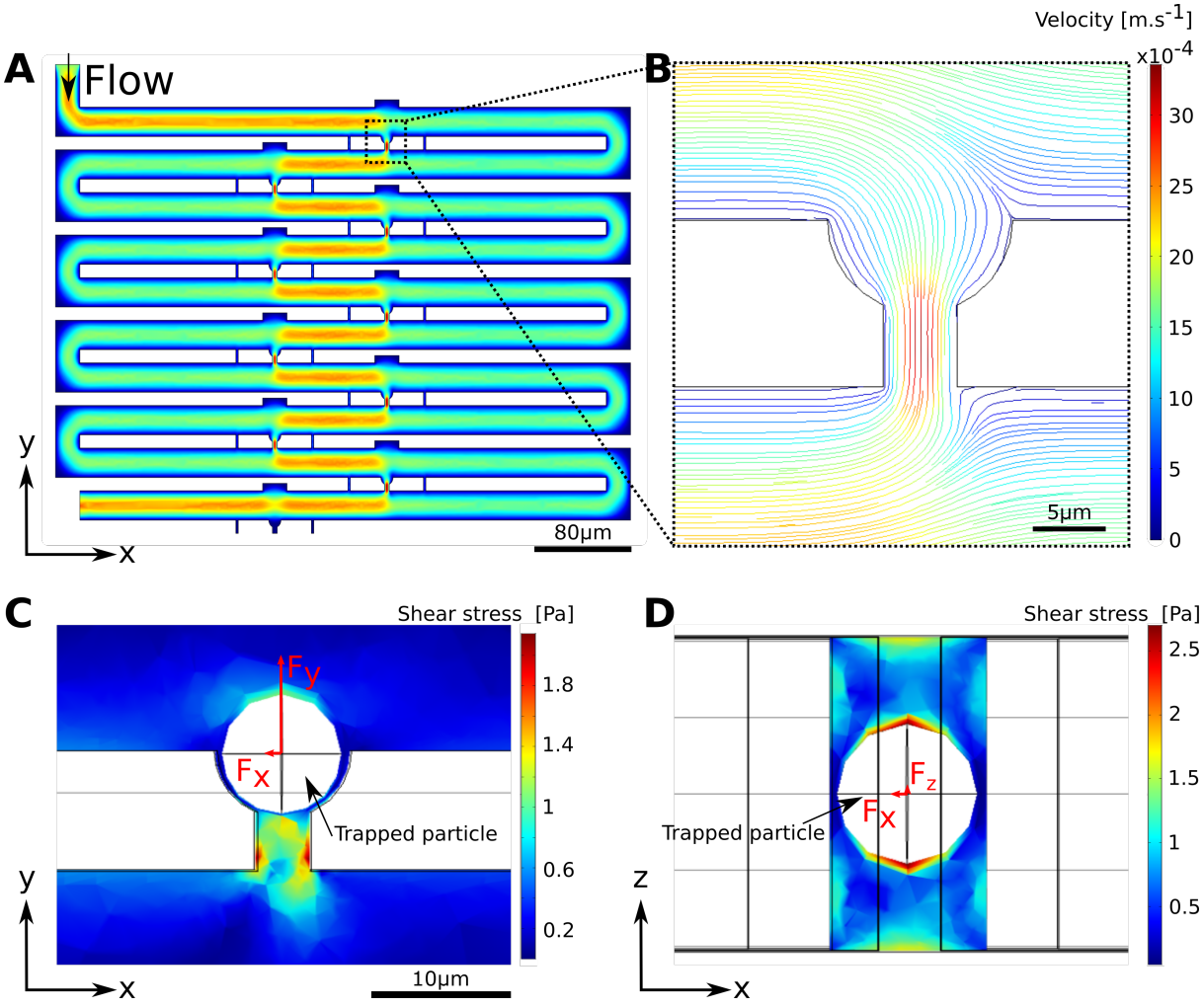

Fig. S1: CFD analysis presenting the resulting flow-velocity, shear stress and force distributions for the two conditions before and after cell trapping. 3D simulation without cell immobilization: (A) flow-velocity field distribution in the area of the cell immobilization sites; (B) close-up of the first site in (A) with the pressure distribution and velocity streamlines. 3D CFD simulation with an immobilized cell: (C) shear stress distribution in the horizontal cross-section at 10 μm above the bottom of the channel after a single cell has been trapped at the center of the orifice; (D) vertical cross-section through the center of the cell and immobilization orifice. The red arrows in (C) and (D) proportionally represent the calculated x -, y - and z -component of the net force exerted on the 10 μm diameter sphere.

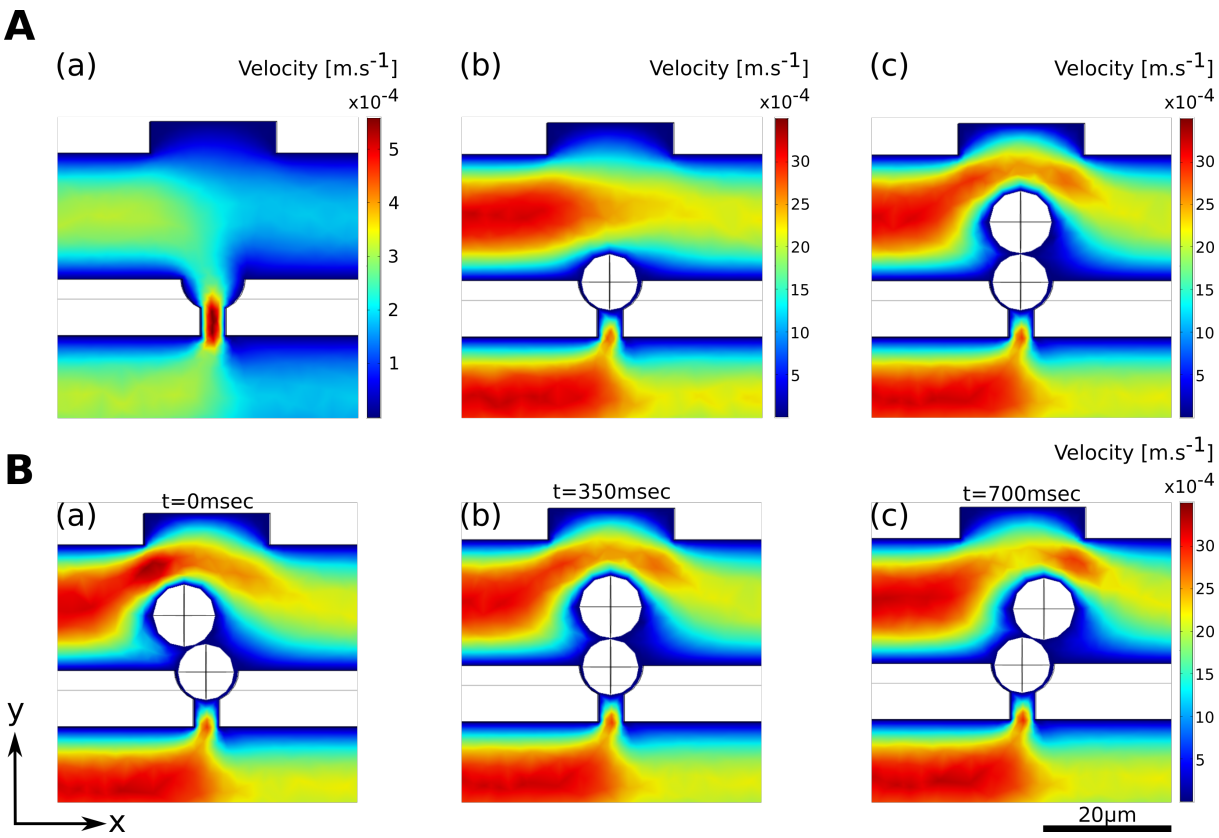

Fig. S2: CFD analysis presenting the resulting flow-velocity distributions at a single trap location on the XY plane at a middle channel height (10 μm). 3D simulation of the flow velocity in different cases (A), without any cell trapped (a), with a cell trapped (b) and with a cell rolling over a trapped cell (c). 3D simulation of a cell rolling over a trapped cell (B) at different time points (a, b and c).

Movie S1 (+/+): Fluorescence and brightfield merge movie from which the time lapse on Fig. 4D top was extracted. Movie of a rolling OR-GFP expressing cell on an trapped OR-GFP expressing cell (+/+). The images were acquired every 787msec and the movie is played at 7 FPS (real speed).

Movie S2 (+/-): Fluorescence and brightfield merge movie from which the time lapse on Fig. 4D top was extracted. Movie of a rolling OR-GFP expressing cell on an trapped citrin expressing cell (+/-). The images were acquired every 787msec and the movie is played at 7 FPS (real speed).