Electronic Supplementary Material (ESI) for Lab on a Chip.

Effect of in-plane and out-of-plane bifurcated microfluidic channels on the flow of aggregating red blood cells

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Supplementary Text

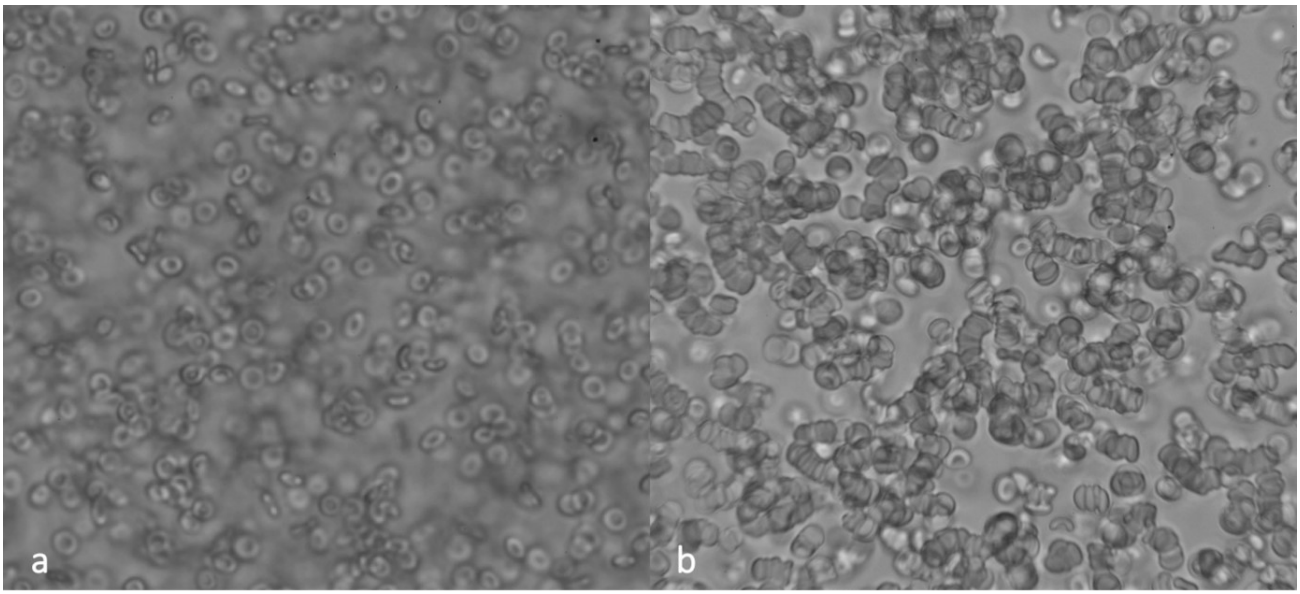

Figure S1.
An example of the prepared sample under equilibrium condition at hematocrit of 10% observed using 50x Air objective. (a) represents RBCs sample in absence of the Dextran, (b) example of the aggregated sample due to presence of the Dextran.

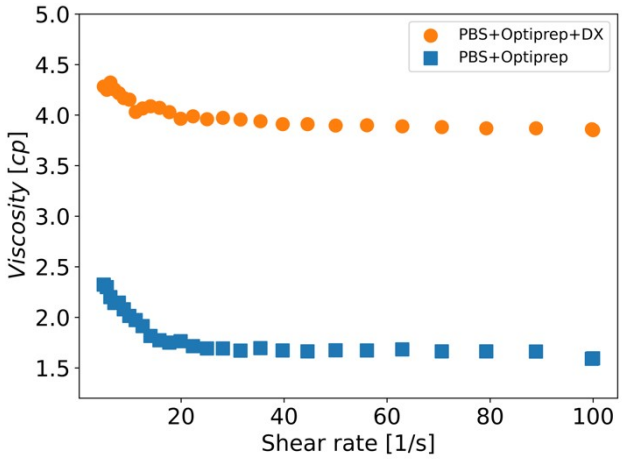

Figure S2.
Measured viscosity of the PBS-Optiprep with and without Dextran.

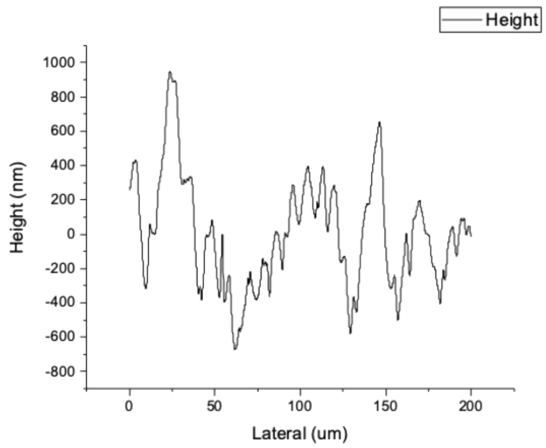

Figure S3.
Measured roughness of the fabricated chip using DektakXT profilometer (Bruker, US). The measured results indicate the roughness of the surface in the order of a 1.5 **µ**m.

The videos are show cases and thus represent only 2 % of the total movie.

Movie S1.

Blood flow through a 3D geometry with $^{L}/_{D} = 3$ and hematocrit of $H5_{dex}$ (5% volume fraction of RBCs and 50 $mg\ ml^{-1}$ dextran to induce aggregation). The flow rate is 30 $\mu l\ min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 20 μm

Movie S2.

Blood flow through a 3D geometry with $^{L}/_{D} = 3$ and hematocrit of $H10_{dex}$. The flow rate is 30 $\mu l\ min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 40 μm.

Movie S3.

Blood flow through a 3D geometry with $^{L}/_{D} = 3$ and hematocrit of $H20_{dex}$. The flow rate is 30 $\mu l\ min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 20 μm

Movie S4.

Blood flow through a 3D geometry with $^{L}/_{D} = 6$ and hematocrit of $H20_{dex}$. The flow rate is 30 $\mu l\ min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 20 μm.

Movie S5.

Blood flow through a 3D geometry with $^{L}/_{D} = 9$ and hematocrit of $H20_{dex}$. The flow rate is 30 $\mu l\, min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 20 μm.

Movie S6.

Flow dispersion of 2 μm polystyrene beads through a 3D geometry with $^{L}/_{D} = 3$ and volume fraction of 10%. The flow rate is 30 $\mu l\, min^{-1}$ that matches physiological conditions. Bright field microscopy taken with an exposure time of 200 μs. The scale bar represents 40 μm

Movie S7.

The central segment of Movie S5 captured using bright-field microscopy with an exposure time of 200 μs. This extended sequence provides evidence that RBCs are not subject to jamming or adhesion along the channel walls. However, between 1 to 3 seconds into the footage, a tumbling RBC is observed within the region marked by the red rectangle. Following this occurrence, no further events are detected for the subsequent 13 seconds. The scale bar indicates a length of 10 μm.