- Electronic Supplementary Information -

Fully-automated and field-deployable blood leukocytes separation platform using multi-dimensional double spiral (MDDS) inertial microfluidics

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and (c) one quad-version of MDDS device, respectively. MDDS device, multi-dimensional double spiral device.

Fig. S6. Gating strategy for the identification of PMNs and assessment of PMN activation and function.

Fig. S7. PLT recoveries and WBC purities under considering the PLT populations for three different recirculation platforms having (a) a single-version of MDDS device, (b) two quad-version of MDDS devices, and (c) one quad-version of MDDS device, respectively. The WBC purities of (a−c) were calculated as the portion of WBCs against RBCs and PLTs. The values in graphs are expressed as the mean±SD (n=3−4). MDDS platform, multi-dimensional double spiral platform; PLT, platelet; WBC, white blood cell.

Video S1. Single spiral device versus MDDS device on blood separation

Video S2. Assembly method of a platform having a single-version of MDDS device

Video S3. Operation of a platform having a single-version of MDDS device

Video S4. Assembly method of a platform having two quad-version of MDDS devices

Video S5. Operation of a platform having two quad-version of MDDS devices

Video S6. Parallel operation of three different platforms having two quad-version of MDDS devices

Video S7. Hand-powered operation of a platform having two quad-version of MDDS devices

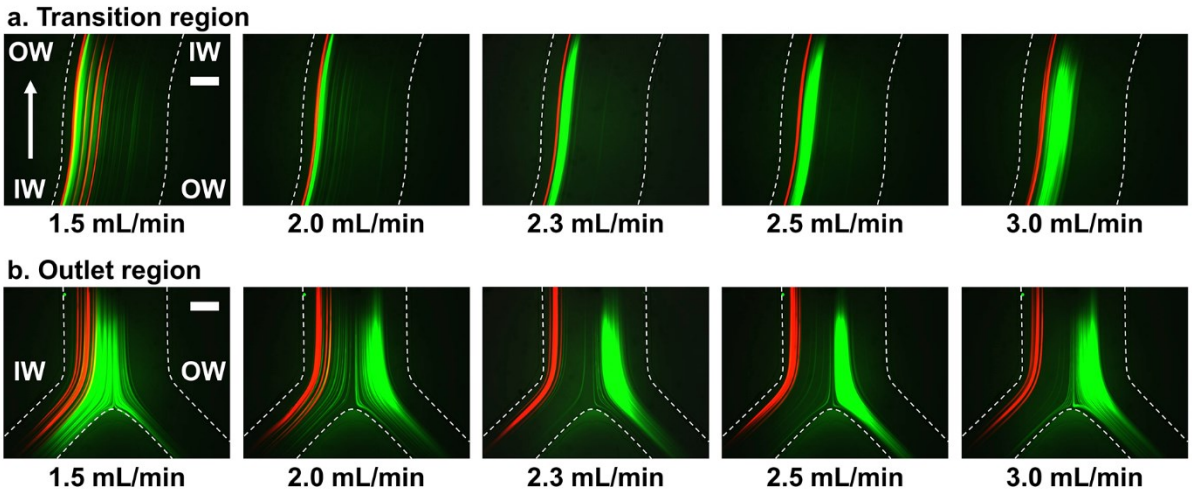


Fig. S1. Particle trajectories at (a) transition region and (b) outlet region in the MDDS device under various flow rate conditions; particles having diameters of 6 (green) and 10 μm (red) were used to mimic the movement of RBCs and WBCs, respectively (scale bar: 200 μm). IW, inner wall; OW, outer wall.

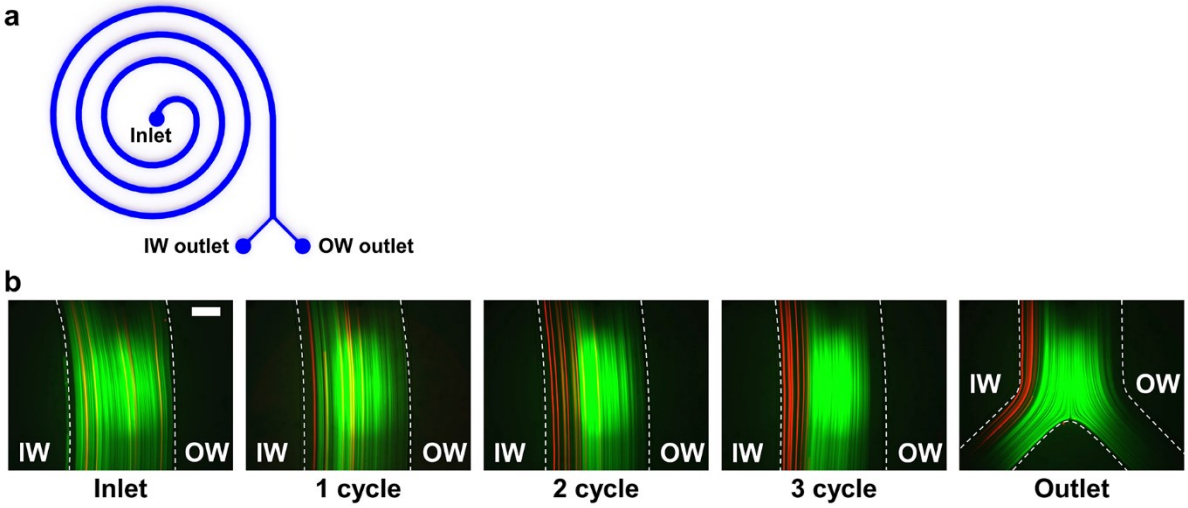


Fig. S2. (a) Channel configuration of the single spiral device. (b) Particle trajectories in the single spiral device; particles having diameters of 6 (green) and 10 μm (red) were used to mimic the movement of RBCs and WBCs, respectively (scale bar: 200 μm). IW, inner wall; OW, outer wall.

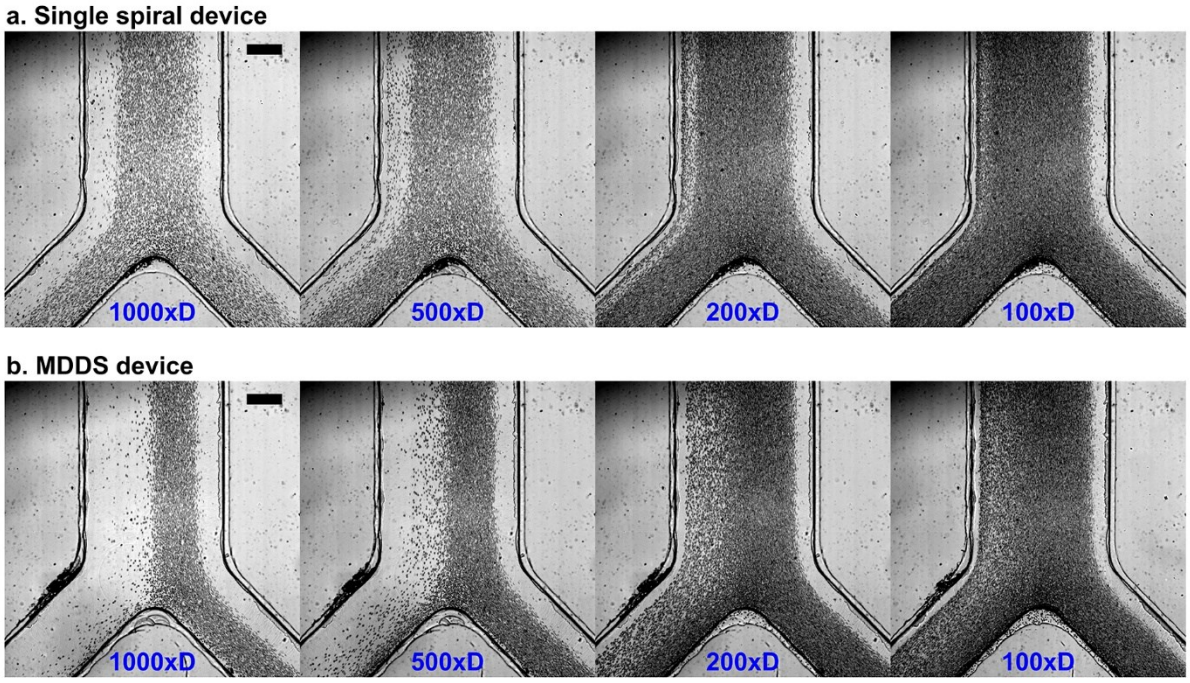


Fig. S3. Microscopic images of blood samples in (a) the single spiral and (b) the MDDS devices under various blood dilution conditions (scale bar: 200 μm); 20 consecutive images captured by a high-speed camera were overlaid for clear comparison. MDDS device, multi-dimensional double spiral device.

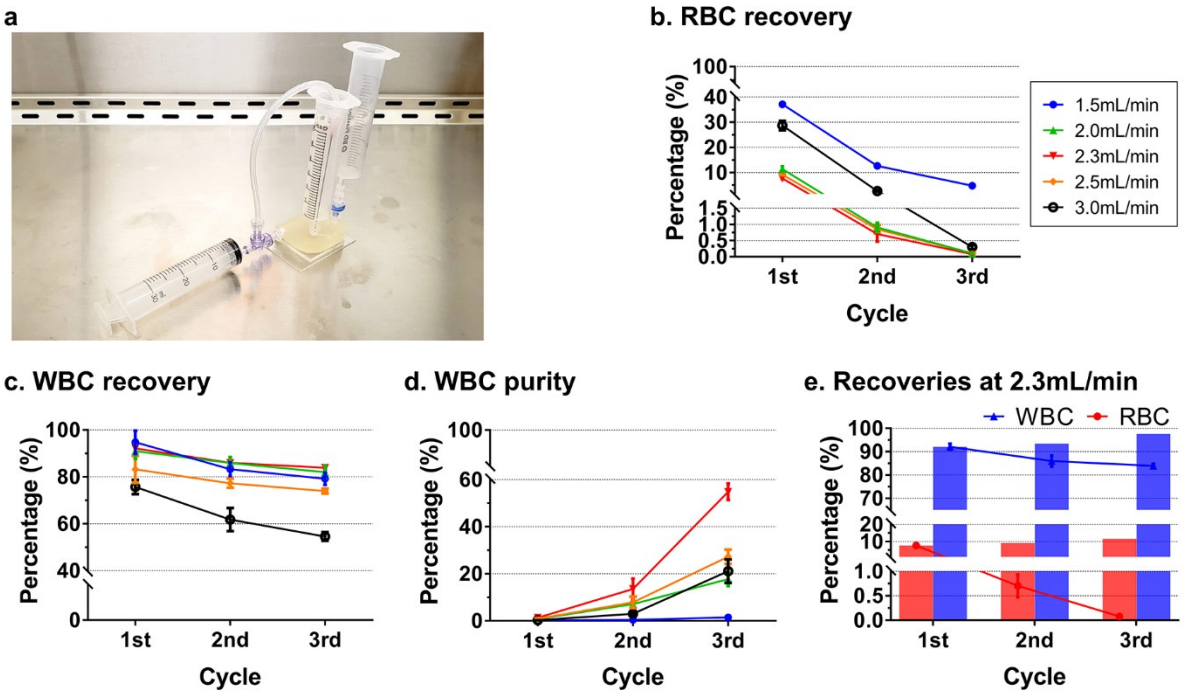


Fig. S4. (a) A photo of the recirculation platform having a single-version of MDDS device. (b) RBC and (c) WBC recovery rates and (d) WBC purity rate from the inner wall outlet with the 3 cycles of recirculation under various flow rate conditions; initial sample: 500× diluted blood. (e) RBC and WBC recovery rates under the optimal flow rate condition, 2.3 mL/min. The values in graphs are expressed as the mean±SD (n=3−4). The bar graph in (e) shows recoveries on each cycle while the line graph shows accumulate recoveries. The WBC purities of (d) were calculated as the portion of WBCs against RBCs. RBC, red blood cell; WBC, white blood cell.

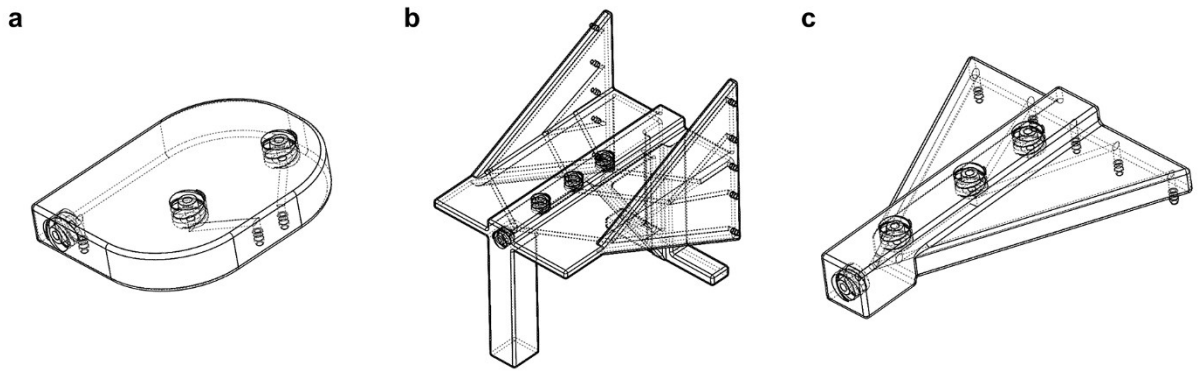
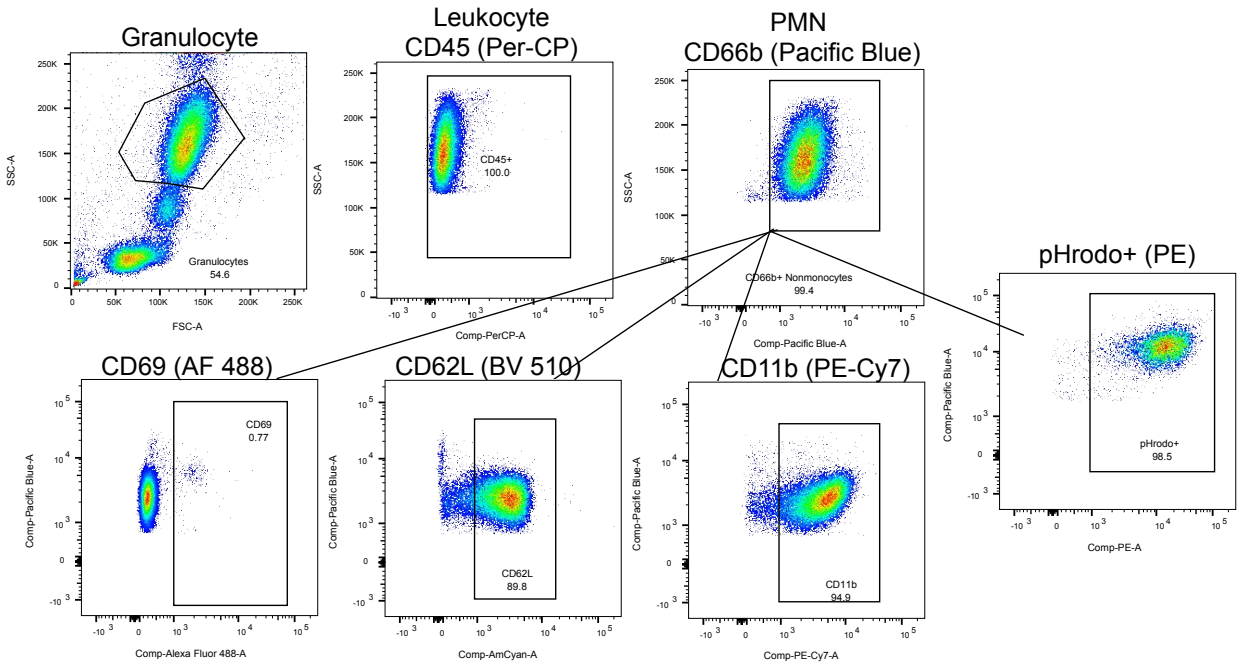


Fig. S5. CAD images of the 3D-printed connectors fabricated for three different recirculation platforms having (a) a single-version of MDDS device, (b) two quad-version of MDDS devices, and (c) one quad-version of MDDS device, respectively. MDDS device, multi-dimensional double spiral device.



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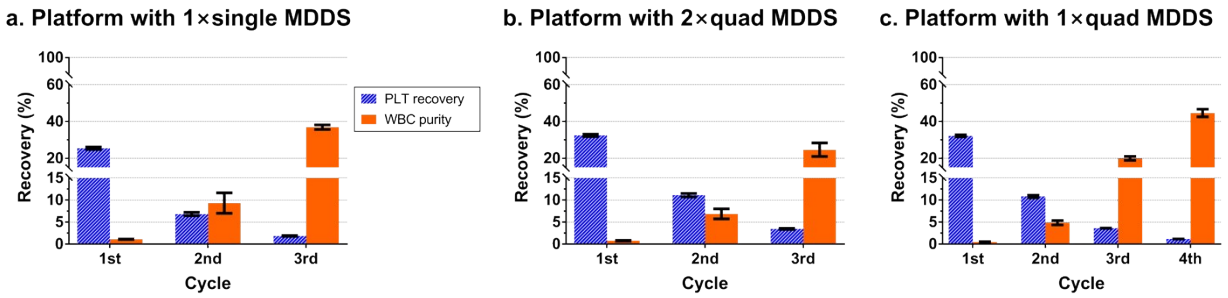

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