**Electronic Supplementary Information (ESI)**

# Standing surface acoustic wave (SSAW)-based cell washing

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## Viability test on washed white blood cells (WBCs)

In order to examine the biocompatibility of our SSAW-based cell washing device, we measured the viability of WBCs washed from lysed blood samples using our device. In this experiment, a lysed blood sample was prepared and introduced into our SSAW-based cell washing device without fixation. Three different samples were collected after cell washing: original lysed blood sample; washed WBCs; and control (WBCs collected through the lower outlet when no SSAW was applied). Then Propidium Iodide (PI) staining was conducted on these three samples to identify dead cells in each sample. After staining, bright-field and fluorescence images were taken for each sample and the viability was calculated as the percentage of PI-negative WBCs. The average viability of five different images for original sample, washed WBCs, and control was 83.6 ± 2.7%, 80.2 ± 5.8%, and 79.7 ± 6.7%, respectively, as shown in Fig. S1. Two-Sample t-Test was performed and no significant difference in viability was found between these three groups. This result demonstrates that the viability of collected WBCs was not compromised after cell washing, proving the high biocompatibility of our SSAW-based cell washing device.

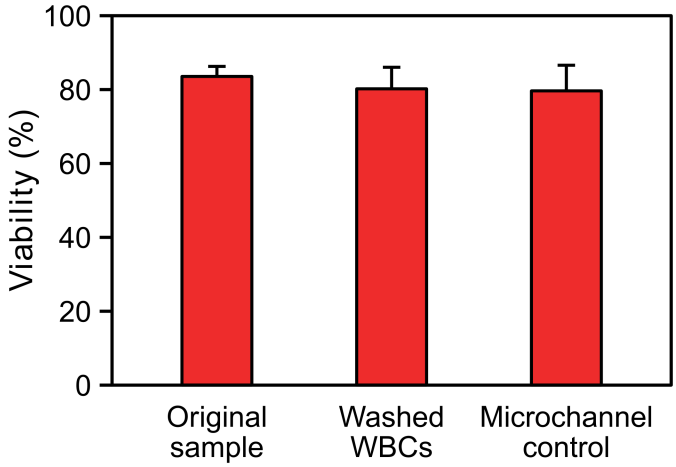


Figure S1: Viability of WBCs in original sample, washed WBCs, and control.

## Video captions

**Supplementary Video S1:** Video taken at the outlet region of the bead-washing experiment at 19.58 MHz and 26.8 $V_{pp}$. At this optimized condition, all of the 10 $\mu$m beads exited through the upper outlet and almost all of the 0.87 $\mu$m beads exited through the lower outlet.

**Supplementary Video S2:** Video taken at the outlet region of the WBC-washing experiment when there was no SSAW applied. All of the WBCs exited the microchannel through the lower outlet, mixed with debris.

**Supplementary Video S3:** Video taken at the outlet region of the WBC-washing experiment when the SSAW was applied at 19.58 MHz and 34.0 $V_{pp}$. Almost all of the WBCs got washed out and collected through the upper outlet, while the debris remained in the original flow stream and exited through the lower outlet.