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

Supplementary Data

Video SV1: Devices loaded with fibrin (ch2) and vessel (ch1) were treated with IL-1β and TNFα cytokines. Fluorescently labelled PMNs (cyan) were perfused through the ch1 and the time lapse videos of a region within ch1 were acquired for a duration of 30 s.

Video SV2: Devices loaded with fibrin (ch2) and vessel (ch1) were treated with IL-1β and TNFα cytokines. The devices were then treated with DS-IkL (60 μM). Fluorescently labelled PMNs (cyan) were perfused through ch1 and the time lapse videos of a region within ch1 were acquired for a duration of 30 s.

Video SV3: The beating vascularized cardiac tissue-chips under basal conditions (no-PMN; no-drug) conditions. The GCaMP6 reporter fluorescence was recorded using timelapse recording for 15 s.

Video SV4: The vascularized cardiac tissue-chips were treated with IL-1β and TNFα and activated PMNs were perfused through the vessel in ch1 for 4 hours. The GCaMP6 reporter fluorescence was recorded using timelapse recording for 15 s.

Video SV5: The vascularized cardiac tissue-chips were treated with IL-1β and TNFα cytokines. The devices were then treated with DS-IkL (60 μM) and activated PMNs were perfused through ch1 for 4 hours. The GCaMP6 reporter fluorescence was recorded using timelapse recording for 15 s.

Video SV6: The vascularized cardiac tissue-chips were treated with IL-1β and TNFα and activated PMNs were perfused through the vessel in ch1 for 4 hours. The brightfield timelapse recording was performed for 15 s.

Video SV7: The vascularized cardiac tissue-chips were treated with IL-1β and TNFα. The devices were then treated with DS-IkL (60 μM) and activated PMNs were perfused through ch1 for 4 hours. The brightfield timelapse recording was performed for 15 s.

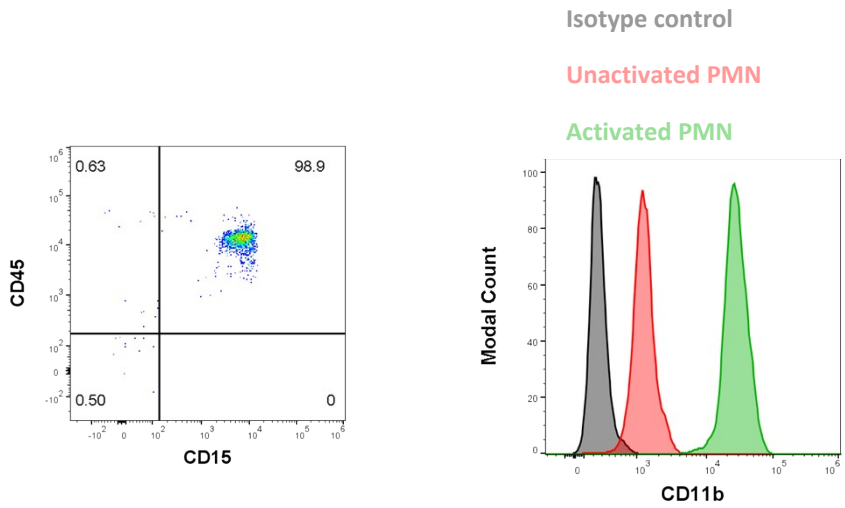

Figure S1. A) PMNs were isolated from healthy donors, labeled with antibodies, and analyzed by flow cytometry. B) PMNs were treated with IL-1β and TNFα cytokines (activated PMN) or not treated with cytokines (unactivated) and analyzed with flow cytometry.

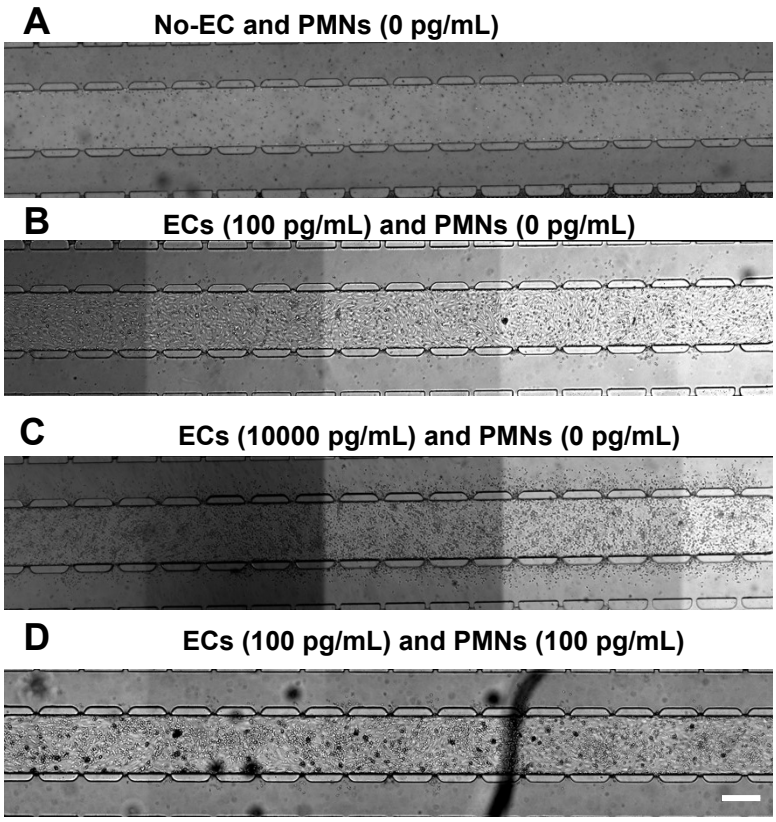

Figure S2. Brightfield images of the devices showing endothelial cell coverage. The microfluidic devices were loaded with fibrin in ch2, and ch1 was coated with ECs or not coated with cells. The devices were then treated with indicated concentrations of TNFα and IL-1β. Finally, PMNs treated with indicated concentrations of the cytokines were perfused through the device. Representative brightfield images of devices under the four conditions (Similar to Fig. 4C-F). Each image is created by stitching five fields of views and the differences in the brightness along the length of the image are due to stitching artefacts. A) no-EC and B-D) ECs (flat cells) and PMNs (small round cells) can be seen. The scale bar indicates 200 µm.

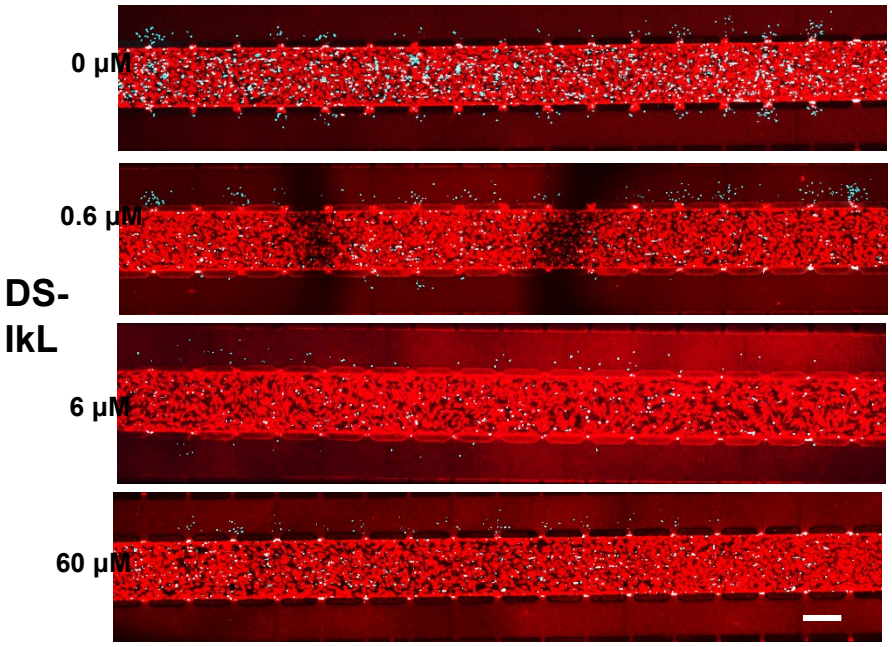

Figure S3. DS-IkL does not impact the endothelial cell continuity (coverage) in the organ-on-a-chip platform. Representative images of endothelial cells (red) after perfusion of PMNs (cyan) under different drug treatment conditions. The scale bar indicates 200 µm.