

Electronic Supplementary Information (ESI) available:

Movie 1. (Left) Timelapse images of endothelial cells dividing and proliferating within vessel-chips kept inside a cell culture incubator. (Right) Quantification of total microchip area covered by the endothelial cells. The vessel-chip becomes confluent with endothelial lumen within 48 hours of cell seeding.

Movie 2. A 3D reconstruction of confocal micrographs of the vessel-on-chip lined with BOECs on all sides of the channel and stained for VE-cadherin and nuclei. Image shows that a BOEC-laden vascular lumen is formed within organ-chips.

Movie 3. Time series showing platelet adhesion on BOEC-vessel-chips with or without TNF- α treatment. Each frame is 5 minutes apart but for presentation, the movie runs at two frames per second.