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

A vascularized organ-on-a-chip platform for large-scale drug screening applications

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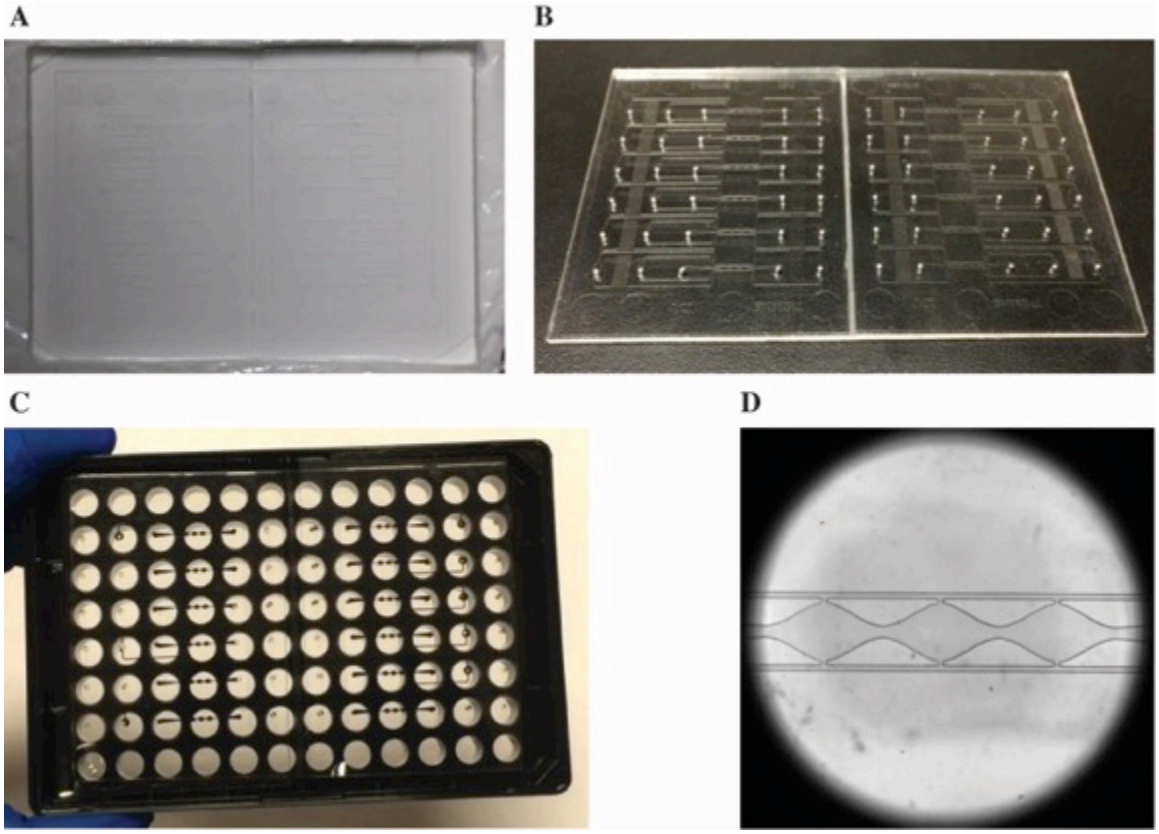
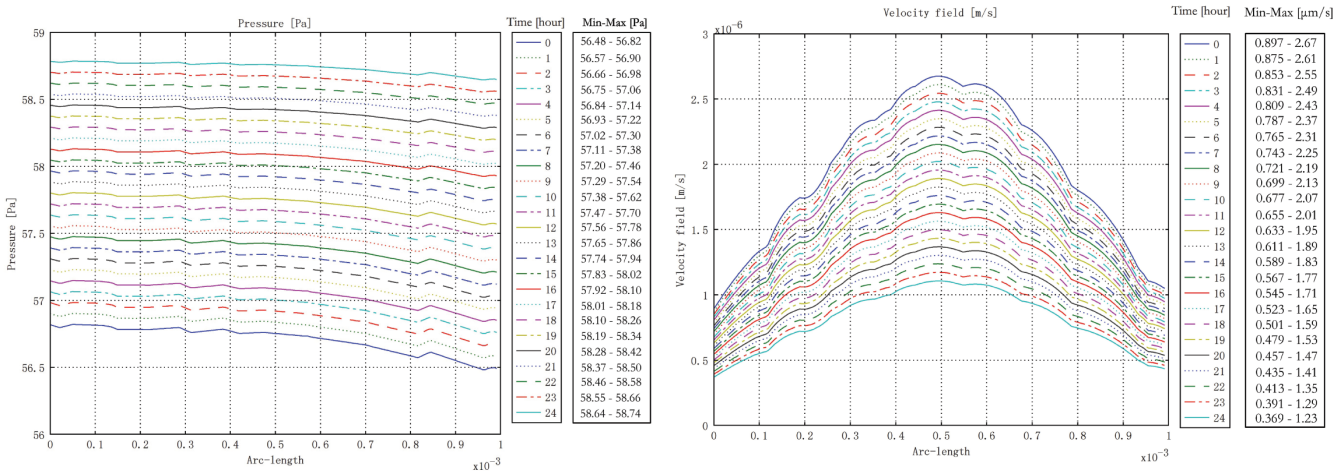
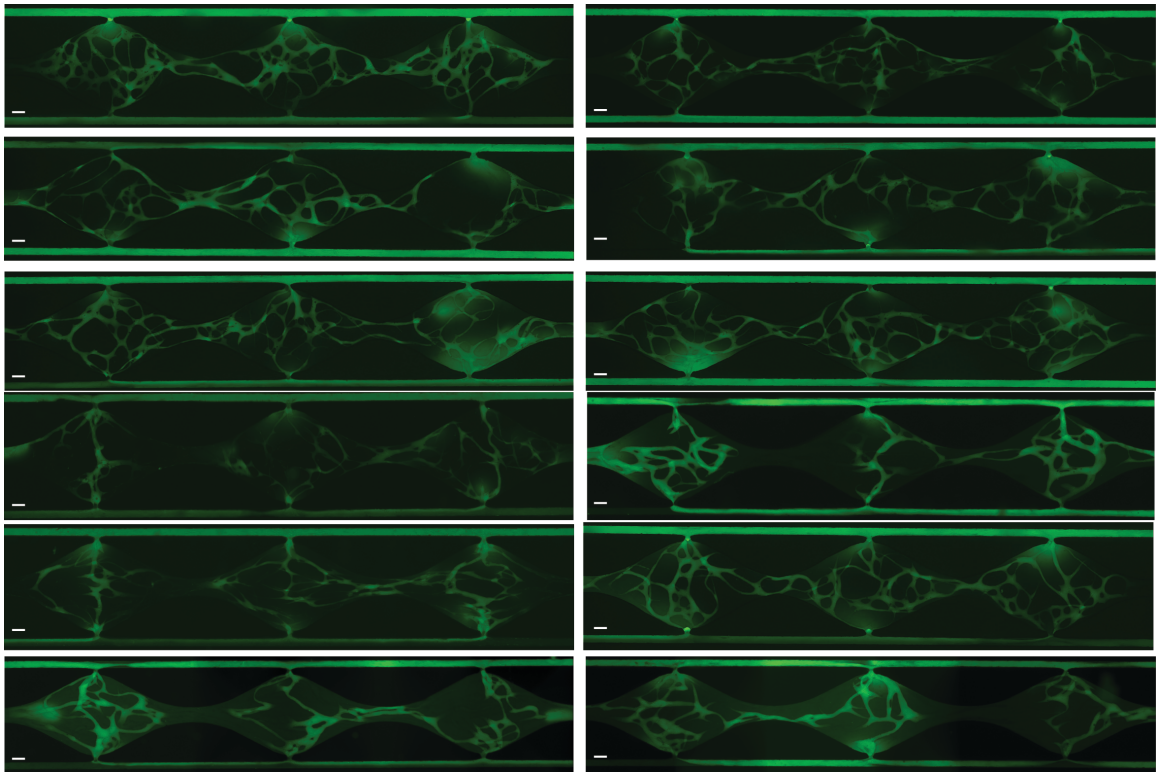


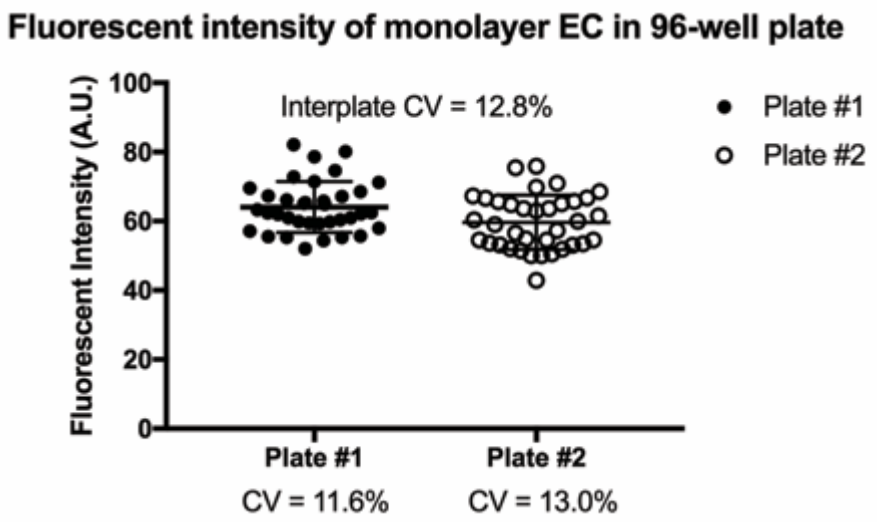
Supplemental Figure S1: Platform fabrication. (A) A customized master mold is fabricated using 2-part polyurethane liquid plastic and a micro-molding technique. (B) A PDMS device layer is replicated from the polyurethane master mold, and holes are punched for inlets and outlets. (C) A bottom view of a fully assembled platform. (D) A low-power view of 3 tissue chambers inside a single well.



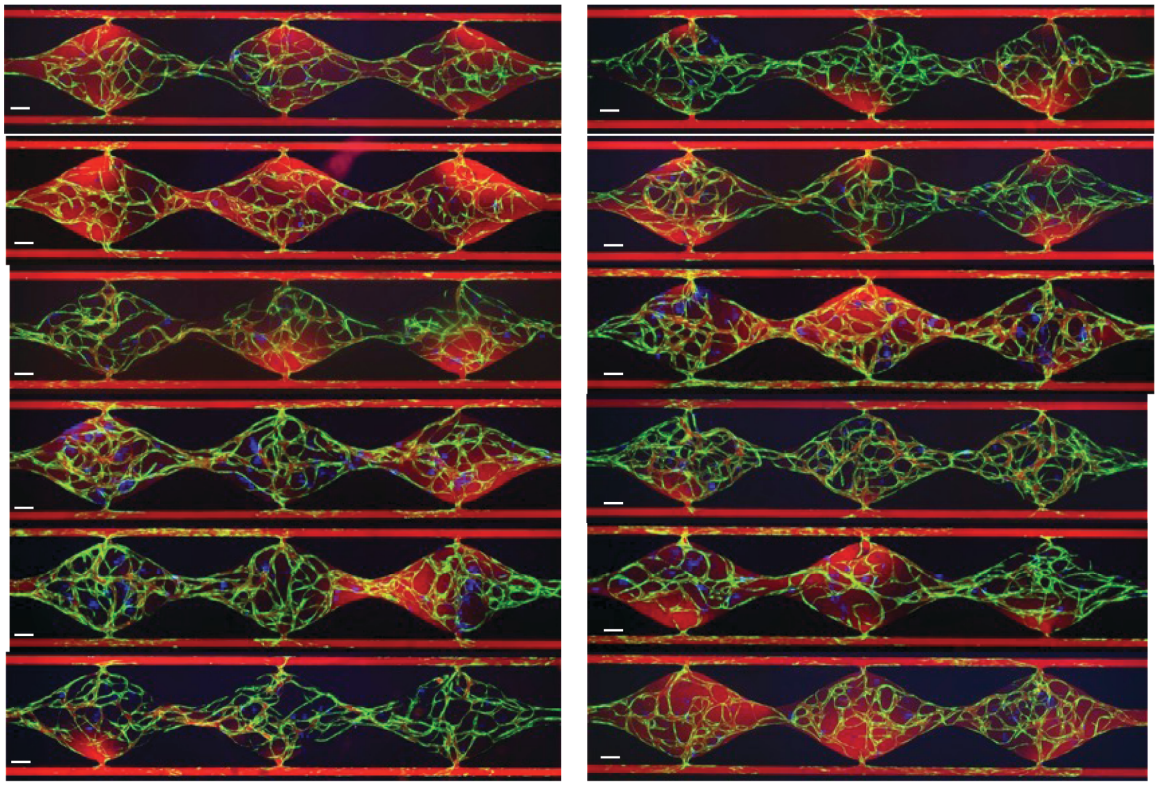
Supplemental Figure S2: Finite element simulation of hydrostatic pressure and interstitial velocity flow in horizontal direction of a tissue chamber.



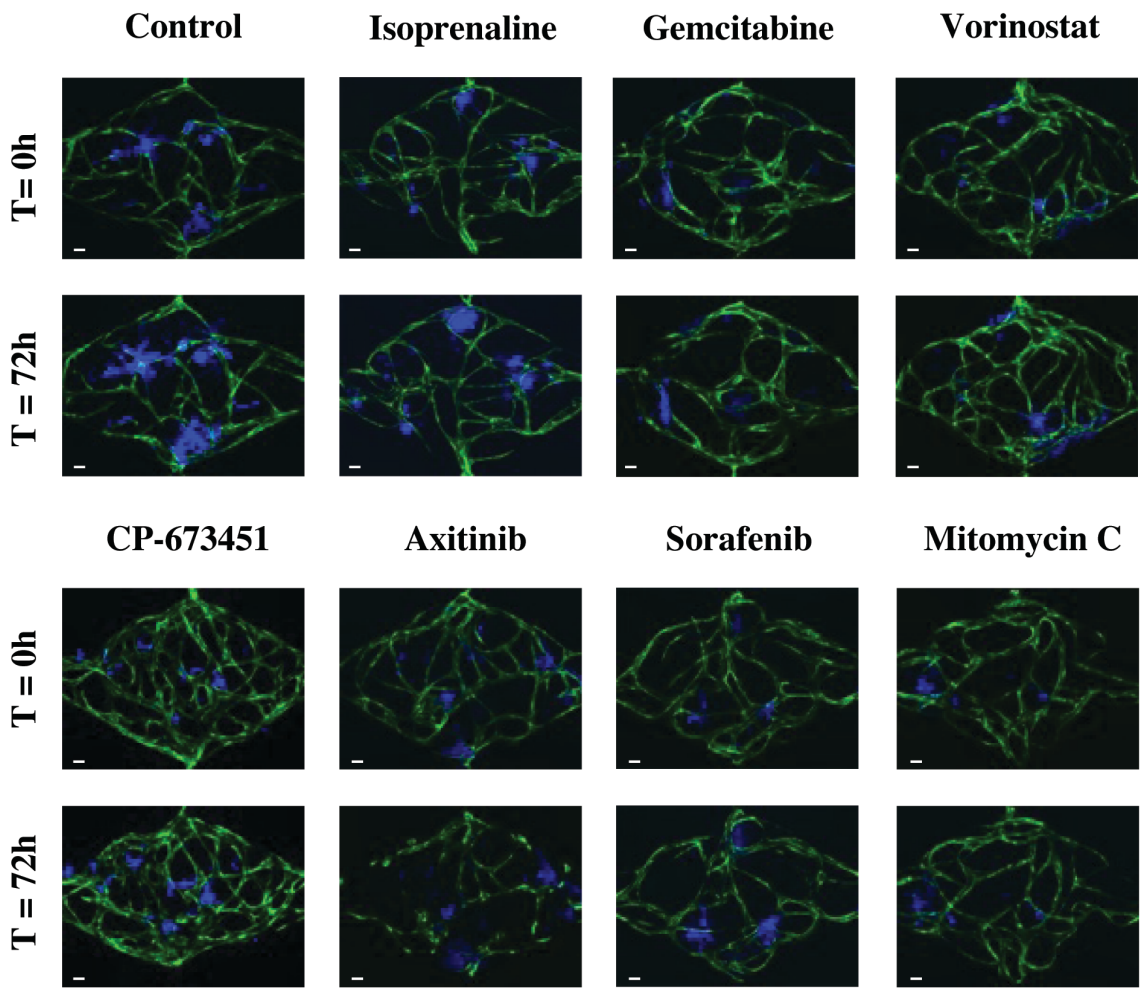
Supplemental Figure S3: 70 kDa-FITC dextran perfusion in 12 tissue units within a single platform. Scale bar = 100 µm.



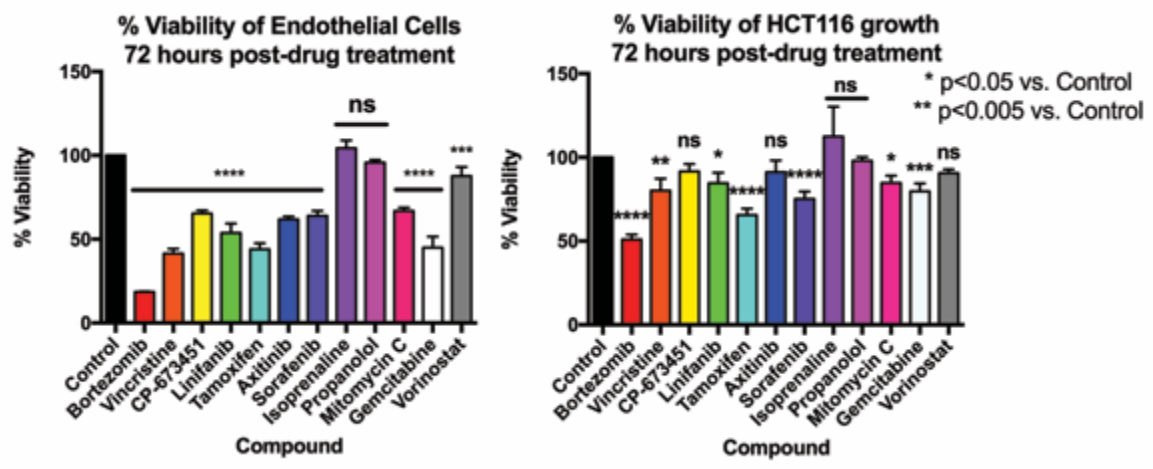
Supplemental Figure S4: Coefficient of variation (CV) of a standard 2D monoculture assay. Fluorescent-tagged endothelial cells were plated in 2 independent 96-well plates and allowed to adhere for 2 hours. Fluorescent intensity in each well was measured using a fluorescent plate reader and used to calculate the CV.



Supplemental Figure S5: 70 kDa-Rhodamine B dextran perfusion in 12 VMTs within a single platform. Scale bar = 100 μm.



Supplemental Figure S6: Representative images before (T= 0h) and after (T= 72h) of drug treatment in the VMTs. Scale bar = 50 μm.



Supplemental Figure S7: Blinded, primary drug screening at 1 μM in 2D monoculture assay. Cell viability was quantified using XTT assay after 72 hours of drug treatment.

Supplemental Table S1: Sequence of qRT-PCR primers.

Gene Name	Sequence 5'→3'	
18S	CCCCGGCCGTCCCTCTTA	Forward
	CGCCCCCTCGATGCTCTTAG	Reverse
ICAM-1	CAGAGGTTGAACCCCCACAGT	Forward
	TCTGAGACCTCTGGCTTCGT	Reverse
E-selectin	CCGTCCGCCAGCCTCAGAAT	Forward
	TAGCCTCGCTCGGGGTTGGAC	Reverse
VCAM-1	CCATTTGACAGGCTGGAGAT	Forward
	TACTGTGGGCAGAGAATCCA	Reverse

Supplemental Table S2: Summary of drug compounds and their targets.

Compound	Target(s)
Bortezomib	20S Proteosome
Vincristine	Microtubule inhibitor
CP-673451	Multi-tyrosine kinase inhibitor (Concentration ≤1 μM: PDGFR-α/β, c-Kit, VEGFR1/2)
Linifanib	Potent ATP-competitive VGEFR/PDGFR inhibitor
Tamoxifen	Estrogen receptor antagonist
Axitinib	Multi-tyrosine kinase inhibitor (Concentration ≤1 μM: VEGFR1/2/3, PDGFR-α/β)
Sorafenib	Multi-tyrosine kinase inhibitor (Concentration ≤1 μM: VEGFR2, Raf, PDGFR-β, c-Kit, FGFR1)
Isoprenaline	β-adrenergic receptor agonist
Propranolol	β-adrenergic receptor inhibitor
Mitomycin C	DNA synthesis inhibitor
Gemcitabine	DNA synthesis inhibitor
Vorinostat	HDAC inhibitor

Source: Selleck Chemicals.