Supplementary Information

A Glomerular Filtration Barrier Modeling on a Chip with Tunable Basement Membrane Deposition and 3D cultured Podocytes

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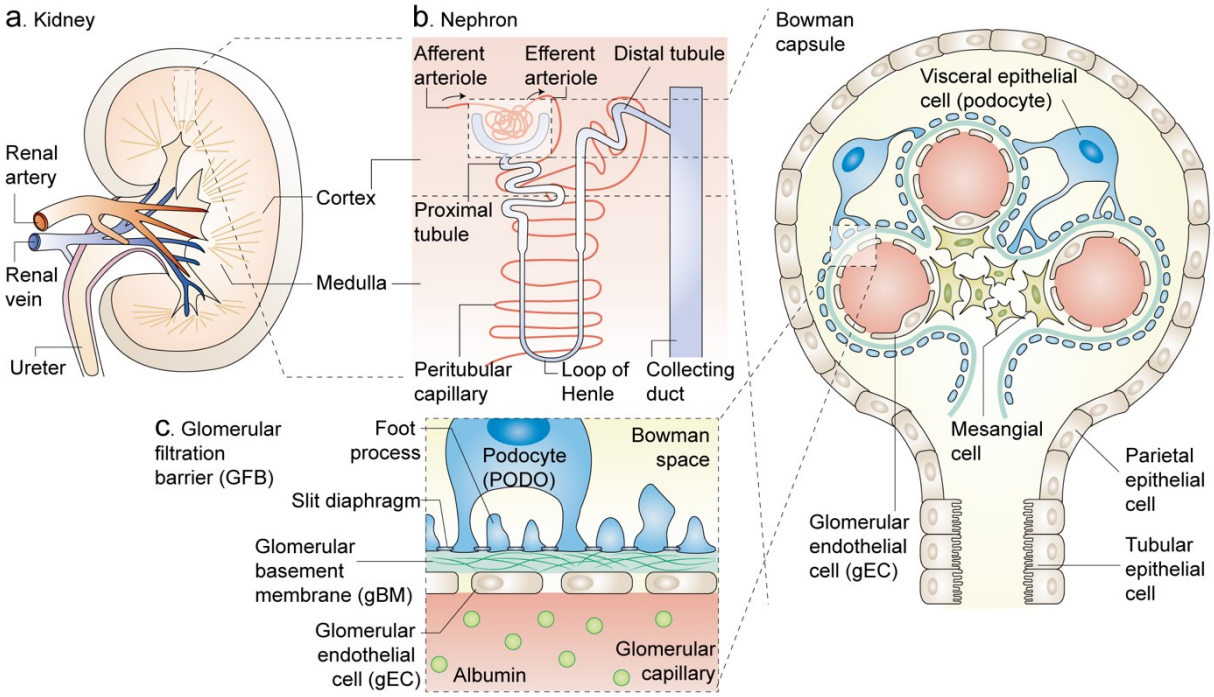

Fig. S1 (a) Structure of kidney, (b) nephron, and (c) glomerular filtration barrier.

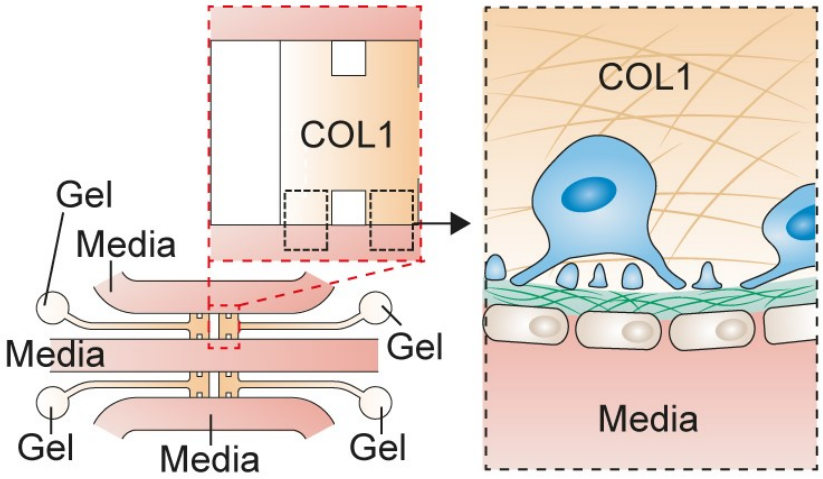

Fig. S2 Schematic images showing region of interest in the microfluidic device.

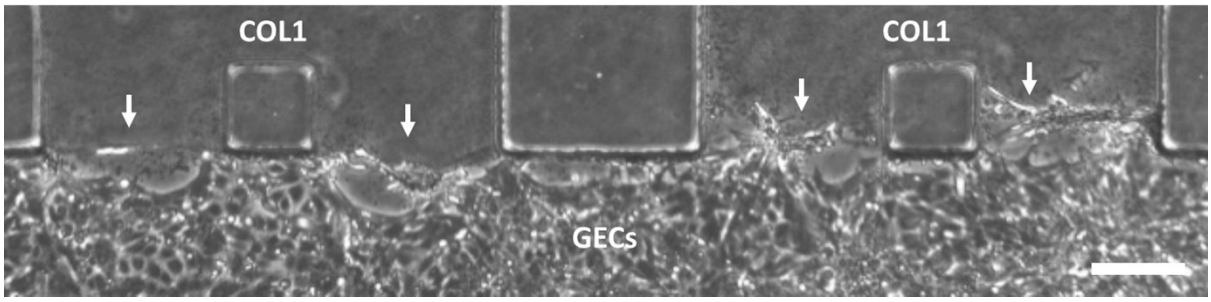

Fig. S3. gECs showing instability in a microfluidic chip in a previously reported endothelial cell culture condition (condition in [18,20]). Arrows indicate detachment of gECs. Scale bar is 150 μm.

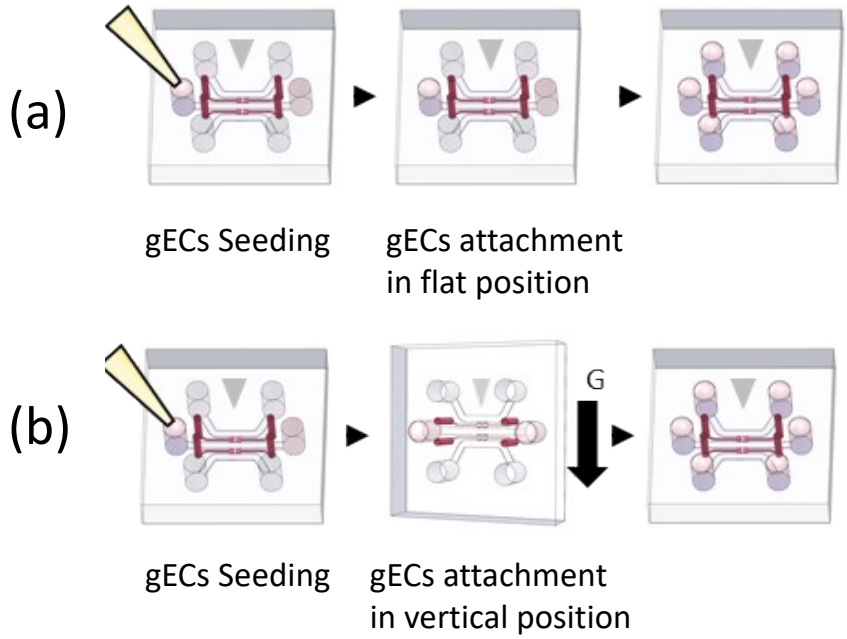

Fig. S4. Schematic of gEC attachment guidance design. (a) flat position and (b) vertical position during gECs attachment after cell seeding. In vertical position, gECs were guided by gravity to attach side wall of COL1.

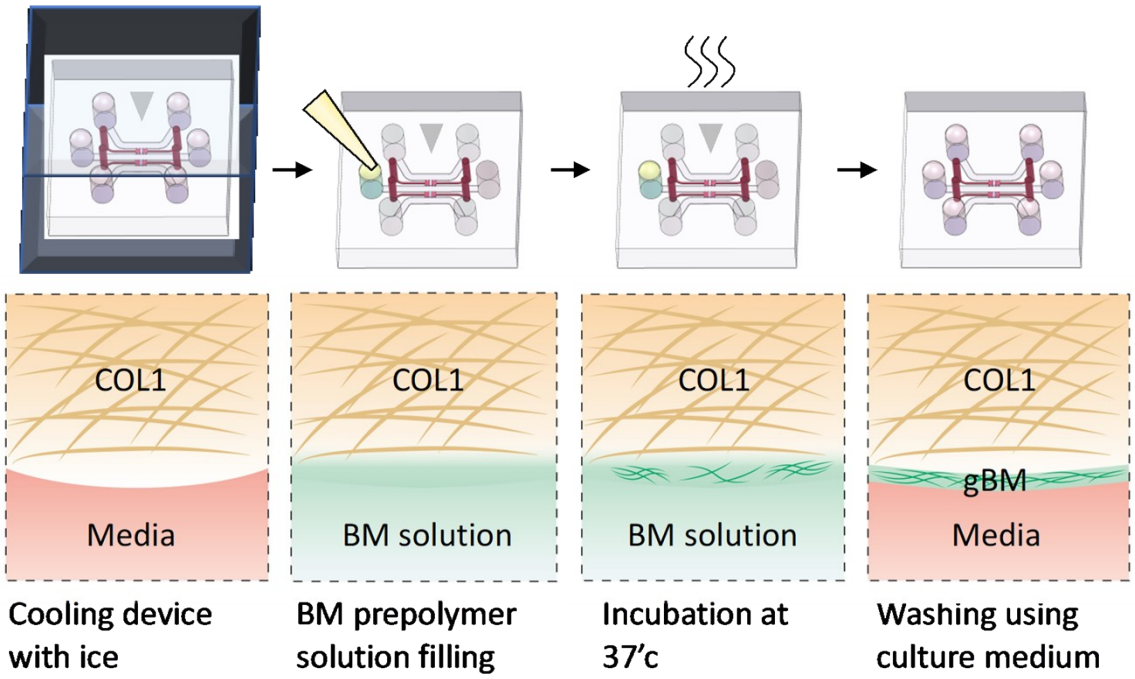

Fig. S5 Schematic of synthetic gBM deposition process.

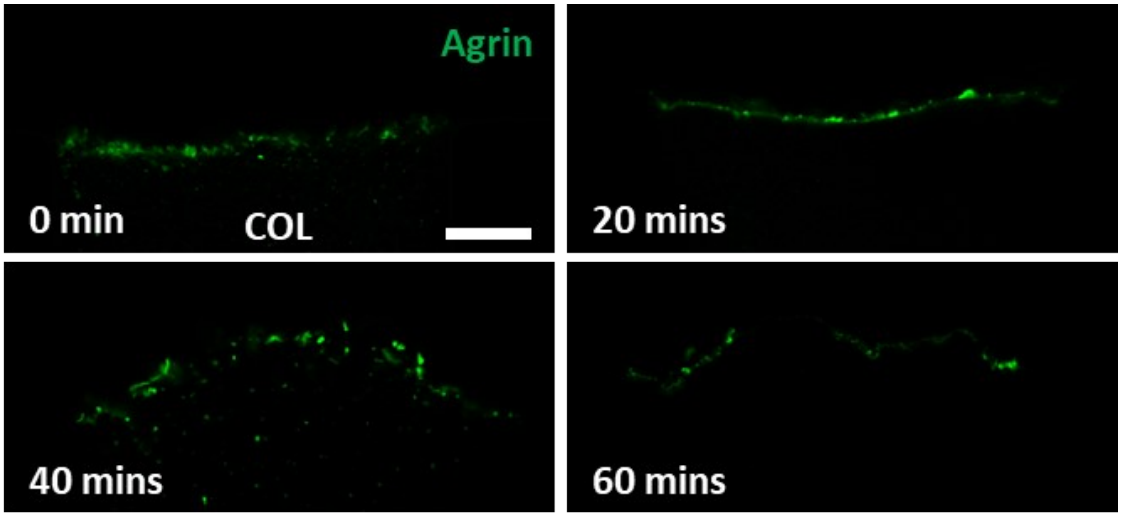

Fig. S6 Representative images of agrin in synthetic gBM according to deposition time. Scale bar is 50 μm.

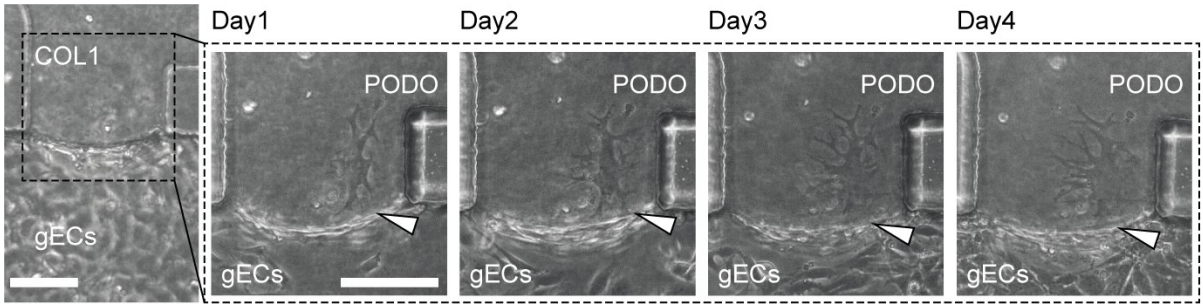

Fig. S7 3D morphological change of a PODO in COL1 hydrogel near gEC monolayer. Arrowhead indicates protrusion of PODO toward gEC monolayer. Scale bar is 150 μm

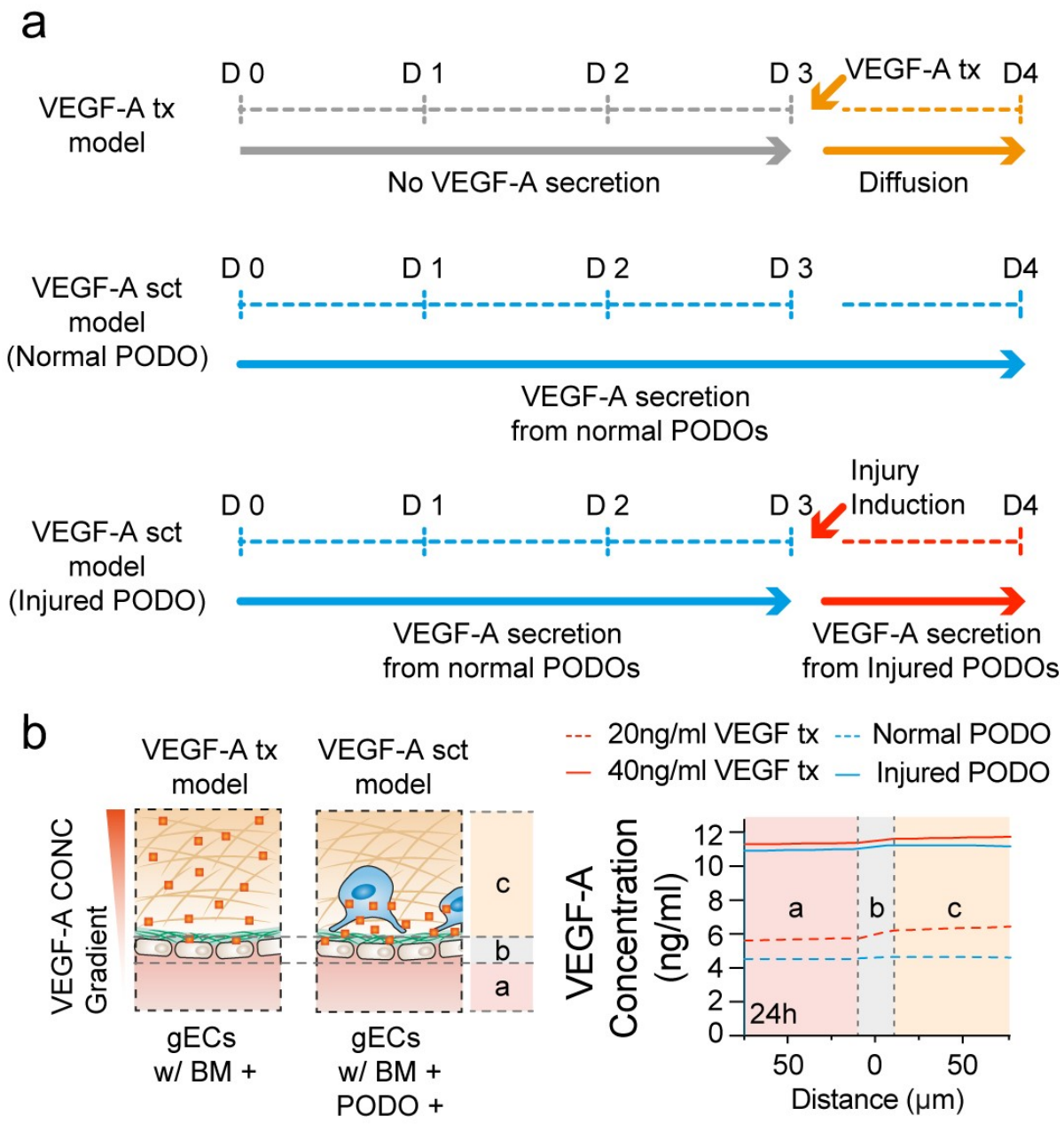

Fig. S8 Computational simulation for VEGF-A transport in case of VEGF-A treatment (VEGF-A tx) and VEGF-A secretion from the podocytes (VEGF-A sct) in the microfluidic device (a) Simulation timeline for mimicking experimental timeline. (b) Schematic of VEGF-A tx model and VEGF-A sct model (Left). VEGF-A concentration profile at a, b, and c region (Right).

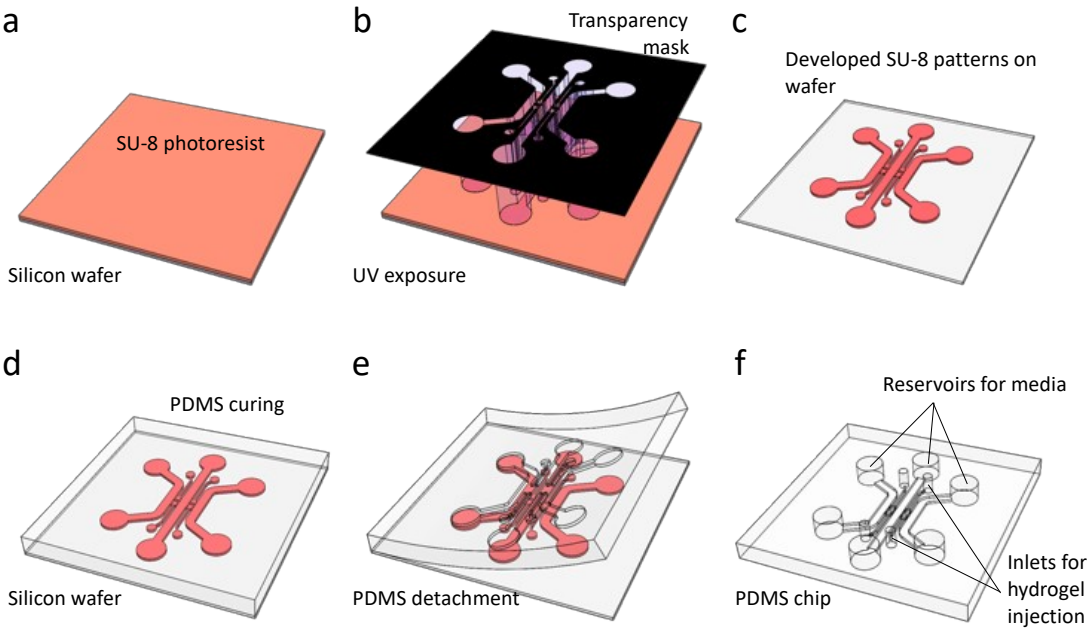

Fig. S9 Microfluidic device fabrication process using soft lithography. (a) Silicon wafer spin coated with SU-8. (b) UV exposure through transparency photomask. (c) Developed SU-8 patterns. (d) Cured PDMS on SU-8 patterns. (e) Detached PDMS. (f) Trimmed and punched PDMS chip.

Gene	Forward	Reverse
SYNPO	CTTTGGGGAAGAGGCCGATTG	GTTTTCGGTGAAGCTTGTGC
WT1	CAGATGAACCTAGGAGCTACCTT	TGCCCTTCTGTCCATTTCA
NPHS2	TTGGCACATCGATCCCTCAC	CTTTGGCCTGTCTTTGTGCC
ZO1	ACCACCAACCCGAGAAGAC	CAGGAGTCATGGACGCACA
OCLN	ACCCGAAGAAAGATGGATCG	CATAGTCAGATGGGGGTGGA
CLDN5	CTCTGCTGGTTCGCCAACA	CCCAGCTCGTACTTCTGTGACA
GAPDH	AGGTCGGTGTGAACGGATTTG	GGGGTCGTTGATGGCAACA

Table S1. Sequences of primers for qRT-PCR