Supplementary information for

Artificial Blood Vessel Implanted Three-Dimensional Microsystem for Modeling Transvascular Migration of Tumor Cells

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This file includes:

Figure S1- S8

Other Supporting Online Material for this manuscript includes the following:

Supplementary Movie 1

Supplementary Movie 2

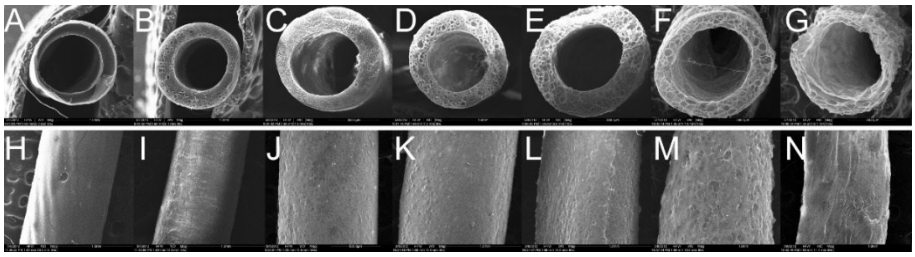

Fig.S1 SEM images of microtubes of cellulose and cellulose/PEO. blends: (A, H) cellulose, (B, I)9:1 wt %, (C, J) 8:2 wt %, (D, K) 7:3 wt %, (E, L) 6:4 wt %, (F, M) 5:5 wt %, (G, N) 4:6 wt % (cellulose /PEO).

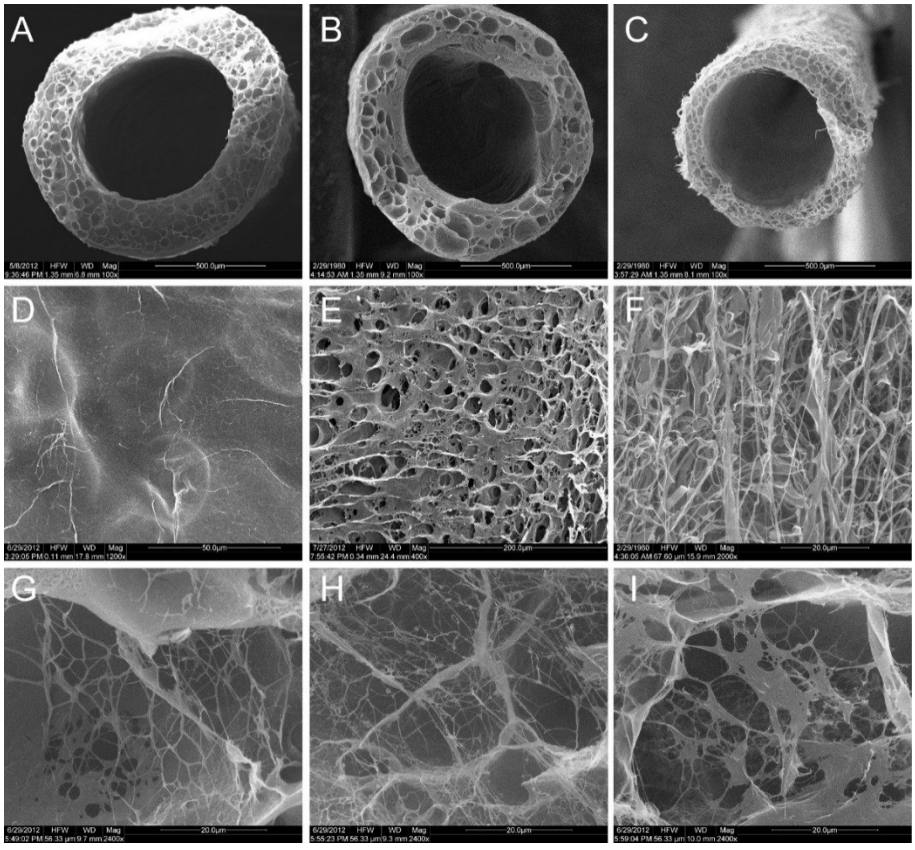

Fig. S2 SEM images of microtubes of cellulose /PEO blends with different treatments. SEM images of the section of microtubes (cellulose/PEO 6:4) without chitosan sacrificial template(A), with chitosan sacrificial template before (B) and after (C) dissolving in acetic acid solution; SEM images of the inner surface of microtubes (cellulose/PEO 6:4) without chitosan sacrificial template(D), with chitosan sacrificial template after dissolving in acetic acid solution(E), and cellulose/collagen (1mg/mL) microtube(F); SEM images of acropores inside cellulose/collagen microtube stuffed by 1mg/mL collagen (G); 2.5mg/mL collagen(H) and 5mg/mL collagen(I).

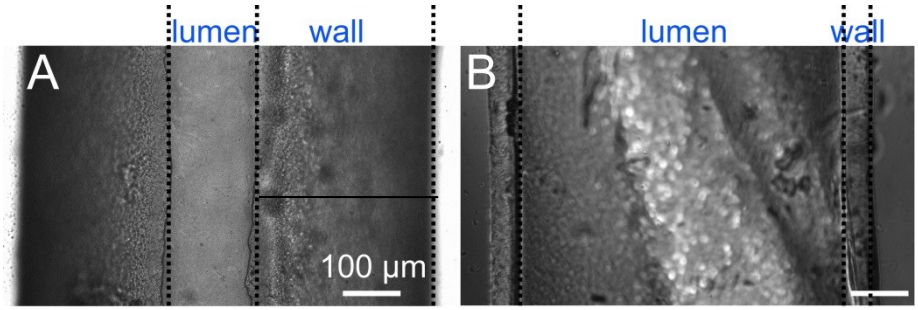

Fig. S3 Microscopic images showing cellulose microtubes with inner diameter of ca.150 μm (A) and another microtube with thickness ca. 50 μm (B).

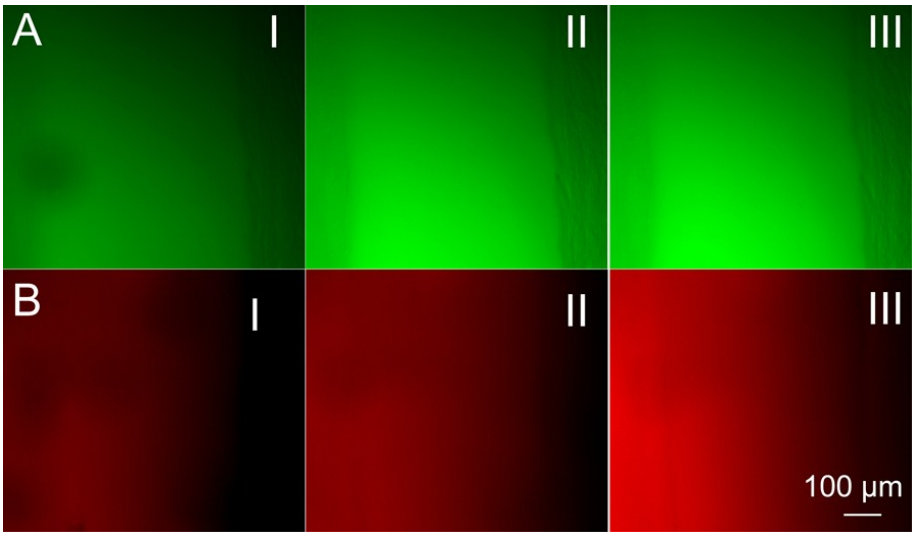

Fig. S4 Fluorescence microscopic image showing the gradient generation of FITC-dextran (Mw = 20 kDa) (A) and Rhodamine-dextran (Mw = 70kDa) (B)between adjacent cellulose lumens over time, The time of I,II,III is 15 min, 24 h,48 h.

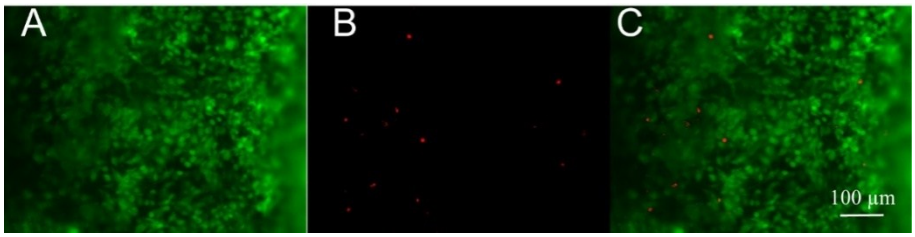

Fig. S5 Viability experimental results showing excellent cytocompatibility of cellulose/collagen microtubes. Fluorescence microscopic images of cells stained by Calcein-AM (A) and PI (B), and merged image (C).

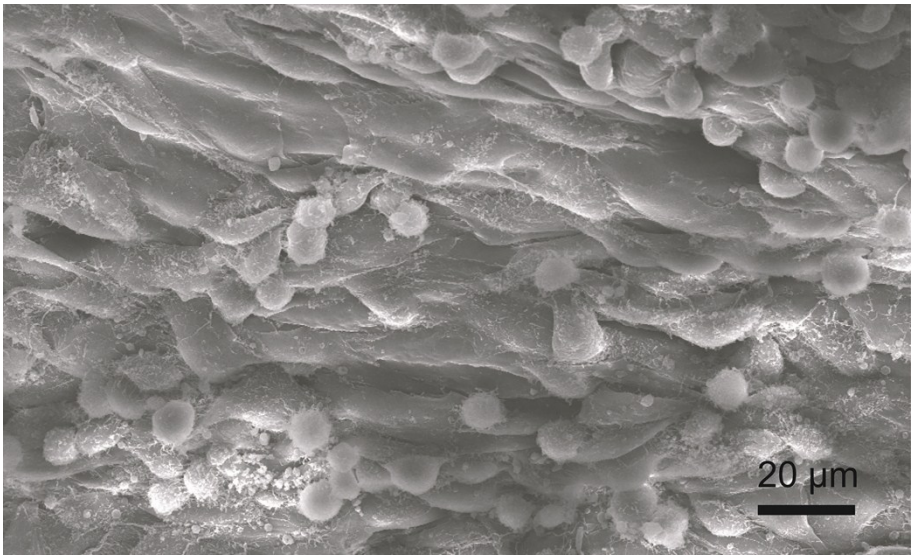

Fig. S6 SEM images showing endothelial cells on the surface of cellulose/collagen tubes

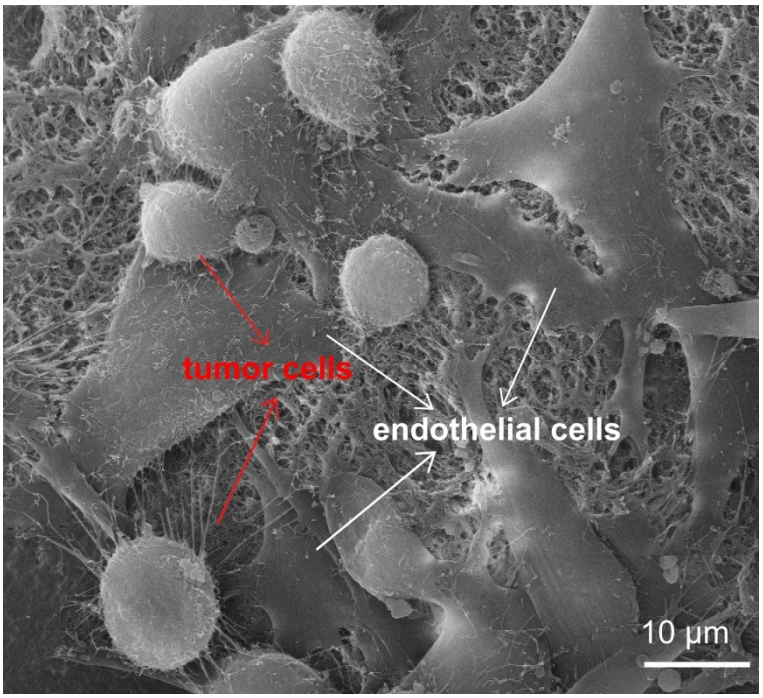

Fig. S7 SEM image showing the adherence of tumor cells on endothelial cells and the destruction of confluent endothelial cell monolayer.

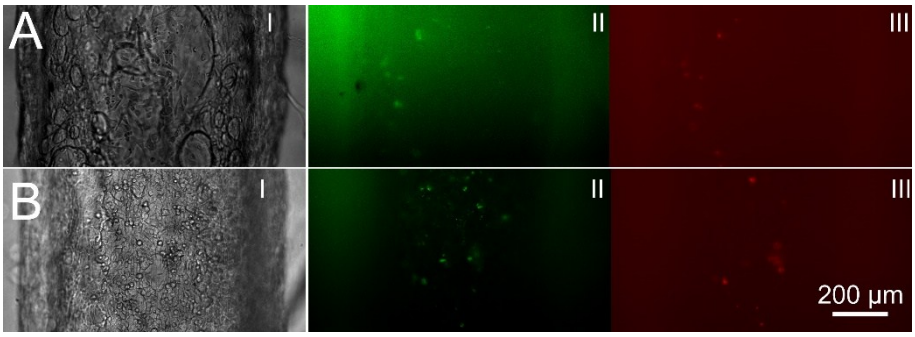

Fig. S8 Apoptosis of HUVEC cells in the absence (A) and presence (B) of HCCLM9 cells. I: the microscope image of HUVECs; II:Fluorescence image of HUVECs stained by Annexin V-FITC Apoptosis Detection Kit for early apoptosis; III: Fluorescencent image of HUVECs stained by PI.

Supplementary Movie 1 Endothelial cells at the different layer positions of a cellulose/collagen tube cultured after 48 h under static flow conditions obtaining from Z-stack model, labeled with phalloidine.

Supplementary Movie 2 ECs cultured in a cellulose/collagen tube under pulsatile flow conditions (peak pressure 100 mmHg, end diastolic pressure 10 mmHg, frequency 1 Hz, flow rate 1.3 mL/min).