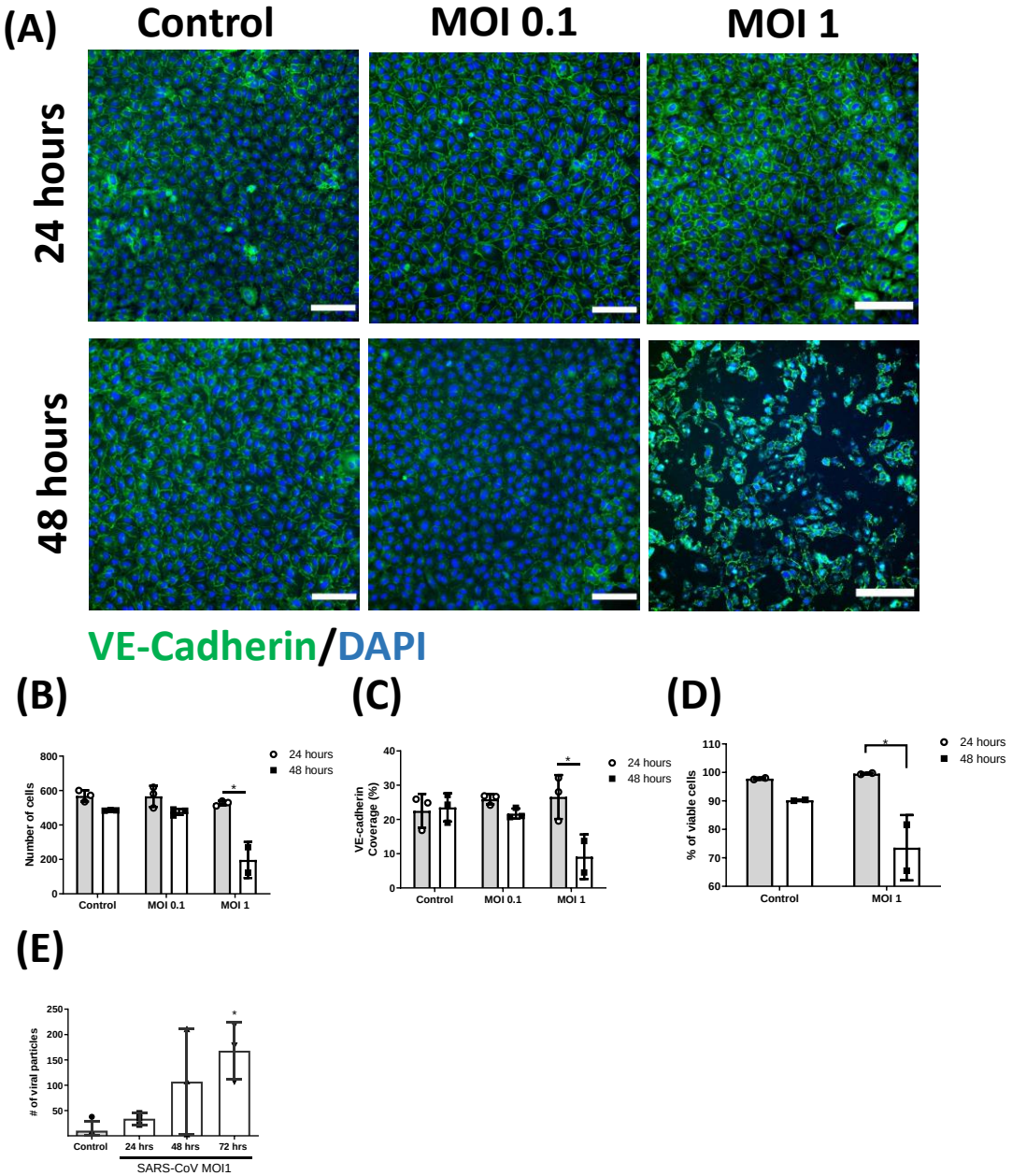

Figure S1: Dose response of SARS-CoV-2 and longitudinal analysis of endothelial marker expression under static monolayer condition. (A) Fluorescent microscope images of HUVECs treated with MOI 0.1 and MOI 1 of SARS-CoV-2 for 24 hours and 48 hours. HUVECs were stained with VE-cadherin (green) and DAPI (blue). Scale bar = 200µm. Quantitative image analysis of (C) the number of DAPI positive cells, (D) VE-cadherin coverage, and (D) cellular viability from fluorescent microscope images. Data are mean ± SD, N=3. Two-way ANOVA with Holm-Sidak *post hoc* test, $p<0.05$; *significant relative to 24-hour control in each treatment group. (E) Quantification of SARS-CoV-2 viral RNA load by RT-PCR upon SARS-CoV-2 infection at MOI 1. One-way ANOVA with Holm-Sidak *post hoc* test, *$p<0.05$; significant compared to non-virus treated control.

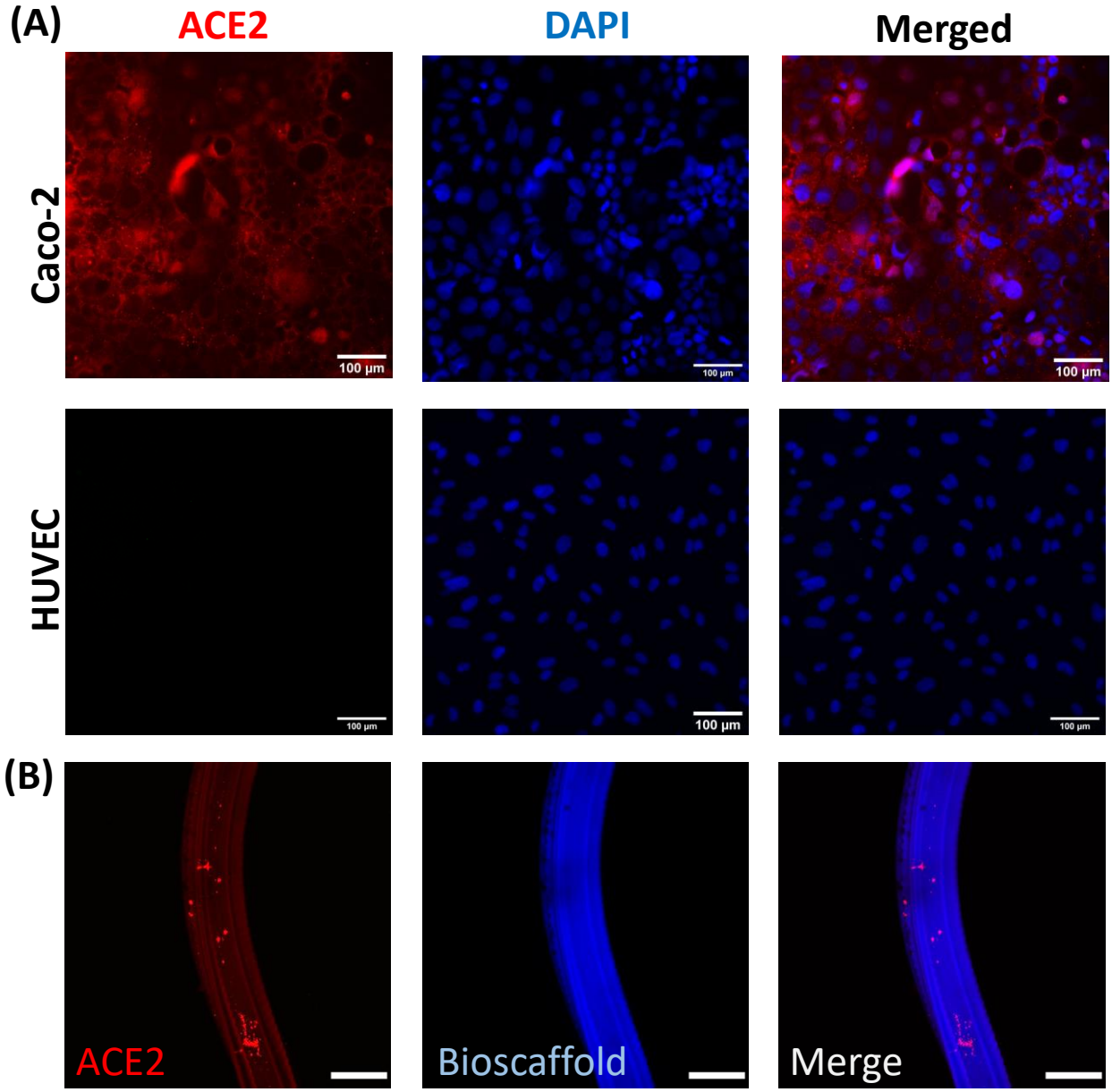

Figure S2: Expression of ACE2 on endothelial cells in both 2D and InVADE platform. (A) Fluorescent microscope images of Caco-2 and HUVECs cultured in 2D well-plate. Cells were immunostained with ACE2 (red) and DAPI (blue). Scale bar = 100µm. (B) Representative confocal image of ACE2 in InVADE system. Cells were stained with ACE2 (white) and bioscaffold was indicated in blue color. Scale bar=200µm.

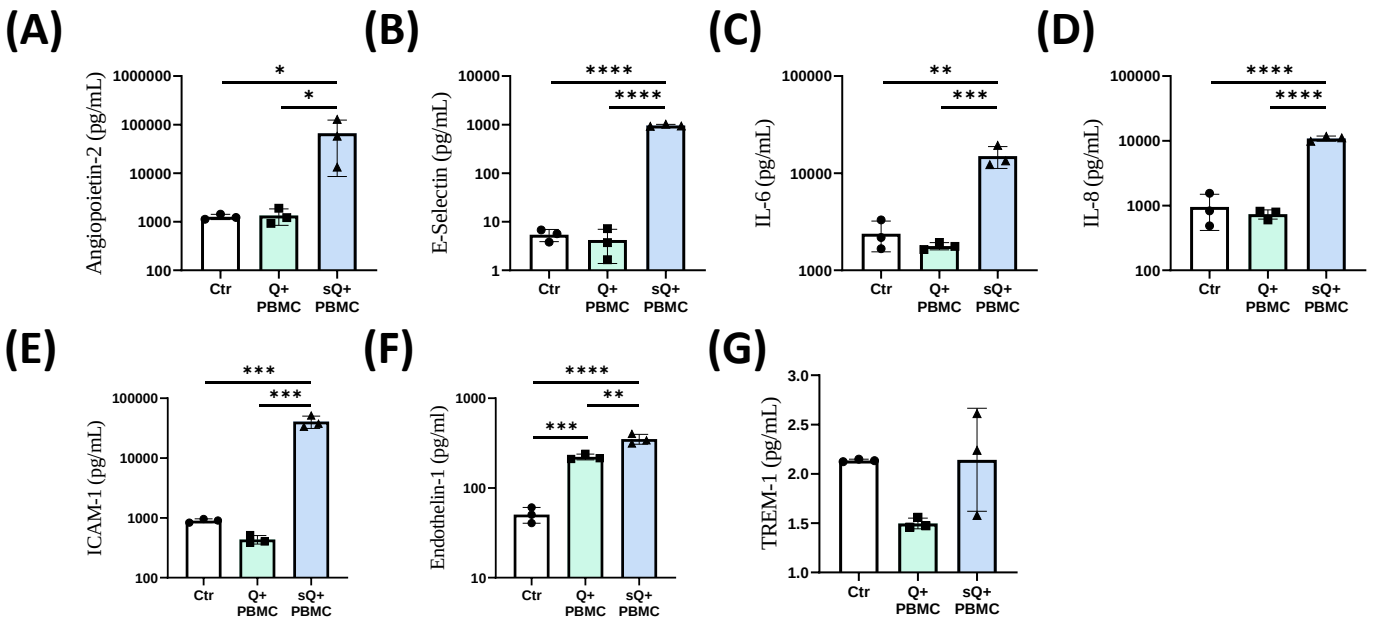

Figure S3: Baseline effects of QHREDGS and the scrambled control in vasculature-on-a-chip with immune cells in the absence of SARS-CoV-2. Analysis of endothelial cell activation marker upon peptide treatment in the InVADE system. Concentration of (A) Ang-2, (B) E-selectin, (C) IL-6, (D) IL-8, (E) ICAM-1, (F) endothelin-1, and (G) TREM-1. Data are mean ± SD. N=3. One-way ANOVA with Holm-Sidak *post hoc* test, *p<0.05, **p<0.01, ***p<0.001, ****p<0.0001.