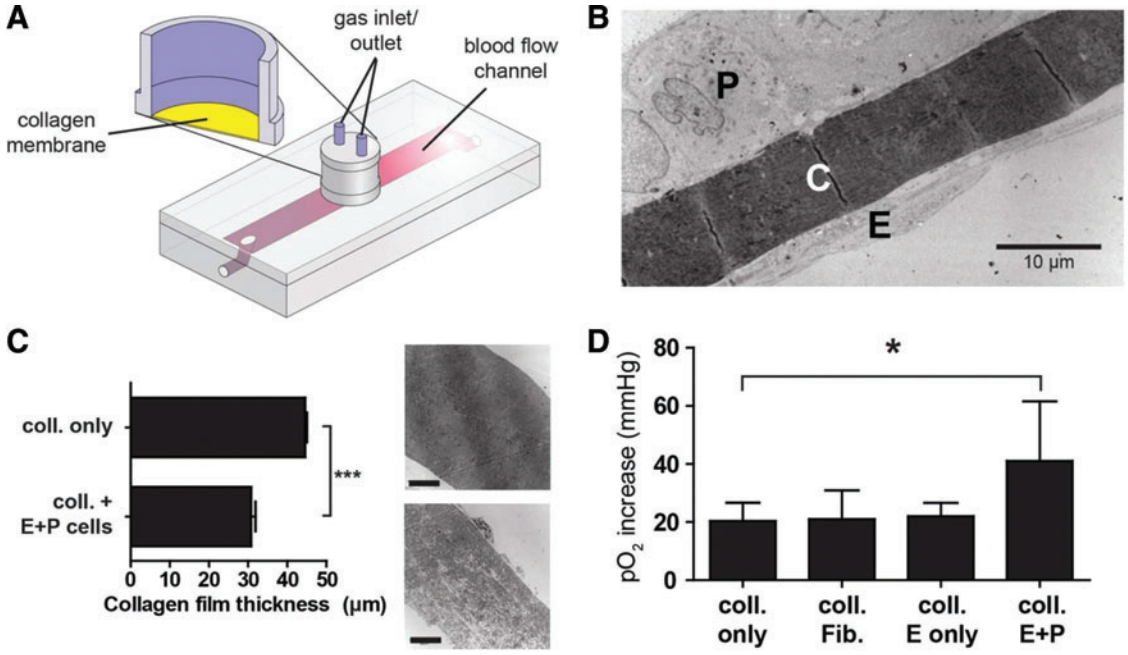
Supplementary Data



SUPPLEMENTARY FIG. S1. **(A)** Schematic of single-channel transwell device with blown-up detail showing location of the collagen membrane. Parenchymal cells are seeded on the superior face of the membrane, while endothelial cells are seeded on the inferior face, in contact with the microfluidic channel. **(B)** Transmission electron microscopy (TEM) showing detail of collagen membrane [C] in tissue-engineered alveolus with H441 lung adenocarcinoma cell [P] and human umbilical vein endothelial cells (HUVEC) [E]. **(C)** Change in collagen film thickness due to presence of attached endothelial cells and pneumocytes. *Inset:* TEM images of the membranes following incubation with either control medium without cells, *top*, or HUVECs and H441s, *bottom*. Scale bar = 10 μm. ***$p < 0.001$. **(D)** Oxygenation of blood (measured as change in partial pressure of oxygen from inlet to outlet) via gas exchange across various membranes in the tissue-engineered alveolus. *$p < 0.05$. coll., collagen membrane; E only, endothelial cells only; E + P, endothelial cells (HUVECs) and pneumocytes (H441); Fib., fibroblasts.