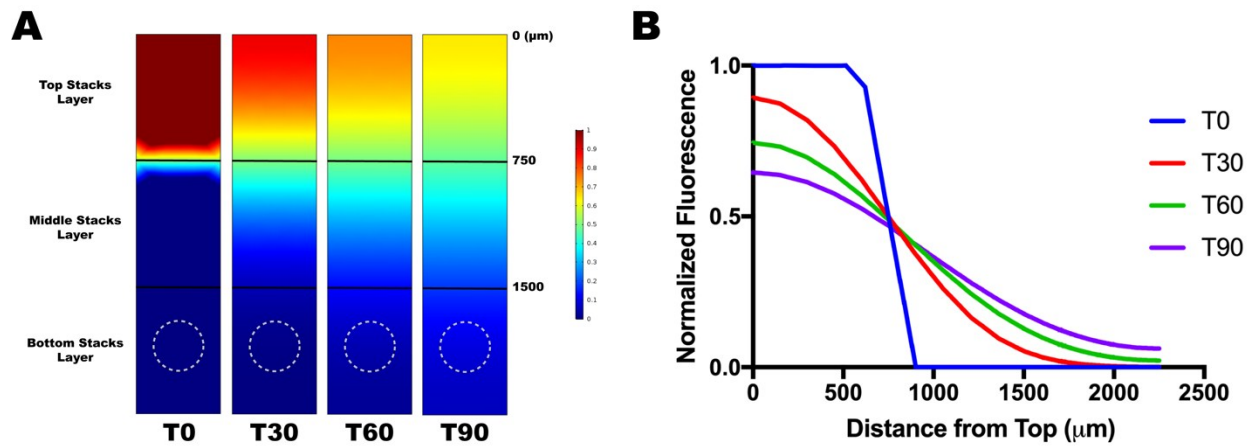


Supplementary Information

Collagen Retention %

		Bore Height (mm)		
		0.25	0.5	0.75
Bore Diameter (mm)	0.5	56.67 (±15.3)	73.33 (±11.5)	83.33 (±5.8)
	0.75	26.67 (±5.8)	60.00 (±10)	70.00 (±17.3)
	1	16.67 (±15.3)	36.67 (±5.8)	43.33 (±15.3)

Supplementary Figure 1: Table showing collagen retention rate in Stacks layers with various bore diameters and heights.



Supplementary Figure 2: COMSOL model of 10 kDa FITC-dextran diffusion through a hydrogel similar in porosity and density to 4mg/mL Collagen-I in a LENS device. **A** – Computed diffusion profiles at T = 0 min through T = 90 min. **B** – Quantified normalized fluorescence vs. distance from top of stacks layer at different time points.

Gene	Assay ID	Gene Function
ACTB	Hs.PT.39a.22214847	Encodes for beta-actin, one of the two non-muscle cytoskeletal actins
GAPDH	Hs.PT.39a.22214836	Encodes for glyceraldehyde 3-phosphate dehydrogenase, an enzyme that catalyzes the sixth step of glycolysis
CYBB	Hs.PT.58.15232180	Encodes for NADPH oxidase 2 (NOX2), a super-oxide generating enzyme which forms ROS
NCF1	Hs.PT.58.26118879	Encodes for p47Phox, a 47kDa cytosolic subunit of neutrophil NADPH Oxidase
NCF2	Hs.PT.58.255793	Encodes for p67Phox, a 67kDa cytosolic subunit of neutrophil NADPH Oxidase
NFKB1	Hs.PT.58.20344216	Encodes for NFkB p105 subunit, a transcription factor which stimulates the expression of genes involved in a wide variety of biological functions
NFKBIA	Hs.PT.58.15498666.g	Encodes for I kB α , an inhibitor of NFkB
CEACAM8	Hs.PT.58.39067762	Encodes for carcinoembryonic antigen-related cell adhesion molecule 8, also known as CD66b, involved in cell adhesion, cell migration, and pathogen binding. Expressed exclusively on Granulocytes
ITGAM	Hs.PT.58.40141028	Encodes for integrin alpha M, also known as macrophage-1 antigen (Mac-1), and CD11b, involved in cell adhesion and migration. It is involved with several immune processes such as chemotaxis, cell activation, and phagocytosis. It is expressed on the surface of many leukocytes of the innate immune system including neutrophils
PECAM1	Hs.PT.58.19487865	Encodes for platelet endothelial cell adhesion molecule, found on the surface of neutrophils and is involved in leukocyte transmigration, and removing aged neutrophils from circulation
SELL	Hs.PT.58.463962	Encodes for L-selectin, also known as CD62L, is involved in cell adhesion. Found on surface of leukocytes
CXCR2	Hs.PT.58.41092811	Encodes for interleukin 8 receptor beta, is a G-protein-coupled receptor involved with sensing extracellular IL-8
TNFRSF1A	Hs.PT.58.19429998	Encodes for tumor necrosis factor receptor 1, also known as CD120a, is the major cell surface receptor for TNF α , and is involved with mediating apoptosis and inflammation
RSAD2	Hs.PT.58.713843	Encodes for Viperin, is a cellular protein involved in inhibiting many DNA and RNA viruses
CXCL8	Hs.PT.58.39926886.g	Encodes for interleukin 8, involved in mediating neutrophil chemotaxis

Supplementary Figure 3: Table of IDT PrimeTime qPCR primers used for qPCR analysis