Supplemental Figures

FIGURE. S1. UV light intensity vs distance for different sources used for crosslinking printed hydrogels. (A) Low Power 4 Nichia LED Array NCSU033A LEDs (B) Spectroline Lamp 365 nm EN280L single bulb, 2.0 mW/cm2 (C) Underside view of High Powered 4 LED Array and circulation heat sink, 136mW/cm2, 60 Ohm resistance per LED, Nichia 365 nm UV LED NC4U133A (D) Side view of High Powered LED array at printing distance with tip in contact with printing surface. (E) Intensity measured with radiometer. Power fit data and extrapolated to generate intensity estimates at print surface (Table 4.1). Plotted are the intensity vs distance for the light meter sensor centered under the high powered LED array mounted on the syringe carriage (C 4 HLED), sensor under the right syringe tip (RT 4 HLED) , sensor under the left syringe tip (LT 4 HLED), sensor under single high power LED (HLED), sensor under single low power LED with resistance set at 25 Ohms (LLED 25 Ohm), under single low power LED with resistance set at 33 Ohms (LLED 33 Ohm), single low power LED with resistance set at 55 Ohms (LLED 55 Ohm), and sensor under the Spectroline lamp.

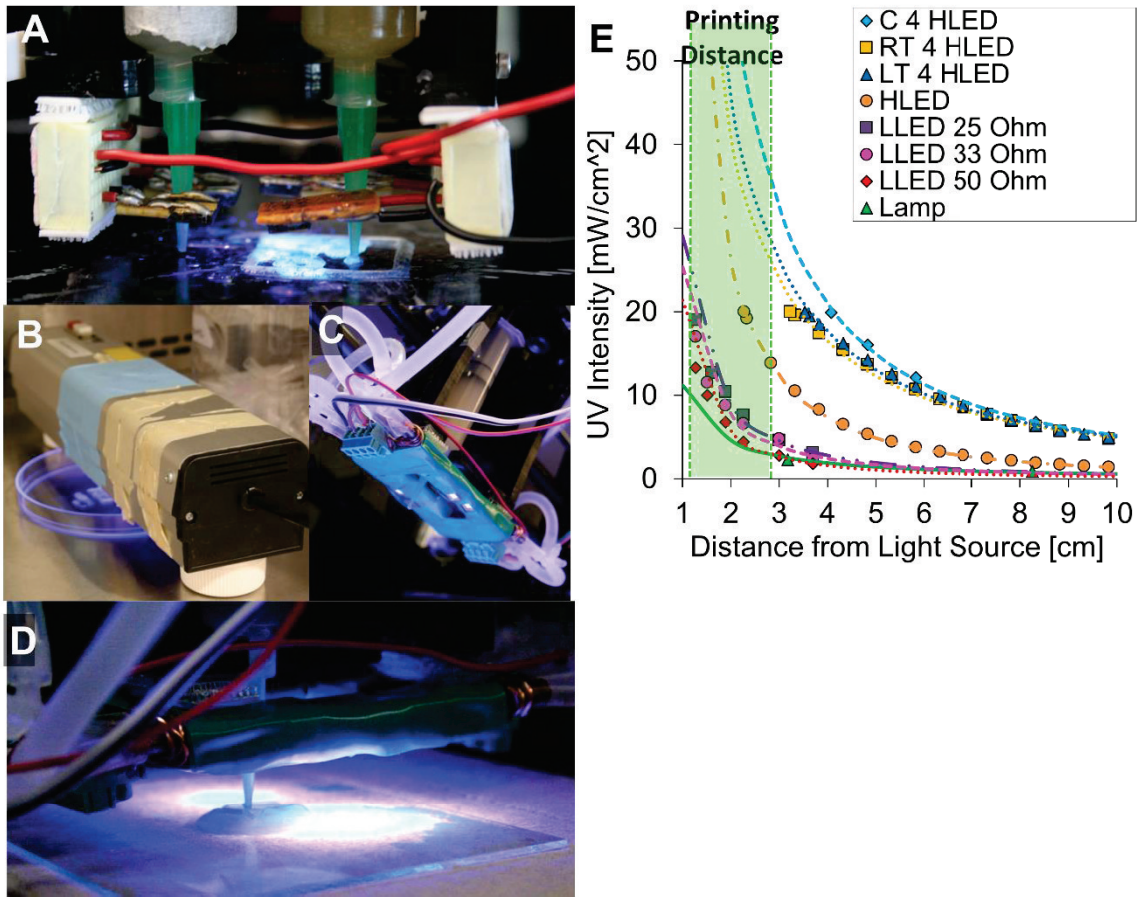


FIGURE. S2. Viability in HAVIC/Irgacure hydrogels. (A) Representative images of Live/Dead stained HAVIC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 µm.

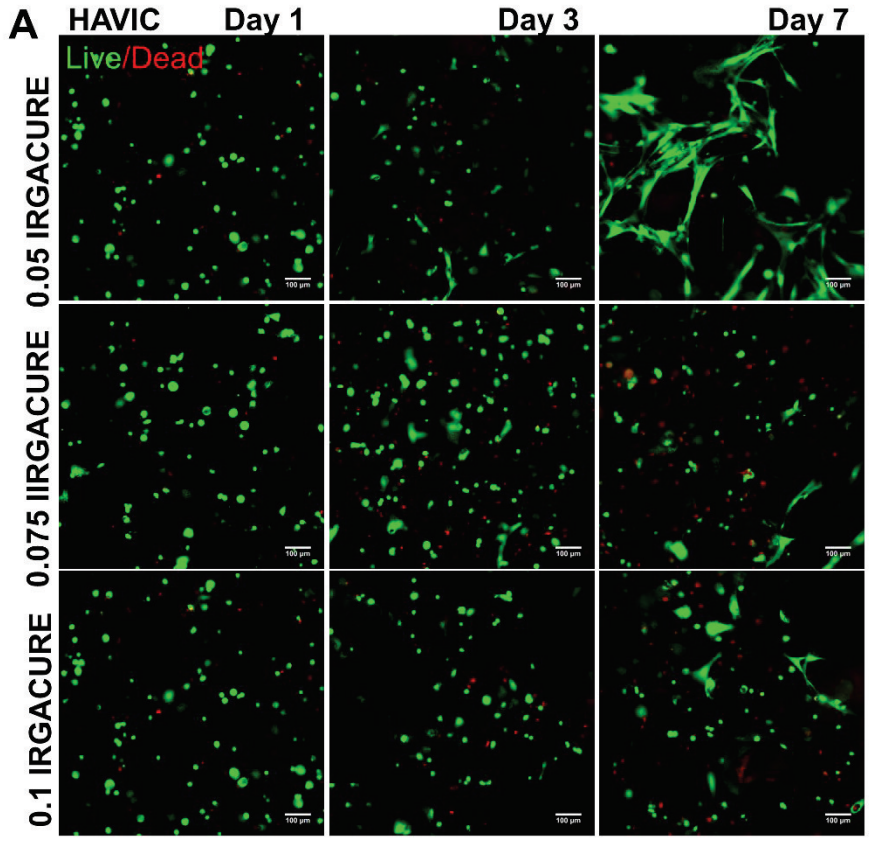


FIGURE. S3. Viability in HAVIC/VA086 hydrogels. (A) Representative images of Live/Dead stained HAVIC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 µm.

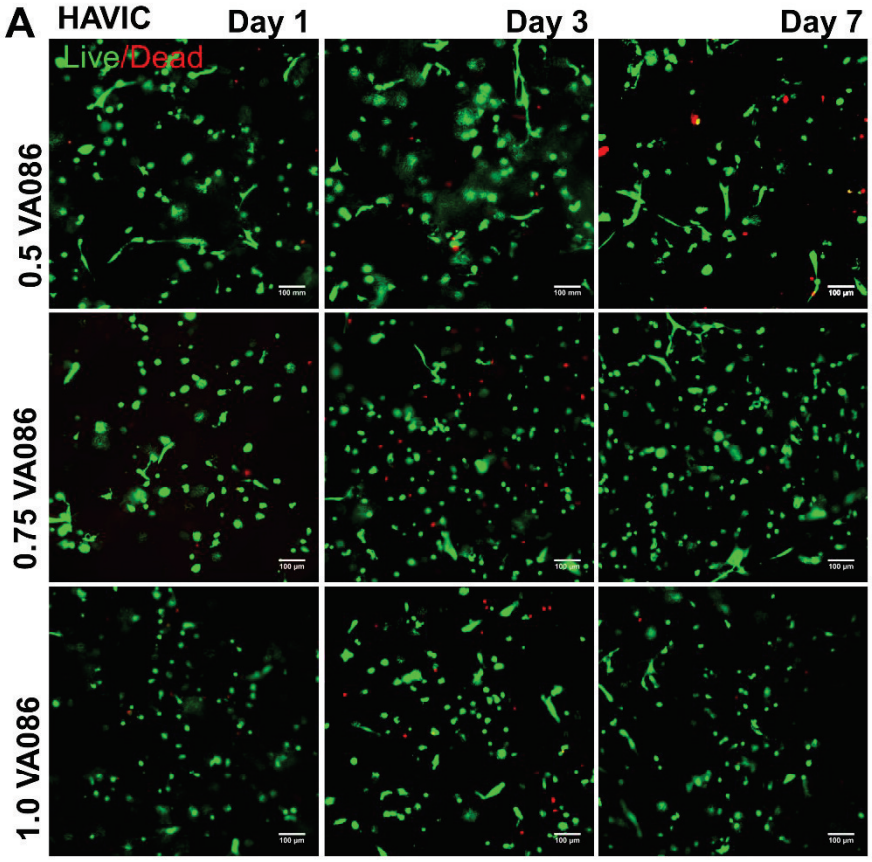


FIGURE. S4. (A) Viability in HASSMC/Irgacure hydrogels. Representative images of Live/Dead stained HASSMC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 μm.

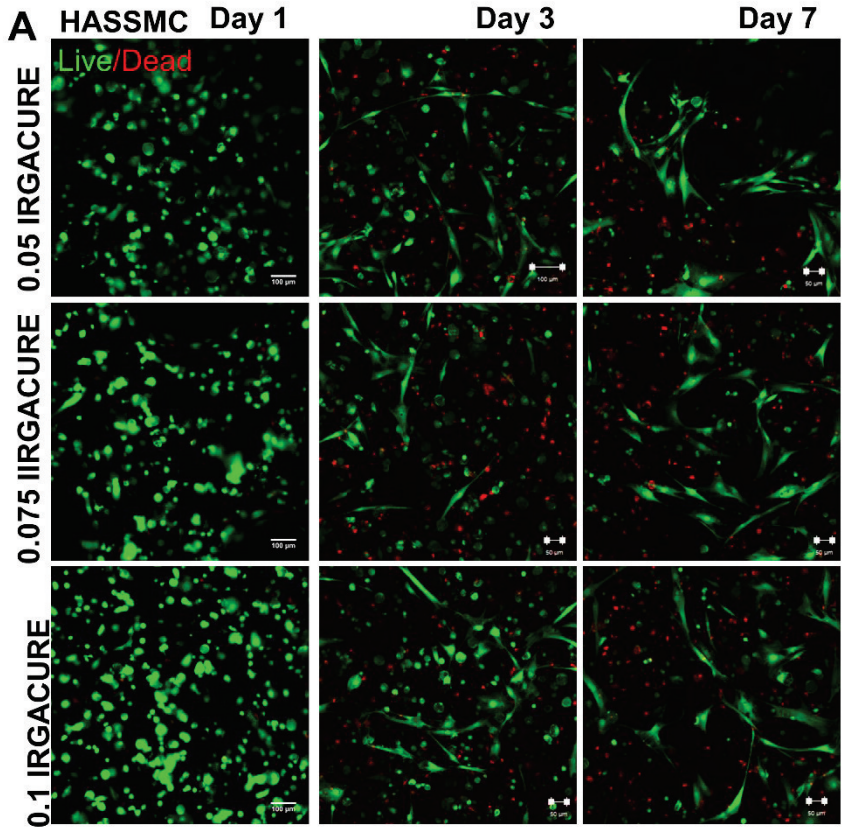


FIGURE. S5. Viability in HASSMC/VA086 hydrogels. (A) Representative images of Live/Dead stained HASSMC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 μm.

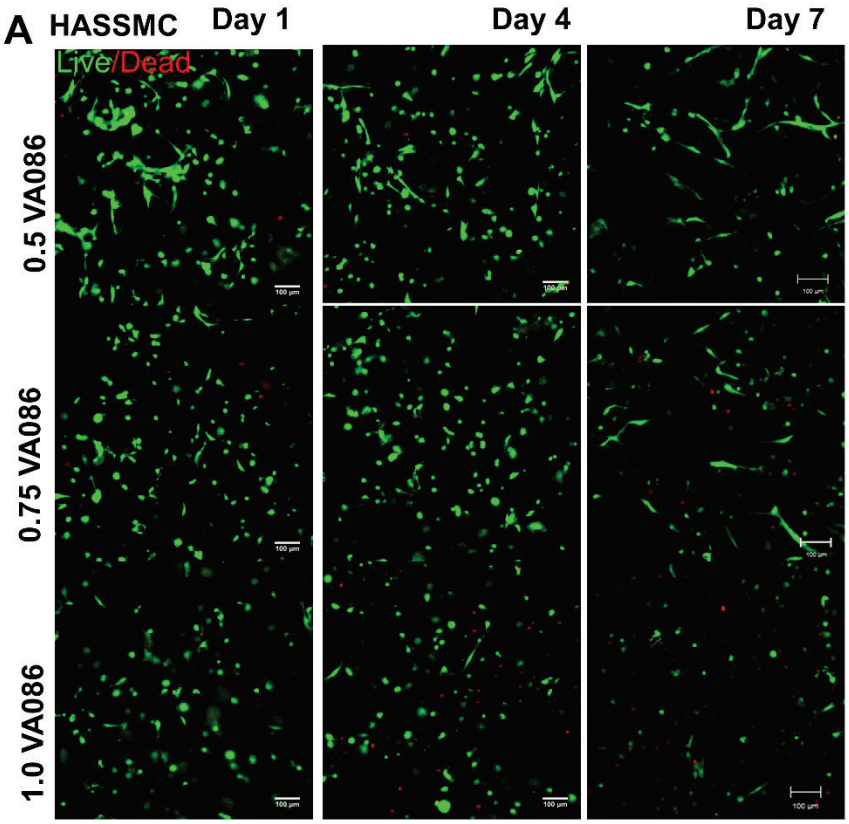


FIGURE. S6. Viability in HADMSC/Irgacure hydrogels. (A) Representative images of Live/Dead stained HADMSC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 µm.

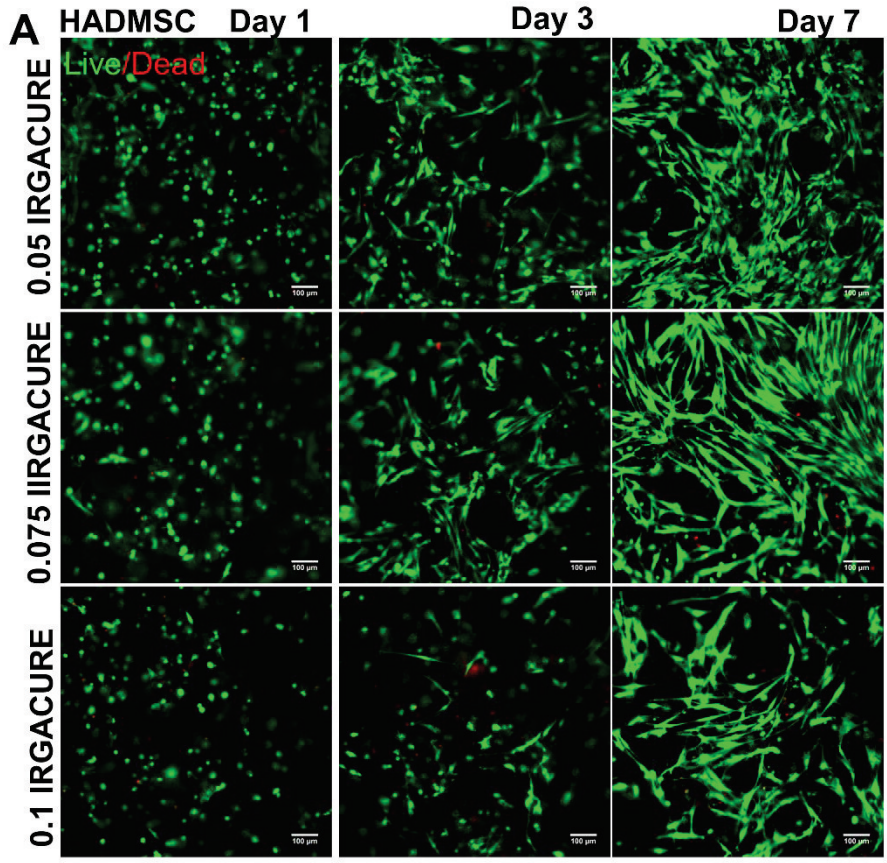


FIGURE. S7. Viability in HADMSC/VA086 hydrogel. (A) Representative images of Live/Dead stained HADMSC gels crosslinked at 2 mW/cm2 after up to Day 7 culture. Scale bars are 100 μm.

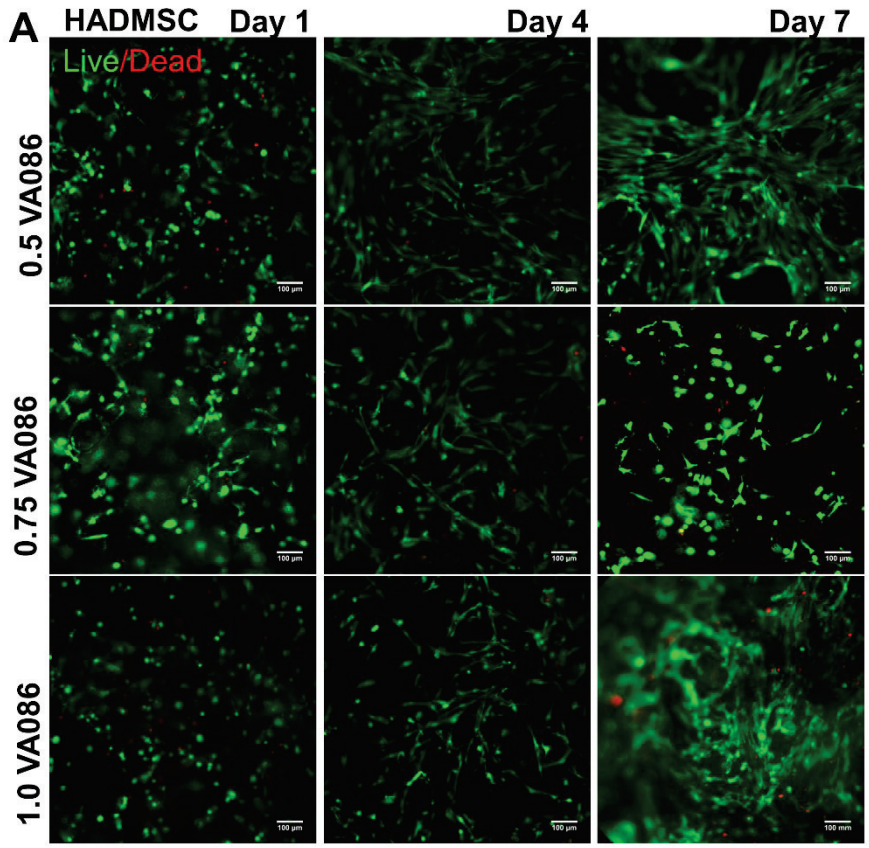


FIGURE. S8. Representative images of encapsulated DCF/CTR labeled HBSS and catalase treated cells taken directly after crosslinking of hydrogel.(A) HAVIC (B) HASSMC (C) HADMSC. Green is the DCF indicating oxidative stress and red is cell tracker red staining the cytoplasm. Scale bars are 50 μm.

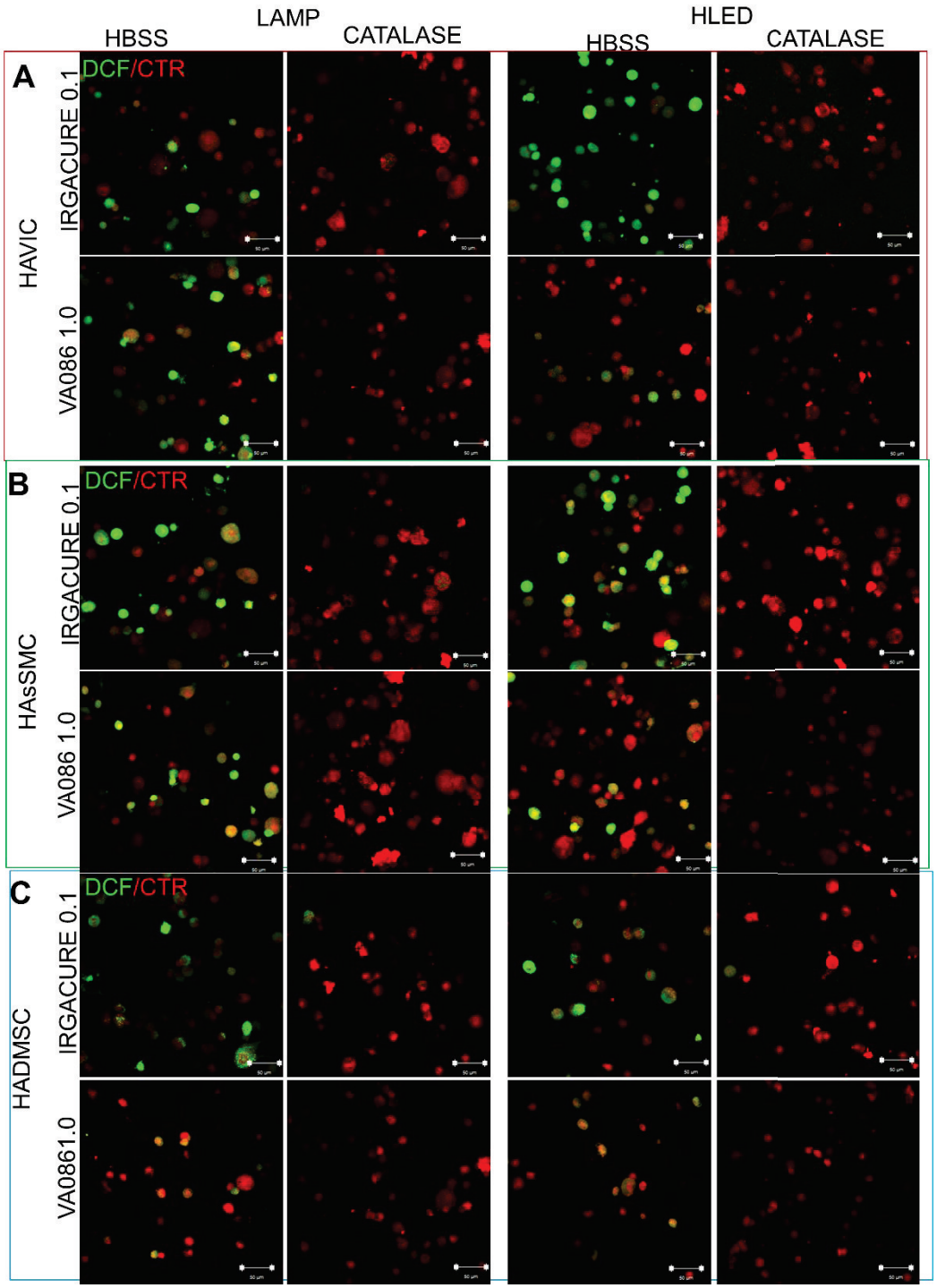


FIGURE. S9. Linear fit of percent of encapsulated cells experiencing general oxidative stress versus relative fluorescence of general oxidative stress indicator in encapsulated cell-hydrogels. (A) Diagram of how foaming in VA086 hydrogels crosslinked with HLED array would cause higher signal in the multi-well plate reader set on top read. (B) Linear fit of percentage of cells displaying oxidative stress in confocal images versus relative fluorescence of cell-hydrogel disks for all 24 conditions. 3 cell types, 2 light sources, 2 cell treatments (HBSS and Catalase), 2 photoinitiator conditions. All error bars are standard error of the mean. (C) Excluding HLED/VA086 data and refit percentage of cells displaying oxidative stress in confocal images versus relative fluorescence of cell-hydrogel disk.

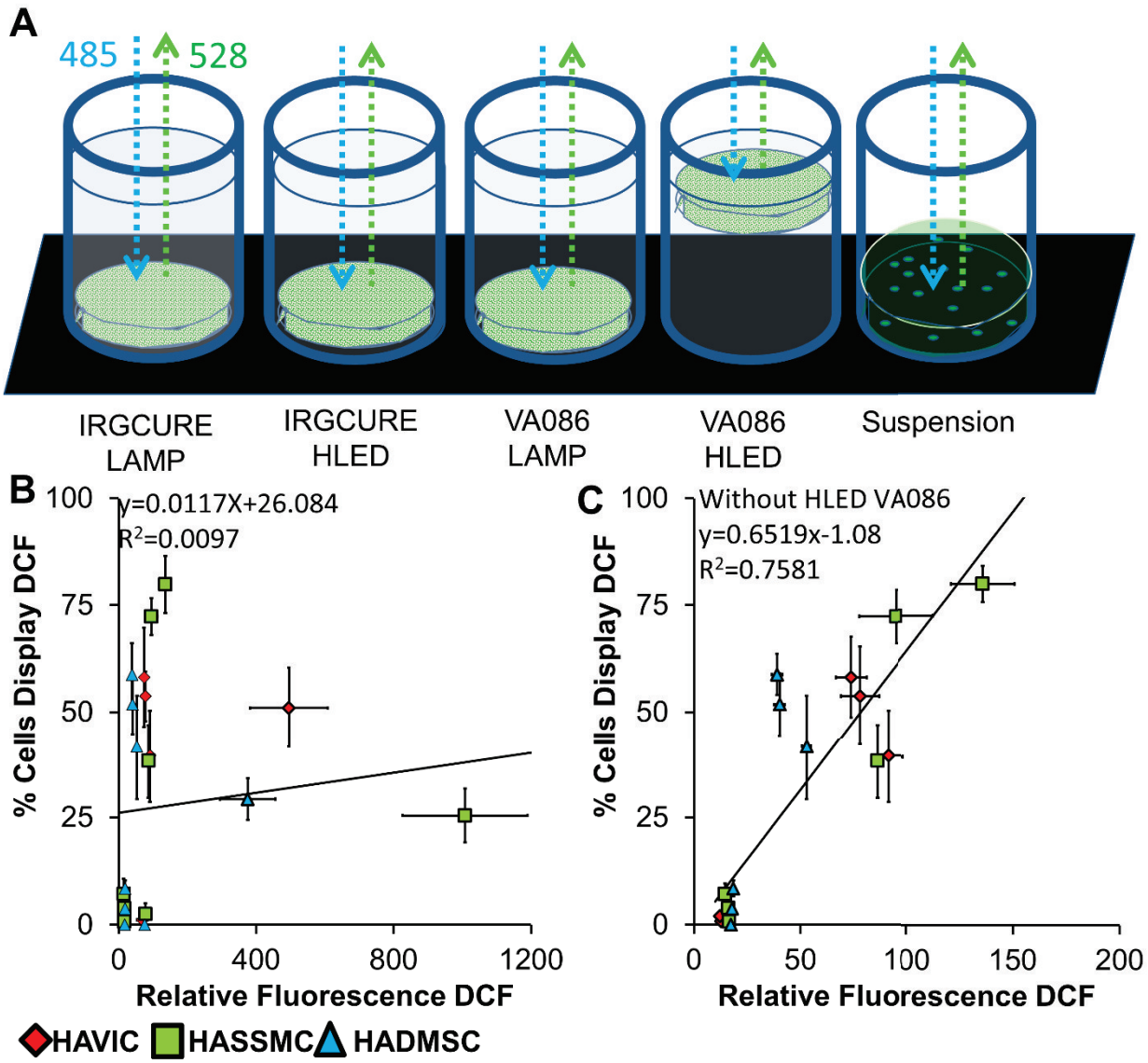


FIGURE. S10. Representative images of HBSS and catalase treated cells encapsulated then cultured to Day 3 then stained with Live/Dead. (A) HAVIC, (B) HASSMC (C) HADMSC. Scale bars are 100 μm.

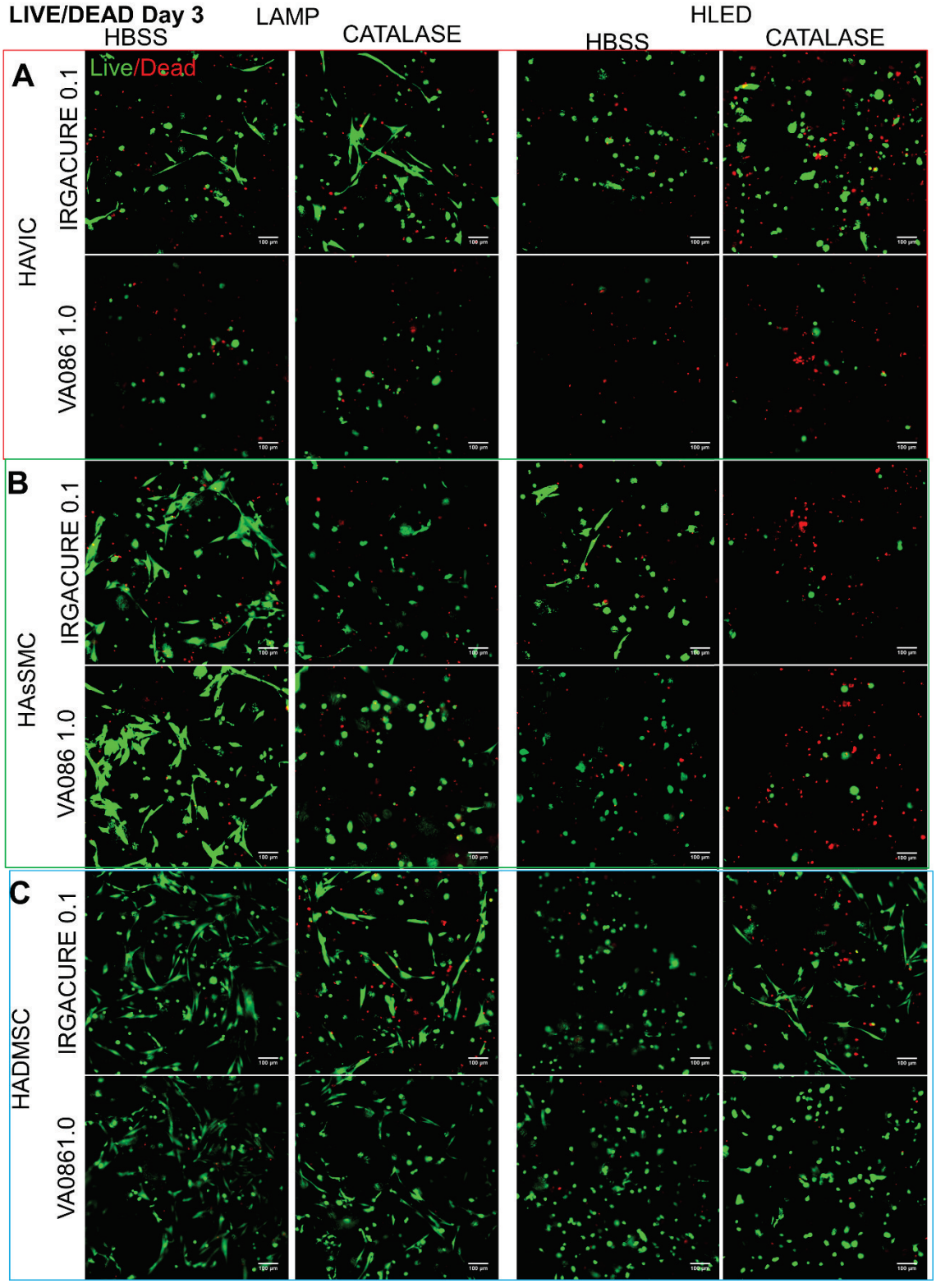
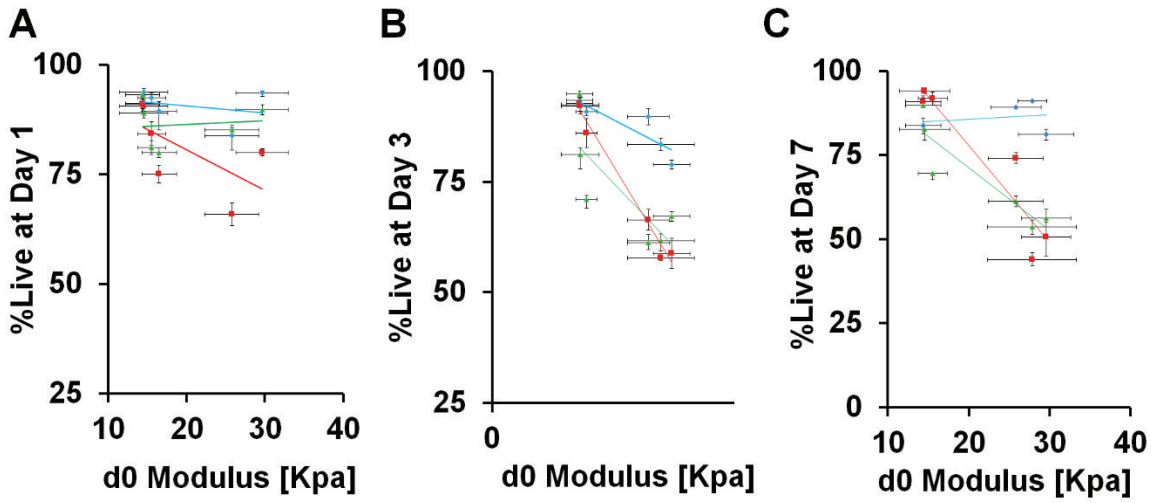


FIGURE. S11. Modulus E_{5to15} plotted against the percentage of live cells in the hydrogel of hydrogels made with 0.5-1.0w/v% VA086 and 0.05-0.1w/v% Irgacure crosslinked at 2mw/cm2 on (A) day 1, (B) day 3, and (C) day 7 of culture.



	Day 1	Day 3	Day 7
HADMSC	y = -0.1559x + 93.727	y = -0.7052x + 103.13	y = 0.1417x + 82.86
	R^2 = 0.0773	R^2 = 0.7795	R^2 = 0.0424
HAVIC	y = -0.9181x + 98.961	y = -2.2756x + 124.08	y = -2.8883x + 135.73
	R^2 = 0.3915	R^2 = 0.9822	R^2 = 0.8749
HASSMC	y = 0.0876x + 84.654	y = -1.4334x + 103.38	y = -1.8611x + 108.5
	R^2 = 0.0124	R^2 = 0.627	R^2 = 0.831

TABLE S1. Extrapolation of light source measurements.

Light Source	Power Fit	R^2	Intensity at Printing/ Crosslinking Surface [mW/cm^2]	Distance from Source [cm]	Energy [J] to 8 mm disk		
					3 min	5min	7min
Sensor Centered between syringe Tips, 4 HLEDS	$y=175.61*(x)^{(-1.531)}$	0.9987	136	1.2	12.30	20.51	28.71
Sensor Under Right Syringe Tip, 4 HLEDS	$y=101.78*(x)^{(-1.312)}$	0.9887	82	1.2	7.42	12.37	17.31
Sensor under left syringe tips 4HLEDs	$y=118.65*(x)^{(-1.371)}$	0.9953	94	1.2	8.50	14.17	19.84
Single HLED (60 Ohm)	$y=93.868*x^{(-1.834)}$	0.9993	67	1.2	6.08	10.13	14.18
Single LLED (25 Ohm)	$y=29.102*x^{(-1.686)}$	0.9976	21	1.2	1.94	3.23	4.52
Single LLED (33 Ohm)	$y = 25.365*x^{(-1.699)}$	0.9663	19	1.2	1.68	2.81	3.93
Single LLED (50 Ohm)	$y=21.38*x^{(-1.878)}$	0.9978	15	1.2	1.37	2.29	3.20
Lamp	$y=11.194*x^{(-1.281)}$	0.976	2	2.7	0.18	0.30	0.42

TABLE S1. Extrapolation of light source measurements and intensity at printing and crosslinking surface. High powered light emitting diode (HLED), Low powered light emitting diode (LLED).

TABLE S2. Modulus, viability, and morphology from photocrosslinking conditions day 1 of culture.								
Lamp 2mw/cm^2								
Con.		**E**	**HADSMC**		**HAVIC**		**HASSMC**	
[w/v%]		[kPa]	[%live]	Circ	[%live]	Circ	[%live]	Circ
0.025	I	22.8±3.1	-	-	-	-	-	-
0.05	I	37.1±4.8	93.5±0.4	0.24±0.01	79.9±0.8	0.70±0.01	89.7±1.1	0.68±0.01
0.075	I	42.0±8.2	89.5±2.2	0.22±0.04	75.1±2.0	0.73±0.01	79.9±1.1	0.70±0.1
0.1	I	40.9±4.1	83.9±1.8	0.16±0.04	65.8±2.6	0.78±0.01	85.2±1.0	0.70±0.01
0.25	V	-	-	-	-	-	-	-
0.5	V	19.3±2.7	91.1±1.1	0.53±0.05	91.0±1.5	0.74±0.01	93.2±0.6	0.61±0.02
0.75	V	20.0±3.9	93.8±0.8	0.58±0.03	90.6±1.3	0.67±0.02	89.0±1.2	0.68±0.03
1.0	V	21.3±2.7	92.4±0.2	0.55±0.02	84.3±2.7	0.71±0.01	81.1±1.6	0.66±0.02
High Powered LED 136mw/cm^2								
0.1	I	45.6±5.2	-	-	-	-	-	-
1.0	V	120.7±10.2	-	-	-	-	-	-

TABLE S2–Summary averages and standard error of mean of compressive modulus (E_{5to15}) of crosslinked hydrogels made with different photoinitiator concentration (con.), photoinitiator type either Irgacure 2959 (I) or VA086 (V), percent live cells per condition at day 1, and circularity per condition. All cells handled in PBS and conditions photocrosslinked with the lamp at 2mW/cm^2.

TABLE S3. Swelling ratios for Photocrosslinking conditions			
Con.	**Initiator**	**Intensity**	**Swelling Ratio**
[w/v%]		**[mW/cm^2]**	
0.025	I	2	26.3±1.8
0.025	I	136	24.0±1.1
0.1	I	2	13.2±1.2
0.1	I	136	10.2±0.7
0.5	V	136	14.6±0.9
1.0	V	2	19.9±0.3
1.0	V	136	10.5±0.4

TABLE S3. Weight based swelling of crosslinked hydrogels made with different photoinitiator concentration (con.), photoinitiator type either Irgacure (I) or VA086 (V), and light source intensity during crosslinking.

TABLE S4. Percentage of cells positive for general oxidative stress and relative fluorescence.

Con.		Int.	HADSMC		HAVIC		HASSMC	
			HBSS	CAT	HBSS	CAT	HBSS	CAT
[w/v%]		[mW/cm^2]	[%]	[%]	[%]	[%]	[%]	[%]
0.1	I	2	58.8±7.3	3.8±1.8	58.2±11.7	0.8±0.8	72.4±6.7	7.2±3.5
1.0	V	2	41.5±12.3	0.0±0.0	39.5±10.9	3.2±2.5	38.3±8.7	0.8±0.8
0.1	I	136	51.8±6.9	8.5±1.9	53.8±5.8	2.1±1.4	79.9±6.7	3.9±0.9
1.0	V	136	29.3±4.8	0.0±0.0	51.0±9.5	1.2±1.1	25.5±6.3	2.5±2.5
Relative Fluorescence Per Gel								
0.1	I	2	39.0±2.4	17.9±1.0	73.9±7.2	12.8±0.4	135.9±14.8	14.7±0.2
1.0	V	2	52.9±2.1	17.3±0.3	91.4±7.1,	15.5±0.2	86.3±2.7	16.4±0.7
0.1	I	136	40.2±2.5	40.2±2.5	78.0±9.1	78.0±9.1	135.9±14.8	135.9±14.8
1.0	V	136	375.9±80.2	375.9±80.2	495.4±113.5	495.4±113.5	1007.8±182.2	1007.8±182.2

TABLE S4. Percentage of encapsulated cells that fluoresce green when labeled with DCF and were photoencapsulated. Conditions varied by photoinitiator concentration (con.), photoinitiator type either Irgacure (I) or VA086 (V), light intensity (Int.) cell type, and then treatment (HBSS control or catalase).

TABLE S5. Percentage and circularity of live cells with and without catalase treatment and photoencapsulation.

Con.		Int.	HADSMC		HAVIC		HASSMC	
			HBSS	CAT	HBSS	CAT	HBSS	CAT
[w/v%]		[mw/cm^2]	[%live]	[%live]	[%live]	[%live]	[%live]	[%live]
0.1	I	2	92.8±1.7	62.0±2.5	34.2±5.9	49.2±2.4	60.7±1.8	41.3±3.0
1.0	V	2	83.6±4.8	93.7±0.9	23.4±3.5	46.1±1.8	74.4±2.9	43.7±1.4
0.1	I	136	85.2±1.4	59.2±2.5	38.5±3.9	41.3±3.0	44.8±5.7	24.4±3.8
1.0	V	136	76.5±6.1	80.0±4.9	7.44±1.2	15.8±1.3	45.1±4.6	25.0±12.8
Circularity								
0.1	I	2	0.609±0.042	0.574±0.037	0.686±0.013	0.650±0.020	0.559±0.018	0.661±0.009
1.0	V	2	0.532±0.010	0.568±0.030	0.787±0.17	0.699±0.019	0.554±0.033	0.742±0.011
0.1	I	136	0.767±0.013	0.678±0.013	0.657±0.063	0.779±0.029	0.697±0.032	0.728±0.015
1.0	V	136	0.726±0.014	0.735±0.008	0.759±0.021	0.751±0.029	0.759±0.021	0.751±0.028

TABLE S5. Percentage and circularity of live cells with and without catalase treatment and photoencapsulation. Conditions varied by photoinitiator concentration (con.), photoinitiator type either Irgacure (I) or VA086 (V), light intensity (Int.) cell type, and then treatment (HBSS control or catalase).

TABLE S6. Results of Two-Way ANOVA: Analyzing the Factors VA086 Photoinitiator Concentration and Light Source Intensity on Hydrogel Swelling Ratio.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity Source	1	474.8	474.8	105.6	<0.0001*
VA086 Concentration	1	112.2	112.2	25.0	<0.0001*
Light Intensity X VA086	1	3.1	3.1	0.7	0.4151
Error	21	94.4	4.5		

TABLE S6. VA086 two way ANOVA for swelling ratio data. A two-way ANOVA was conducted that examined the effect that photoinitiator concentration and light source have on hydrogel selling ratio. In VA086 hydrogel there was not a statistically significant interaction between the effect of photoinitiator concentration and the effect of light source on hydrogel swelling ratio ($F=0.4151$ $p=0.4151$). However, both light intensity and photoinitiator concentration independently affect the swelling ratio of the photocrosslinked hydrogel ($p<0.0001$*).

TABLE S7. Results of Two-Way ANOVA: Analyzing the Factors Irgacure Photoinitiator Concentration and Light Source Intensity on Hydrogel Swelling Ratio.					
Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity Source	1	50.3	50.3	5.2	0.0319*
Irgacure Concentration	1	1246.6	1246.6	128.0	<0.0001*
Light Intensity X Irgacure	1	1.1	1.1	0.1	0.7428
Error	25	243.4	4.5		

TABLE S7. Irgacure two way ANOVA for swelling ratio data. A two-way ANOVA was conducted that examined the effect that photoinitiator concentration and light source have on hydrogel selling ratio. In Irgacure hydrogel there was not a statistically significant interaction between the effect of photoinitiator concentration and the effect of light source on hydrogel swelling ratio ($F=0.1101$ $p=0.7428$). However, both light intensity and photoinitiator concentration independently affect the swelling ratio of the photocrosslinked hydrogel.

TABLE S8. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and Irgacure Photoinitiator Concentration on Percentage of Live Cells at Day 1 of Culture

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Irgacure Concentration	2	556.0	278.0	27.5	<0.0001*
Cell Type	2	1519.2	759.6	75.2	<0.0001*
Irgacure X Cell	4	238.2	59.5	5.9	0.0015
Error	27	272.7	10.1		

TABLE S8. A two-way ANOVA was conducted that examined the effect that cell type and photoinitiator concentration on the percentage of live cells observed at day 1 in culture. At day 1 in culture there was a statistically significant interaction between the effect of cell type and the effect of photoinitiator concentration on the percentage of live cells ($F=5.894$ $p=0.0015$). For hydrogels prepared with Irgacure at day 1 in culture the effect of photoinitiator concentration on the percentage of live cells depends on the cell type encapsulated, with photoinitiator concentration having a greater effect on HAVIC and HASSMC than on HADMSC.

TABLE S9. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and VA086 Photoinitiator Concentration on Percentage of Live Cells at Day 1 of Culture					
Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
VA086 Concentration	2	228.7	114.4	12.6	0.0002*
Cell Type	2	129.3	64.6	7.1	0.00035*
VA086X Cell	4	143.3	35.8	3.9	0.0127*
Error	25	226.4	9.1		

TABLE S9. A two-way ANOVA was conducted that examined the effect that cell type and photoinitiator concentration on the percentage of live cells observed at day 1 in culture. There was a statistically significant interaction between the effects of cell type and VA086 photoinitiator concentration on the percentage of live cells. The effect of VA086 photoinitiator concentration on the percentage of live cells depends on the cell type encapsulated ($F=3.96$ $p=0.0127$), with photoinitiator concentration having a greater effect on HAVIC and HASSMC than on HADMSC.

TABLE S10. Results of Two-Way ANOVA: Analyzing the Factors Irgacure Photoinitiator Concentration and Day in Culture on Percentage of Live HADMSC.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Irgacure Concentration	2	579.6	289.8	23.6	<0.0001*
Day	2	153.3	76.6	6.2	0.0060*
Irgacure X Day	4	72.6	18.2	1.6	0.2149
Error	27	332.1	12.3		

TABLE S10. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HADMSC. For HADMSC here was not a statistically significant interaction between the effects photoinitiator concentration and day in culture on the percentage of live cells in hydrogels prepared with Irgacure ($F=1.555$ $p=0.2149$). As day in culture increases and as Irgacure photoinitiator concentration increases, the percentage of live cells decreases (**Fig.3C**).

TABLE S11. Results of Two-Way ANOVA: Analyzing the Factors VA086 Photoinitiator Concentration and Day in Culture on Percentage of Live HADMSC.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
VA086 Concentration	2	0.2	0.1	0.0384	0.8469
Day	1	8.7	8.7	0.9464	0.4077
VA086 X Day	2	16.3	8.2	1.7705	0.2002
Error	17	78.3	4.6		

TABLE S11. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HADMSC. For HADMSC there was not a statistically significant interaction between the effects photoinitiator concentration and day in culture on the percentage of live cells ($F=1.771$ $p=0.0.2002$). Post-hoc Tukey HSD $p<0.05$ found no significant differences between day in culture or between photoinitiator concentration indicated by matching letters (**Fig.3D**).

TABLE S12. Results of Two-Way ANOVA: Analyzing the Factors Irgacure Photoinitiator Concentration and Day in Culture on Percentage of Live HAVIC.					
Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Irgacure Concentration	2	1924.9	962.4	33.04	<0.0001*
Day	2	1764.3	882.1	30.00	<0.0001*
Irgacure X Day	4	842.6	210.6	7.16	0.0005*
Error	27	793.8	29.4		

TABLE S12. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HAVIC. There was a statistically significant interaction between the effects of day in culture and photoinitiator concentration on the percentage of live cells. The effect of photoinitiator concentration on the percentage of live cells depends on the day in culture ($F=7.165$ $p=0.0005$), with photoinitiator concentration having a greater effect on the percentage of live cells at later culture times (**Fig.3E**)

TABLE S13. Results of Two-Way ANOVA: Analyzing the Factors VA086 Photoinitiator Concentration and Day in Culture on Percentage of Live HAVIC.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
VA086 Concentration	2	79.9	39.9	2.71	0.0853
Day	2	164.1	82.0	5.56	0.0098*
VA086 X Day	4	75.7	18.9	1.28	0.3018
Error	26	383.6	14.7		

TABLE S13. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HAVIC in hydrogels prepared with VA086. There was not a statistically significant interaction between the effects of day in culture and photoinitiator concentration on the percentage of live cells (F=1.284 p=0.3018) (**Fig.3F**).

TABLE S14. Results of Two-Way ANOVA: Analyzing the Factors Irgacure Photoinitiator Concentration and Day in Culture on Percentage of Live HASSMC.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Irgacure Concentration	2	4828.7	2414.3	210.56	<0.0001*
Day	2	197.5	98.7	8.61	0.0014*
Irgacure X Day	4	182.6	45.6	3.98	0.0124*
Error	25	286.6	11.4		

TABLE S14. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HASSMC. There was a statistically significant interaction between the effects of day in culture and photoinitiator concentration on the percentage of live cells ($F=3.9815$ $p=0.0124$) (Fig.3G).

TABLE S15. Results of Two-Way ANOVA: Analyzing the Factors VA086 Photoinitiator Concentration and Day in Culture on Percentage of Live HASSMC.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
VA086 Concentration	2	278.7	139.3	6.3402	0.0057*
Day	2	1831.9	915.9	41.671	<0.0001*
VA086 X Day	4	140.7	35.1	1.6005	0.204
Error	26	571.5	21.9		

TABLE S15. A two-way ANOVA was conducted that examined the effect photoinitiator concentration and day in culture have on the percentage of live cells for HASSMC in hydrogels prepared with VA086. There was not a statistically significant interaction between the effects of day in culture and photoinitiator concentration on the percentage of live cells ($F=1.6005$ $p=0.204$). Photoinitiator concentration had more effect at longer culture times (Fig.3H).

TABLE S16. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and Irgacure Photoinitiator Concentration on Circularity of Live Cells at Day 1 of Culture

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Irgacure Concentration	2	0.015	0.007	12.540	<0.0001*
Cell Type	2	0.097	0.048	82.504	<0.0001*
Irgacure X Cell	4	0.018	0.004	7.504	0.0003*
Error	27	0.016	0.001		

TABLE S16. A two-way ANOVA was conducted that examined the effect that cell type and photoinitiator concentration on the circularity of live cells observed at day 1 in culture. At day 1 in culture there was a statistically significant interaction between the effect of cell type and the effect of photoinitiator concentration on the circularity of live cells ($F=7.5042$ $p=0.0003$*). At day 1 in culture for hydrogels prepared with Irgacure the circularity of live cells depends on the cell type, and encapsulated and HAVIC and HASSMC are more round than HADMSC **(Fig. 4A)**.

TABLE S17. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and VA086 Photoinitiator Concentration on Circularity of Live Cells at Day 1 of Culture

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
VA086 Concentration	2	0.001	0.000	0.151	0.861
Cell Type	2	0.140	0.070	27.503	<0.0001*
VA086 X Cell	4	0.019	0.005	1.888	0.1438
Error	25	0.064	0.003		

TABLE S17. A two-way ANOVA was conducted that examined the effect that cell type and VA086 photoinitiator concentration on the circularity of live cells observed at day 1 in culture. At day 1 in culture there was not a statistically significant interaction between the effect of cell type and the effect of photoinitiator concentration on the circularity of live cells (F=1.8884 p=0.1438*). However, at day 1 in culture for hydrogels prepared with VA086, the circularity of live cells does depend on the cell type (**Fig.4B**).

TABLE S18. Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on Percentage of Cells that are Positive/green fluorescent DCF in Hydrogels prepared with Irgacure.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	0.6	0.6	0.00	0.953
Cell Type	2	1368.1	684.0	3.84	0.0296
Light Intensity X Cell Type	2	33.2	16.6	0.09	0.9111
Treatment	1	42347.2	42347.2	237.76	<0.0001*
Light Intensity X Cell Type	1	15.1	15.1	0.08	0.77
Cell Type X Treatment	2	1038.8	519.4	2.92	0.07
Light Intensity X Cell Type X Treatment	2	282.9	141.4	0.79	0.46
Error	41	7302.3	178.1		

TABLE S18. A three-way ANOVA was conducted that examined the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the percentage of cells that will exhibit DCF fluorescence immediately after the hydrogel prepared with Irgacure is photocrosslinked around them. There was not a statistically significant interaction between the effect of light intensity, the effect of cell type, and the effect of treatment on the percentage of DCF positive cells ($F=0.46$ $p=0.46$). Catalase treatment reduces the percentage of cells experiencing oxidative stress (**Fig.5A**).

Post-hoc Tukey HSD $p<0.05$ non-matching letters

TABLE S19. Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on Percentage of Cells that are Positive/green fluorescent DCF in Hydrogels prepared with VA086.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	65.2	65.2	0.38	0.5399
Cell Type	2	453.8	226.9	1.33	0.2763
Light Intensity X Cell Type	2	298.2	149.1	0.88	0.4251
Treatment	1	15751.2	15751.2	92.55	<0.0001*
Light Intensity X Cell Type	1	58.2	58.2	0.34	0.56
Cell Type X Treatment	2	331.7	165.8	0.97	0.39
Light Intensity X Cell Type X Treatment	2	490.1	245.1	1.44	0.25
Error	36	6127.1	170.2		

TABLE S19. A three-way ANOVA was conducted that examined the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the percentage of cells that will exhibit DCF fluorescence immediately after the hydrogel prepared with VA086. There was not a statistically significant interaction between the effect of light intensity, the effect of cell type, and the effect of treatment on the percentage of DCF positive cells ($F=1.44$ $p=0.25$). Catalase reduces the percentage of cells experiencing oxidative stress (**Fig.5B**).

TABLE S20. Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on the intensity of green fluorescence DCF present in cell-hydrogels prepared with Irgacure.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	884.1	884.1	5.1	0.0289*
Cell Type	2	13550.4	6775.2	38.9	<0.0001*
Light Intensity X Cell Type	2	1160.7	580.4	3.3	0.0442*
Treatment	1	52939.4	52939.4	303.9	<0.0001*
Light Intensity X Cell Type	1	769.3	769.3	4.4	0.0409*
Cell Type X Treatment	2	16139.6	8069.8	46.3	<0.0001*
Light Intensity X Cell Type X Treatment	2	1010.5	505.3	2.9	0.06
Error	48	8361.6	174.2		

TABLE S20. A three-way ANOVA was conducted that examined the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the intensity of DCF fluorescence exhibited by a cell-hydrogel disk prepared with Irgacure. There was not a statistically significant interaction between the effect of light intensity, the effect of cell type, and the effect of treatment on the percentage of DCF positive cells ($F=2.30$ $p=0.0647$).

TABLE S21. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and Pre-encapsulation Treatment on the intensity of green fluorescence DCF present in cell-hydrogels prepared with VA086 and photocrosslinked with the HLED light source.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Cell Type	2	45782.0	22891.0	6.5	0.0075*
Treatment	1	1830985.0	1830985.0	51.9	<0.0001*
Cell Type X Treatment	2	443849.9	221925.0	6.3	0.0085*
Error	18	634519.8	35251.0		

TABLE S21. A two-way ANOVA was conducted that examined the effect that cell type and pre-encapsulation treatment with catalase has on the intensity of DCF fluorescence exhibited by a cell-hydrogel disk prepared with VA086 and photocrosslinked with the HLED light source. There was a statistically significant interaction between the effect of cell type and the effect of treatment on the percentage of DCF positive cells (F=6.30 p=0.0085*).

TABLE S22. Results of Two-Way ANOVA: Analyzing the Factors Cell Type and Pre-encapsulation Treatment on the intensity of green fluorescence DCF present in cell-hydrogels prepared with VA086 and photocrosslinked with the lamp light source.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Cell Type	2	1617.0	808.5	19.5	<0.0001*
Treatment	1	21938.2	21938.2	528.3	<0.0001*
Cell Type X Treatment	2	1886.5	943.3	22.7	<0.0001*
Error	18	747.5	41.5		

TABLE S22. A two-way ANOVA was conducted that examined the effect that cell type and pre-encapsulation treatment with catalase has on the intensity of DCF fluorescence exhibited by a cell-hydrogel disk prepared withVA086 after photocrosslinking with the lamp light source. There was a statistically significant interaction between the effect of cell type and the effect of treatment on the percentage of DCF positive cells ($F=22.7$ $p<0.0001$).

TABLE S23. Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on the percentage of live cells in cell-hydrogels prepared with Irgacure.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	726.5	726.5	13.9	0.007*
Cell Type	2	11645.7	5822.9	111.6	<0.0001*
Light Intensity X Cell Type	2	460.3	230.2	4.4	0.0193*
Treatment	1	2081.9	2081.9	39.9	<0.0001*
Light Intensity X Treatment	1	23.1	23.1	0.4	0.51
Cell Type X Treatment	2	3071.4	1535.7	29.4	<0.0001*
Light Intensity X Cell Type X Treatment	2	47.4	73.7	1.4	0.26
Error	36	1877.8	52.2		

TABLE S23. A three-way ANOVA was conducted to examine the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the percentage of live cells at day 3 in culture in a cell-hydrogel disk prepared with Irgacure. There was not a statistically significant interaction between the effect of light intensity, the effect of cell type, and the effect of treatment on the percentage of live cells ($F=1.41$ $p=0.26$), but there was a significant interaction between effect of cell type and effect of catalase treatment ($F=29.44$ $p=<0.0001*$).

TABLE S24. Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on the percentage of live cells in cell-hydrogels prepared with VA086.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	4297.3	4297.3	42.5	<0.0001*
Cell Type	2	29466.6	14733.3	145.8	<0.0001*
Light Intensity X Cell Type	2	458.3	229.2	2.3	0.12
Treatment	1	12.6	12.6	0.1	0.73
Light Intensity X Treatment	1	35.1	35.1	0.3	0.56
Cell Type X Treatment	2	3531.0	1765.5	17.5	<0.0001*
Light Intensity X Cell Type X Treatment	2	312.6	156.3	1.5	0.23
Error	35	3536.3	101.0		

TABLE S24. A three-way ANOVA was conducted to examine the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the percentage of live cells at day 3 in culture in a cell-hydrogel disk prepared with VA086. There was not a statistically significant interaction between the effect of light intensity, the effect of cell type, and the effect of treatment on the percentage of live cells ($F=1.5470$ $p=0.2271$), but there was a significant interaction between effect of cell type and effect of catalase treatment ($F=17.4736$ $p=<0.0001$*).

TABLE S25: Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on the circularity of live cells in cell-hydrogels prepared with Irgacure.					
Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	0.1371	0.1371	68.9457	<0.0001*
Cell Type	2	0.0315	0.0157	7.9090	0.001400
Light Intensity X Cell Type	2	0.0036	0.0018	0.8941	0.417900
Treatment	1	0.0001	0.0001	0.0781	0.786500
Light Intensity X Treatment	1	0.0014	0.0014	0.7281	0.399100
Cell Type X Treatment	2	0.0014	0.0007	9.1929	0.0006*
Light Intensity X Cell Type X Treatment	2	0.0366	0.0183	3.4696	0.0419*
Error	36	0.0717	0.0020		

TABLE S25: A three-way ANOVA was conducted to examine the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the circularity of live cells at day 3 in culture in a cell-hydrogel disk prepared with Irgacure. There was a statistically significant interaction between the effect of catalase treatment, the effect of light intensity, and the effect of cell type (F=3.469 p=<0.0419*).

TABLE S26: Results of Three-Way ANOVA: Analyzing the Factors Cell Type, Light Intensity, and Pre-encapsulation Treatment on the circularity e of live cells in cell-hydrogels prepared with VA086.

Source of Variation	Degrees of Freedom	Sums of Squares	Means Square	F Ratio	P value (probability of making type one error)
Light Intensity	1	0.0894	0.0894	30.1467	<0.0001*
Cell Type	2	0.0679	0.0340	11.4492	<0.0001*
Light Intensity X Cell Type	2	0.0870	0.0435	14.6654	<0.0001*
Treatment	1	0.0217	0.0217	7.3198	0.0105*
Light Intensity X Treatment	1	0.0001	0.0001	0.0179	0.894200
Cell Type X Treatment	2	0.0157	0.0079	2.1197	0.135200
Light Intensity X Cell Type X Treatment	2	0.0807	0.0403	13.5989	<0.0001*
Error	35	0.1038	0.0030		

TABLE S26: A three-way ANOVA was conducted to examine the effect that cell type, light intensity, and pre-encapsulation treatment with catalase has on the circularity of live cells at day 3 in culture in a cell-hydrogel disk prepared with VA086. There was a statistically significant interaction between the effect of catalase treatment, the effect of light intensity, and the effect of cell type (F=13.5989 p=<0.0001*).