Supplementary Material (ESI) for Lab on a Chip

SUPPORTING INFORMATION FOR:

A Cell-laden Microfluidic Hydrogel

Yibo Ling[1,2], Jamie Rubin[3], Yuting Deng[4], Catherine Huang[4], Utkan Demirci[1,5], Jeffrey M. Karp[3], Ali Khademhosseini[1,5,]

[1] Harvard-MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

[2] Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

[3] Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

[4] Department of Biology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

[5] Center for Biomedical Engineering, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, MA 02115, USA

Methods

To determine the viability of cells in channels as a function of both axial distance along and vertical distance away from the channel, the viability of cells within 1.25mm x 0.25mm zones were assessed (n = 3 for each value, an average of 46 cells/zone). Zones were defined at various vertical distances (50 μm, 300 μm, 550 μm, 800 μm, 1050 μm; the labeled values indicate the distance from the channel floor to the floor of the zone) and axial distances (0.0 cm, 1.5 cm, 3.0 cm). Paired t-tests were used to assess statistically significant differences in viability. Due to concerns about human error in cell counting we considered $p < 0.005$ to be statistically significant (conservative when compared to $p < 0.05$ used in many typical biological experiments).

Supplementary Material (ESI) for Lab on a Chip

Results

Detailed viability data is presented for PBS flow controls at day 1 (Figure S1), day 2 (Figure S2), and day 3 (Figure S3). On the left hand side the data is binned by both axial distance along and vertical distance above the channel. For all 3 days, no statistically significant differences were found between zones of varying axial distances along the channel (left panel in Figures S1, S2, S3). These three axial values were plotted together (n = 9, right panel in Figures S1, S2, S3). Here, no significant differences were found between the viability values of different vertical zones.

Detailed viability data is presented for experimental media flow conditions in zones 50 μm (Figure S4), 300 μm (Figure S5), 550 μm (Figure S6), 800 μm (Figure S7), and 1050 μm (Figure S8) above the channel. For all 5 vertical distances, no statistically significant differences were found between zones of varying axial distances along the channel. As such, the data was reorganized by collapsing the axial conditions (resulting samples sizes of n = 9 for each data point) and presented as Figure 6 in the main body of the text.

Supplementary Material (ESI) for Lab on a Chip

Figure Captions

Figure S1: Viability data for PBS flow control experiments at day 1 in zones binned by vertical distance above and axial distance along the channel (left panel, n=3) as well as only by vertical distance above the channel (right panel, n = 9). Error bars span 1 standard deviation from the mean.

Figure S2: Viability data for PBS flow control experiments at day 2 in zones binned by vertical distance above and axial distance along the channel (left panel, n=3) as well as only by vertical distance above the channel (right panel, n = 9). Error bars span 1 standard deviation from the mean.

Figure S3: Viability data for PBS flow control experiments at day 3 in zones binned by vertical distance above and axial distance along the channel (left panel, n=3) as well as only by vertical distance above the channel (right panel, n = 9). Error bars span 1 standard deviation from the mean.

Figure S4: Viability data for media flow experimental conditions within a 1.25mm x 0.25mm zone 50 μm above the channel floor. Axial distance as well as time course data are plotted (n = 3). Error bars span 1 standard deviation from the mean.

Figure S5: Viability data for media flow experimental conditions within a 1.25mm x 0.25mm zone 300 μm above the channel floor. Axial distance as well as time course data are plotted (n = 3). Error bars span 1 standard deviation from the mean.

Figure S6: Viability data for media flow experimental conditions within a 1.25mm x 0.25mm zone 550 μm above the channel floor. Axial distance as well as time course data are plotted (n = 3). Error bars span 1 standard deviation from the mean.

Figure S7: Viability data for media flow experimental conditions within a 1.25mm x 0.25mm zone 800 μm above the channel floor. Axial distance as well as time course data are plotted (n = 3). Error bars span 1 standard deviation from the mean.

Figure S8: Viability data for media flow experimental conditions within a 1.25mm x 0.25mm zone 1050 μm above the channel floor. Axial distance as well as time course data are plotted (n = 3). Error bars span 1 standard deviation from the mean.

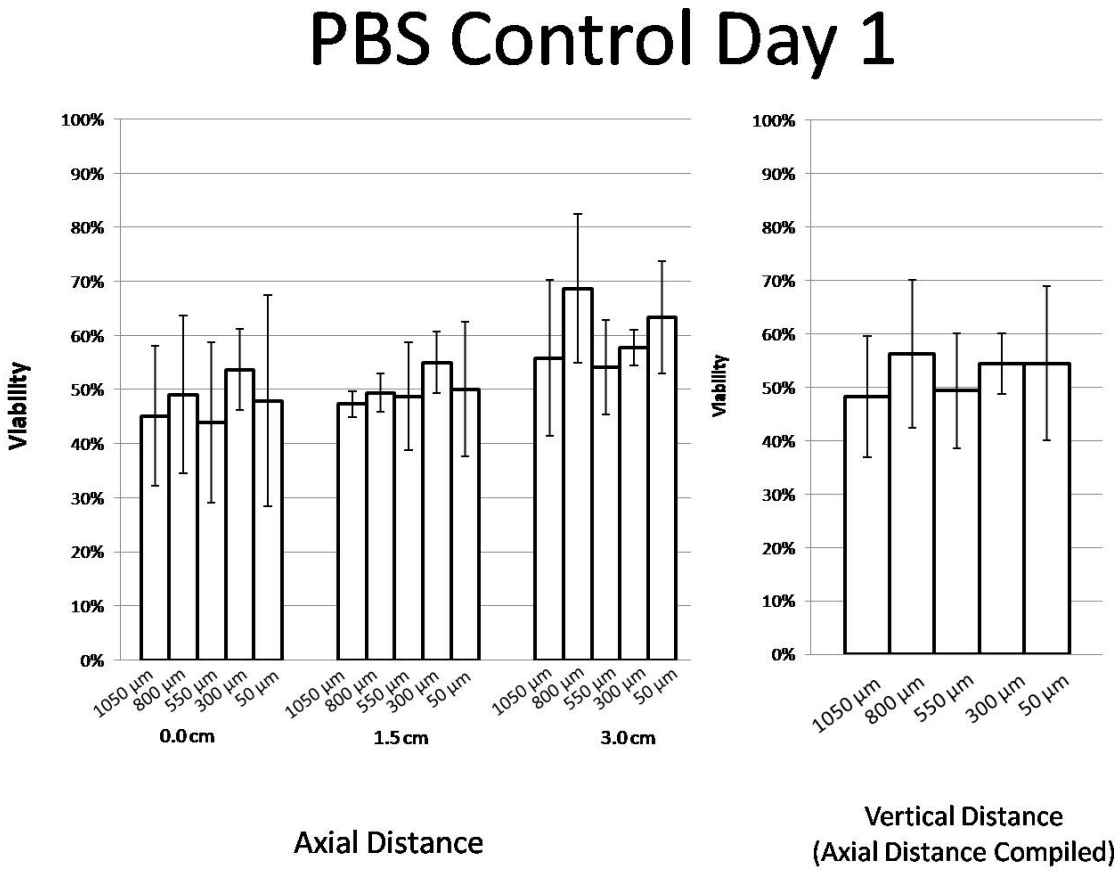

Figure S1

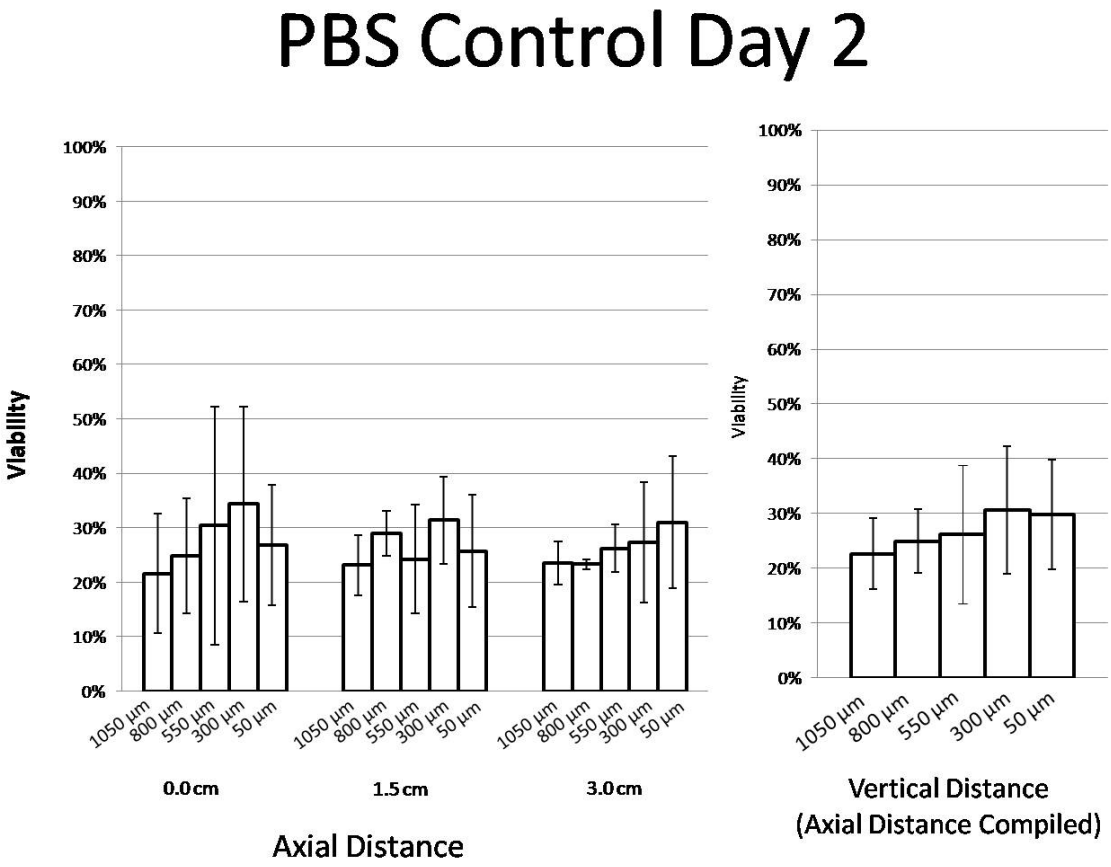

Figure S2

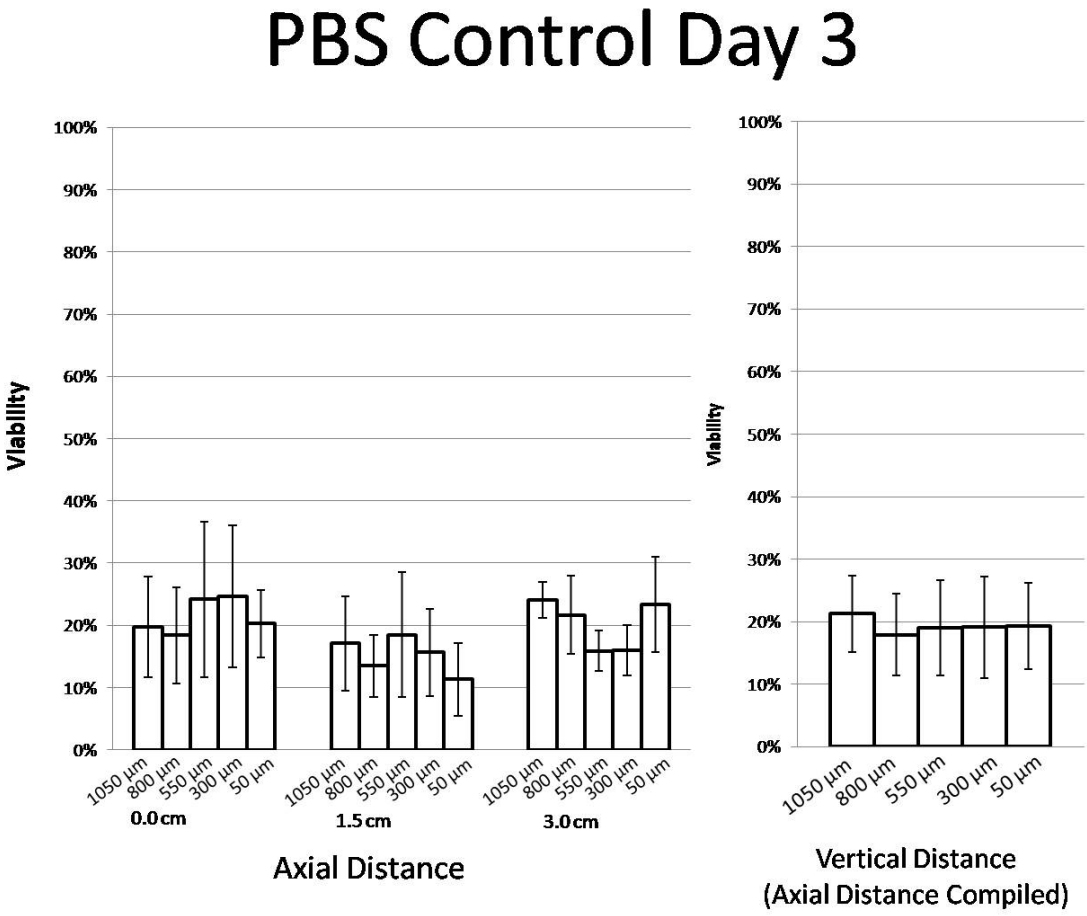

Figure S3

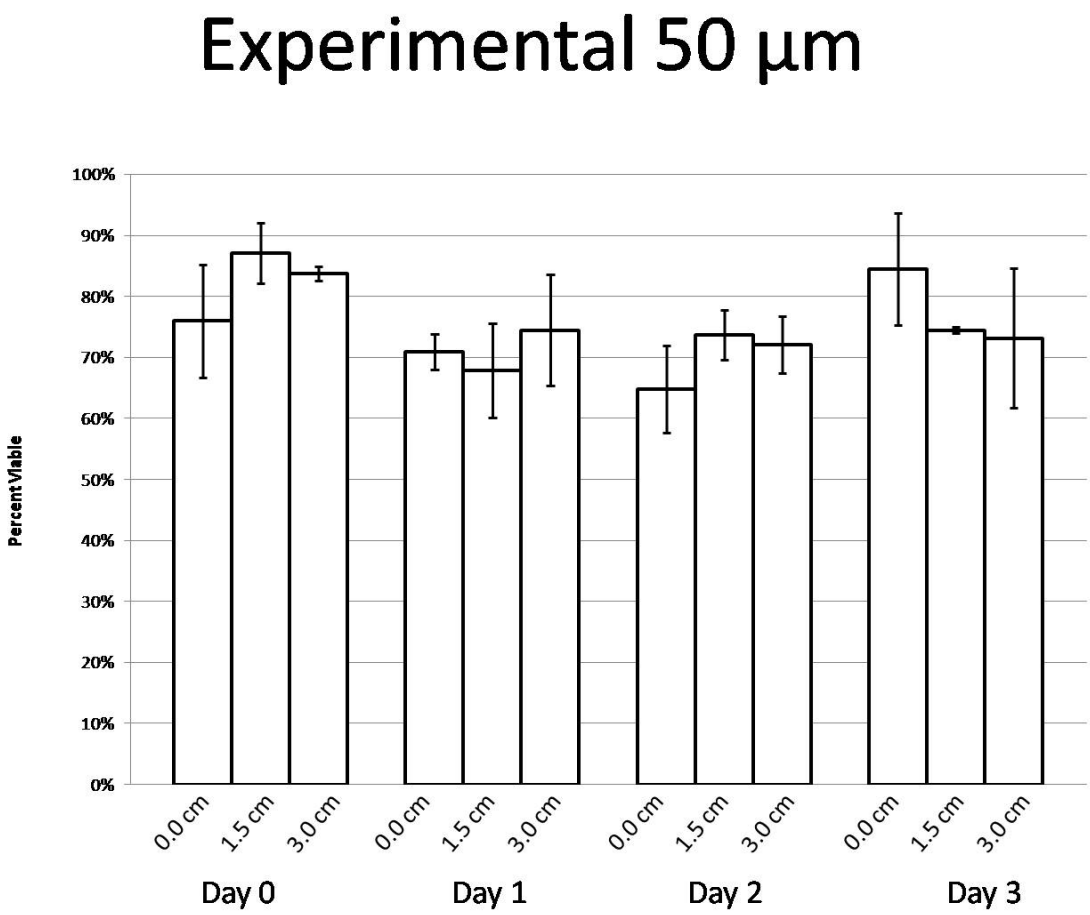

Figure S4

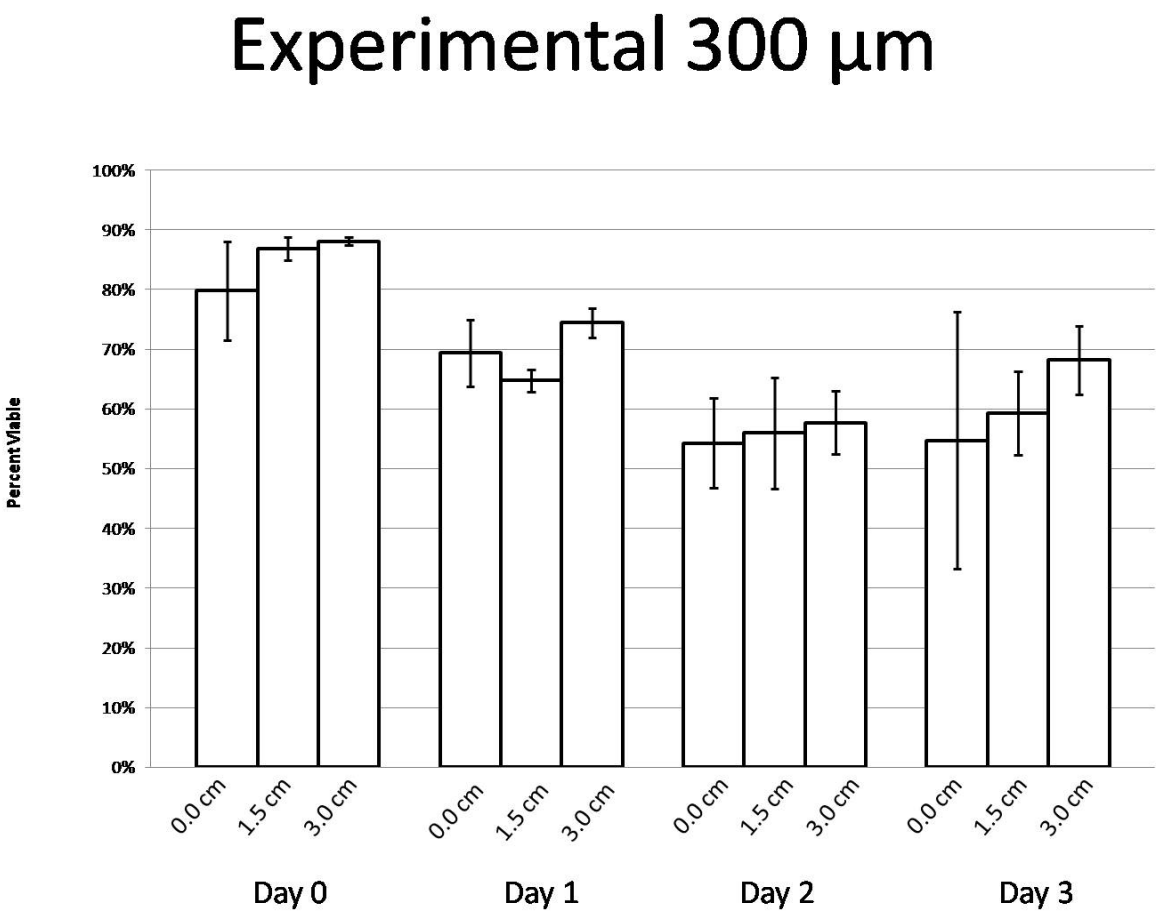

Figure S5

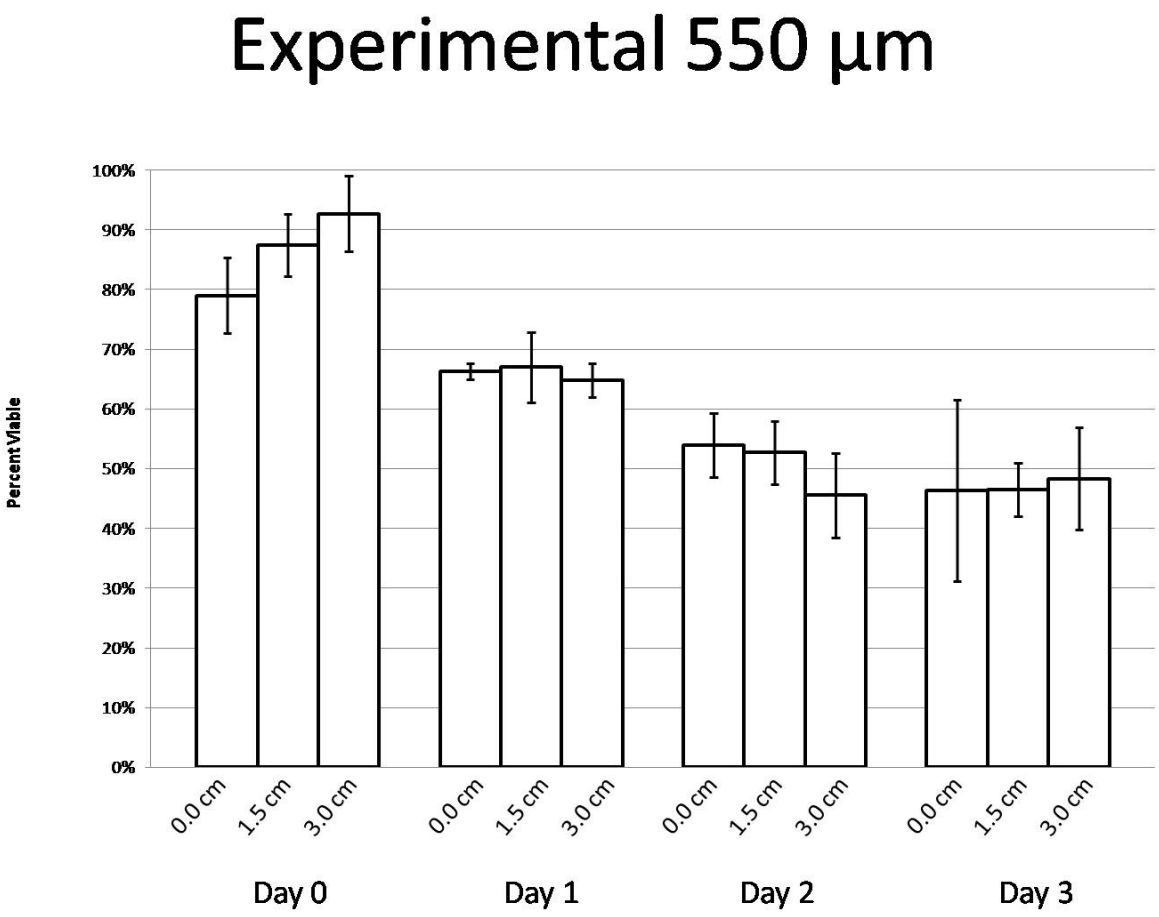

Figure S6

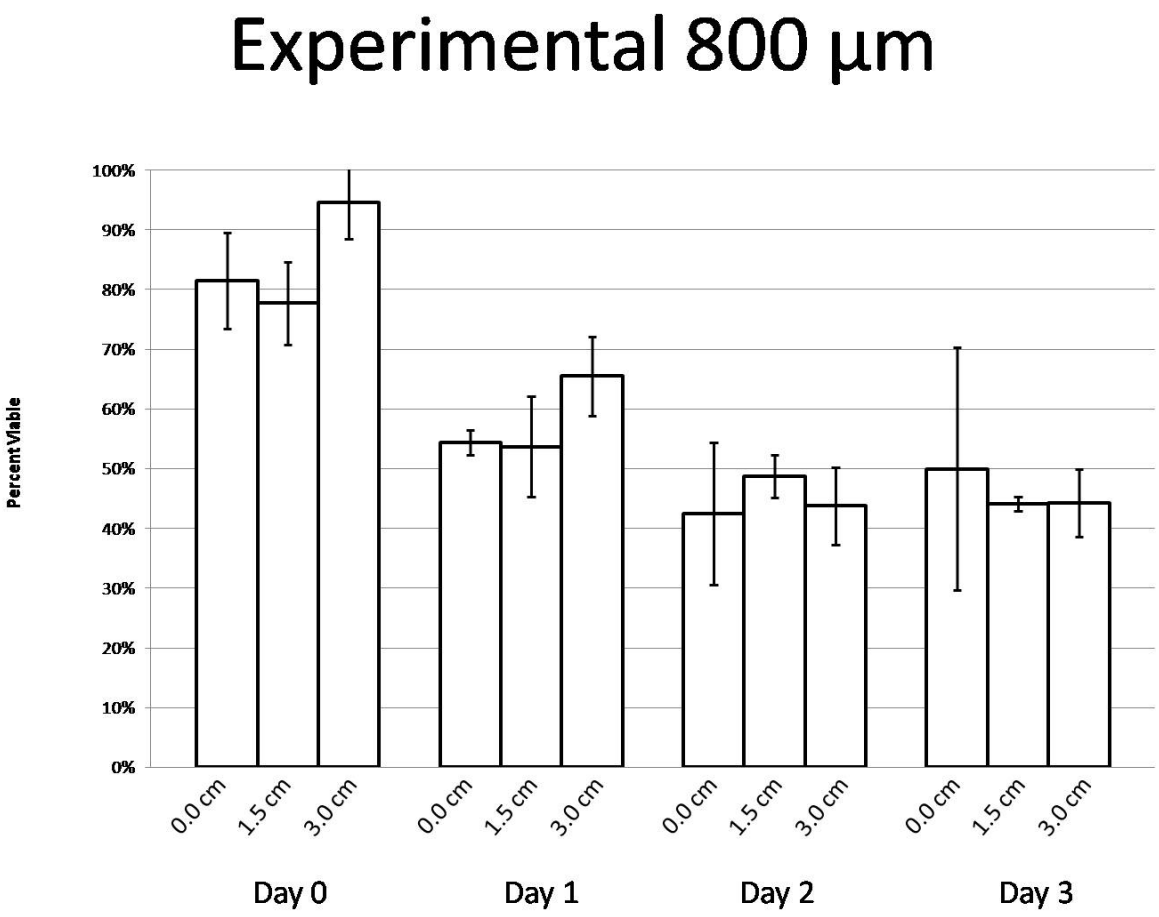

Figure S7

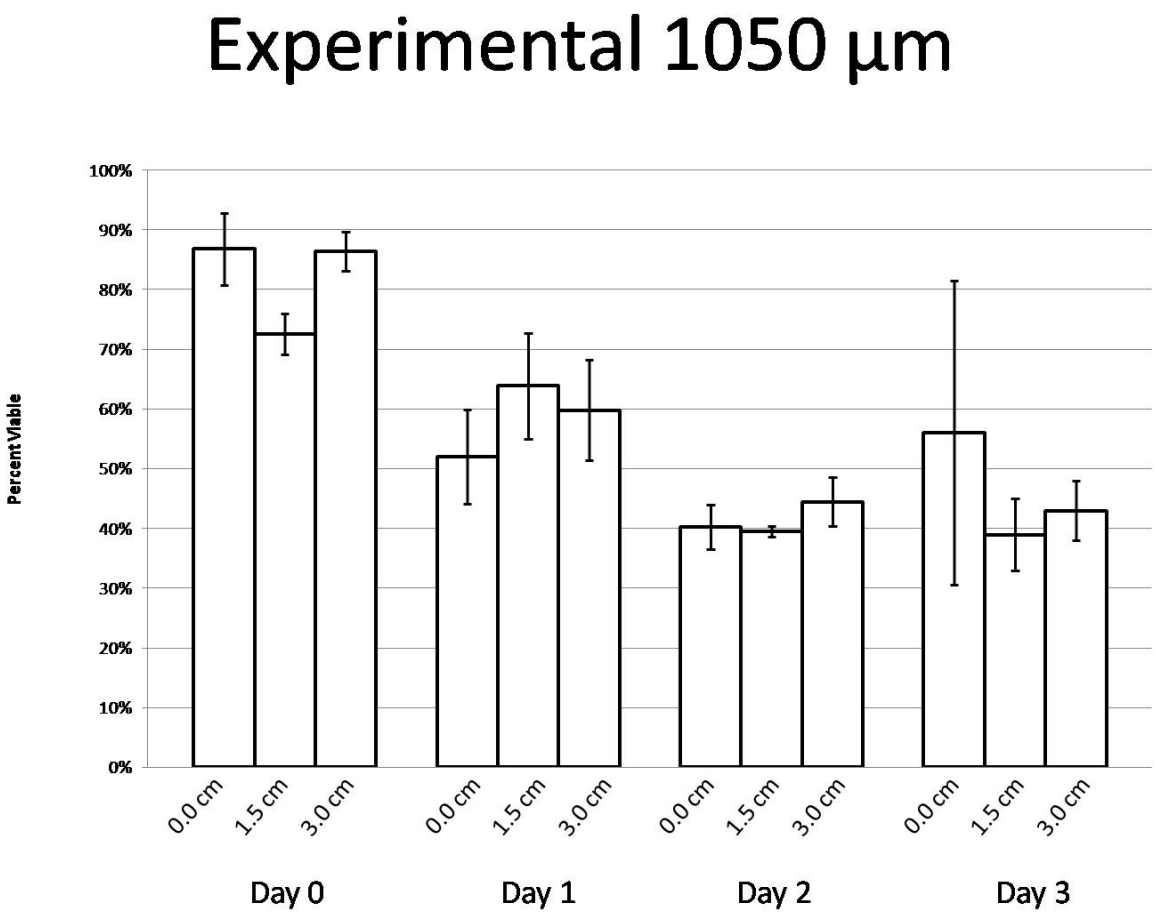

Figure S8