

Title: Microencapsulation of Tissues and Cells

Team Members:

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Client:

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Problem Statement:

A method of treatment for various diseases incorporates the encapsulation of cells and tissues and the time-released delivery of chemical mediators. Presently, this method encounters a slew of problems, including a lack of biocompatibility, limited immunoprotective properties, and hypoxia. The client desires the development of microcapsules that would permit the successful release of hormones (namely, testosterone and inhibin) by encapsulated cells into animals, while avoiding the aforementioned problems.

Website: http://homepages.cae.wisc.edu/~bme200/microencapsulation_fall05/

Last Week's Goals:

- Finish LIVE/DEAD experiment. Remove background noise.
- Continue to improve method of isolating microcapsules from microfluidic device.

This Week's Goals:

- Conduct LIVE/DEAD on cells in microfluidic capsules Monday, if cell viability over Thanksgiving break permits

Summary of Accomplishments:

- Finished LIVE/DEAD on 1uL droplets
- Conducted LIVE/DEAD on PEG droplets from microfluidics device; insufficient crosslinking still observed.

Difficulties:

- Delicate balance between incomplete polymerization of PEG (droplets aggregate when exiting device into microcentrifuge tube) and preventing full polymerization within microfluidic pipet (clogging the device)

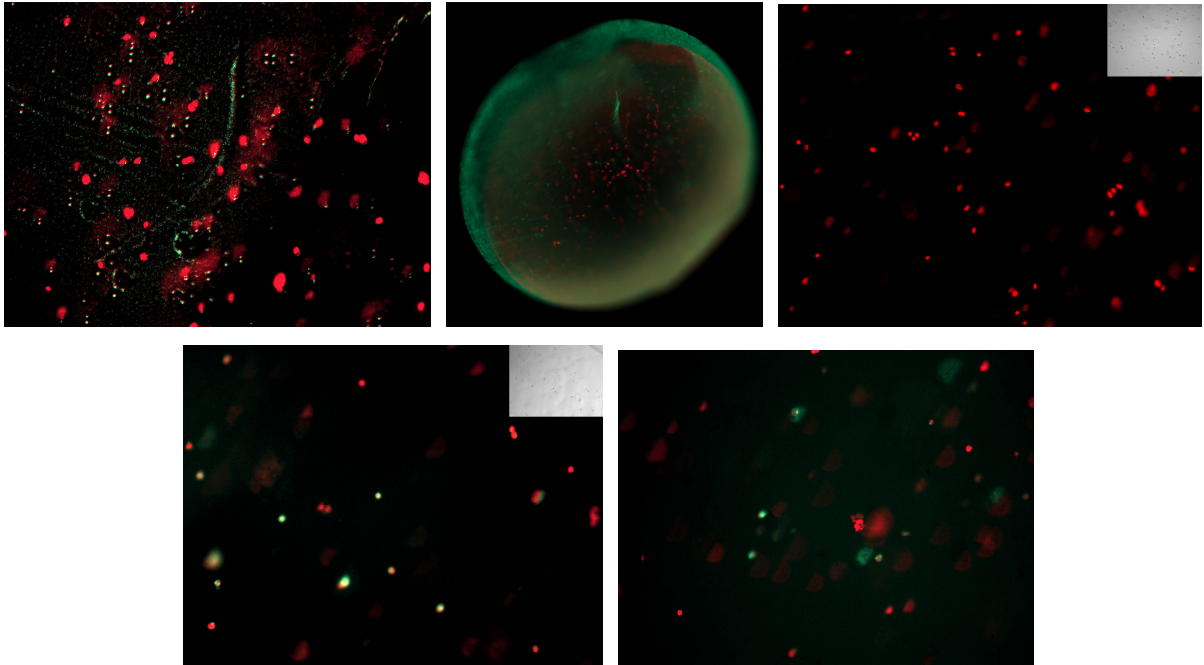


Figure 6. Top row is LIVE/DEAD on 1 μ L capsules polymerized for 30 s. (Left) Capsule placed immediately into LIVE/DEAD solution and imaged after 15 min at 100x. (Middle) Whole capsule after 2 d at 40x. Note PEG may autofluoresce. (Right) Hydrogel after 5 d at 100x. Bottom row is LIVE/DEAD on PEG polymerized within entrance tube of microfluidic device. Hydrogel was sectioned into 4 mm cylinders, kept in media, and imaged (left) 1 h and (right) 1 d after UV exposure. Insets are cells at 100x under normal light. All cells at 4 p.



Figure 7. (Left) Composite image of MA-10 cells in PEG droplets at 100x after 1 h. Spheres appear to be ‘flat’ against 96-well plate surface. Droplets suspended in PBS. Visible and LIVE/DEAD images overlaid to show cell location in droplet (PEG not visible under fluorescence). (Right) Thanksgiving turkey.

Activities: (laboratory work, more or less equal contributions from team members)

Team: 12 hr – experiments

Joe Zechlinski: 0 hr –

Bryan Baxter: 0 hr –

Tim Eng: 0 hr –

April Zehm: 0 hr –

Total time this week: 12.0 hours

Cumulative Project time: 128.0 hours

Note hours not updated due to time constraints in writing progress report.