

## Bone marrow microenvironment culturing system for mesenchymal stem cells

### msc\_culture

**Client:** Dr. Wan-Ju Li

**Advisor:** Dr. Tracy Puccinelli

**Team:** Taylor Marohl [tmarohl@wisc.edu] (920) 412-8765 (Leader)

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**Date:** 2/17/17 – 2/23/17

#### Problem Statement:

Mesenchymal stem cells (MSCs) are widely studied for their valuable multipotent character that could enable tissue regeneration, especially in orthopedic injuries. Unfortunately, the yield of MSCs through extraction from bone marrow is low, and cells must be expanded in culture without the risk of spontaneous differentiation. Current culture methods are variable in their ability to maintain MSCs in a multipotent state, and do not adequately attempt to recreate the physiological conditions that prevent differentiation. For this reason, there is a need for a culture system that allows researchers to sustain multipotency in their cells by mimicking the bone marrow microenvironment through substrate stiffness and oxygen concentration.

#### Last Week's Goals:

- Experiment with biomaterial
- Begin bioreactor fabrication
- Finish midsemester paper

#### Summary of Individual/Team Role Accomplishments:

- **Taylor Marohl:** Wrote progress report.
- **Veronica Porubsky:** Ordered materials and communicated with the client.
- **Michelle Tong:** Attended BSAC meeting.
- **Maddie Meier:** Updated website.

#### Summary of Design Accomplishments/Literature Search:

- Our focus last week was on the midsemester presentation and paper

#### Activities:

Person	Task	Time	Weekly Total	Sem. Total
Taylor	-Prelim paper -Progress report	-6hr -0.5hr	6.5 hr	25 hr
Veronica	-Prelim paper	-4hr	4 hr	18 hr
Michelle	-Differentiation and proliferation assays -Prelim paper	-1hr -3hr	4 hr	19.5 hr
Maddie	-Prelim paper	-2hr	2 hr	13.5 hr

Team	-Team Meeting -Advisor Meeting	-1.5 hr -0.5 hr	2hr	13.5hr
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### Goals for This Week:

- Finalize protocols for biomaterial fabrication and evaluation
  - Learn how to use lyophilizer and plan rheometer stiffness characterization
- Begin bioreactor fabrication

### Schedule for Upcoming Week :

- **Friday 2:30pm** Advisor Meeting
- **Thursday 6:00pm** Team Meeting

### Difficulties:

- No new difficulties since last week

### Project Schedule/Timeline:

Color Key:     **Deliverables**     **Bioreactor**     **Biomaterial**     **Outreach**     **Questions**

#### Fri 2/10 - Thurs 2/16 (MADDIE OUT 2/15-2/16)

- **Biomaterial experimentation**
- **Order bioreactor materials**
- **Bioreactor Soliworks**
- **MIDSEMESTER PRESENTATION Friday 2/17**
- **Finish midsemester paper**

#### Fri 2/17 - Thurs 2/23 (VERONICA GONE 2/21-2/25)

- **Begin bioreactor fabrication**
- **MIDSEMESTER PAPER DUE Wednesday 2/22**

#### Fri 2/24 - Thurs 3/2 (VERONICA GONE 3/1-3/5)

- **Biomaterial experimentation**
- **Bioreactor fabrication**

#### Fri 3/3 - Thurs 3/9

- **Biomaterial experimentation**
- **Bioreactor fabrication**

#### Fri 3/10 - Thurs 3/16

- **Fabricate multiple biomaterial stiffnesses, freeze**
- **Finish bioreactor fabrication**

#### Fri 3/17 - Thurs 3/23

- **SPRING BREAK**

#### Fri 3/24 - Thurs 3/30

- **Start cell evaluation on biomaterial**

- Bioreactor validation

Fri 3/31 - Thurs 4/6 (MADDIE GONE THIS WEEK)

- Continue cell evaluation on biomaterial
- Begin cell evaluation on bioreactor

Fri 4/7 - Thurs 4/13

- Finish cell evaluation on biomaterial, analyze data
- Continue cell evaluation on bioreactor
- Begin working on poster, final report

Fri 4/14 - Thurs 4/20

- Finish cell evaluation on bioreactor, analyze data
- Finish poster, continue working on final report

Fri 4/21 - Thurs 4/27

- **Fri 4/28 FINAL POSTER PRESENTATION Friday 4/28**
- Finish final report

Fri 4/28 - Thurs 5/4

- **Wed 5/3 FINAL REPORT DUE Wednesday 5/3**