Improving the precision of small human tissue biopsy processing

Date: 3/25/26-4/8/26

Client: Dr. Angela Gibson
Advisor: Dr. Tracy Jane Puccinelli
Team:

Ruhi Nagarkatte (Team Leader)
Ella Lang (Communicator)
Gianna Inga (BSAC)
Simon Nam (BWIG)
Sarah Raubenstine (BPAG)
Grace Spiegelhoff (MedTech)

Problem Statement

In the treatment of extensive burns or wounds, patients rely on emerging treatment research in the field of tissue growth and healing. Currently, studies into the healing properties of porcine skin are conducted to visualize how viable epidermis cells migrate over the site of the wound to promote cell regrowth. However, once in a culture, the porcine tissue samples cannot remain viable unless all fat is removed and the cells are able to absorb the culture media. Additionally, this process of creating samples is not standardized, resulting in samples of varying sizes with jagged edges, which limits the efficiency of sample preparation. To solve this, fabricating a tool that incorporates multiple sample slots, with uniform sizing, and a fixed blade will help to streamline research efficiency and produce more viable samples that can be successfully imaged.

Brief Status Update

The team has been finalizing testing over the past couple of weeks. Images from the sterilization testing were preliminarily analyzed in ImageJ. The FEA analysis on the connectors and layers of the biopsy press was conducted. Additionally, a preliminary draft of the executive summary was completed. The team is preparing the final design, with nylon as the base, for usability testing with the client on 4/10.

Summary of Weekly Team Member Design Accomplishments

- Team
  - Completed sterilization testing and analysis on Image J
  - Completed first draft of the executive summary
  - Conducted an FEA on PC and nylon layers
- Ruhi Nagarkatte
  - Completed assigned portion of the executive summary
  - Conducted an FEA on the PC and nylon layers
  - Completed required trainings for autoclave use
- Ella Lang
  - Completed sterilization test procedure and analysis

    - Edited and wrote parts of the executive summary
    - Prepared for testing in the lab on Friday, April 10th
- Gianna Inga
    - Completed assigned portion of the executive summary draft
    - Continued updating report article
    - Confirmed new outreach assignment
- Simon Nam
    - Completed assigned portion of the executive summary draft
    - Updated the design award type (Excellence) on the BME Design portal
    - Continued updating the results and survey collections
- Sarah Raubenstine
    - Completed assigned portion of the executive summary draft
    - Updated lab archives and expense pages
    - Prepare for final usability data collection and data analysis

Weekly/Ongoing Difficulties

In the coming week, the team is planning on conducting a final round of usability testing with the client with the nylon 12 base. The results will be analyzed and compiled with the other testing data in the final poster draft. The team is also hoping to simulate sterilization of the nylon base with an autoclave. Any feedback received on the executive summary will be implemented.

Upcoming Team and Individual Goals

- Team
    - Analyze data from usability testing with the client
    - Finalize all areas of testing, including sterilization with the autoclave
    - Refine the final draft of the executive summary based on advisor feedback
    - Begin drafting the final poster presentation
- Ruhi Nagarkatte
    - Update executive summary based on advisor feedback
    - Divide and complete final poster presentation
    - Update LabArchives
    - Schedule autoclave training within the next week
- Ella Lang
    - Complete final tissue testing with the client
    - Go over the executive summary feedback from our advisor
    - Complete autoclaving tests on each device component
- Gianna Inga
    - Update LabArchives
    - Finalize analysis of testing
    - Complete final device testing
- Simon Nam
    - Update the executive summary

    - Finalize the testing and results section after the final device testing
    - Prepare for the final deliverables (poster presentation & journal)
- Sarah Raubenstine
    - Edit executive summary based on feedback on draft
    - Work on final poster presentation
    - Finish testing with client and final design using porcine skin samples

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Preliminary Oral Presentation	Friday, 02/06/2026	All	100%	X
Preliminary Deliverables	Wednesday, 02/25/2026	All	100%	X
301 Show and Tell Feedback	Friday, 03/20/2026	All	100%	X
Executive Summary Draft	Friday, 04/03/2026	All	100%	X
Executive Summary Final	Friday, 04/17/2026	All	0%	
Poster Presentations	Friday, 04/24/2026	All	0%	
Final Deliverables	Wednesday, 04/29/2026	All	0%	

Materials and Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	2/10/26	1	$2.81	$2.81	N/A
BME Clear Resin	3D printed polymer through Makerspace design budget	Makerspace	N/A	UW-Madison	N/A	2/18/26	1	$11.42	$11.42	N/A
0.236 in PC	Polycarbonate Sheet: 0.236 in Thick, 12 in x 12 in, Colorless, Clear, 9,500 psi Tensile Strength	N/A	PS-PC-SR-189	Grainger	1ETY6	2/20/26	1	$21.20	$21.20	https://www.grainger.com/product/Polycarbonate-Sheet-0-

										236-1ETY6
0.118 in PC	Polycarbonate Sheet: 0.118 in Thick, 12 in x 12 in, Colorless, Clear, 9,500 psi Tensile Strength	N/A	PS-PC-SR-181	Grainger	1ETY4	2/20/26	1	$14.36	$14.36	https://www.grainger.com/product/Polycarbonate-Sheet-0-118-1ETY4
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/4/26	1	$1.12	$1.12	N/A
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/11/26	1	$2.06	$2.06	N/A
Nylon	3D printed polymer through the BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	3/19/26		$8.00	$8.00	N/A
								TOTAL:	$49.55	