Improving the precision of small human tissue biopsy processing

Date: 4/16-4/23

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 finalized the Biopsy Press design and has printed in both PLA and Nylon. This past week has been spent finalizing testing results, specifically, sample thickness, user survey and sanitization results. On 4/15 autoclave testing was completed, resulting in no damage or warpage to the device. Additionally, each team member has been working on the final poster and revising the executive summary. The team plans to continue to refine the final deliverables for upcoming deadlines.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Completed all the testing for the final device
    - Completed executive summary
    - Completed rough draft of the final poster presentation
- Ruhi Nagarkatte
    - Completed testing with the client with the nylon base layer
    - Completed assigned section of final report
    - Printed PLA base layer
    - Tested nylon and polycarbonate with the autoclave

- Ella Lang
    - Researched potential coatings that could help with Nylon sanitization
    - Helped update the final poster
    - Finished up all sanitization testing-based statistics
- Gianna Inga
    - Worked on final poster
    - Added dimensions to the CAD photos
- Simon Nam
    - Updated the executive summary
    - Worked with team on poster draft for final presentation
- Sarah Raubenstine
    - Picked up design from client for further testing and feedback
    - Completed initial draft of poster
    - Completed testing with the client and nylon base layer
    - Ran device through the autoclave for sterlilizability testing

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
    - Prepare for the final presentation
    - Finalize the journal
- Ruhi Nagarkatte
    - Finalize the FEA and discussion sections poster presentation
    - Update executive summary based on advisor feedback
    - Update poster/report based on autoclave results
- Ella Lang
    - Help update the executive summary
    - Complete the Sanitization Testing section of the poster and assist with other areas as needed
    - Organize Sanitization Testing results from the autoclave tests
- Gianna Inga
    - Finalize final poster
    - Finalize base material based on client feedback
- Simon Nam
    - Finalize & rehearse for the poster presentation
- Sarah Raubenstine
    - Finalize and rehearse poster presentation

- Compile final thickness measurements and usability testing for deliverables

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	N/A	PS-PC-SR-181	Grainger	1ETY4	2/20/26	1	$14.36	$14.36	https://www.graing

	Thick, 12 in x 12 in, Colorless, Clear, 9,500 psi Tensile Strength									er.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	