

Improving the precision of small human tissue biopsy processing

Date: 2/18/26-2/25/26

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 continued to consolidate research and completed the first draft of the article. The team met with the client on Friday, 2/20/26, to discuss the new design and practice tissue sampling methods. Additionally, two polycarbonate sheets were ordered and received from Grainger. The team began machining the PC on Wednesday, 2/25/26, and is hoping to finalize the design by early next week.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Met with the client to discuss and try out the new design
 - Ordered & picked up the polycarbonate slabs
 - Began bandsawing the PC sheets & scheduled a waterjet appointment
- Ruhi Nagarkatte
 - Met with the client to discuss and try out the new design
 - Picked up polycarbonate sheets from the client
 - Began machining the polycarbonate for the layered design
 - Completed assigned sections of the journal article draft

- o Looked into waterjet techniques
- Ella Lang
 - o Began machining the polycarbonate, stacking design
 - o Identified machining best practices utilizing the waterjet
 - o Wrote assigned sections of the journal article's first draft
- Gianna Inga
 - o Finalized design
 - o Wrote assigned sections of the journal article
 - o Decided on the final materials
 - o Wrote first fabrication protocol for polycarbonate
- Simon Nam
 - o Met with the client to discuss and test the new design for further feedbacks
 - o Began machining the polycarbonate, assisted the group
 - o Wrote assigned sections of the journal's article first draft
 - o Scheduled another machining session with team to utilize waterjet for modification of polycarbonate
- Sarah Raubenstine
 - o Met with client to discuss and test out new design and gather feedback
 - o Wrote assigned portion of draft journal article
 - o Recorded new material expenses based on client purchase

Weekly/Ongoing Difficulties

The team is hoping to finalize the machining and 3D printing portions of the final design in the coming week. The client is receiving additional porcine skin samples on Thursday, 2/26/26; the team will potentially schedule a time to try the new device if the final design is complete. Finally, changes will be made to the first draft of the journal article based on advisor feedback and new data.

Upcoming Team and Individual Goals

- Team
 - o Finish machining the polycarbonate and assemble the full design
 - o Waterjet the polycarbonate sheets for an accurate cut
 - o Refine the preliminary journal article draft as new data is available
- Ruhi Nagarkatte
 - o Finalize and deliver the polycarbonate and assembled design
 - o Assist in water jetting the polycarbonate for the layered design
- Ella Lang
 - o Assist in finalizing and delivering the polycarbonate design
 - o Help prepare waterjet files for the scheduled Friday session
 - o Begin sterilization testing with the polycarbonate design

- Gianna Inga
 - Assemble final design
 - Print bottom layer of design in nylon 12
- Simon Nam
 - Finalize the polycarbonate machining with waterjet for assembly of new composite material design
 - Meet with client again to test the device with samples
- Sarah Raubenstine
 - Finalize latest fabrication and assemble most current design
 - Gather client feedback on the newest design after testing
 - Update usability testing protocols for new device

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
Show and Tell	Friday, 03/20/2026	All	0%	
Executive Summary Draft	Friday, 04/03/2026	All	0%	
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
0.236 in PC	Polycarbonate Sheet: 0.236 in Thick, 12 in x 12 in, Colorless, Clear,	N/A	PS-PC-SR-189	Grainger	1ET Y6	2/20/26	1	\$21.20	\$21.20	http://www.w.gr

	9,500 psi Tensile Strength									aing er.co m/p rodu ct/P olyc arbo nate -She et-0-236-1ETY 6
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	1ET Y4	2/20/26	1	\$14.36	\$14.36	http:// www .gr aing er.co m/p rodu ct/P olyc arbo nate -She et-0-118-1ETY 4
									TOTAL:	\$38.37