

# Improving the precision of small human tissue biopsy processing

Date: 3/4/26 - 3/11/2026

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 testing the finalized design over the past week. The new design incorporating multiple polycarbonate layers cut from waterjet was refined for visibility enhancement for clients while cutting the samples. Few modifications still had to be made for the design based on clients' further feedback. More protocol surveys will be conducted with users of the device throughout the testing session with the clients.

## Summary of Weekly Team Member Design Accomplishments

- Team
  - Met with the client and conducted protocol survey of the device
  - Revised the journal draft from the preliminary report feedback given
  - Arranged another testing meeting with the client
- Ruhi Nagarkatte
  - Finalized and machined the pieces of the design with the waterjet
  - Met with client and tested the new design with the porcine samples
  - 3D Printed more base designs in PLA
  - Revised journal based on advisor feedback

- Ella Lang
  - Assisted in testing out the device in the lab by giving users a demo and preparing samples
  - Planned and communicated with the client about further user evaluation testing
  - Began prepping for sterilization testing
- Gianna Inga
  - Met with client and tested another round of porcine skin
  - Updated journal draft based on advisor feedback
  - Edited CAD drawing of device based on client and survey feedback
- Simon Nam
  - Met with the team to waterjet additional polycarbonate layers
  - Met with the client to test the device and conducted protocol survey
  - Revised the journal draft based on feedback from design advisor
- Sarah Raubenstine
  - Met with team to waterjet polycarbonate for final design
  - Met with client to test the device and receive design feedback
  - Revised journal article based on design feedback

## **Weekly/Ongoing Difficulties**

The team is hoping to continue usability testing later this week as the client is receiving more porcine samples. The materials of the design will also be finalized; the base will be printed in nylon in the coming weeks. The team is hoping to move forward with other areas of testing such as sterilizability and structural analysis.

## **Upcoming Team and Individual Goals**

- Team
  - Move into sterilizability and structural analysis testing
  - Continuously update the journal based on feedback
  - Plan to 3D print the base in nylon within the next few weeks
- Ruhi Nagarkatte
  - Conduct usability testing with the client and perform an FEA analysis
  - Continue to edit journal based on advisor feedback
  - Plan sterilizability testing with an autoclave
  - Analyze testing results and make changes to the design based on feedback
- Ella Lang
  - Run sterilization tests with the new device
  - Continue performing user evaluation testing with the client
  - Continue to edit the journal for the advisor meeting on Thursday
- Gianna Inga
  - Retest changed device with porcine skin to see if it produces more accurate results
  - Analyze results
  - Document device changes
- Simon Nam

- o Meet with client again to conduct further protocol survey and receive additional feedback
- o Meet with team to update the journal draft
- o Plan further strategies to include design implications for commercialization purposes of the device
- Sarah Raubenstine
  - o Meet with the client to conduct further testing and receive feedback
  - o Meet with team to update article and implement feedback
  - o Implement possible device edits based on testing feedback

## 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	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
BME Clear Resin	3D printed polymer through Makerspace design budger	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	1ET Y6	2/20/26	1	\$21.20	\$21.20	<a href="https://www.grainger.com/product/Polycarbonate-Sheet-0-236-1ETY6">https://www.grainger.com/product/Polycarbonate-Sheet-0-236-1ETY6</a>
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	<a href="https://www.grainger.com/product/Polycarbonate-Sheet-0-118-1ETY4">https://www.grainger.com/product/Polycarbonate-Sheet-0-118-1ETY4</a>
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
								<b>TOTAL:</b>	\$41.55	