Improving the precision of small human tissue biopsy processing

Date: 2/4/26 -2/11/26

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)

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

Last week, the team presented past accomplishments and future goals to their advisor. The team also met with Grace, the MedTech, to update her on future plans for the semester and receive feedback on the presentation. Changes were made to the biopsy press to have one well and a new pressure applicator. To be easily machinable, the first three layers will be clear polycarbonate (PC) and the bottom layer will be nylon. Lastly, the team updated testing protocols and finalized a journal to publish an article to.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Met with Grace and Dr. TJP to present the preliminary presentation and goals
    - Redesigned the biopsy press based on the client feedback
    - Updated sanitization, usability, and FEA testing protocols
    - Finalized a journal to publish an article to: ASME Journal of Medical Devices
- Ruhi Nagarkatte
    - Presented preliminary presentation to advisor
    - Updated FEA testing protocol
    - Researched and finalized different journals to publish to

- Ella Lang
    - Presented to our advisor and met with Grace
    - Researched and decided on the journal to publish in
    - Updated sanitization testing protocol to include an autoclave section
- Gianna Inga
    - Redesigned CAD model to implement changes from the client
    - Reprinted the prototype in PLA
    - Researched materials to utilize for final design
- Simon Nam
    - Presented preliminary presentation to advisor
    - Looked further into stages of processing submission for journal article
- Sarah Raubenstine
    - Presented preliminary design to advisory and discussed semester goals
    - Looked into different journals for article submission
    - Record advisor meeting notes and set upcoming team goals

Weekly/Ongoing Difficulties

In the next week, the team hopes to print the new biopsy press design in the materials specified above and subsequently machine it. Additionally, the team will finalize a time to meet with the client when they are scheduled to sample the porcine skin samples. Once the new biopsy press is used, any feedback will be implemented and the team will begin testing, specifically in the sanitization and usability areas.

Upcoming Team and Individual Goals

- Team
    - Finalize design by printing in PC and nylon and machining it
    - Finalize a date and time to visit the client during tissue sampling
    - Start consolidating research and data for the journal article
- Ruhi Nagarkatte
    - Help with finalizing the design through printing and machining
    - Begin dividing up the preliminary report among the team members
    - Gather research and testing results for the journal article
- Ella Lang
    - Continue updating testing protocols
    - Finalize tissue testing timing
    - Assist with printing further design iterations with various materials
- Gianna Inga
    - Finalize materials for final design
    - Finalize design
    - Communicate with team current design and any changes to implement

    - Start machining final design
- Simon Nam
    - Help with assembling the iterated design with the team
    - Meet with the client for another testing phase (next Fri*)
    - Begin drafting some parts of the journal
- Sarah Raubenstine
    - Gather images and testing results for journal article initial drafting
    - Coordinate and meet with client to conduct pig skin sample testing
    - Assist with final design fabrication

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	0%	
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	

								TOTAL:	$2.81	