

Improving the precision of small human tissue biopsy processing

Date: 10/23/25-10/29/25

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 (Med Tech)

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

Over the past week, the team continued to model the handle for the razor blade on OnShape. Additionally, the team looked at different materials for the track that will attach the biopsy press to the fume hood, including rubber slabs available on ShopUW. Also taken into consideration were the manufacturing methods via the machines in the Team Lab. A protocol was developed for the questionnaire aspect of the testing.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Met to discuss testing methods and the IRB application
 - Found material to use and machine for the track attachment system
 - Prepared pitch and questions for show and tell
 - Prepared testing protocol for survey/usability testing
- Ruhi Nagarkatte
 - Started and completed IRB application
 - Drafted consent form for survey/usability questionnaire (IRB)
 - Looked at different materials for the track for the biopsy press
 - Prepared progress report 8

- Ella Lang
 - Helped prepare the recruitment and design image aspects of the IRB form
 - Helped look into base design materials
 - Researched sterilizability test materials needed
- Gianna Inga
 - Fixed dimensions on the biopsy press to accommodate a razor blade
 - Completed CITI training to prepare for human subject testing
 - Prepared for show and tell
 - Created CAD model for razor blade handle
- Simon Nam
 - Modified the base design with dimension and mechanism changes
 - Worked on determining material choices for base design
 - Contributed to IRB/Human subject application procedure
 - Prepared for show & tell
- Sarah Raubenstine
 - Helped prepare survey testing protocols and recruitment survey to submit to IRB
 - Looked into purchasing options for base design
 - Prepared for show and tell

Weekly/Ongoing Difficulties

The team is focused on completing the IRB application as soon as possible to move forward with the usability testing. The team is hoping to survey TECH members as they have experience with razor blades and sharp objects. Additionally, the team is hoping to finalize all aspects of the design within the next two weeks to begin the other areas of testing.

Upcoming Team and Individual Goals

- Team
 - Finalize blade handle and 3D print it to test it with the given materials
 - Order the rubber slab for the track attachment and machine it to fit the biopsy press
 - Attend Show & Tell and receive feedback from peers
 - Begin survey/questionnaire testing
- Ruhi Nagarkatte
 - Attend show & tell to receive feedback on the current design
 - Assist in making the track attachment for the biopsy press
 - Finalize and submit the consent form and IRB application
- Ella Lang
 - Attend show & tell and make updates to the design based on feedback
 - Order sterilization test materials and work on procedure
 - Support teammates working on the base design
- Gianna Inga
 - Finalize the CAD models to be printed
 - Ensure that the prints function how they are supposed to
 - Finalize CAD drawing to be printed with final material
- Simon Nam

- Sarah Raubenstine
 - Finalize and submit IRB application and begin coordinating testing
 - Implement peer suggestions from show and tell into design
 - Finalize material purchasing for base design

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Product Design Specification First Draft	Thursday, 09/18/2025	All	100%	X
Design Matrix Design Ideas	Friday, 09/26/2025	All	100%	X
Preliminary Presentations	Friday, 10/03/2025	All	100%	X
Preliminary Deliverables	Wednesday, 10/08/2025	All	100%	X
Show and Tell	Friday, 10/31/2025	All	0%	
Poster Presentations	Friday, 12/05/2025	All	0%	
Final Deliverables	Wednesday, 12/10/2025	All	0%	

Materials and Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Prototype Prints										
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	9/26/25	1	\$5.00	\$5.00	N/A
PLA	3D printed polymer through BME design Makerspace budget	Makerspace	N/A	UW-Madison	N/A	10/16/25	1	\$1.20	\$1.20	N/A
								TOTAL:	\$6.20	

