Improving the precision of small human tissue biopsy processing

Date: 10/29/25-11/6/25

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 work on developing the final designs for additional components, such as the handle for the razor blade. Additionally, the team decided on having a neoprene rubber layer attached to the bottom surface of the design to prevent slipping while in contact with the fume hood. This material was ordered through the client. An IRB submission and testing protocol were developed for the usability evaluation of the final design. Part of this will be conducted with the client prior to Thanksgiving. In terms of student testing, it is planned for the IRB submission to occur on Friday, 11/7.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Met to confirm testing methods and finalization of IRB application
    - Prepared testing protocol for survey/usability testing
    - Held a regular meeting with client (Bailey)
    - Set goals for the next following weeks until the week of final presentation
- Ruhi Nagarkatte
    - Met with client and team to update and plan client testing

    - Updated IRB application with survey protocols and materials
    - Brainstormed ideas for the rubber base from Show and Tell feedback
    - Helped prepare Progress Report 9
- Ella Lang
    - Found and sent out sterilization testing materials that will be ordered by the client
    - Met with the client and discussed future testing plans and schedule
    - Helped prepare and send progress report #9
- Gianna Inga
    - Researched different ways the CAD drawing can attach more securely
    - Updated the CAD drawing
    - Revised the razor blade handle
- Simon Nam
    - Initiated Progress Report 9 for making updates
    - Participated in team's meeting with the client
    - Researched further on the specific material for the base design (*Neoprene rubber effect on sterilizability)
    - Updated the BME webpage
    - Communicated with team to set further plans & goals for the next few weeks remaining until final deliverables' deadline
- Sarah Raubenstine
    - Met with team and client to order final materials and solidify testing plans
    - Updated survey protocols and recruitment survey for IRB application
    - Researched material types for base

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
    - Print out blade handle and finalized base design for assembly
    - Send out testing protocols and questionnaires to the client
    - Submit the IRB application
    - Receive the purchased order and making any additional orders necessary for the final design components
- Ruhi Nagarkatte
    - Revise IRB with advisor and submit it by the end of the week
    - Start brainstorming for force analysis (FBD) testing for the device
    - Print the blade handle within the next week to test fit with razor blade
    - Prepare final design for usability testing
- Ella Lang
    - Receive base materials and assist in the fabrication of the base

    - Continue to plan sterilization testing and complete the protocol with known equipment
    - Help prepare the final device design for testing with the client prior to Thanksgiving
- Gianna Inga
    - Implement the clickable or attachments to the razor blade handle and biopsy press
    - Print the razor blade handle to see the problems
    - Revise the CAD drawings for IRB testing
    - Create CAD model of base
- Simon Nam
    - Continue working on base design fabrication after receiving purchased order
    - Assist in gathering survey questionnaire data and communication with clients' people
    - Update lab archive team folder with more contents included from protocols and testings
- Sarah Raubenstine
    - Get feedback on survey protocols and submit IRB application
    - Print blade handle and final design for usability testing
    - Prepare materials for client usability testing to be conducted over Thanksgiving

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	100%	X
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
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
Rubber Slab	12 in x 12 in sheet of 50A black rubber	Grainger Vendor	6050-1/2A	Grainger	848EH8	10/31/25	1	$49.99	$49.99	https://www.grainger.com/product/Rubber-Sheet-Commercial-Grade-848EH8
								TOTAL:	$56.19	