Improving the precision of small human tissue biopsy processing

Date: 10/16/25-10/23/25

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

The team is continuing to iterate on the Biopsy Press design features based on the feedback received from the client from a few weeks ago. Different types of blades and hard styrofoams were obtained from the clients. This week, the team initiated testing the performance and functionality of the modified design. The team especially evaluated the dimensions of the blades and their compatibility with the size/scale of the printed design based on the cutting technique of the user. Additionally, the team made plans to fabricate a razor blade handle and a rubber base to increase the device's usability. The team hopes to make progress towards testing, fabrication, and assembly while preparing for the upcoming Show and Tell next week.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Held a team meeting for discussion of modified design and procedure for testing and performance analysis
    - Obtained more materials needed for further implementation of base system to be added on to the design
- Ruhi Nagarkatte

    - Met with group to discuss testing plans and other design components
    - Searched for rubber slabs (TeamLab, Makerspace, ECB) for the base
    - Brainstormed different methods of attaching the handle to the blade
- Ella Lang
    - Met with the team and discussed/assigned testing plans and further design modifications
    - Researched base designs and plan for fabrication
    - Prepared and sent progress report
- Gianna Inga
    - Dimensioned client blades
    - Met with group to discuss testing and future design decisions
    - Decided to utilize the razor blade into the design and implement a handle for user
- Simon Nam
    - Discussed the design improvements with the team members
    - Initialized on further base implementation for the design for stability
    - Discussed the material choice for the base holding system to the ground.
    - Updated the design webpage
- Sarah Raubenstine
    - Met with team to discuss testing plans and divide up testing protocols
    - Discussed and brainstormed solutions for utilizing the razor blade in our design
    - Searched for base design materials and brainstormed survey testing protocols

Weekly/Ongoing Difficulties

There are no ongoing difficulties facing the team this week. All team members have been assigned to initiate the protocols and data collection for preliminary tests that include safety, accuracy, and precision for certain blades and styrofoam that will be used to simulate the texture of porcine skin models, and create an additional base system for the design's stability while operating inside the fume hood.

Upcoming Team and Individual Goals

- Team
    - Prepare for Show & Tell happening next week
    - Simulate biopsy cutting with the design, given blades, and styrofoam
- Ruhi Nagarkatte
    - Begin brainstorming force / FBD analysis for the design to aid in FEA simulation
    - Begin developing an FEA protocol on OnShape
    - Prepare team pitch document for Show and Tell
    - Finalize rubber slab order for the base
- Ella Lang
    - Work on preparing a sterilizability testing plan
    - Work with the team to prepare the handle and base design for the upcoming show and tell
    - Test all design components before the show and tell
- Gianna Inga
    - Update CAD drawing to accommodate razor blade
    - Make razor blade handle that ensures secure attachment

    - Test reprinted biopsy press design and new handle to ensure feasibility
- Simon Nam
    - Continue working on the base system design and use necessary equipments to cut out the chosen material for fabrication
    - Support other team members on testing and data collection
    - Prepare for Show & Tell
        - come up with questions to ask other teams for the better functionality of the design overall
- Sarah Raubenstine
    - Draw up survey and accuracy testing protocols and prepare materials for testing
    - Coordinate purchasing of base materials with client
    - Prepare with team for Show and Tell and gather feedback from peers

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	