Improving the precision of small human tissue biopsy processing

Date: 10/9/25-10/16/25

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 last week. The newest version of this design was printed on Thursday, 10/16. Additionally, the team is brainstorming different ways to attach the Press to the client's workbench in the lab setting, in order to maximize usability and ease of use; so far, variations of clamps and tracks for the design to snap in have been brainstormed to incorporate into the device. The team hopes to keep printing iterations before Show and Tell at the end of the month.

Summary of Weekly Team Member Design Accomplishments

- Team
    - Redesigned and 3D-printed the Biopsy Press based on client feedback
    - Brainstormed ways to incorporate an attachment to the lab bench-top
    - Picked up materials (various blades, styrofoam) to test device efficacy
- Ruhi Nagarkatte
    - 3D Printed newest version of the Biopsy Press
    - Conducted research on typical mechanical properties used in biopsy procedures
    - Began thinking of testing methods, outside of porcine and cadaver testing

    - Drafted Progress Report #6
- Ella Lang
    - Joined the team meeting to discuss design updates
    - Brainstormed base ideas to secure the design to the benchtop
    - Sent out the Progress Report and updated clients
- Gianna Inga
    - Discussed potential changes for the design based on the client feedback
    - Made initial changes to make the design assemble and disassemble easier, only hold 2 samples, and larger diameter indents
    - Took notes during the team design discussion
- Simon Nam
    - Participated in team's meeting for final design modifications & progressions
    - Assisted in 3D printing for modified final design
    - Updated the webpage
    - Researched further on handle parts to implement
- Sarah Raubenstine
    - Met with team to discuss design modifications
    - Pick up supplies from client and propose ideas for device stabilization
    - Began researching testing methods

Weekly/Ongoing Difficulties

There are no ongoing difficulties facing the team this week. All team members hope to keep printing new iterations of the Biopsy Press until it becomes ideal for usage. To preliminarily test the safety, accuracy, and precision, certain blades and styrofoam will be used to simulate the texture of porcine skin models. Additionally, the team hopes to incorporate an attachment mechanism to the device so it can secure to the client's bench top in the lab.

Upcoming Team and Individual Goals

- Team
    - Continue iterating and 3D printing the Biopsy Press device
    - Add in an attachment mechanism to the design
    - Coordinate with the clients to begin testing on porcine skin models
    - Begin thinking about and drafting a pitch for Show and Tell
- Ruhi Nagarkatte
    - Continue to brainstorm ideas for the attachment mechanism
    - Assist in 3D printing new models
    - Brainstorm and finalize usability & mechanical testing ideas
- Ella Lang
    - Begin designing a base and procure the materials needed
    - Brainstorm testing methods with the group and advisor
    - Test materials provided by the client and design any improvements, such as a handle
- Gianna Inga
    - Attend advisory meeting with updates on the design

    - Dimension the blades received from the client
    - Implement the blades into the design
    - Update the design to also accommodate an attachment part
- Simon Nam
    - Participate in testing the strength and precision of the blades with modified design
    - Prepare for the Show & Tell progress
    - Prepare a layout for testing protocol and data collection
- Sarah Raubenstine
    - Help brainstorm and draft testing protocols
    - Implement new supplies from client into the device
    - Continue researching blade covers and testing methods

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	