

Improving the precision of small human tissue biopsy processing

Date: 9/25/25-10/02/25

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

Last week, the team started 3D printing the biopsy cutter assembly at the Makerspace. It did not attach together perfectly, so iterations were made to account for this problem. Additionally, a biopsy punch, scalpels, and the biopsy guillotine were received in preparation for the preliminary presentations on 10/3/25.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Printed initial biopsy press design and redesigned connector parts & holes
 - Completed the preliminary design presentation
 - Started preparing the preliminary report
- Ruhi Nagarkatte
 - 3D Printed first prototype of the biopsy press
 - Completed assigned portion of preliminary presentation and rehearsed with the team
 - Picked up the biopsy punch, scalpels, and guillotine design from the client
 - Prepared Progress Report #4
- Ella Lang

- o Completed my assigned presentation section slides
 - o Began working on the preliminary report sections
 - o Prepared Progress Report #4 email and project updates
- Gianna Inga
 - o Evaluated the 3D printed prototype
 - o Researched the allowance needed to have 3D parts interlock with each other smoother
 - o Completed my individual parts of the preliminary presentation
 - o Updated the CAD model for an improved print
- Simon Nam
 - o Assisted with 3D printing the prototype of Design 3
 - o Prepared for the oral preliminary presentation (slides & rehearsal)
 - o Updated the status of the team's BME design page including preliminary presentation
- Sarah Raubenstine
 - o Assisted with 3D printing prototype of Design 3
 - o Researched competing designs
 - o Completed portions of preliminary presentation and rehearsed with group
 - o Updated financial information after 3D print

Weekly/Ongoing Difficulties

There are no ongoing difficulties facing the team this week. The team drafted the designs on OnShape and completed the design matrix with scoring justifications and explanations provided for design criteria (see below). In the coming week, the team will start printing preliminary designs and pick up the current tools used by the clients.

Upcoming Team and Individual Goals

- Team
 - o Continue to iterate and fabricate the biopsy press design
 - o Assign and complete the preliminary report
 - o Conduct research on material choices and other specs
 - o Setup design consultation meeting with Jesse at the TeamLab
- Ruhi Nagarkatte
 - o Assist in printing and assembly of new version of biopsy press
 - o Continue research on materials, standards, and market impact
 - o Help divide up the preliminary report & complete assigned portion
 - o Discuss and book with the team a consultation meeting with Jesse
- Ella Lang
 - o Refine 3D design dimensions
 - o Continue working on the preliminary report
 - o Print another design iteration for the biopsy press
 - o Research and begin purchasing blades
- Gianna Inga

- o Complete individual parts of the preliminary report
- o Record my presentation and embed it into the preliminary presentation
- o Evaluate the new 3D printed prototype to improve the effectiveness
- o Improve the paper cutter design to make it feasible
- Simon Nam
 - o Continue working on fabrication of design with different material choice
 - o Finalize and submit the preliminary report
 - o Continue researching on more efficiency and safety protocols regarding cutting mechanism for the design
- Sarah Raubenstine
 - o Write individual sections and finalize preliminary report
 - o Begin purchasing materials for further fabrication and update purchasing information
 - o Update and reprint biopsy press 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	0%	
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
								TOTAL:	\$5.00	