

Improving the precision of small human tissue biopsy processing

Date: 9/11/25-9/18/25

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)

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 brainstormed design ideas this week and began narrowing down options as a group. The team also completed the PDS (Product Design Specifications), which lays out all key aspects and goals of the final design. Additionally, the team continued to research competing designs and tissue biology to further immerse themselves in the product application field. Lastly, the team began working on the design matrix and plans to meet with their advisor on Friday.

Summary of Weekly Team Member Design Accomplishments

- Team
 - Met to discuss and narrow down preliminary design ideas
 - Completed the first draft of the Product Design Specifications (PDS)
 - Continued research on physiology, materials, standards, and competing designs
- Ruhi Nagarkatte
 - Drafted Progress Report #2
 - Brainstormed two preliminary design ideas based on research and client specs
 - Scheduled team meeting to discuss progress and designs
 - Continued research on ISO, FDA standards and common methods used in tissue biopsies
 - Completed assigned portion of PDS

- Ella Lang
 - Brainstormed 2 preliminary design ideas
 - Completed assigned PDS sections and helped edit the PDS as a whole
 - Continued researching current biopsy cutting mechanism/competing designs and updated the design notebook
- Gianna Inga
 - Brainstorm & document design ideas
 - Meet with group to present and critique design ideas
 - Conduct research on materials and blade options
 - Finish individual parts of the PDS
- Simon Nam
 - Brainstormed on preliminary design ideas
 - Continued research focusing more on research settings of biopsy for design criteria considerations
 - Completed assigned sections of PDS deliverables
 - Further looked into presentation slides provided by client for further references and considerations for device ideas/inspirations
 - Updated the project page with new changes and addition of deliverables
- Sarah Raubenstine
 - Brainstormed possible preliminary designs
 - Met with group to decide on what preliminary designs to move forward with
 - Finished individual portions of the PDS
 - Conducted research on current lab methods and safety measures

Weekly/Ongoing Difficulties

There are no ongoing difficulties facing the team this week. Everyone has started to brainstorm preliminary ideas based on research and certain client requirements. By next week, a design matrix will be completed to weigh the top 3 design ideas.

Upcoming Team and Individual Goals

- Team
 - Complete the design matrix with the top designs
 - Brainstorm ideas for materials and fabrication methods
 - Continue to conduct research on tissue biopsy processing methods and materials
- Ruhi Nagarkatte
 - Divide up design matrix among team
 - Update team meeting folder in design notebook
 - Complete assigned portion of design matrix
- Ella Lang
 - Narrow down the design options and meet with the team to discuss matrix criterion
 - Complete the design matrix
 - Continue research on design materials
 - Begin modeling designs in OnShape

- Gianna Inga
 - Create CAD drawing of my best design idea
 - Attend outreach seminar
 - Continue to research for design background knowledge
 - Complete design matrix
- Simon Nam
 - Assist on design matrix creation and specify the scoring/justification of each design criterias
 - Continue researching on design mechanisms and fabrication methods
 - Consult with Design Innovation Lab for printing a demo model for one of the selected possible design for preliminary oral presentation
 - Assist on BME outreach seminar with sharing personal experience to other BME 400 classmates
- Sarah Raubenstine
 - Work on design matrix assessing possible preliminary designs
 - Continue to research and update the team design notebook
 - Finalize cleaned up design sketches and CAD drawings
 - Attend outreach seminar

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	0%	
Preliminary Presentations	Friday, 10/03/2025	All	0%	
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

[illegible]

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