

Multi-chamber culture insert for connected neuronal aggregates

Date: 09/17/2026

Client: Dr. Jason Brant

Advisor: Prof. Mehmet Orman

Team:

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Problem statement

Common devices used in biological research, including well plates and petri dishes, are readily accessible, provide easy platforms for addition of cells, media, and reagents, and allow for observation using standard laboratory microscopes; however, they fail in their ability to model the complex physiological environments of the human body. In recent decades, there has been a large push toward the development of microphysiological systems used for research, for example, the Organ-on-a-Chip platforms. The ability to model complex tissue environments is incredibly important for the study of the auditory pathway because of its dynamic environment. 2D systems completely isolate cells from the complex physical forces, specialized microenvironments, and 3D neural networks that are vital to the transduction of sound to the brain. The multi-chamber culture insert device provides a more dynamic platform to study the growth and interactions of neuronal cell bodies on a 3D platform. The device allows for growth and interaction of neuronal cell aggregates in a structured manner. The device separates a well plate chamber into distinct sections each holding a neuronal aggregate. The device allows for growth of neurons between chambers, but separates the media in each chamber, allowing for independent treatments of aggregates.

Brief status update

The team met with clients to discuss the project. The PDS was completed.

Difficulties / advice requests

- N/A

Current design

- N/A

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	

Major team goals for the next week

1. Brainstorm preliminary designs and choose three to move forward with into the semester.
2. Meet with client again to discuss PDS and preliminary design ideas.

Next week's individual goals

- Greta
 - Brainstorm preliminary designs
 - Meet with team to share design ideas
 - Evaluate designs in design matrix
 - Continue research on potential materials and methods of fabrication.
- Eli
 - Create preliminary designs
 - Evaluate preliminary designs in design matrix
 - Continue research
- Sam
 - Create individual design ideas
 - Meet with team to share preliminary designs
 - Evaluate preliminary design in design matrix
 - Continue research
- Safia
 - Continue to gain more understanding about the fabrication process and the different ways of doing so.

- Brainstorm and create initial project designs.
- Meet with the team and client to collaborate on design ideas, and narrow down possibilities.
- Sri
 - Continue research on microfluidic devices and ergonomics aspect of it
 - Use research to develop 2-3 ideas, regroup and discuss our ideas with one another
 - Review client slides/guidelines to understand the research better
- Sophia
 - Brainstorm and roughly layout design ideas to meet with team and client
 - Continue research on possible fabrication methods
 - Evaluate designs

Timeline

Task	Sept				Oct					Nov				Dec	
	4	11	18	25	2	9	16	23	30	6	13	20	27	4	9
Project R&D															
Empathize	X	X	X												
Background & Research	X	X	X												
Preliminary Designing															
Final Design Prototyping															
Testing															
Deliverables															
Progress Reports		X	X												
Product Design Specifications			X												
Design Matrix															
Prelim presentation & Selection of Final Design															
Show and Tell															
Final Poster															
All Deliverables Due															
Meetings															
Client			X												
Advisor	X	X	X												
Website															
Update	X	X	X												

Filled boxes = projected timeline

X = task was worked on or completed

Previous week's goals and accomplishments

- Greta
 - Continue research on existing devices and background of project
 - Prepare questions and attend client meeting and gain valuable insight on the project
 - Create progress report 2 and update google drive with more helpful reference documents
- Eli
 - Continue research on existing device issues
 - Assemble questions in advance of client meeting
- Sam
 - Continue research on project background on current solutions/issues.
 - Prepare client meeting questions.
 - Meet with client to discuss project goals and advice for approaching this challenge.
- Safia
 - Continue research on the background and purpose of the project, and how it aids the real world.
 - Prepare questions to ask the client in order to understand their perspective and hope for the project.
 - I know understand the basis and background of the project better, and more of the fabrication process
- Sri
 - Understand basis of project and conduct research on previous devices made
 - Attend client meeting and brainstorm questions to ask, research materials used
- Sophia
 - Continued research on the usage and limitations of microfluidics for cell imaging
 - Prepared questions to ask the client

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Greta	9/15	Meet with client and team to discuss project	2	6.5	8.25
	9/16	Work on product design specifications	3		
	9/16	Research articles for PDS	1		
	9/17	Update google drive and create progress report	0.5		
Eli	9/14	Continued research on microfluidic device article provided by client	0.5	5.5	7
	9/15	Met with client to discuss project	2		
	9/17	Worked on PDS	3		
Sam	9/15	Meet with client and team to discuss project goals and specifications	2	5.5	7.25
	9/16	Worked on PDS	2.5		
	9/17	Researched competing designs for PDS	1		

Safia	9/15	Meet with client and team to discuss project and roles.	2	5.5	6.75
	9/16	Started research on safety, reliability, and life in service of the project, and then started PDS.	1.5		
	9/17	Continued working on PDS. Also found articles about ECM, agarose, and neurons for PDS and research.	2		
Sri	9/15	Met with client to understand the project and guidelines, discussed with team about PDS	2	6	7.5
	9/16	Started working on PDS and researched the ergonomics aspect of the insert	1		
	9/17	Found a few articles to research for design brainstorming, editing and refining PDS	3		
Sophia	9/14	Continued reading articles provided by client	1	6	7.75
	9/15	Met with team to discuss client's needs	1		
	9/16 - 9/17	Researched standards for PDS and worked on PDS	4		