

Healing In Alignment: Bioelectric Dressing for Collagen Alignment

Progress Report #2

Date: 09/17/2026

Client: Dr. Jasmine Craig

Advisor: Professor Amit Nimunkar

Team:

Anya Bergman
Ellinore Letts
Shashandra Suresh
Callum Brown
Claire Nesemann

Problem statement

Keloids are a form of dermal scarring that is caused by excessive fibroblast proliferation, and excessive extracellular matrix formation. These scars grow gradually and extend beyond the initial wound margins. Treatments such as occlusive dressings, compressive therapy, steroid and topical therapy aim to modulate the wound healing process, but have variable efficacy, require prolonged patient compliance and often have undesirable side effects. The goal of this project is to create a bioelectric dressing that would apply an exogenous electrical stimulus in order to directly affect galvanotaxis within the wound healing process. Current research has demonstrated that an externally applied, low intensity electric field can modulate fibroblast orientation, reduce excessive collagen deposition and promote a more organized ECM architecture, ultimately stimulating healing on the cellular level during early stages of wound regeneration.

Brief status update

The project is in the literature research phase. We are researching vital aspects of our project and competing designs. We have outlined the product design specifications and started to develop ideas for creating a prototype and testing process that mimics the in vivo environment.

Difficulties / advice requests

No difficulties currently in this stage of the design process.

Current design

The team is in the early stages of research. No design ideas have been created currently.

Materials and expenses

Item	Description	Manufac-turer	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	

*Current budget: \$500

Goals

Major team goals for the next week

1. Create a design matrix
2. Outline plan for the project with a timeline.
3. Start to purchase materials for prototyping.

Next week's individual goals

- Anya Bergman
 - Design matrix of circuit schematics for constant voltage vs. constant current
 - Continued research
- Ellinore Letts
 - Development 2D monoculture and coculture testing protocol.
 - Research applicable assays to run once the testing protocol is complete.
- Shashandra Suresh
 - Create potential designs for circuitry
 - Research competing designs and previous circuitry for bioelectric dressings
- Callum Brown
 - Generate list of materials needed for 2D & 3D in vitro keloid environments for client to order.
 - Assist in developing protocol for in vitro keloid modeling
- Claire Nesemann
 - Give an outline of what the bandage should be. This will be used for after our device prototype is mostly finalized.
 - Support the development of the monoculture and coculture testing protocols.

Timeline

Task	Sep				Oct					Nove				Dec	
	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10
Project R&D															
Empathize	X	X													
Background...	X	X													
Prototyping															
Testings															
Deliverables															
Progress Reports	NA	X	X												
Prelim presentation															
Final Poster															
Meetings															
Client	X														
Advisor	X	X													
Website	X	X													
Update	X	X													

Filled boxes = projected timeline

X = task was worked on or completed

Detailed accomplishments

Previous week's goals and accomplishments

- Anya Bergman
 - Created draft of a proposed circuit timeline.
 - Met with clients for initial plans and objectives.
 - Worked on the PDS.
 - Created block diagrams for electrode interface.
- Ellinore Letts
 - Created draft of a proposed testing project timeline.
 - Met with clients to determine semester goals and project objectives.
 - Continued background research.
- Shashandra Suresh
 - Worked on PDS
 - Met with client and the previous team to discuss project specifications and objectives
 - Researched more background information on keloid treatment and pathology
- Callum Brown
 - PDS
 - Met with client
 - Background research on FPCLs and other 3D fibroblast models
- Claire Nesemann
 - Met with clients and past group to determine what has been accomplished and what are the semester expectations

- Researched possible materials and prototyping protocols for bandages
- Completed the PDS

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Anya Bergman	9/16 9/17	Research and Block Diagrams PDS	2 2	4	6
Ellinore Letts	9/14-9/19	Research PDS	2 .5	2.5	4.5
Shashandra Suresh	9/17	PDS Research	1 1	2	4
Callum Brown	9/14-9/17 9/17	Research PDS	2 .5	2.5	4.5
Claire Neumann	9/16-9/17 9/17	PDS Research for bandage	2 2	4	6