Democratizing Placement of Endoluminal Negative Pressure Devices for Gastrointestinal Leaks

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Problem statement

Currently, large defects in the GI tract (often caused by surgical complications) are treated with surgery. For external wounds, the use of negative pressure wound therapy has become widely used. This therapy, colloquially called VAC therapy, leads to improved healing of superficial wounds. For the past few years, some surgeons have been placing similar VAC devices into the GI tract through the mouth or anus to treat defects in the GI tract. The success of this therapy has been outstanding, with some studies finding that 90% of wounds that would have otherwise required surgery can be closed without making any additional incisions at all. The process of VAC placement is currently labor intensive and requires some skill in manipulating an endoscope, which has limited its widespread use. Development of a streamlined way to deploy VAC therapy into the GI tract would allow more surgeons to use this therapy to heal anastomotic leaks.

Brief status update

This week the team focused on completing the preliminary report. The report focuses on all aspects of the project completed so far, including future plans. The team has discussed fabrication and testing of the device. Since most of the focus was on developing the report, the team is now working on finding a biomaterial that can be used to fabricate the coating. Once this material is decided, the team will order materials and begin prototyping.

Difficulties / advice requests

The team has to work on ordering materials to begin prototyping. The team could use some advice on what companies to order from, especially when ordering chemical compounds. Important aspects of ordering materials the team wants to consider is the cost of the material, the cost of shipping, and the estimated shipping time.

Current design

The degradable coating design scored the most points in the design matrix and is now the current design. The team is conducting research into the materials needed to develop a film and create fabrication protocols.This research is expected to be completed next week to allow for materials to be ordered and begin fabrication

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**	

Major team goals for the next week

1. Finalize a material for the degradable coating
2. Order materials that are not available in the lab or that the team currently has
3. Develop fabrication protocol
4. Begin prototyping

Next week's individual goals

- Simon Fetherston
    - Research pullulan as a potential biocompatible coating
    - Create a fabrication protocol
    - Work on developing an esophageal model that can be used for placement and force testing
- Evelyn Mikkelson

    - Continue researching potential coating materials and fabrication
    - Research on cavity environment that could cue degradation
    - Meet with client to discuss options and ideas for materials and ordering them
- Mariah Smeeding
    - Research/review degradation testing protocols
    - Research biocompatible degradable materials that could be promising
    - Meet with client to discuss potential material choices and preliminary report
    - Begin to work on a material design matrix if we are using one
- Yeanne Hwang
    - Research biocompatible degradable material and pre-existing cases
    - Meet with client to discuss material choices and financial management
    - Research manufacturing methods to compress sponge and coat with degradable material

Timeline

Task	Jan	Feb				March					April				May	
	26	2	9	16	23	1	8	15	22	29	5	12	19	26	3	10
Project R&D																
Empathize	X	X	X													
Background…	X	X	X	X	X											
Prototyping				X	X											
Testings																
Deliverables																
Progress Reports	X	X	X	X	X											
Prelim presentation				X												
Final Poster																
Meetings																
Client		X		X												
Advisor	X	X	X	X	X											
Website																
Update	x	X	X	X	X											

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Individual:
    - Evelyn Mikkelson
        - Work on preliminary report
        - Begun research on coating material
    - Simon Fetherston
        - Created testing protocols

        - Worked on preliminary report
        - Continued research on potential biomaterials other than chitosan
    - Mariah Smeeding
        - Complete portions of preliminary report
        - Begin research on material choices
    - Yeanne Hwang
        - Research biocompatible material
        - Work on preliminary report
- Team :
    - Complete preliminary report
    - Research materials to finalize design

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Evelyn M	02/20/2026 02/23/2026 02/25/2026	Research degradable materials Research for preliminary report Work on preliminary report	2 2 1	2 2 1	16
Simon F	02/20/2026 02/21/2026 02/22/2026	Create testing protocols Complete sections of preliminary report Research biomaterial with stronger mech. properties than chitosan	2 2 1	2 2 1	18
Yeanne H	02/21/2026 02/25/2026	Research biocompatible material Work on preliminary report	2 2	2 2	16
Mariah S	02/24/2026- 02/25/2026	Research for and write preliminary report	2	2	16.6