

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 worked on gathering materials to begin fabricating preliminary prototypes. The team has decided to make a gelatin film as well as a sodium alginate film. In the lab, the team was able to find all of the compounds needed to create the films. The next step will be to begin initial fabrication of the films. Fabrication plans have been written to allow for repeatability and consistency.

Difficulties / advice requests

The team is concerned about the molds used to cast the films. The lab has some pyrex petri dishes. However, acquiring a PTFE mold or larger pyrex dishes could allow for larger films to be made. With a larger film, it can be cut according to the size needed for the sponge. Also, a dogbone mold would be useful for the team to make dogbone film samples that can be used for mechanical testing.

Current design

The current design to be fabricated and tested is a gelatin film and a sodium alginate film. Fabrication and testing of the mechanical properties will indicate the plausibility of either film in being used as an encapsulating, degradable film. This film will then be used as the sponge coating and degradation can be tested.

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost	Link
Category 1									
Porcine Gelatin	CAS 9000-70-8 Type A powder, ~300 g Bloom, suitable for cell culture	Sigma Aldrich	G1890	Sigma Aldrich	G1890-100g	Mar 11 2026	100g * 1	\$53.40	Link
Glycerin	CAS 56-81-5 Density 1.261 g/mL USP/FCC grade	Fisher Chemical	G314	Fisher Scientific	G314	Mar 11 2026	4L * 1	\$676.7	Link
Alginate acid sodium salt from brown algae	CAS 9005-38-3 Medium viscosity	Sigma Aldrich	A2033	Sigma Aldrich	A2033-100G	Mar 12 2026	100g * 1	\$82.80	Link
							Total:	\$812.9	

Major team goals for the next week

1. Finalize fabrication protocols
2. Fabricate sodium alginate and gelatin films
3. Pick up additional fabrication materials (sponge, NG tubes, sutures)
4. Prepare for show and tell

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

Previous week's goals and accomplishments

- Individual:
 - Evelyn Mikkelson
 - Researched degradable materials and how we could get them
 - Meet with team and Prof. Ohnsorg to discuss material options
 - Simon Fetherston
 - Researched mechanical properties and fabrication of type A gelatin
 - Researched sodium alginate films
 - Met with Prof. Ohnsorg to discuss material chemistries
 - Mariah Smeeding
 - Set up a meeting and met with Dr. Ohnsorg to discuss material possibilities and key properties to be aware of moving forward
 - Researched PLA biocompatible and degradable films in studies
 - Researched sodium alginate films and procedures for fabrication
 - Yeanne Hwang
 - Research degradable materials of PLA and alginate
 - Research patents for mixing materials to change mechanical properties
 - Meeting with Dr. Ohnsong to discuss about material choices
- Team :
 - Created fabrication protocol for gelatin film
 - Assembled materials to begin fabricating films
 - Discussed important chemistries to allow for in vivo degradation and biocompatibility

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Evelyn M	03/12/2026	Research fabrication and blends containing alginate and gelatin	1	1	22
Simon F	03/10/2026 03/09/2026 03/12/2026	Researched gelatin and alginate films Met with Prof. Ohnsborg Worked of gelatin film fabrication protocol	1.5 0.5 1	3	24
Yeanne H	03/11/2026 03/10/2026 03/09/2026	Research degradable materials of PLA and alginate Research patents for mixing materials to change mechanical properties Meeting with Dr. Ohnsong to discuss about material choices	1 1.5 0.5	3	22
Mariah S	03/09/26 03/10/26	Discuss materials with Dr. Ohnsorg Research PLA materials	.5 1	2	21.6

	03/11/26	Research sodium alginate	.5		
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