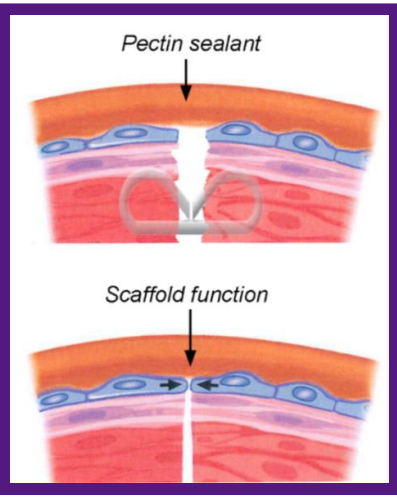
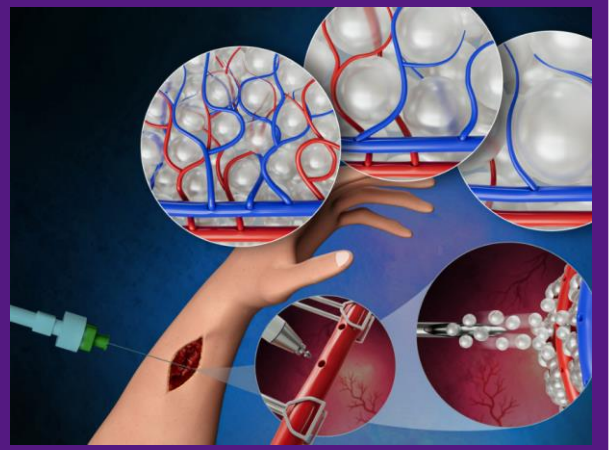
Medical Device Case Study

6/3/2024

Strategic Insights

Which new biomaterial to commercialize?

Pectin Patches vs. Microgel Scaffolds

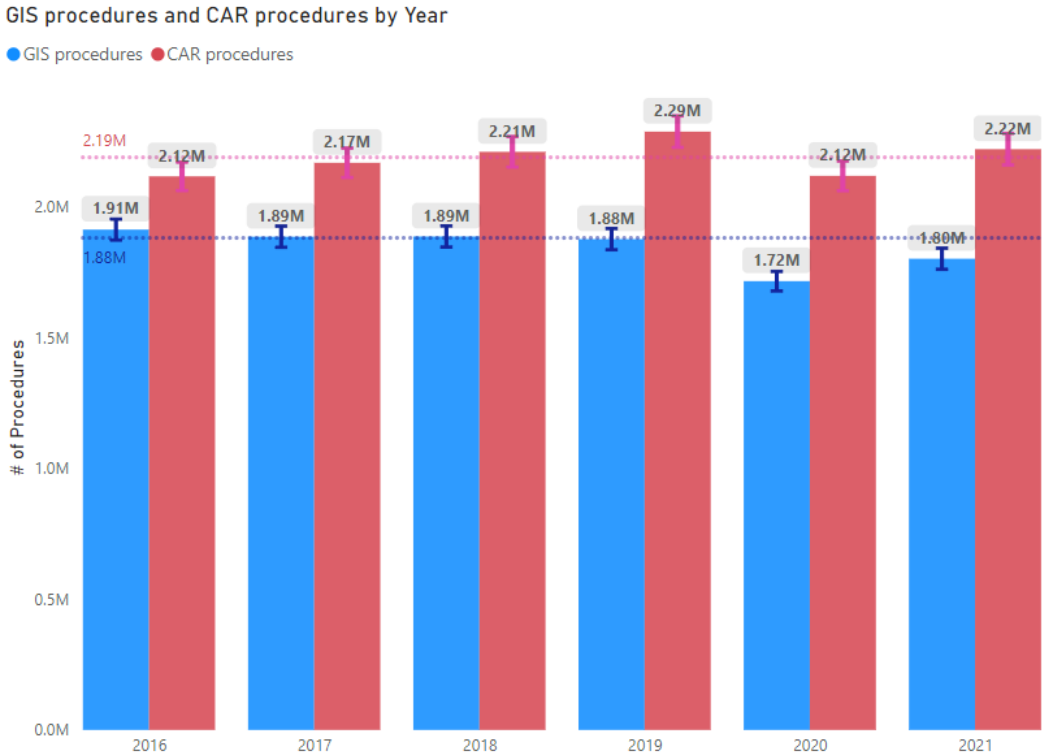
Biomaterial	**Pectin Patch** (Plant-derived structural Heteropolysaccharide) 	**Gelatin-based Granular Hydrogel Scaffolds (GHS)** 
Surgical Applications	Surgical Sealants in **Gastrointestinal System Procedures** to prevent anastomotic leak	Inject GHS with Surgical Micropuncture in **Cardiovascular Procedures**
Current Status	Greater adhesivity to serosa than NCF or PSA and can seal an ex vivo bowel segment	Accelerates cell growth and vascularization in well-organized patterns within live rat tissues
Benefits	• Sealant with mechanical and barrier functions • Wound healing scaffold	Precisely guide vascularization for advanced soft tissue engineering and regeneration
Limitations	• Ex vivo study • Difficulty in simulating bowel anastomosis	Further research in small, and large animals, even people is needed

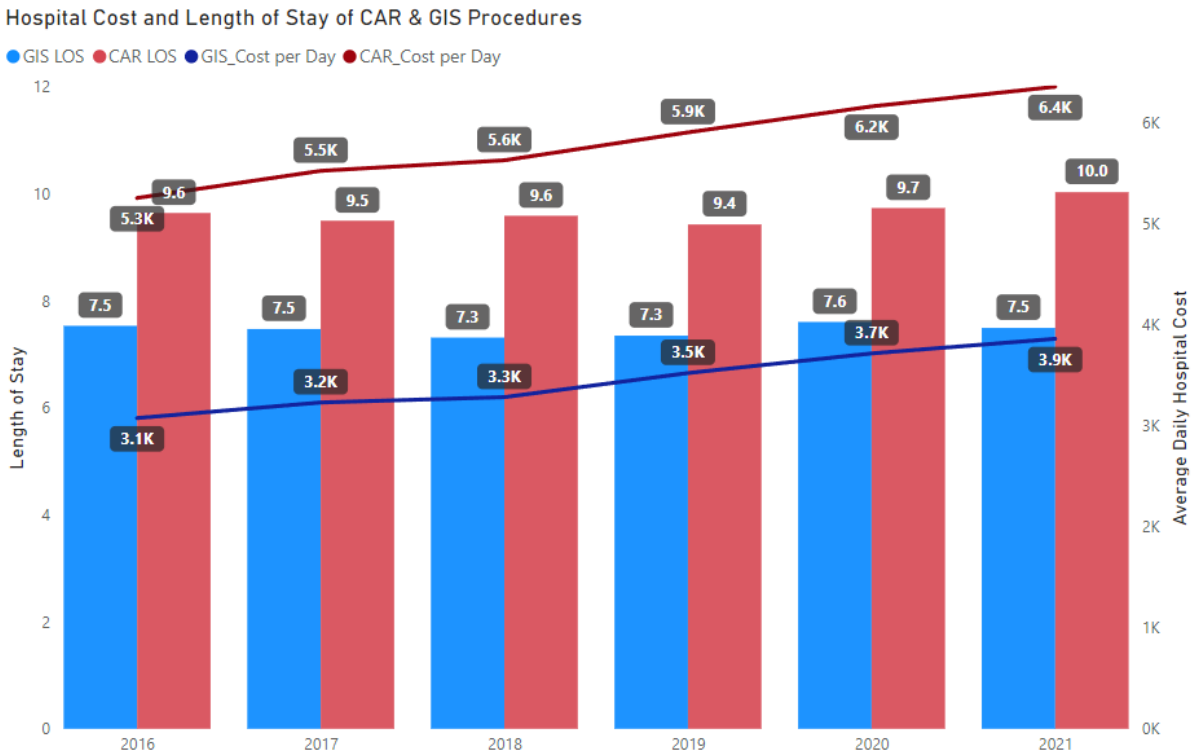
Polymers **2021**, **https://doi.org/10.3390/polym13162811**
Small **2023**. **https://doi.org/10.1002/smll.202307928**

*Note
NCF: nanocellulose fiber, PSA: pressure sensitive adhesives

Market size for the biomaterials?

Gastrointestinal system (GIS) vs. Cardiovascular (CAR) Procedures





Future Estimate (2027-2028)	GIS	CAR
Annual Procedures	$ 1.9 M	$ 2.2 M
Average Hospital Stay	7.5 Day	9.7 Day
Average Daily Hospital Cost	$ 4.9 K	$ 8.0 K
Economic Value of 5% Shorter Hospital Stay → Pricing	$ 1.8 K	$ 3.9 K

Data Source: HCUPnet US Nationwide Inpatient Sample (NIS) https://datatools.ahrq.gov/hcupnet/
https://hcup-us.ahrq.gov/toolssoftware/ccsr/PRCCSR-User-Guide-v2024-1.pdf
Clinicoecon Outcomes Res. 2016; doi: 10.2147/CEOR.S112762

How to make Investment Decisions?

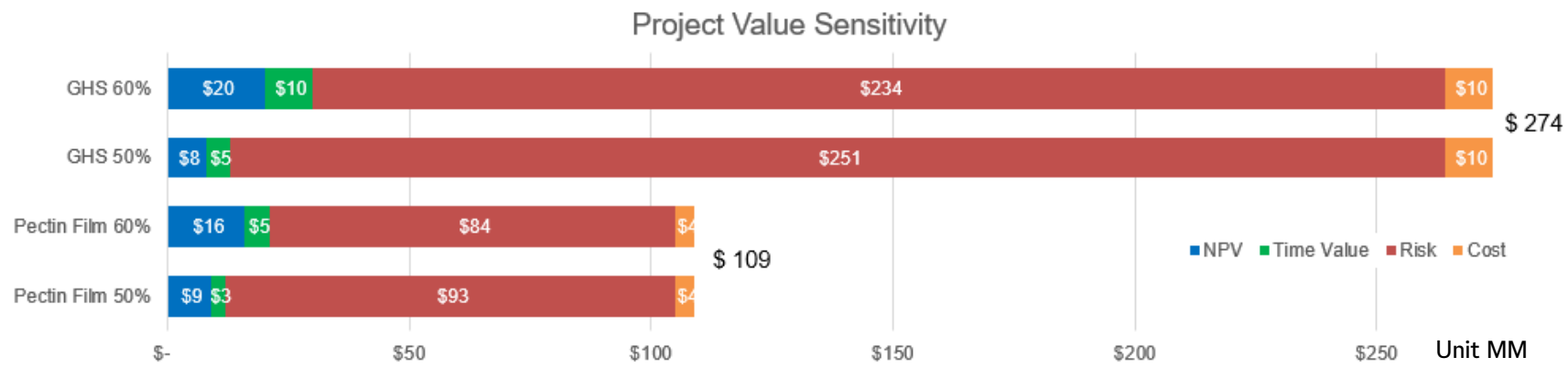
Insights & Recommendation

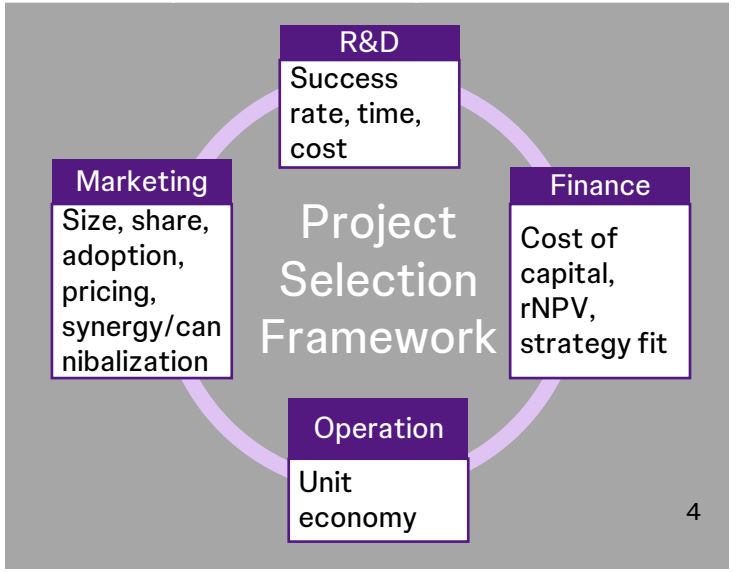
1. **Product development risk** is the primary driver of the projects' final value. An increase in the success rate from 50% to 60% at stage time results in double the projects' risk-adjusted NPV. Investing in R&D capability is crucial to increasing the overall R&D success rate.

2. **The Pectin Patch** presents a more favorable investment choice due to its shorter development time and lower associated risk. The pectin film can leverage sealant market access, leading to market penetration and revenue generation. GHS is also a promising area for development, given its substantial market size and its complementary nature to the revascularization product line.

3. **Key assumptions** are made to simplify complex problems and identify frameworks and key drivers. Expertise from the R&D, Marketing, Operations, and Finance teams is needed to obtain realistic assumptions and forecasts for the analysis.

Assumptions & Results	Pectin Patch	GHS Micropuncture
US Market Size	$ 342 M	$ 858 M
Patient Adoption	10%	
Ethicon Market Share	10%	
Kit Price	$ 1800	$ 3900
Profit %	32% (EBITDA Margin)	
Technology Obsolete Time	10 years	
Total Cash Inflow if Success	**$ 109 M**	**$ 274 M**
Tech Development Time	3 years	4 years
Investment Each Year	$1M, $1M, $2M	$2M, $2M, $3M, $3M
Success Probability	**50% each year**	
Discount Rate	9.5% (IPR&D Cost of Capital)	
Project Value	$ 105 M	$ 264 M
Risk-Adjusted Value	$ 12 M	$ 13 M
Risk-Adjusted NPV (rNPV)	**$ 9 M**	**$ 8 M**





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Nature Biotechnology **volume 19**, pages813–817 (2001) https://www.nature.com/articles/nbt0901-813#citeas