

Expandable Nasogastric Tube

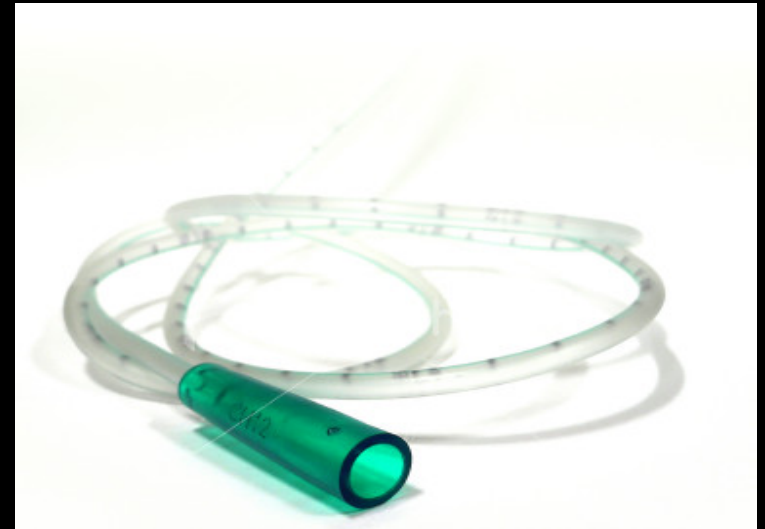
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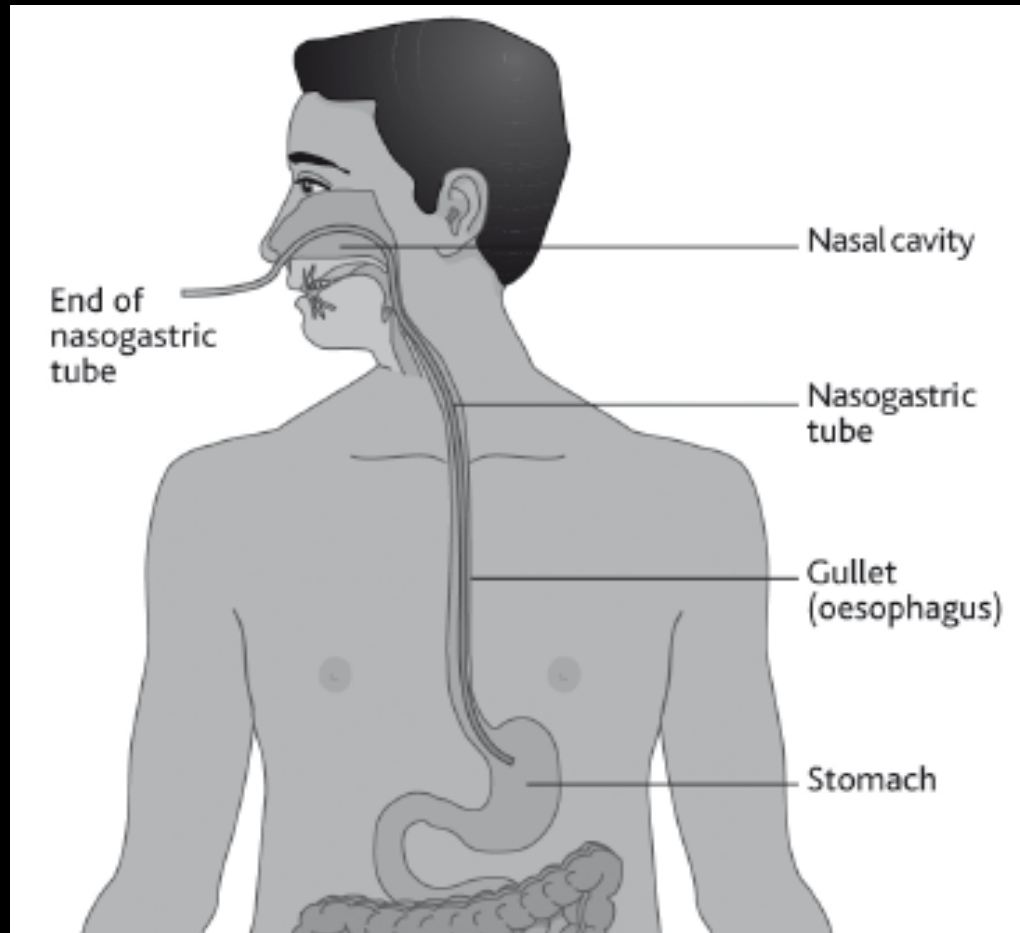
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Quinn

Nasogastric Tube Background

- Evacuate stomach contents
- Decompress the stomach
- Treatment of gastric immobility
- Remain in place for 48-72 hours
- Medical complications
 - ~0.3% of placements cause death
- Low cost



Placement of Nasogastric Tubes



Problem Statement

- Reduce the insertion diameter from 6mm to 3mm
- Increase placement accuracy
- Increase patient comfort
- Decrease risk medical complications



Competition

Nano Vibronix

- Generates vibrations
- Expensive

Kimberly-Clark Nasogastric Tube

- Varying stoma lengths
- Silicone balloon
- Expensive



Design Criteria

- Patient Comfort
- Patient Safety
- Materials
- Reliable
- Cost

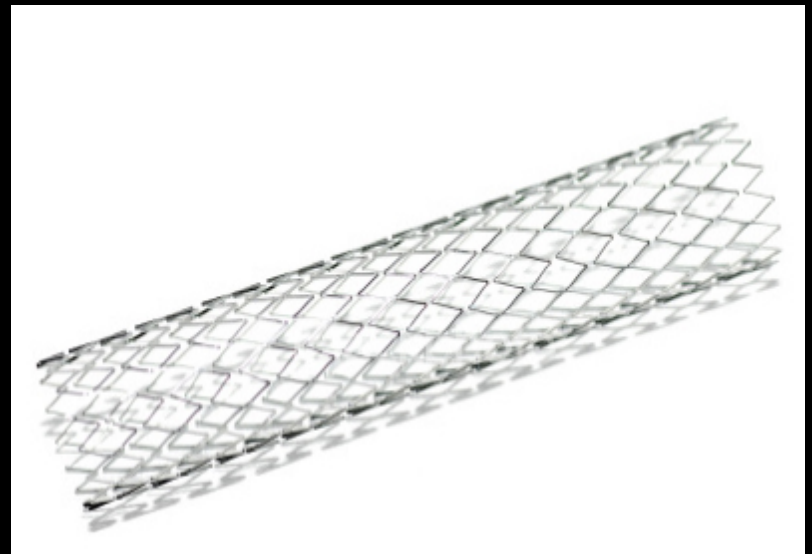
Materials

Shape-memory Polymer

- Transformation Temperature
- Sterilizable
- Non-toxic

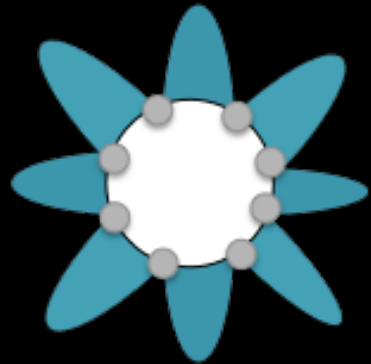
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- Biocompatible
- Corrosion-resistant
- Composition
- Reactive

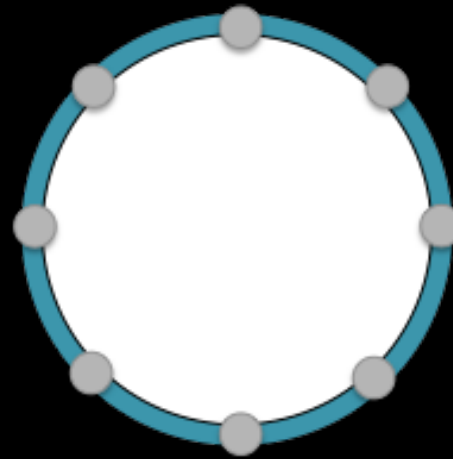


<http://info.admet.com/Portals/70514/images/stent.jpg>

Alternative Designs-Stent Bubble Device

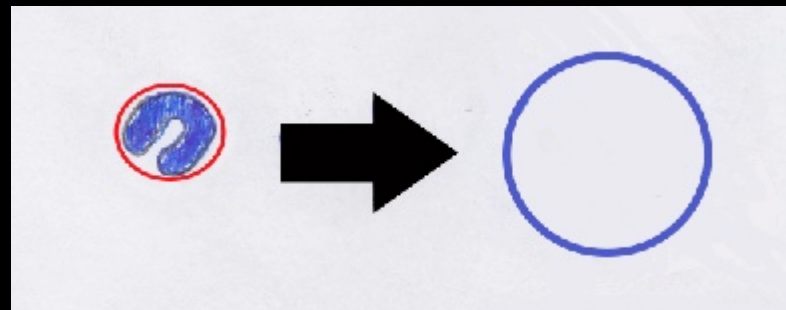
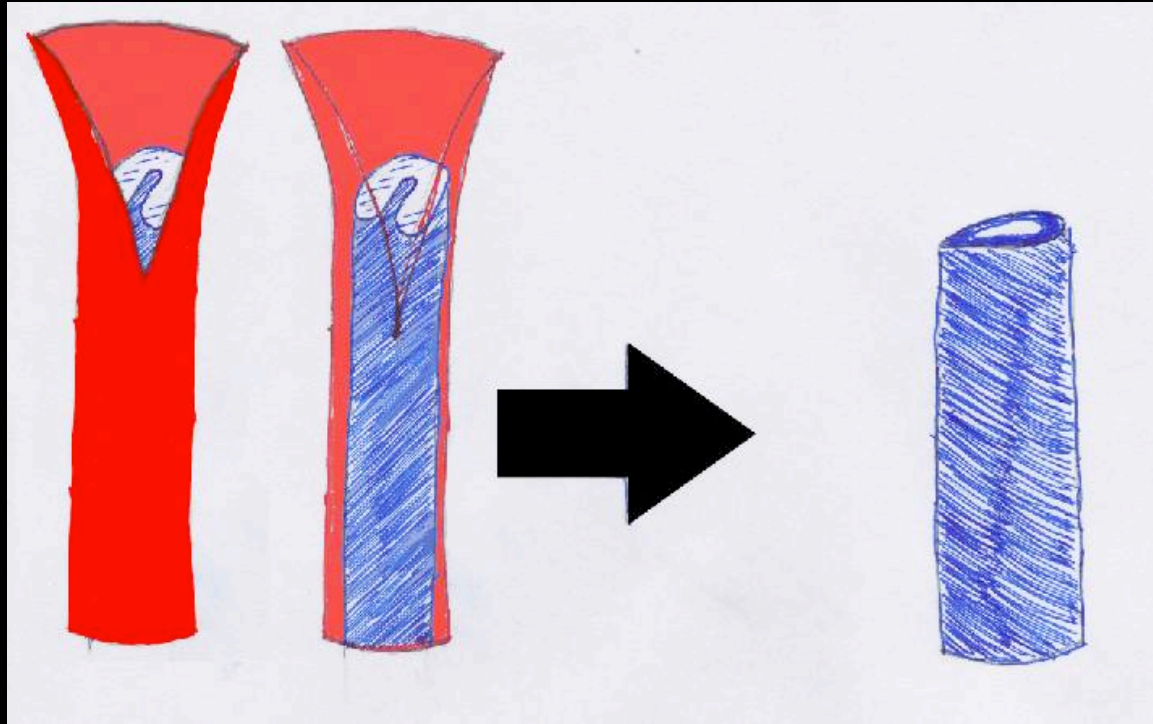


Compressed

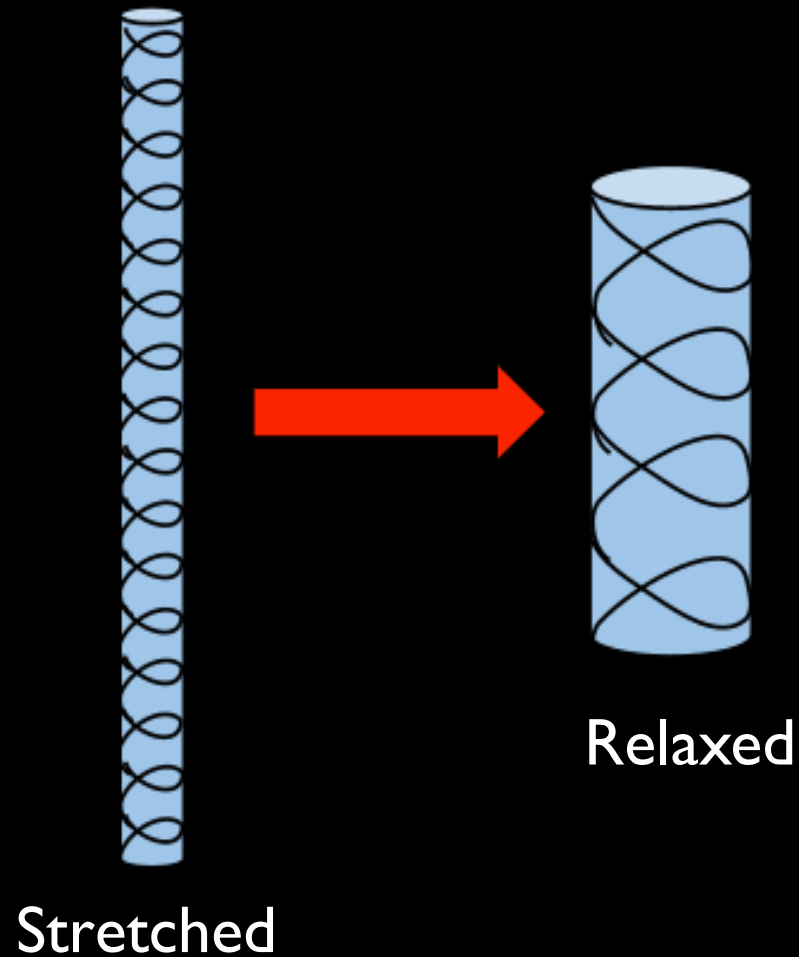


Expanded

Alternative Designs-Shape Memory Polymer



Alternative Designs- Stretchy Coil

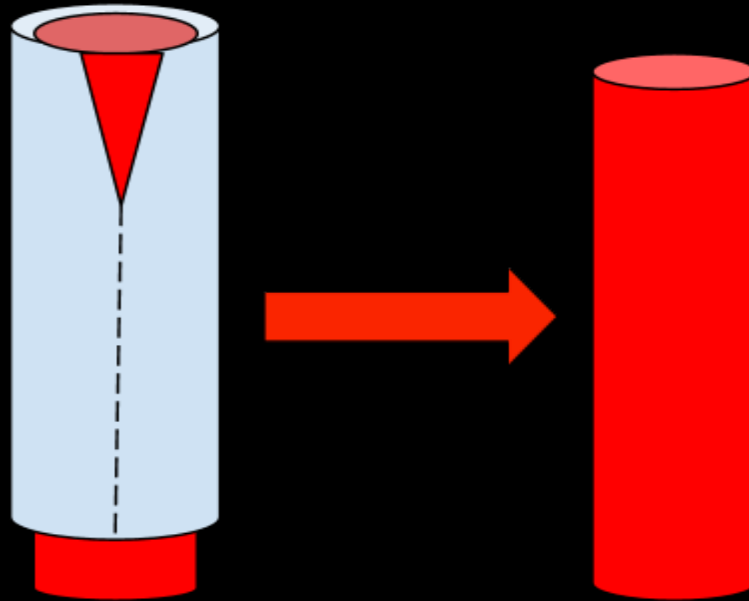


Design Matrix

	Weight	Stent Bubble Device	Shape Memory	Stretchy Coil
Comfort	1	3	4	4
Diameter	1	2	3	4
Modifications	1	1	4	2
Cost	1	2	4	3
Ease of Use	.75	1	5	2
Manufacturability	.5	1	4	3
Expandability	.5	4	3	4
Feasibility	.25	1	3	3
Total	30	8.75	20.75	16

Final Design - Shape Memory Polymer

- Thermoplastic Polyurethane
- Sheath for insertion



Sheathed

Decompressed

Future Work

- Choose polymer
- Obtain polymer
- Design sheath
- Testing
- Research manufacturing options



https://www.thermo.com/com/CMA/Images/Image_46998.jpg

Conclusion

- Current placement very uncomfortable
- Benefits of smaller diameter
- Many material options



Acknowledgments

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References

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Questions?

