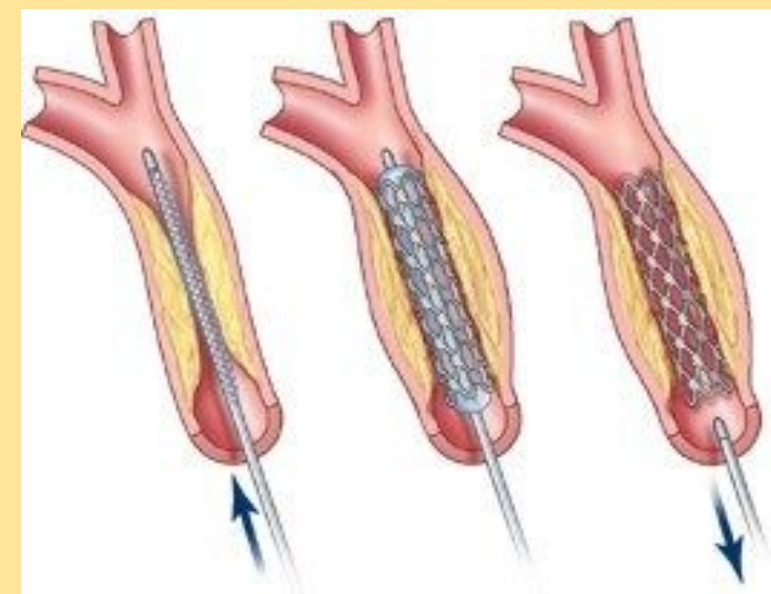
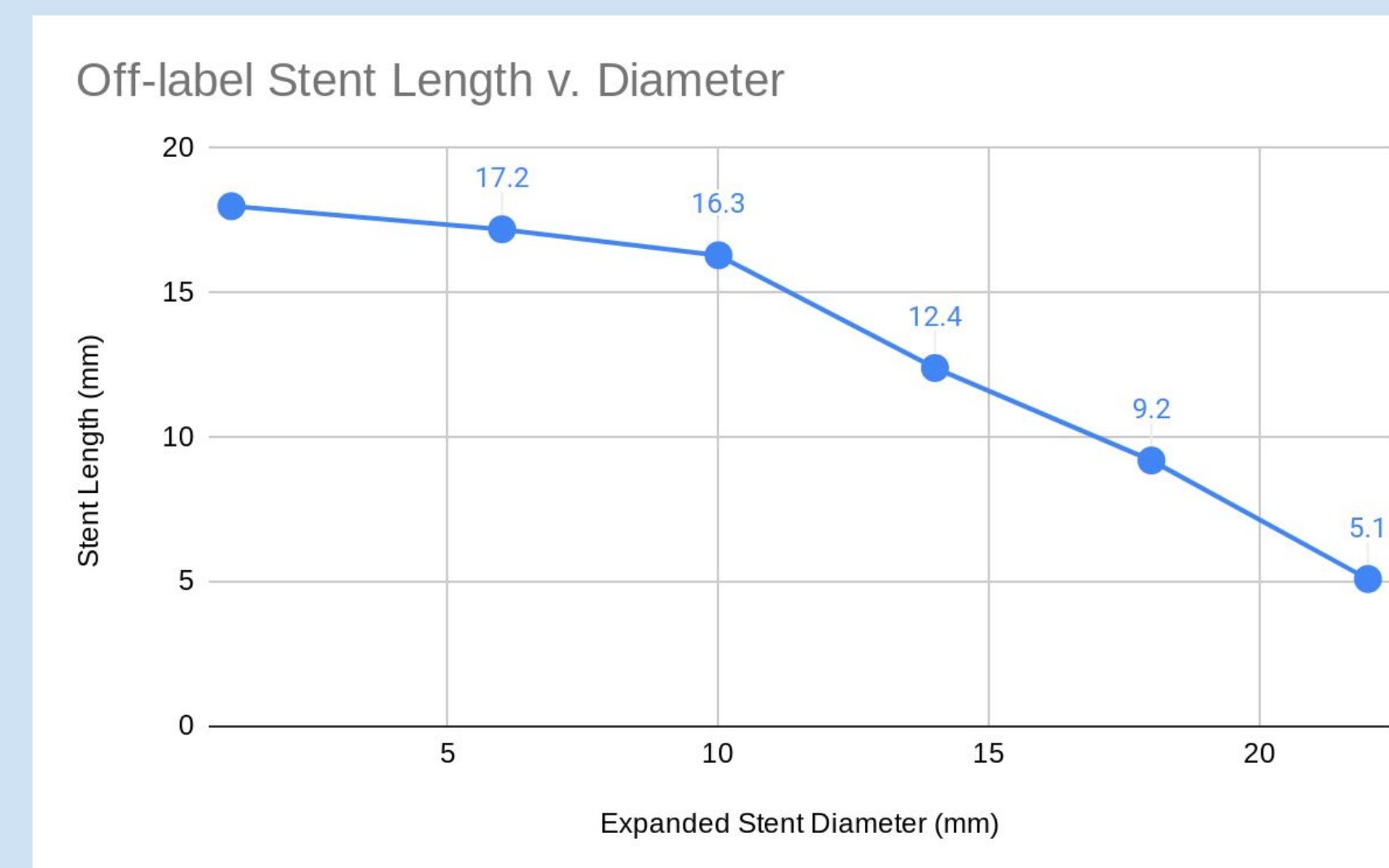
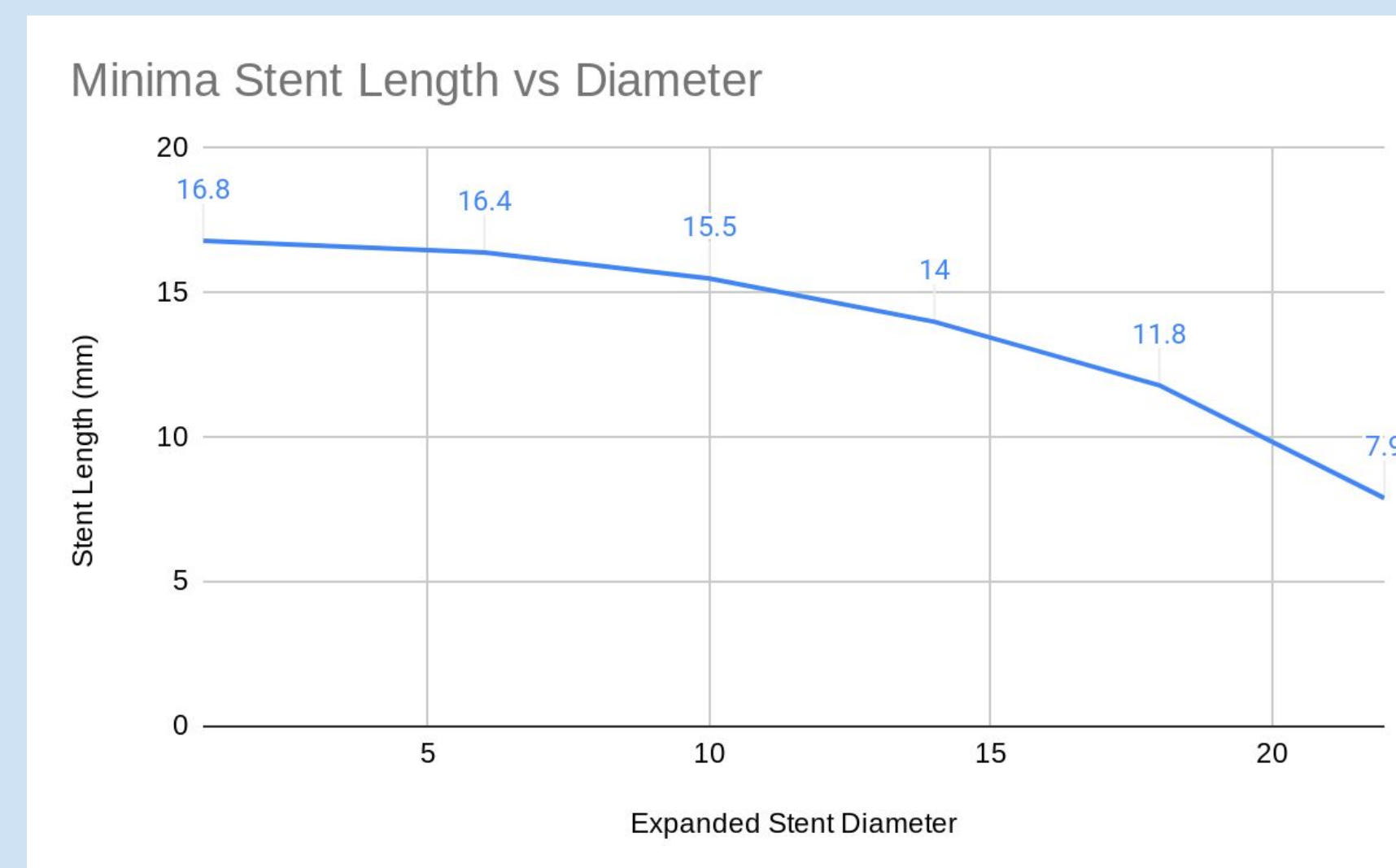


INTRODUCTION

The coronary stent, a crucial medical device for treating coronary artery disease since the 1980s, has undergone significant advancements in design and functionality. While proven effective for adults, children with similar artery blockages lack a suitable solution, leading to the adaptation of adult stents for pediatric use. However, these modifications are suboptimal, resulting in increased hospital stays and the need for repeated procedures. Recognizing the need for a more tailored approach, I aim to compare the viability of Renata Medical's Minima stent against current off-label adult solutions. As an emerging medical device company, Renata Medical's innovation presents a potential breakthrough, yet remains unexplored in comparison to established options. With a personal motivation stemming from familial concern, I am driven to identify the most effective solution for pediatric patients like my younger siblings.

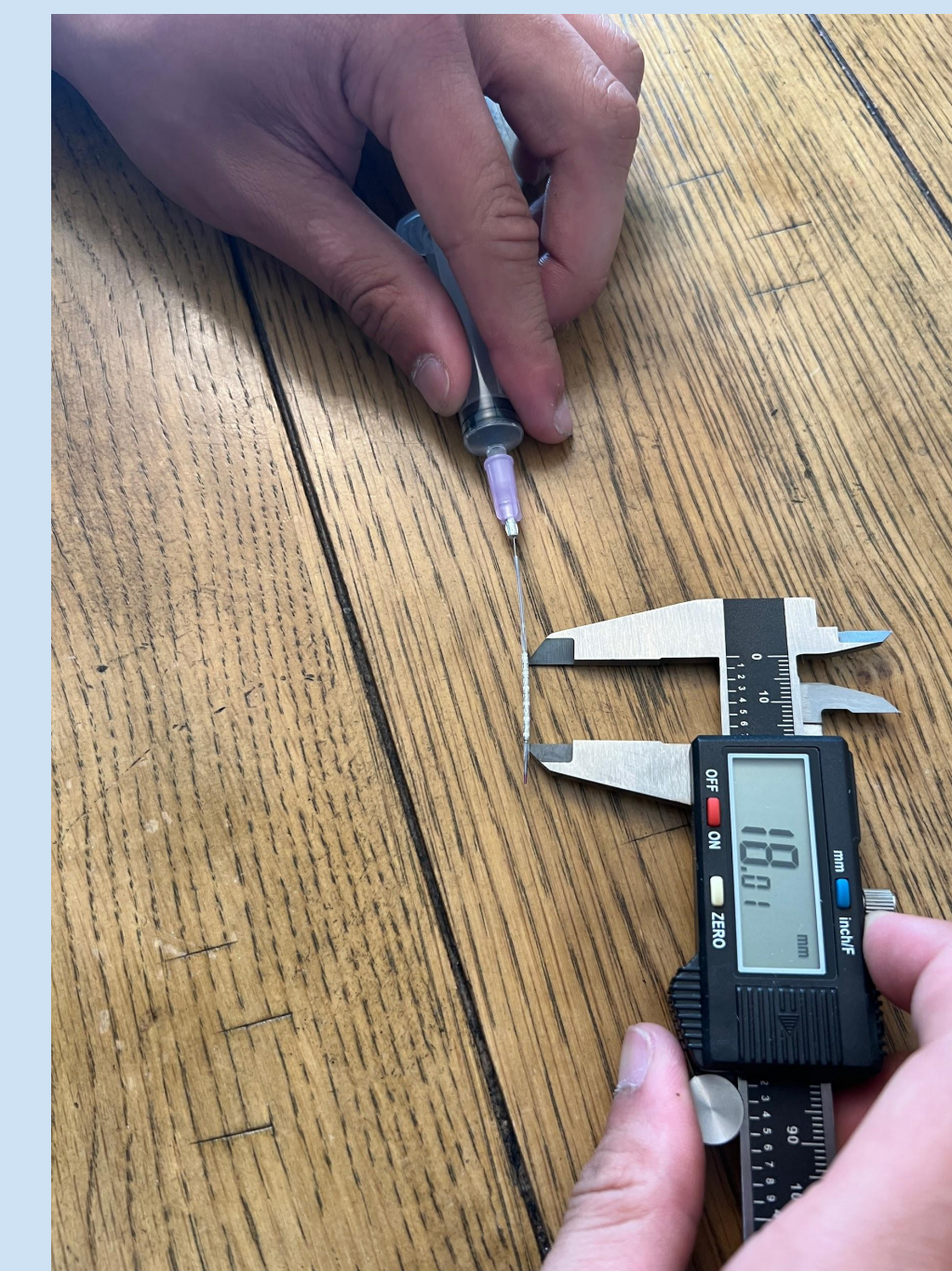
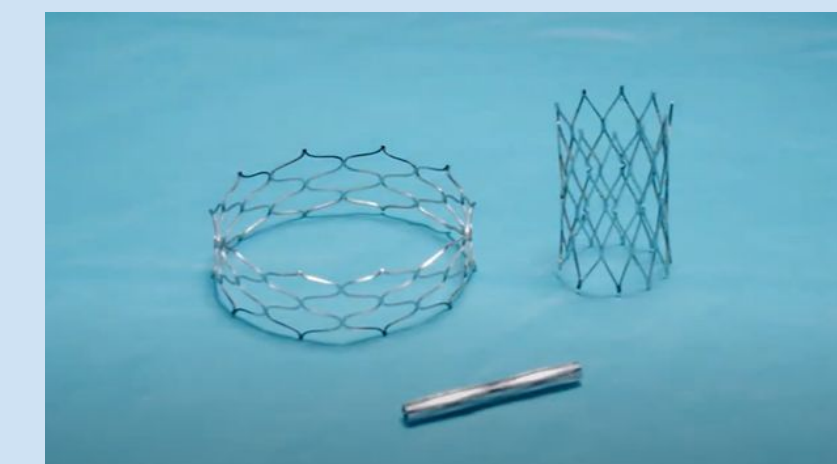


DATA AND FINDINGS



In both graphs, there's a discernible inverse correlation between stent diameter and length, indicating that as one variable increases, the other decreases. This discrepancy suggests that the Renata stent design prioritizes maintaining consistent proportions across a wider range of diameters to enhance its adaptability to various anatomical contexts (from neonate to full grown). The Off-Label Stent on the other hand has a more dramatic drop off in terms of length to diameter, not allowing for proportionate growth with the child.

The stent's length-to-diameter ratio for a growing child is crucial because if too much length is sacrificed for diameter it threatens stent migration and/or restenosis (renarrowing) of the blood vessel. If length drops off too much in expansion it risks restenosis of the blood vessel in parts the stent does not cover which would require an additional intervention with another stent.



CONCLUSIONS, IMPLICATIONS, AND NEXT STEPS

Conclusion: The Renata Minima stent's superior safety and effectiveness underscore the necessity of tailored solutions in pediatric cardiology. Off-label stents' limitations highlight the importance of regulatory approvals and safety considerations for pediatric medical devices.

Implications: This comparison emphasizes the critical role of specialized medical devices in influencing healthcare decisions and enhancing outcomes for pediatric patients.

Next Steps: Further research and validation of the Renata Minima stent's efficacy are essential for improving care standards and advancing treatment options for pediatric cardiac conditions.

RESEARCH METHODOLOGIES

I will rank the stents based on clinical effectiveness and safety, considering factors like cost, hospital stay, patient comfort, convenience, impact on lifestyle, and risks. Data is gathered from reliable sources such as university studies and national medical institutions to ensure accuracy and relevance.

In addition to utilizing metadata, I had the privilege of conducting tests on actual coronary stents to gather substantive data regarding stent overexpansion. For the Off-Label stent measurements, I relied on my own experiments involving the stent and utilized a digital calliper for precise measurements. To ensure accuracy, I averaged the measurements obtained from four identical stents.

In complement to the empirical findings, I extensively referenced peer-reviewed literature from authoritative sources such as the National Library of Medicine (Pubmed Central) for comprehensive insights into stent characteristics and performance. Moreover, I consulted various hospital articles to gather general information on the clinical application of both stents.

DISCUSSION, ANALYSIS, AND EVALUATION

	Renata Minima Stent	Off-Label Stent
Expansion Capability	Versatile, accommodates wide range from child to adult. Lost little more than half 2.1x its length when expanded to 22mm.	Limited due to off-label use, potential mismatch for pediatric patients. Lost 3.5x of its length when expanded to 22mm.
Regulatory Approval	Soon to be FDA-approved for pediatric use, meets strict safety standards.	Lack of FDA approval for pediatrics raises safety concerns.
Safety	Rigorously evaluated, no re-stenting necessary because the length of the stent does not drop below the appropriate range in the artery of a full grown adult.	Multiple procedures necessary, overlapping of stents inside the artery and possible restenosis in between procedures.
Cost	Initial price unknown but no follow up stenting necessary except the addition of balloon angioplasty on the existing expandable stent.	Procedure itself cost 10-13k with each stent costing \$1600 with the addition of a \$600 balloon. Multiple stent procedures necessary.

ACKNOWLEDGEMENTS / REFERENCES

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Works Cited:

