

Exclusive IP Position for a Unique Pericardium Biomaterial with Advantages for TAVR, TMVR & Other Transcatheter Cardiovascular Therapies

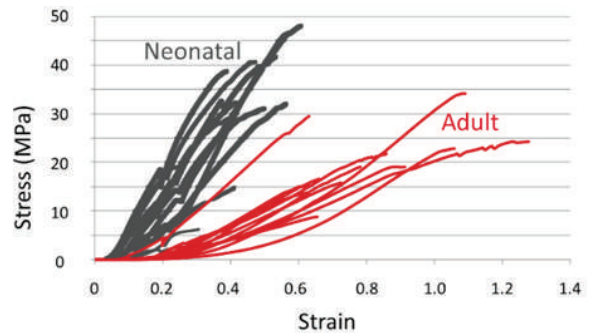
## Technology Highlights

The pericardium biomaterial properties are advantageous to percutaneous delivery devices<sup>1</sup>:

- **Enhanced durability and strength**
- **Enables smaller diameter access**
- **Reduced calcification-related stress**

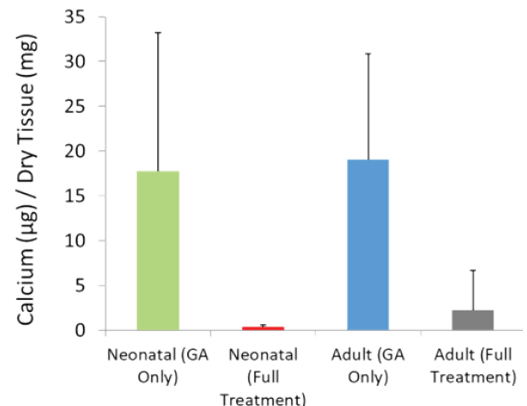
## Material Overview

The collagen in neonatal pericardium is highly aligned, making it **significantly stronger** than adult pericardium<sup>2</sup>. Neonatal tissue also exhibits increased elastin content and is only ½ the thickness compared to adult pericardium. Taken together, these properties allow for improved hemodynamics and less fatigue-related failure in TAVR/TMVR therapies, where valve leaflets must open and close rapidly for hundreds of millions of cycles<sup>1</sup>.



Because neonatal pericardium is ultra-thin compared to adult pericardium, when used in TAVR/TMVR therapies, the **crimp profile can be reduced**<sup>1</sup>. When constructing valve leaflets from this material, the compressed state volume fraction of the valve can be reduced by up to 60%, enough to fit in a 16F catheter or less, enabling the least invasive means to deliver a percutaneous valve without over-crimping and inducing structural changes to the leaflet that may have a negative clinical impact<sup>3</sup>.

At Collagen Solutions, the pericardium biomaterial is processed using unique harvesting procedures, tightly controlled quality inspections and preparation protocols, and widely accepted chemical fixation techniques<sup>4,5</sup>. These processes are designed to optimize mechanical properties of the material that subsequently help to reduce functional stresses associated with calcification<sup>1</sup>. Further evidence that the use of the neonatal pericardium biomaterial may **prevent calcification** has been demonstrated in a 30-day in vivo rat study using appropriate cross-linking methods (indicated as 'full treatment').



## Intellectual Property

Collagen Solutions has patent protection for the use of neonatal pericardium in medical applications in the United States and other geographies (US9095430B2<sup>1</sup>). Additional patent coverage is in Europe, Australia, and New Zealand (allowed claims vary by jurisdiction).

## Business Overview

Collagen Solutions has decades of experience providing animal-derived tissues for medical devices and developing novel collagen-based technologies, both internally and through collaboration with leading biomaterial scientists. We supply materials to numerous cardiovascular device manufacturers, including early stage and well-established companies.

## References

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3. Kiefer, P. et al. Crimping May Affect the Durability of Transcatheter Valves: An Experimental Analysis. The Annals of Thoracic Surgery 92, 155–160 (2011).
4. Kaye, H. R., Kirby, N., Hawley, A., Mudie, S. T. & Haverkamp, R. G. Collagen Fibril Strain, Recruitment and Orientation for Pericardium Under Tension and the Effect of Cross Links. RSC Adv. 5, 103703–103712 (2015).
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## Partnership Opportunity

Collagen Solutions is seeking commercial partners for the supply, exclusive licensing, or further technology development of this unique biomaterial.

To inquire about partnership opportunities, please contact:

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