Improved Fixation Method for Bioprosthetic Heart Valves (2007-012)

This method of fixation enhances shelf life and biomechanical integrity of implantable tissues

Market Overview

Bioprosthetic Heart Valves can replace defective or diseased heart valves, but a majority of these valves fail within a few years due to calcification and degeneration. Currently used methods of fixation, such as glutaraldehyde crosslinking, are not adequate to fix all extracellular matrix components, especially glycosaminoglycans (GAGs) present in the middle spongiosa layer. This technology presents methods for improving the structural and mechanical characteristics of implantable tissue as well as methods for increasing the lifespan of the implantable heart valve tissue.

Technical Summary

This technology features a novel improvement of bioprosthetic heart valves (BHVs). This technology is a new method for fixation of BHVs derived from porcine aortic valves. More specifically, these methods can include the bonding of one or more enzyme inhibitors in or on tissue in the course of a stabilization process. Through these methods, implantable tissue can be stabilized and can exhibit increased resistance to degradation, specifically, degradation due to enzyme activity following implantation of the tissues. These methods can lead to increased levels of beneficial extra cellular matrix components remaining in the stabilized implantable tissues as compared to previously known stabilized implantable tissues. Increased levels of such components can further improve the implantable tissues through improved mechanical characteristics and can also lead to a longer lifespan of a bioprosthesis.

Application

Used as a method of improving integrity of vascular implants and engineered tissues; Development of implantable graft materials

Development Stage

Pre-Clinical Validation; *In vitro data*; *In vivo data*

Advantages

- Improves the structural and mechanical characteristics of implantable tissue
- Increases the lifespan of the implantable tissue
- Increases resistance to degradation
- Increases levels of beneficial extra cellular matrix componenets remaining in the stabilized implantable tissues

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Issued Patent	USA	N/A	8,142,805	07-012	Narendra Vyavahare, Devanathan Raghavan

About the Inventors

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Dr. Naren Vyavahare earned his Ph.D. in Chemistry from the University of Pune, India. Prior to joining Clemson, Dr. Vyavahare served as a Research Assistant Professor at the University Of Pennsylvania School Of Medicine and the University of Michigan. He holds over 15 issued US and foreign patents and several more in patent pending status. His research interests focus on targeted treatments to restore extracellular matrix and tissue function in heart valves, aortic aneurysms, vascular calcification, COPD, and skin disorders.

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