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Elastin Targeted Drug Delivery for Treating Elastin Degenerative Diseases (2012-048)

Micro-sized Drug Carriers Target Damaged Elastin and Prevent further Degeneration

Market Overview

This targeted drug delivery approach uses micro-sized drug carriers with elastin antibodies that recognize, attach, and deliver compounds to prevent enzymatic degradation of elastin in diseased tissue. Enzymatic degradation of elastin tissue is the primary cause of chronic obstructive pulmonary disease (COPD) and abdominal aortic aneurysm (AAA). COPD is the third leading cause of death in the U.S. and there are over 3 million new cases of AAA each year. Currently, damaged elastin is managed via surgical procedures like endovascular surgery. While most procedures are minimally invasive, its lifespan has yet to be determined and does not directly improve the condition of elastic tissue at the damaged site. Clemson University researchers have developed drug carriers designed to target damaged elastin by a simple IV injection. The elastin antibody drug carriers bind to exposed elastin and deliver therapeutic compounds to preserve and regenerate elastin tissue.

Application

Treating COPD, cardiovascular aneurysms; elastin regeneration

Stage of Development

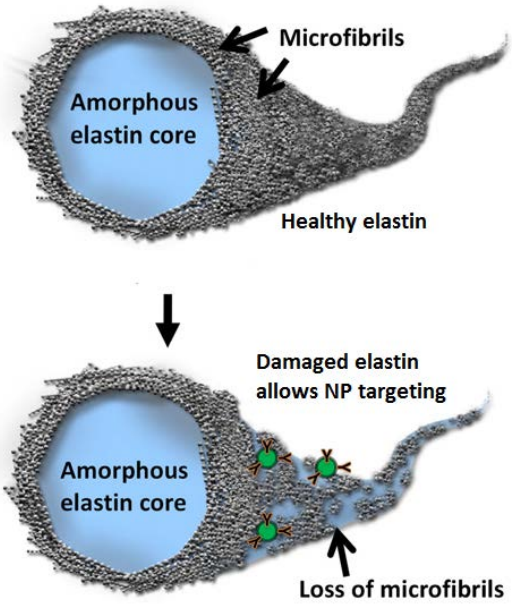
In vivo animal studies

Advantages

- Targets extracellular matrix proteins and not cellular proteins, boosting efficacy and minimizing systemic effects
- Inhibits or reverses progression of elastin degeneration, overcoming barriers of current treatments

Technical Summary

This approach utilizes drug-loaded nanoparticles coated with elastin antibodies to correct and prevent elastin degradation. These particles are coated with receptors that bind specifically to damaged or exposed elastin molecules, thus increasing the residence time of the particles inside the body and improving the drug efficacy at the degeneration site. The particles also release a polyphenol (PGG) that works to prevent degradation from occurring while also regenerating elastic tissue. These particles can be delivered intravenously, marking a significant advantage over surgical treatments. The approach demonstrates effectiveness in targeting in vivo in number of animal models of the diseases such as AAA, COPD, arteriosclerosis, and skin disorders.



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App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Utility	United States	13/929,140	NA	2012-048	Naren Vyavahare, Aditi Sinha

About the Inventor

Dr. Naren Vyavahare is a Hunter Endowed Chair and Professor in the Department of Bioengineering at Clemson University. He 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.

For More Information

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