Albumin Biomaterials for Use in Implants and Related Devices (08-067)

Albumin coating or bioplastic material for improved performance with enhanced biocompatibility

Market Overview

With ever-advancing implantation technologies, there arises a growing need for materials that are biocompatible and able to reduce the risk of biomaterial-centered infections (BCI). Such infections are a key limitation in the performance of various implants, and play a crucial role in the treatment of the ear condition known as otitis media with pressure equalization tubes. Myringotomy, the procedure used to treat otitis media, has an estimated BCI incidence rate of approximately 4.3% annually. The concern for biofilm formation on implanted devices also makes new materials that can mitigate these risks highly desirable. Clemson University researchers have developed a material, based on the serum albumins, that can be used as a component of a device body or as a coating for current devices. These materials have shown a reduction in bacterial adhesion in vivo, increasing antibacterial properties. Additionally, these coatings have been verified to not compromise the bone integration with implants.

Application

Orthopedic Devices/Medical Implants

Stage of Development

In vivo proof of concept demonstrated in animal model

Advantages

- Provides enhanced bacterial and biofilm resistance, allowing for a reduction in risk of infection.
- Delivers therapeutic agents to the site of implant, providing long-term protection
- Material does not compromise an implant's bone integration, making it ideal for coatings

Technical Summary

The albumin-based material developed by Clemson researchers allows for device bodies or protein-based coatings for devices to be fabricated. These devices are able to gain improved properties through the characteristics associated with the albumin protein family, specifically the serum albumins. Albumin's resistance towards bacterial adhesion provides these devices with improved antibacterial and anti-biofilm qualities. These albumin proteins also have the ability to bind physiologically vital agents such as cations, fatty acids, and hormones, and are capable of binding various pharmaceuticals. Therefore, this technology can be used in procedures that require the delivery of one or more therapeutic agents that will benefit the patient. Ideally, these albumin materials will allow reduction of material-based infections in various procedures, including those such as a myringotomy or the introduction of bone implants or artificial heart valves.

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App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Utility	United States	13/905,726	NA	08-067	Benjamin R. Whatley, Xuejun Wen, Igor Luzinov, Suraj Sharma

About the Inventor

Dr. Igor Luzinov is a Professor of Materials Science and Engineering at Clemson University. He earned is M.S. in Chemical Engineering and Technology and Ph.D. in Polymer Chemistry from Lviv Polytechnic National University in Ukraine. Before joining the faculty at Clemson, he served as a Postdoctoral Research Associate at Iowa State and Western Michigan University, a NATO Research Fellow at the Center Education and Research on Macromolecules, and a Senior Research Scientist at the Physical Chemistry Institute within the National Academy of Sciences of Ukraine. In his career, Dr. Luzinov has been named the 2015 Outstanding Researcher of the Year and has been involved in over 400 scientific publications. His current research focuses on nanofabrication of thin polymer films and the development of multi-component polymer systems and composites.

For More Information

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