Biomolecular Coating for Implants (#3967)

Biological protein ligands that recapitulate the structure of natural proteins and convey integrin receptor specificity

Georgia Tech inventors have engineered biological protein ligands that recapitulate the structure of natural proteins and convey integrin receptor specificity. Binding of specific integrin receptors triggers selective signaling pathways and elicits particular cellular and host responses. An important feature of these biomimetic ligands is that they can be applied as bioactive coatings on biomedical devices. These bioactive coatings elicit enhanced healing responses in vivo compared to the unmodified material. Notably, the biomimetic ligand coatings result in improved healing compared to the natural biological protein. Our study establishes a simple, single-step biologically active implant coating that enhances bone repair and implant integration for clinical orthopedic and dental applications.

Benefits/Advantages

- Simple, one-step surface modification without chemical cross-linking agents
- Modification at the time of surgery in the operation room
- Straight forward sterilization
- Ligands are not derived from mammalian sources
- Minimal risk of pathogen transmission

Potential Commercial Applications

- Biomedical and biotechnological applications
- Bone repair
- Orthopedic and dental applications
- Tissue healing

Background/Context for This Invention

Upon implantation, synthetic materials elicit an inflammatory response that results in a foreign body reaction and fibrous encapsulation. The foreign body reaction severely limits device integration and in viva performance of numerous biomedical devices, including chemical biosensors, electrical leads/electrodes, therapeutic delivery systems, and orthopaedic and cardiovascular prostheses. Extensive efforts have concentrated on surface treatments and coatings to improve host tissue-implant integration.

Dr. Andrés J. García
Executive Director - Georgia Tech, Parker H. Petit Institute for Bioengineering and Bioscience

Dr. David M. Collard
Professor and Associate Dean, College of Sciences

Dr. Abigail Wojtowicz
Graduate Research Assistant — Georgia Tech School of Mechanical Engineering

Jenny E. Raynor
Graduate Research Assistant — Georgia Tech School of Mechanical Engineering

Dr. Barbara Boyan
Professor — Georgia Tech School of Biomedical Engineering

More Information

U.S. Patent Issued - 8,114,431

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/biomolecular-coating-implants

Images: