Modular Peptide Binds to Biomaterials and Promotes New Bone Formation

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a modular peptide that binds to hydroxyapatite-based biomaterials and promotes new bone formation.

Overview

Musculoskeletal conditions cost an estimated $254 billion each year in the United States, and bone and joint diseases account for half of all chronic conditions in adults over the age of 50. Current clinical bone replacement strategies use synthetic materials to bridge gaps in bone tissue. Hydroxyapatite (HA) coatings have been shown to enhance bone bonding to implant materials. However, these coatings typically are unable to actively induce new bone formation.

Emerging approaches for bone repair and replacement therapies have focused on delivering growth factors to skeletal defects, as these biomolecules can induce the formation of bone. But a practical delivery method has not yet been developed for clinical orthopedic applications.

The Invention

UW–Madison researchers have developed a novel approach for linking growth factors to the surface of an HA-coated biomaterial. Their approach uses a modular peptide design with two functional units: a biologically active growth factor portion that can initiate osteogenesis, angiogenesis or osteogenic differentiation and a binding portion that improves the non-covalent binding of the peptide to “bone-like” HA-based biomaterials. These modular peptides can be used to coat, or “decorate,” biomaterials, providing an improved method of delivering growth factors to skeletal defects.

Applications

- Bone regeneration, including spine fusion, dental augmentation and non-union fracture healing
- Other clinical orthopedic applications

Key Benefits

- Improves delivery of growth factors that promote the formation of new bone
- Modular peptide binds to HA-coated material with high affinity.
- Spacer connects the two functional units and allows molecule to remain active while staying bound to the biomaterial.

Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

Additional Information

For More Information About the Inventors

- William Murphy
- Mark Markel
- Ben Graf

Related Intellectual Property

- View Divisional Patent in PDF format.

Publications

- Lee J.S., Lee J.S. and Murphy W.L. 2010. Modular Peptides Promote Human Mesenchymal Stem Cell Differentiation on Biomaterial Surfaces. Acta Biomater. 6, 21-28.
- Lee J.S., Lee J.S., Wagoner-Johnson A. and Murphy W.L. 2009. Modular Peptide Growth Factors for Substrate-Mediated Stem Cell Differentiation. Angew. Chem. Int. Ed. 48, 6266–6269.
- Lu Y., Markel M.D., Nemke B., Lee J.S., Graf B.K. and Murphy W.L. 2009. Influence of Hydroxyapatite-Coated and Growth Factor-Releasing Interference Screws on Tendon-Bone Healing in an Ovine Model. Arthroscopy 20, 1427-1434.

Tech Fields

- Medical Devices : Device coatings

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846