Biologically Active Sutures Enhance Tissue Healing Following Surgical Procedures

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing sutures and other common orthopedic materials that provide controlled delivery of biological substances for regenerative medicine.

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. Bone-tendon healing presents a particularly challenging problem that must be addressed in orthopedic procedures such as cruciate ligament reconstruction or repair of the rotator cuff, patellar tendon or avulsion injury. Recovery time can be six months or more, and scar formation, rather than the desired bone-tendon healing, occurs frequently. Soluble growth factors and other biological molecules may enhance bone-tendon healing, but a practical delivery method has not yet been developed for clinical orthopedic applications.

Sutures are used widely in orthopedic surgery and are a key component of virtually all bone-tendon healing applications in orthopedics. But the potential use of sutures as platforms to deliver therapeutic molecules, particularly proteins, has received little attention, even though their proximity to healing tissues and widespread use in surgical procedures suggests they could be an ideal vehicle to promote tissue healing.

THE INVENTION

UW-Madison researchers have developed a method of coating the surface of commonly used suture materials and other orthopedic devices with a biodegradable layer containing molecules that can induce tissue growth and limit bacterial infection. The rate at which the coating degrades can be modified to control the release of the molecules.

Specifically, a suture is coated with a mineral layer under physiological temperature and pH, resulting in a nano-porous structure with high surface area for protein binding. Then biologically active molecules are bound to the surface of the suture for subsequent release in vivo. Protein binding can be achieved rapidly in the operating room, and the process can be adapted to enable the incorporation of a wide range of other therapeutic...
molecules, in addition to proteins.

APPLICATIONS

• Provides enhanced sutures and other orthopedic materials for a wide range of surgeries in which tissue healing is non-optimal, including meniscal repair, rotator cuff repair and cruciate ligament reconstruction
• Delivers biological substances that can enhance healing

KEY BENEFITS

• Enhanced sutures can promote tissue healing.
• Density, location and release profile of the bioactive molecules can be tailored for specific applications by controlling the conditions during the binding step.
• Coating is suitable for tacks, screws, anchors, plates, pins and nails, in addition to sutures.

STAGE OF DEVELOPMENT

Controlled and sustained release of biologically active proteins from enhanced sutures has been demonstrated, with improvement in bone-tendon healing in clinically relevant animal models.

ADDITIONAL INFORMATION

Tech Fields
Medical Devices - Device coatings
Medical Devices - Orthopedics

CONTACT INFORMATION

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