



**THE UNIVERSITY of TEXAS**

**HEALTH SCIENCE CENTER AT HOUSTON**

Office of Technology Management

## **ANTIBIOTIC MICROSPHERES AND THEIR USE AGAINST INFECTION AND OSTEOMYELITIS**

**Market:** More than 750,000 people in the United States have knees, hips, or shoulders replaced surgically each year. The implants are sometimes prone to infection, resulting in repeat surgeries for repair, replacement, and sometimes even removal.

**Competitors and Current Problems:** Systemic applications of antibiotics for local infections can increase side effects, particularly when the infection is located in bone. Generating high serum levels to reach therapeutic levels in bone greatly increases risk of nephrotoxicity, ototoxicity, and gastrointestinal side effects. Use of bone cement, collagen sponges, and polymeric or calcium sulfate carriers in combination with antibiotics may result in non-linear, short-term delivery, and the substrate must be removed in order to not inhibit tissue regeneration or serve as a focal site for subsequent infection.

**The Technology:** University of Texas Health Science Center at Houston and Rice University scientists developed implantable, injectable, or otherwise internalizable time-release microspheres that deliver antibiotics in a near-linear fashion. Different formulations of PLGA microspheres with or without PEG were reproducibly made with Ancef, Tobramycin, Vancomycin, and Cefazolin, and entrapment efficiency measured at up to 61.8%. The in vitro elution rate was linear over the tested 28 day period, and in vivo drug release characteristics were profiled in a mouse muscle pouch model. The in vivo study showed no extreme inflammation response and consistent levels of antibiotic in surrounding tissue. Histology showed the microspheres remain at the site of implantation and do not inhibit tissue regeneration. Rabbit studies showed the effectiveness of antibiotic microspheres in eradicating an established case of osteomyelitis. Minimum inhibitory and bactericidal concentrations were determined. The microspheres can be used not only therapeutically for existing infections, but also preventatively in surgeries, particularly applications with orthopedic implants, cardiovascular stents, grafts, hernia repair, gynecological and neurosurgical procedures, etc.

### **Publications:**

Clin Orthop Relat Res. 2003 Oct;(415):279-85

Clin Orthop Relat Res. 2004 Apr;(421):293-9

### **NON-CONFIDENTIAL TECHNOLOGY DESCRIPTION**

The preceding is intended to be a non-confidential summary of a novel technology created at the University of Texas Health Science center at Houston (UTHSCH), for which the University is pursuing patent protection.

**UTHSCH Ref. No.** 2004-0044

**Inventors:** Dr. Clyburn

**Patent Status:** pending US and non-US applications

**License Available:** world-wide non-exclusive, orthopedic field of use

To obtain further information about this technology, please contact:  
Office of Technology Management, 7000 Fannin, Suite 720, Houston, TX, 77030  
Phone: (713) 500-3369 Fax: (713) 500-0331  
Email: uthsch-otm@uth.tmc.edu