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Evaluation of polycaprolactone encapsulated Vancomycin for controlled drug delivery from a bone void filling putty

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The advent of Total Joint Replacements (TJR), specifically total hip and total knee replacements has significantly relieved pain and improved quality of life for over a 50000 Americans per year; however, up to 10% of implants will prove clinically unsuccessful in restoring function and quality of life, requiring a revision procedure to remove the original device and infected bone, replace components and restore lost bone. Although only 1-3% of these initial failures can be attributed to periprosthetic joint infections (PJI), chronic PJI accounts for recurrence rates at revision that skyrocket to a staggering 15-20%. Unfortunately, clinical treatment strategies rely on systemic antibiotic delivery to bone, which is hampered by physiology. Alternatively, implanted local delivery systems such as Antibioitc Eluting Bone Cement provide inadequate pharmacokinetics that inadvertently promotes the development of antibiotic resistant bacteria populations. Thus, chronic PJI and the advent of antibiotic resistance could be better addressed by integrating and exploiting local, extended duration antimicrobial delivery directly from malleable osteoconductive bone void filling (BVF) materials. Under these parameters, a resorbable, antibiotic eluting bone void filling putty has been developed and various polymer formulations have been evaluated. By incorporating vancomycin encapsulated in biocompatible and biodegradable PLGA nanoparticles, the duration of effective local vancomycin concentrations released from a patented bone void filling putty can be extended with the duration of drug release dependent on the ratio of PLA to PGA subunits.

Biography

Amanda E Brooks has completed her PhD in 2006 from the University of Wyoming and Post-doctoral studies at the University of California San Diego and the University of Utah. She is currently an Assistant Professor in Pharmaceutical Sciences at North Dakota State University. She has published more than 35 peer reviewed papers and routinely serves as an ad hoc reviewer for a variety of journal and granting agencies.

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