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Antibiotic release from implant surfaces using immobilized PLGA microspheres

Dongwei Wang, Ke Duan and **Jie Weng**
Southwest Jiaotong University, China

Postoperative infections are a serious complications in the clinical applications of bone implants. Antibiotic release from the implant surfaces is a promising approach to address this problem. However, a general technique suitable for the incoproration and controlled release of various antibiotics from various implants has not been developed. Here, we report a versatile method for loading and releasing a variety of antibiotics from bone implants. Polylactide-co-glycolide (PLGA) microspheres containing triclosan (an oil-soluble antibiotic) or gentamicin (a water-soluble antibiotic) were separately synthesized by solvent evaporation method. The microspheres were surface-immobilized on Polymethylmethacrylate (PMMA) discs by suspension in water, pipetting on the discs, and vacuum drying. Scanning electron microscopy and total organic content analysis showed that, ~85% of the microspheres remained attached to the disc surfaces even after immersion in phosphate buffered saline for 12 d. Triclosan-loaded PLGA microspheres gave a slow sustained *in vitro* release, while gentamicin-loaded PLGA microspheres showed initial burst release and a subsequent slow release. After co-culture with *E. coli* or *S. aureus* for 24 h, discs carrying triclosan or gentamicin-loaded PLGA microspheres produced clear inhibition zones, indicating antibacterial activities. This simple method can be applied to a variety of drugs, substrates, and microspheric materials. For example, ciprofloxacin-loaded PLGA microspheres were also successfully immobilized on hydroxyapatite-coated titanium surfaces by this method, and *in vitro* bacterial culture tests confimred that the resulting samples had antibacterial properties.

Biography

Dongwei Wang is a PhD student at School of Materials Science and Engineering, Southwest Jiaotong University, China. Her main interests include porous bone implants, drug delivery systems and surface modification.

wdw_swjtu@163.com

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