

Bone Tissue Concentrations of Ciprofloxacin Released from Polylactide-Polyglycolide 80/20 Screws Implanted in Rabbits' Cranial Bone.

Johanna Tiainen¹, MD, Minna Veiranto², MSc(Eng), Jyri Koort³, Esa Suokas⁴, Dr. Tech., Pertti Törmälä², MD, PhD, Sci.h.c., Timo Waris¹, MD, PhD, Outi Kaarela¹, MD, PhD, Nureddin Ashammakhi^{1,2} MD, PhD, FRCSEd

1. Department of Surgery, Oulu University Hospital, Oulu, Finland.
2. Institute of Biomaterials, Tampere University of Technology, Tampere, Finland.
3. Orthopedic Research Unit, University of Turku, Turku, Finland.
4. Linvatec Biomaterials Ltd., Tampere, Finland.

The aim of this study was to assess tissue concentrations of ciprofloxacin released from bioabsorbable self-reinforced polylactide/polyglycolide (SR-PLGA) 80/20 miniscrews in rabbits' cranial bone. Two screws were implanted in each rabbit, one screw on either side of the sagittal suture (n=24 rabbits). Animals were sacrificed after 2, 4, 8, 16, 24 and 52 weeks, four animals per group. From each rabbit two blocks of bone, each containing one screw were retrieved. One block was used to assess tissue drug concentration. The other block was used for histological examination of which results are reported elsewhere. The release level of ciprofloxacin was moderate in the first two weeks (4390 ± 4180 ng/g). After 4 weeks the release level started to rise (14100 ± 2706 ng/g) and stayed in top levels up to 8 weeks (mean 7590 ± 4554 ng/g). From 16 weeks (91 ± 39 ng/g) to 24 weeks (mean 40 ± 16 ng/g) release levels were very low, but climbed up to moderate levels after 52 weeks (1270 ± 1037 ng/g). Ciprofloxacin-releasing SR-PLGA 80/20 screws released gradually the loaded ciprofloxacin. They could be used clinically for prophylaxis or treatment of bone infection as well as osteofixation in craniomaxillofacial surgery in nonload-bearing or light load-bearing applications.

Keywords: ciprofloxacin, cranial bone, SR-PLGA, tissue reaction