

## **Tissue Reactions to Multifunctional Bioabsorbable Ciprofloxacin-Releasing Polylactide-Polyglycolide 80/20 Screws in Rabbit Cranial Bone**

Johanna Tiainen<sup>1</sup>, Ylermi Soini<sup>2</sup>, Esa Suokas<sup>3</sup>, Minna Veiranto<sup>4</sup>, Pertti Törmälä<sup>4</sup>,  
Timo Waris<sup>1</sup>, Nureddin Ashammakhi<sup>1,4</sup>

1. Department of Surgery, Oulu University Hospital, Oulu, Finland.
2. Department of Pathology, Oulu University Hospital, Oulu, Finland.
3. Linvatec Biomaterials Ltd., Tampere, Finland.
4. Institute of Biomaterials, Tampere University of Technology, Tampere, Finland.

The aim of this study was to assess tissue reactions to bioabsorbable self-reinforced ciprofloxacin-releasing polylactide/polyglycolide (SR-PLGA) 80/20 miniscrews in rabbit cranial bone. Two screws were implanted per rabbit, one screw on either side of the sagittal suture (n = 20 rabbits). Animals were sacrificed after 2, 4, 8, 16 and 24 weeks, four animals per group. On histological examination the numbers of macrophages, giant cells, active osteoblasts and fibrous tissue layers were assessed and degradation of the screws was evaluated. At 2 weeks, the highest numbers of giant cells were seen near the heads of the screws. After 4 and 8 weeks, the number of giant cells had decreased but that of macrophages decreased from 16 weeks on. Screws were surrounded by fibrous tissue capsules that progressively grew in thickness over time. Active osteoblasts were seen around the shafts of the screws, with the highest number seen 4 weeks postoperatively. At 16 weeks, compact fragmentation of the screw heads was seen, with macrophages inside the screw matrices. After 24 weeks, no polarizing biomaterial was seen. Ciprofloxacin-releasing SR-PLGA 80/20 screws elicited a mild inflammatory reaction but did not interfere with osteoblast activity. No complications were seen.

### **Keywords**

Ciprofloxacin, cranial bone, SR-PLGA, tissue reaction

### **Acknowledgements**

Research funds from the Technology Development Center in Finland (TEKES, Biowaffle Project 40274/03 and MFM Project 424/31/04), the European Commission (Projects BMH4-98-3892, QLRT-2000-00487, EU Spare Parts Project QLK6-CT-2000-00487), the Academy of Finland (Projects 37726 and 73948) and the Ministry of Education (Graduate School of Biomaterials and Tissue Engineering) are greatly appreciated.