Healing of Cranial Bone Defects with Guided Bone Regeneration

Anna-Liisa Vesala[1], Matti Kallioinen[2], Pertti Törmälä[3], Minna Kellomäki[3], Timo Waris[1], Nureddin Ashammakhi[1,3]

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

The aim was to evaluate the use of self-reinforced poly-L,D-lactide 96/4 (SR-PLA96) sheets for cranial bone tissue engineering in experimental defects in rabbits. Square defects of 10 x 10 mm were created in the right parietal bone. SR-PLA96 implants (15x15 mm) were used to cover these defects in 12 New Zealand White rabbits. Similar defects were created in the left parietal bone, but no sheets were used (controls). The rabbits were killed after 6, 24, or 48 weeks. Histology and histomorphometry were used to evaluate healing of the defects. Defects covered with SR-PLA96 sheets showed more abundant bone formation than control (non-covered) defects. At 6 weeks, the defects were occupied mainly by fibrous tissue. At 24 weeks, healing with bone formation was more obvious in the covered defects. At 48 weeks, bone completely bridged defects covered with SR-PLA96 sheets, and incomplete bridging was seen in non-covered control defects. Hence, bone tissue engineering in experimental cranial bone defects in rabbits can be achieved using SR-PLA96 sheets to guide bone regeneration.

Key Words
Bioabsorbable, guided bone regeneration, polylactide, tissue engineering

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