7. Summary

Histological evaluation of a biodegradable implant for spondylodesis in the cervical spine
(an experimental study in a sheep model)

The autologous tricortical iliac crest bone graft has been used as golden standard for the
anterior decompression of the cervical spinal canal with the following fusion of the vertebral
segment. But among other things the usage of this transplant is associated with a relevant
removal morbidity. Other interponats, like metallic cages present several disadvantages as
well. For instance they cause artefacts during CT and MRI examination and the side effects of
the materials are unknown so far. In this regard bioresorbable cages would offer potential
benefits. Because of their complete degradation, long term effects could be extensively
excluded.

Therefore the goal of this in vivo study was to analyse the spondylodesis of the cervical
vertebrae C 3 and C 4 using a 70/30-poly-(L, DL)-lactide-cage compared to the spondylodesis
with the autologous tricortical iliac crest bone graft. For this purpose 32 sheep underwent
discectomy of C 3 / C 4 and the cage device (groups I, III: n = 8) respectively the bone graft
(groups II, IV: n = 8) were implanted and stabilized with a ventral plate. Euthanasia of the
animals of group I and II occurred after twelve weeks and of group II and IV after 36 weeks.
A semi quantitative histomorphological and histomorphometrical evaluation of the vertebral
segment followed.

This study in the sheep revealed, that the tested 70/30-poly-(L, DL)-lactide-cage is in this
composition not suitable for the spondylodesis of the cervical spine. The implant caused grade
III osteolysis up to five mm and severe foreign body reactions. In addition to this it was not
possible to prove a bony bridging between the vertebral bodies. The cage was not capable to
maintain the position in the intervertebral space. In contrast it migrated towards ventral. After
twelve weeks the device showed already a high deformation and bone formation lacked. In
conclusion it can be stated that the 70/30-poly-(L, DL)-lactide-cage should not be used
clinically as intervertebral implant for spondylodesis in the cervical spine.