Summary

The aim of this animal study is to compare the osteoinductive substance OP-1 (BMP-7) and the osteokonduktive bone-substitute Bio-Oss with autologeous graft concerning their biomechanical stability in intercorporal spinal fusion. Furtheron the study intends to show that sheep is the best animal model for spinal surgery.

Thirty female, adult Merino-Mix sheep are used divided into three groups with ten sheep each. All animals undergo lumbar intercorporal spondylodesis (AILS) by the use of dorsal, monosegmental transpedicular instrumentation. The intervertebral disc is removed via a lateral-dorsal approach and the vertebral end-plates are decorticated. Later the defect is filled with autograft in group S while in groupe B the defect is filled with Bio-Oss and in group O with OP-1.

During the following study period of twenty four weeks the sheep have a continuous clinical follow up and are monitored radiologically and by scintigraphic imaging in set intervalls, whereafter all animals are killed and dissected. The lumbar spine after removal of the hardware is examined macroscopicly, by the means of CT and MRI as well as histologically. The ope-rated motion segment is tested biomecanically in a non-destructive and monocyclic way, which is the main purpose of this part of the study.

Biomechanically testing shows significant increase in stability in the fused segment when being compared to the neigbour segments. This increase however is the lowest in group B. In a paired group analysis it is shown that stiffness of the fused segment is significantly higher in group S and O when being compared to group B concerning the load-directions rotation and flexion. There is no significant difference between groups O and s. It is proven that OP-1 has the ability to reach an comparable result in the intercorporal fusion when being compared to the "goldstandard" autologous graft. However Bio-Oss reaches a much lesser biomechanic stability.

It is also shown that sheep are the best animal model for spinal surgery due to good application of hardware developed for surgery on human kind, as well as simple handling of the animal itself and the applicability of sheep spine for later biomechanical testing.