# Structural endplate changes in early experimental intervertebral disc degeneration evaluated by µCT.

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**INTRODUCTION** Intervertebral disc degeneration (IDD) is a multifactorial chronic disease with changes in disc structure, function, cell and matrix composition. IDD is the most common cause of low back pain. In IDD there is sclerosis of the endplates with decreased perfusion and diffusion of nutrients into the avascular intervertebral disc space.

**MATERIAL AND METHODS** 10 Göttingen minipigs were included. IDD was induced. Levels were randomized to degenerative controls and autologous stem cell transplantation 12 weeks post-operatively. µCT (Scanco µCT40) of the vertebral endplates performed 18 weeks after stem cell transplantation. Resolution was 18 µm isotropic. 3D reconstruction was performed and evaluated with regard to surface smoothness and margin irregularity. Analysis of perfusion weighted MRI is currently being performed and correlated µCT data.

**RESULTS** Only two motion segments with severe degeneration revealed surface roughness and margin irregularities. All endplates had a solid bony endplate without any vascular penetrations into the disc. There was a trend towards an increased trabecular to bone volume ratio (TV/BV) in degenerative control levels compared to levels with stem cell transplantation ($0.245\pm0.058$ vs. $0.221\pm0.050$, $p=0.0624$). There was a significant increase in trabecular thickness in degenerative controls compared to stem cell transplantation levels ($0.132\pm0.018$ vs. $0.123\pm0.020$, $p=0.0348$). No other significant differences were found between normal control, degenerative control and stem cell transplantation levels.

**CONCLUSION** Structural changes in the vertebral endplate were found in degenerative discs eventhough degenerative changes on MRI were mild to moderate. It seems that stem cell transplantation can stop/reverse these changes. Perfusion of endplates will be calculated and correlated to µCT data.