At present, metallic implants are the most commonly applied treatment options in angioplastic interventions. To overcome their disadvantages (for example permanent physical irritation, the inability of adaptation to growth or the formation of artefacts with modern imaging technologies) an absorbable metal stent (AMS) was developed by our group in cooperation with the Biotronik GmbH. 

For the fabrication of the AMS an alloy was chosen which consists of magnesium with additives of Yttrium and rare earth elements. This alloy showed in in vitro studies a 20% reduction of viability and an 80% reduction of proliferation of primary smooth muscle cells in comparison to untreated cells. It turned out that all components of the alloy contributed to the antiproliferative effect. The proliferation and viability of primary endothelial cells was not affected.

Angiography revealed an increased minimal luminal diameter (MLD) for AMS 28 and 56 days after implantation in Göttingen Minipigs compared to stainless steal stents (316 L). Also a decreased neointimal formation could be measured at both time points. The degradation of the stent could be monitored ex vivo by µCT studies. The first signs of AMS degradation could be seen 4 to 10 days after the endothelialisation of the stent was completed. Vast corrosion and a dissolved structure were monitored after 56 days. The stent endothelialisation was not inhibited by the AMS.

Immunhistological stainings of 10 coronary arteries with AMS and 5 with 316L stents were performed four and eight weeks after implantation in Göttingen Minipigs, respectively. Four weeks after implantation the average amount of proliferating cells (Ki-67 positive) was increased compared to eight weeks as expected. Whereas four weeks after implantation in average more Ki-67 positive cells could be detected in 316L stented arteries compared to arteries with AMS, the situation was the reverse after eight weeks. The mean number of early inflammatory macrophages did not show any differences in arteries with AMS and 316L stents four weeks after implantation. By contrast, after 8 weeks the number of early macrophages was increased in 316L stented arteries compared to AMS. No differences could be detected with regard to the staining of smooth muscle cells.

Further immunhistological studies of the four weeks explants revealed no major differences between the two stents, only the amount of nitrotyrosine (as a marker of NO derived oxidants) positive cells was increased in arteries with AMS in comparison to 316L stents. Differences concerning location and amount of T-Cells, CD163 (intermediate and late state inflammatory macrophages) or rhomboid smooth muscle cells (S100A) could not be found.

Our results demonstrate the safety of the AMS regarding degradation and biocompatibility. The discrepancy between the reduced restenosis rates measured in vivo using the AMS eight weeks after implantation and a higher number of proliferating cells detected by immunohistological staining at the same time point will be clarified in further experiments.

**Keywords:** biocompatibility; absorbable stent; cardiovascular