Skeletal Muscle Fibrosis: The Effect of SDF-1α-loaded Collagen Scaffolds
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Introduction
Satellite cells emerge in the late stages of skeletal muscle development and are key cells for post-natal muscle growth and regeneration (1). After injury, satellite cells are activated, proliferate, and fuse to each other or to damaged myofibers (2). However, the healing of large muscle wounds is often accompanied by fibrosis, which prevents full functional recovery of the tissue (3). The aim of this study was to develop a model for muscle fibrosis. Furthermore, in a first attempt to prevent fibrosis, a collagen scaffold with SDF-1α was implanted into the muscle defect.

Materials and Methods
Ø 2 mm full-thickness defects were made in the M. soleus of the rat. The rats were divided into two groups: A) without a scaffold (W), and B) with a collagen scaffold+ SDF-1α (W+SDF-1α). At 3, 10, 28, and 56 days post-surgery, the muscles were analyzed for collagen, and (activated) satellite cells. Differences in collagen inside the wounds, and Pax7⁺ and MyoD⁺ activated satellite cells in the regenerative zone around it were tested for significance using a One-Way and/or Two-Way ANOVA followed by the Holm-Sidak method.

Results
In both the W- and W+SDF-1α-groups, the area percentage of collagen (fig. 1A) is significantly increased to approximately 50%, which persists up to 56 days. In the regenerative zone around the wound, the numbers of Pax7⁺- and MyoD⁺- activated satellite cells in the regenerative zone around it were tested for significance using a One-Way and/or Two-Way ANOVA followed by the Holm-Sidak method.

Discussion and Conclusions
In this study we provide a model for muscle fibrosis, which can be used to test therapeutic interventions to improve muscle regeneration. Fibrosis was observed up to 56 days after wounding. Implanting a SDF-1α-loaded collagen scaffold induced an influx of (activated) satellite cells into the regenerative zone around the wound, and accelerated muscle regeneration. However, this did not prevent the deposition of collagen within the wound. Functional testing of the muscle will be included in future studies.

References

Disclosures
The author have nothing to disclose.