



### **BMSCs transplantation aggravate inflammation, oxidative stress, fibrosis and impair skeletal muscle regeneration**

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**Objective** Skeletal muscle contusion is one of the most common muscle injury in sports medicine and traumatology. Bone marrow mesenchymal stem cells (BMSCs) transplantation is a promising strategy for muscle regeneration. However, the roles of BMSCs, especially the mechanisms involved, in the regeneration of contused skeletal muscle are still not fully recognized. The aim of the study is to evaluate the potential of BMSCs transplantation for muscle regeneration and mechanisms involved after contusion.

**Methods** Ninety-nine C57BL/6J mice were divided into three groups: control group (n=11), muscle contusion and BMSCs treated group (n=44), muscle contusion and sham treated group (n=44). BMSCs were immediately transplanted into gastrocnemius muscles (GMs) following direct contusion. At different time points (3, 6, 12 and 24 days) post-injury, the animals were killed and then GMs were harvested. Morphological and gene expression analyses were used to evaluate the effect of BMSCs transplantation and mechanisms involved.

**Results** The results indicate that BMSCs transplantation impairs muscle regeneration, as well as more fibrotic scar formation after skeletal muscle contusion. Furthermore, macrophages, inflammatory cytokines, chemokines, matrix metalloproteinases and oxidative stress related enzymes were significantly increased after BMSCs transplantation. These results suggest that BMSCs transplantation impairs skeletal muscle regeneration and that macrophages, inflammatory cytokines, chemokines, matrix metalloproteinases and oxidative stress related enzymes may be involved in the process.

**Conclusions** BMSCs transplantation aggravates inflammation, oxidative stress and fibrosis, and impairs skeletal muscle regeneration, which shed new light on the role of BMSCs in regenerative medicine and cautions the application of BMSCs for muscle injury.