**Biofunctional Synthetic Matrix for Muscle Stem Cell Delivery**

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Muscle satellite cells (MuSCs) play a central role in muscle regeneration, but their quantity and function decline with comorbidity of trauma, aging, and muscle diseases. Although transplantation of MuSCs in traumatically injured muscle in the comorbid context of aging or pathology is a strategy to boost muscle regeneration, an effective cell delivery strategy in such contexts has not been developed. We engineered a synthetic hydrogel-based matrix with optimal mechanical, cell-adhesive, and protease-degradable properties that promotes MuSC survival, proliferation, and differentiation. Furthermore, we establish a biomaterial-mediated cell delivery strategy for treating muscle trauma, where intramuscular injections may not be applicable. Delivery of MuSCs in the engineered matrix significantly improved *in vivo* cell survival, proliferation, and engraftment in non-irradiated and immunocompetent muscles of aged and dystrophic mice compared to collagen gels and cells-only controls. This platform may be suitable for treating craniofacial and limb muscle trauma, as well as post-operative wounds of elderly and dystrophic patients.

**References**

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