

Tenogenic Differentiation Potential of Adipose-Derived Mesenchymal Stem Cells

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Mesenchymal stem cells (MSCs) have potential applications in regenerative medicine and tissue engineering and may represent an attractive option for tendon repair and regeneration. Additionally, adipose tissue yields a high number of Adipose-derived Mesenchymal Stem Cells (AMSC) per volume of tissue. Tendinitis and degenerative diseases of flexor tendons are common and debilitating musculoskeletal conditions in equine athletes. In horses with tendinitis, peptide, cell, or small-molecule therapies are used in attempts to decrease the high incidence of recurrence and bolster the limited intrinsic tendon repair capacity. Tendon healing is generally slow and involves a wide range of molecules in a complex but regulated mechanism. Exogenous agents that positively influence any of these phases may be of major therapeutic value in tendon repair. To promote and support tendon healing, one viable strategy is the use or administration of growth factors at the wound/rupture site. Platelet-enriched plasma concentrates have also emerged as useful agents, supplying an array of growth factors including PDGF, IGF-I, TGF- β 1, and, in smaller amounts, EGF, VEGF, hepatocyte growth factor, and basic fibroblastic growth factor. Despite the interest in PDGF as a therapeutic option for tendon healing, there is little compelling evidence to confirm that PDGF induces cell proliferation and matrix production in tendon samples. Growth factors (GFs) such as EGF, FGF, PDGF and TGF- β participate in tendon formation, ECM synthesis or healing, and may assist tenogenic differentiation. Experiments were performed with and without growth factors (IGF-1, TGF- β 1, IGF-1/TGF- β 1, PDGF-BB, and BMP-12), in co-cultures of tenocytes and MSCs mixed in different ratios and by culturing MSCs with spent media obtained from primary tenocytes. This review aims to summarize the strategies currently used for differentiation of MSCs to tenocytes as well as their advantages and limitations, and factors affecting tenogenic differentiation were summarized.

Keywords: Adipose-Derived Mesenchymal Stem Cells, Tendon, Growth Factor, Tenogenic Differentiation