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Myogenic Differentiation of Adipose-Derived Stem Cells for Tissue Engineering

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Volumetric muscle loss (VML) is characterized by muscle injury where the tissue is not able to regenerate naturally. This can occur from combat injuries, traumatic injuries such as car wrecks, surgical procedures such as tumor removal, or abnormal muscle conditions such as muscular dystrophies. There are currently no treatment options for de novo muscle regeneration or function for patients suffering from VML. Multipotent stem cells, such as human adipose stem cells (hASCs), offer the most promise in cell-based regenerative therapies due to their self-renewing capabilities, their ability to differentiate into cells found in mesoderm tissues and the ease with which they can be harvested from patients. hASCs have the potential to differentiate towards a myogenic lineage, however, there is currently no differentiation media that can yield more than 15% myogenic success. Here we focus on optimizing a myogenic differentiation media recipes for hASCs. Initially, two myogenic medias were investigated for their differentiation potential at 2, 4, and 6 weeks of hASC culture. Reverse transcription polymerase chain reaction (RT-PCR) was utilized to determine if common myogenic markers, *desmin*, *myf5*, *myf6*, *myogenin*, *mhc*, and *myod* were expressed in hASCs after exposure to these medias. Immunofluorescence using the antimyosin antibody was also used to qualitatively evaluate differentiation. From these assays we identified a media recipe that reproducibly induces myogenic differentiation and we are currently testing different culture environments to continue working towards the creation of functional muscle tissue for clinical applications