Genetic Determination of in vitro Stem Cell Characteristics

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Stem cell research is opening doors to solving medical complications in amazing and novel ways. Regenerative medicine, one of its principal applications, is responsible for having already saved thousands of lives in early clinical trials. The field of stem cell research is young, but it shows astounding promise. The stem cells under investigation in this study are adipose derived stem/stromal cells (ADSC), a type of stem/stromal cell that can be extracted from adipose tissue and induced to differentiate into multiple cell types. Historically, stem cells have been most commonly derived from bone marrow, but ADSC demonstrate several practical advantages to the more traditional stem cells of the bone marrow. One such advantage is that, in most cases, adipose tissue is very easy to access and extract from the human body. Moreover, thousands of pounds of adipose tissue go to waste each year as the castoff of liposuction and other such procedures. (Gimble, Katz, & Bunnell, 2007). The purpose of this study was to identify correlations between five phenotypes of interest involving ADSC. The second goal of this study is to identify genetic loci that play a role in determining ADSC proliferative capacity and viability in response to oxidative stress in vitro and once transplanted into a patient. The correlative analysis of the phenotypes suggests that fat mass, ADSC proliferative capacity, and ADSC stress resistance are correlated and thus might share distinct regulatory genetic loci. Identification of said genetic loci is complete and a list of underlying genes has been compiled. The goal is to implement genes from this gene list in order to better stem cell viability and proliferative capacity.

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