

39

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Dedifferentiated fat cells: A cell source for regenerative medicine

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Abstract

The identification of an ideal cell source for tissue regeneration remains a challenge in the stem cell field. The ability of progeny cells to differentiate into other cell types is important for the processes of tissue reconstruction and tissue engineering and has clinical, biochemical or molecular implications. The adaptation of stem cells from adipose tissue for use in regenerative medicine has created a new role for adipocytes. Mature adipocytes can easily be isolated from adipose cell suspensions and allowed to dedifferentiate into lipid-free multipotent cells, referred to as dedifferentiated fat (DFAT) cells. Compared to other adult stem cells, the DFAT cells have unique advantages in their abundance, ease of isolation and homogeneity. Under proper condition *in vitro* and *in vivo*, the DFAT cells have exhibited adipogenic, osteogenic, chondrogenic, cardiomyogenic, angiogenic, myogenic, and neurogenic potentials. In this review, we first discuss the phenomena of dedifferentiation and transdifferentiation of cells, and then dedifferentiation of adipocytes in particular. Understanding the dedifferentiation process itself may contribute to our knowledge of normal growth processes, as well as mechanisms of disease. Second, we highlight new developments in DFAT cell culture and summarize the current understanding of DFAT cell properties. The unique features of DFAT cells are promising for clinical applications such as tissue

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