Discussion

The Possibility of Undifferentiated Human Thigh Adipose Stem Cells Differentiating into Functional Hepatocytes

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Stem cells are capable of self-renewal and multipotent differentiation into cells that comprise the various organs of the human body beginning in the embryonic period. Stem cells also play a critical role in regeneration of organ or tissue functions throughout the lifetime. Basically, there are two types of stem cells: one is embryonic stem cells derived from blastocytes, and the other is adult stem cells obtained from fully developed adult tissue or placenta. Embryonic stem cells proliferate easily due to excellent self-renewal potency in their undifferentiated state. However, doing so raises ethical questions. Therefore, research on adult stem cells is actively in progress for a new approach to treating as yet unconquered diseases.

Marrow stem cells as a representative of adult stem cells have been used in studies of differentiation into various tissues [1,2]. However, harvesting bone marrow is painful to patients and requires multiple samplings to obtain sufficient amounts for clinical use. Therefore, many researchers have begun to seek alternative sources of stem cells. Zuk et al. [3] reported multilineage cells in the extract of adipose tissue that they assumed to be stem cells, and the researchers named them "processed lipoaspirate." Recently, these cells have come to be called adipose tissue-derived stromal cells or adipose tissue-derived stem cells [4,5]. These cells can be extracted and separated from adipose tissue, show stable growth and proliferation in a culture environment, and are able to differentiate to various cells like marrow stem cells [6].

Unlike most of studies of adipose tissue-derived stem cells, which have used abdominal fat, the authors used fat from the thigh and differentiated it to morphologically hepatocyte-like cells that showed albumin production and glycogen storage ability, which are distinct characteristics of functional hepatocytes. This finding may provide a foundation for a new method of treatment of hepatic failure.

Recently, differentiation of mesenchymal stem cells has been reported to differ according to its source tissue or the age of the donor [7]. However, the idea that the location of the fat harvest, sex, or age of the donor can influence differentiation characteristics is not yet supported by reliable data. In the authors' paper, human thigh adipose stem cells were able to differentiate into hepatocytes like abdominal adipose tissue-derived stem cells or bone marrow stem cells, but understanding the clear distinction of hepatic differentiation between human thigh adipose stem cells and abdominal adipose tissue-derived stem cells or bone marrow stem cells, and direct human application of these adipose tissue-derived hepatic lineage cells requires further investigation.

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No potential conflict of interest relevant to this article was reported.

Received: 30 Oct 2012 • Revised: 31 Oct 2012 • Accepted: 1 Nov 2012
pISSN: 2234-6163 • eISSN: 2234-6171
http://dx.doi.org/10.5999/aps.2012.39.6.600 • Arch Plast Surg 2012;39:600

