Commentary

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An Overview of Adipose Derived Stromal Cells

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Description

The use of mesenchymal stromal cells (MSCs) in the clinical setting is limited by the difficulty and low efficacy of separating MSCs from the bone marrow. Therefore, various sources of MSC have been extensively investigated. Adipose stromal cells (ASC), a cell line similar to MSCs, have been identified as a promising source. ASCs are becoming increasingly popular in many areas because they can be conveniently removed from adipose tissue.

More than 30 years have passed since adipose tissue (TA) was recognized as the central modulator that orchestrated a sophisticated process called "immune metabolism." Despite its unique role in the regulation of immune and endocrine homeostasis, recent studies have shown that AT also contains significant numbers of hematopoietic stem/progenitor cells (HSPC) that can settle throughout the life.

Adipose tissue (AT) contains Adipose stromal cells (ASC) and hematopoietic stem cells (HSC), both types of cells help provide immune and hematopoietic function to this abundant tissue. Indeed, ASCs, which are believed to be the counterparts of bone marrow mesenchymal stem cells (BMMSCs), support hematopoiesis both *in vitro* and *in vivo*, although with specificities compared to BMMSCs. HSCs located within the AT exhibit specific hematopoietic activity that leads to the formation of myeloid cells that control AT homeostasis. In addition, the ability of ASCs and ATHSC-derived immune cells to leave AT and migrate to injured tissues supports a critical role of these cells in the repair process and converts AT into a physiological reservoir of therapeutic cells.

Hematopoiesis occurs primarily in the bone marrow (BM) of adult and human mice, making the micro environment essential for the maintenance of hematopoietic stem cells (HSCs). Mesenchymal stromal cells (MSCs) have been identified as essential components of the HSC niche.

General properties of adipose derived stromal cells

The isolation procedure and cytological characterization of adult human adipocyte precursors from adipose tissue were investigated in the early 1970s. These cells were collected from various anatomical locations, such as superficial abdominal areas, arm and inguinal and trochanteric areas. Cells isolated from adipose tissue in various studies have been given several similar names, such as: To address this discrepancy, International Fat Applied Technology Society reached a consensus that any stable, plastic-adherent cell population Multipotent, duplicating, and lipoaspirate-derived may be referred to as adipose-derived stromal cells (ASC). ASCs have been characterized as a type of adult stem cell due to their pluripotent but limited ability to differentiate. In general, culture-expanded ASCs are positive for markers such as CD13, CD29, CD44, CD90, and CD105, while they lack hematopoietic-related markers such as CD14, CD19, CD45, CD106, and HLADR. Furthermore, ASCs have the potential to secrete cytokines and chemokines. ASCs can give rise to offspring in the shape of several lines, including adipocytes, osteoblasts, and chondrocytes.

Safety issues of ADSc cells

Cardiovascular disease (CVD) is one among the most common diseases. Every year, CVD kills more people compared to cancer, HIV, diabetes, and trauma together. Safety study of ADSCs carried out by various preclinical and clinical studies has shown that these candidate cells are safe enough to be used in various treatment modalities and also have an effective role in the treatment of diseases that can play. Based on the results of a clinical study, used adipose stromal cell implantation (ADSC) was confirmed to have an adequate safety characteristic without serious complications in patients with degenerative disc disease. However, there have been few reports of serious side effects. For example, some of the adverse effects observed during the study include headache, inflammation, etc.