

## Conflict of interest

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No other conflict of interest to declare.

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## Letter to the Editor

### Implications of adipose derived stem cells (ASCs) in management of burns



Dear Editor,

Approximately 180,000 deaths per annum are caused by burns and most of these fatalities happen in low and middle-income countries. The decreasing trend of deaths secondary to burns is notable among high-income countries [1]. Massive wounds of burn patients are among one of the challenges that are faced by surgeons as coverage choices are restricted, chiefly due to limitations of donor sites [2]. Many studies to assess the efficacy of the latest techniques and new approaches to manage large burn injuries are being done.

The invention and identification of adult mesenchymal stem cells (MSCs) have enabled the development of stem cell-based therapies for clinical use, over the recent years. Adipose tissue being a multipotent organ contains numerous cellular varieties with repair and regenerative abilities like adipose-derived stem cells (ADSCs), pre-adipocytes, pericytes, adipose-resident macrophages and endothelial progenitor cells, etc [3].

Adipose-derived stem cells (ASCs) were discovered as MSCs and since 2001, have been the topic of interest in regenerative medicine and tissue engineering. There were multiple terms for stem cells derived from fatty tissue like adipose-derived stromal cells, processed lipoaspirate cells, adipose-derived mesenchymal stem cells and others but in 2004, the accord was reached on the term of adipose-derived stem cells or ASCs [4]. ASCs are almost like bone marrow-derived mesenchymal stem cells (MSCs) therein can differentiate into varieties like adipocytes, osteoblasts, endothelial cells, epithelium and neurons. Nearly, 5000 ASCs can be extracted from one gram of fat tissue [2]. Clinically significant supply of ASCs is isolated from subcutaneous fatty tissues of the abdomen, thigh, and arm that are obtained by process of lipoaspiration. ASCs from different anatomical areas have different characteristics similarly ASCs from white fatty tissue differs from brown adipose tissue [4].

ASCs are of prime importance in regenerative science due to the secretion of specific soluble multiple growth factors, together with basic fibroblast growth factors (bFGF), insulin-like growth factor one, vascular endothelial growth factor (VEGF), transforming growth factor (TGF)- $\beta$ 1 and hepatocyte growth factors (HGF) that stimulate recovery of damaged tissues [4]. ASCs specifically have shown to reinforce growth through reepithelialization, granulation formation along with the release of growth factors [5]. The platelet derived growth factor-AA (PDGF-AA) in ASCs and endothelial progenitor cells, plays a considerable role to augment wound healing [6]. Moreover, these stem cells possess distinctive paracrine feature by expression of different kinds of growth factors receptors and thus mediate tissue regeneration [4]. Not only this the physiological secretome of fatty tissue within the liquid extracellular fraction of lipoaspirate is also an economical agent for skin regeneration. The liquid material of lipoaspirates, presently disposed as a waste by-product, contains components with regenerative properties. Adipose tissue derived extracellular fraction (AT-Ex) has its impact on cell proliferation, migration and aging in dermal cells.

Exceptional regenerative features of ASCs make them considerable option together with grafting in burn wounds as adipose-derived secretome stimulates the proliferation rate of adipose-derived mesenchymal stem cells (ASCs), increasing the sustainability of autologous grafts along with epidermal and dermal cell proliferation in a dose-dependent manner. Also, it delays cell death and accelerates fibroblast migration. The extracellular fraction of lipoaspirates can be used as an associate for practical tissue repair like skin diseases (acute and chronic wounds, burns, ulcers, and vitiligo) [3].

Chronic inflammation generates complicated microenvironments not amenable to treatment with single growth factor and to overcome this the optimum therapeutic strategy is sustained delivery of growth factors that are able to face the abundance of proteases within the environment of chronic inflammatory wound. Moreover, the right growth factors should be delivered in the precise concentrations to attain desirable outcomes [6]. Considering these specificities of ASCs, further studies are warranted to analyze its clinical outcomes in various types of burn wounds, as it is believed to revolutionize burn management due to its affordability, ease of availability and good results.

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**Ethical approval**

Not applicable.

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**Consent and data availability**

Not applicable.

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