

## Stem Cells and Regenerative Medicine

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### Editorial

First described back in 2002 in the manuscript Molecular Biology of the Cell, UCLA researchers introduced a new innovative adult stem cell population found in adipose tissue, known as adipose-derived stem cells (ADSC). Ever since, ADSCs have become the most prominent type of adult stem cell used in the field. No longer is adipose tissue seen as only a mass of cells involved in fat storage, rather it is seen as a sophisticated ensemble of cellular components with highly specialized and complex functions such as stromal-vascular fraction. Adipose tissue is a source of freshly isolated, heterogeneous stromal vascular fraction cells, and relatively homogeneous adipose stromal stem cells. Both populations display regenerative faculty in soft and hard tissue repair, ischemic injury and autoimmune diseases [1]. While they are known to accomplish both the release of paracrine factors as well as direct lineage differentiation, present-day evidence favors the former paracrine mechanism as its primary method of action.

Due to its abundance, accessibility and reliability, adipose tissue is a great source of multipotent adult stem cells and thus, used by many researchers for tissue engineering purposes. Several scientific studies validate the potential of adipose adult stem cells in regenerative medicine [2-4].

It has become apparent that to effectively translate ADSCs into clinical practice requires relying on technologies that can simplify and maximize the efficacy of the ADSCs. The most optimal methods in translational technology that minimize complications include: closed-system operations, biosensors and real-time monitoring, biomimetics and rapid manufacturing. These methods greatly reduce the required resources for *in vitro* cell handling and effectively minimize human error. For example, through closed-system isolation devices, clinicians can both isolate a patient's cells and re-administer the cells back into the patient in one surgery. The successful isolation of stromal vascular fraction (SVF) from adipose tissue with these devices has already been seen in a number of clinical trials and treatments for tissue repair. Although much advancement in ADSC research has been made in

the last few years, more innovation in successful ADSC translation is needed [4-7].

Translational research on ADSC could enable clinicians to treat patients with ADSC therapies for an array of conditions ranging from tissue engineering to immunomodulatory applications. As ADSCs work their way into clinical practice, it is essential that researchers, physicians, the industry, and regulatory agencies work together to bring promising ADSC therapies to patients in a safe and effective manner.

Considering that chronic non-communicable diseases are the biggest challenge of the 21<sup>st</sup> century, I have no doubt that this decade will be renowned for its advancements in regenerative medicine and adipose-derived adult stem cell research [8].

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