Researchers from University of California San Diego have found that two of the most frequently administered stem cell therapies, which are often used interchangeably, actually contain completely different types of cells. The results challenge the current "one-cell-cures-all" paradigm.
in orthopedic stem cell therapeutics and highlight the need for more informed and rigorous characterization of injectable stem cell therapies before they are marketed for use in patients.

The researchers analyzed cell populations of autologous bone marrow aspirate concentrate (BMAC) and adipose-derived stromal vascular fraction (ADSVF) collected from the same subjects. The study was published July 12, 2024 in *Science Advances*.

These two therapies have many similarities: both are injectable therapies derived from a patient's own cells—bone marrow in BMAC and adipose tissue (fat) in ADSVF—and they are both thought to contain mesenchymal stem/stromal cells (MSCs), cells that can differentiate into muscle, bone and other connective tissues.

Because of their similarities, the two therapies are frequently marketed as interchangeable "stem cell therapies" and are used to treat a range of musculoskeletal and skin conditions, particularly in professional athletes. However, little research to date has attempted to characterize the composition and underlying biology of these two therapies.

This lack of information has prevented rigorous clinical investigations into the ideal dosages for these therapies and, according to the researchers, has encouraged misinformation in the marketing for the treatments within the $11.9 billion-dollar stem cell industry.

To fill this gap, the researchers analyzed 62 BMAC cell populations and 57 ADSVF populations to create a cellular atlas that details what types of cells are present in each therapy, what genes are active in these cells, and what proteins are present.

Their atlas revealed that MSC concentrations in BMAC formulations were extremely low, and that overall, there were no comparable "stem
cell" types in both therapies. In fact, the two treatments had very different compositions; BMAC was composed mainly of red and white blood cells, and ADSVF was composed mainly of connective tissue cells.

In addition, many proteins associated with regenerative function were either absent or found in extremely low concentrations in both therapies, calling their mechanisms of action and overall efficacy into question.

In addition to providing a rich resource for researchers, the findings suggest that the active ingredients in biologic therapies like BMAC and ADSVF need to be defined more thoroughly.

They also suggest that the field as a whole should move toward more standardized cell therapies, in which clinically necessary doses of the cell and protein concentrations have been carefully quantified.


Provided by University of California - San Diego

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