

Stem Cell Regeneration on Burn Victims

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INTRODUCTION

The complex nature and long-term consequence of burn injuries has consistently proven to be a detriment to the victims as the availability for treatment has been scarce. Recent advancements in stem cell research have emerged with a new promising solution to accelerate the healing process. Stem cells have exceptional regenerative abilities which make them the ideal treatment pathway for these victims. This literature review we analyzed the efficiency of utilizing stem cells and advocate for the normalization of their use in the healthcare industry.

OBJECTIVES

This literature review assesses if using stem cells is an optimal treatment pathway for burn injuries. This includes mesenchymal (MSCs), adipose-derived (ADSCs), and induced pluripotent stem cells (iPSCs) and their potential to transform what we know now for treatment of burn wounds. The literature reviews delves into the impact of stem cell-based therapies and their potential to revolutionize treatment.

METHODS

- Research was found through Google Scholar
- The key words of “stem cell burn treatment” and “stem cell types” were used to find information

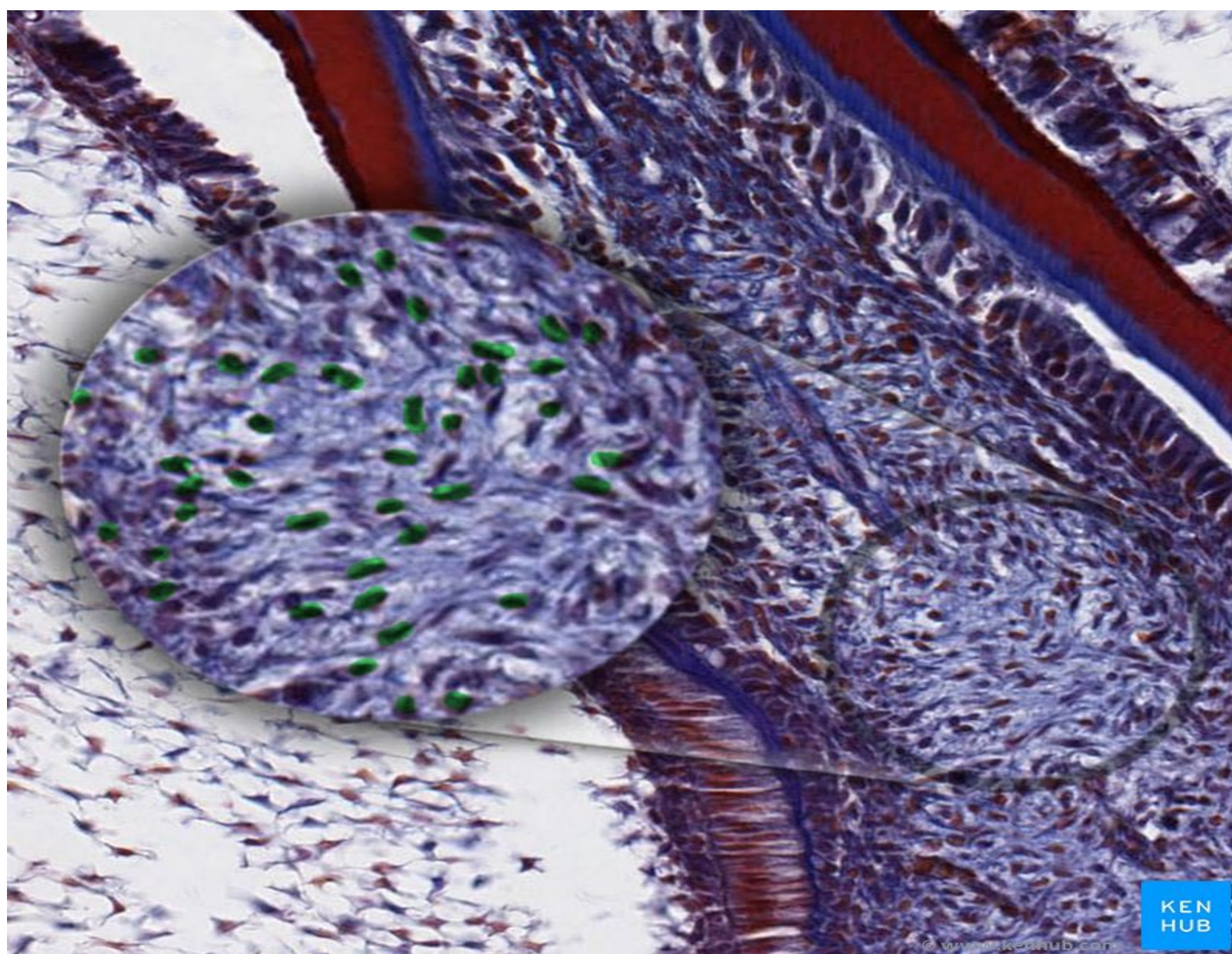


Figure 1. Mesenchymal Stem Cells

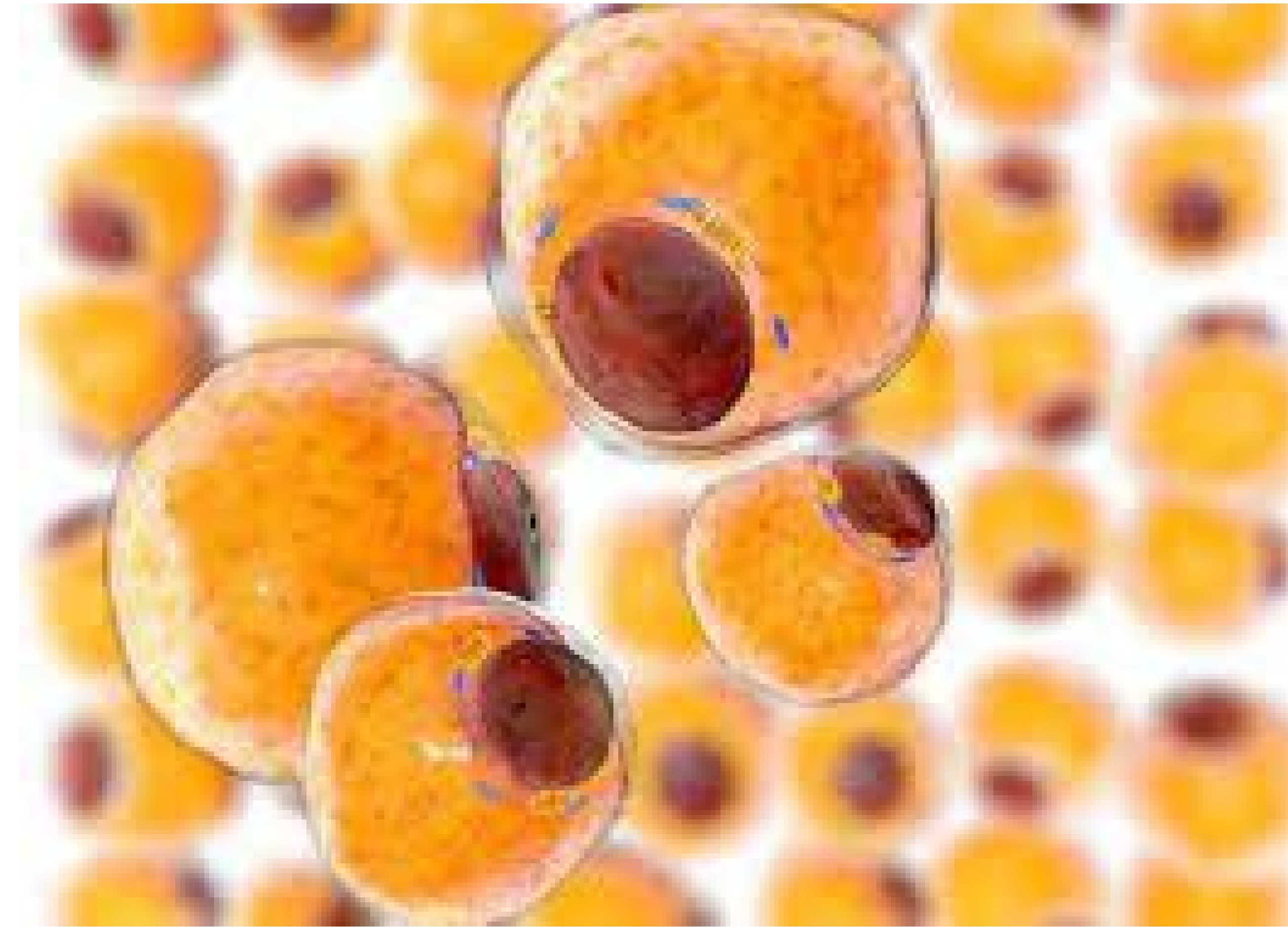


Figure 2. Adipose-derived Stem Cells

RESULTS

- MSCs aid in the healing of burn patients by minimizing tissue damage. They are able to control the heightened immune response that is typically observed in cases of severe burns because they modulate immunological responses. MSCs can be detected in adipose tissue, bone marrow, and umbilical cord blood. Their anti-inflammatory qualities enable them to develop into multiple cell types, leading to immunological regulation and tissue repair.
- Adipose-derived stem cells (ADSCs) can be extracted from subcutaneous adipose tissue located in regions such as the abdomen, thigh, and arm. Given the abundance of adipose tissue in the human body, ADSCs can be obtained in substantial quantities. As tested in the literature review versus a control vehicle it was found that treatment using ADSCs through local injection or spray delivery was much more successful treatment.
- iPSCs are made from a patient's own cells which helps reduce the risk of rejection. The IPSCs cells can be modified into skin cells and provide a substitute for burned skin. However, there are remaining challenges in making IPSCs-based therapies such as intensive labor and the expensive process of deriving IPSC skin substitutes.

DISCUSSION/FUTURE WORK

Moving forward, continued research and clinical trials are essential to further elucidate the mechanisms underlying stem cell-mediated regeneration and to optimize treatment protocols. To address tumor-causing hazards, further research on iPSCs may improve differentiation processes and reprogramming techniques. Advanced tissue engineering techniques benefit ADSCs, and MSC research might concentrate on improving immunomodulatory qualities and assessing long-term clinical usefulness.

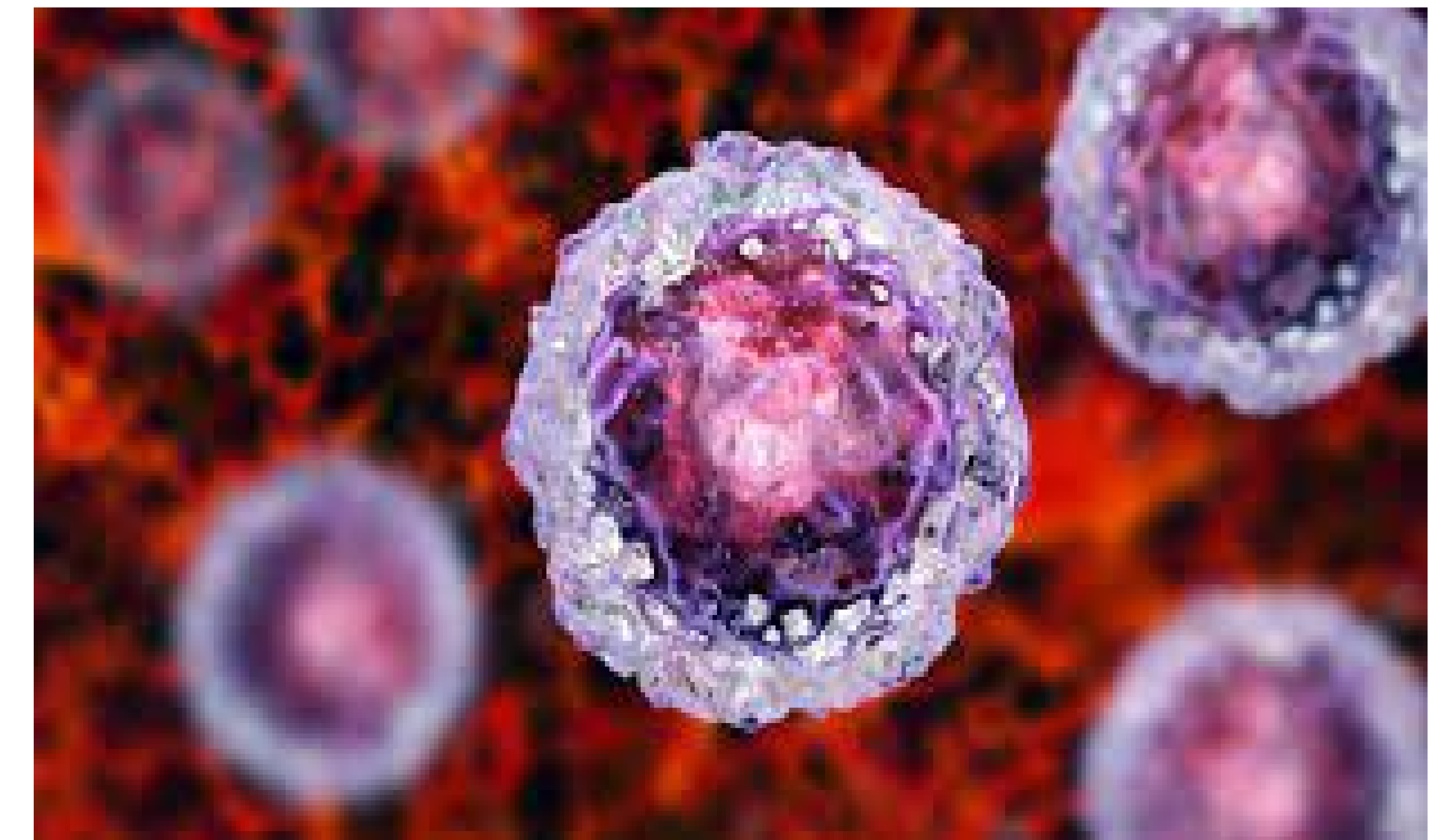


Figure 3. Induced Pluripotent Stem Cells

CONCLUSIONS

In conclusion with differing approaches to tissue repair and regeneration in various situations, each kind of stem cell makes a unique contribution to stem cell regeneration. While MSCs have anti-inflammatory qualities and support tissue regeneration and immune regulation, ADSCs are conveniently accessible and aid in tissue repair, while iPSCs offer variety in differentiation.

References

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