

Proliferation of Adipose Derived Stem Cells Using a Microgravity Bioreactor

Luther Bishop, Jenna Dennis, BS, Abdul-Razak Masoud, PhD, Dr. Alison Smith, MD, PhD
Louisiana State University Health and Science Center, Department of Surgery, Smith Lab

Introduction

- Around 11 million people worldwide are injured by burns yearly (i.e. flames, hot surfaces, chemical burns, etc..).³
- The U.S. faces around 450,000 burn injuries per year.²
- ~180,000 Americans succumb to their burn wounds.³
- Culturing Adipose-Derived Stem cells from damaged tissue for stem cell therapy.
- Adipose-Derived Stem Cells (ADSC) capable of multiple cell lineages, excrete growth factors, cytokines, and antioxidant factors.¹
- The aim of this study was to measure proliferation of ADSCs derived from burn and non-burned patients cultured in a microgravity bioreactor.

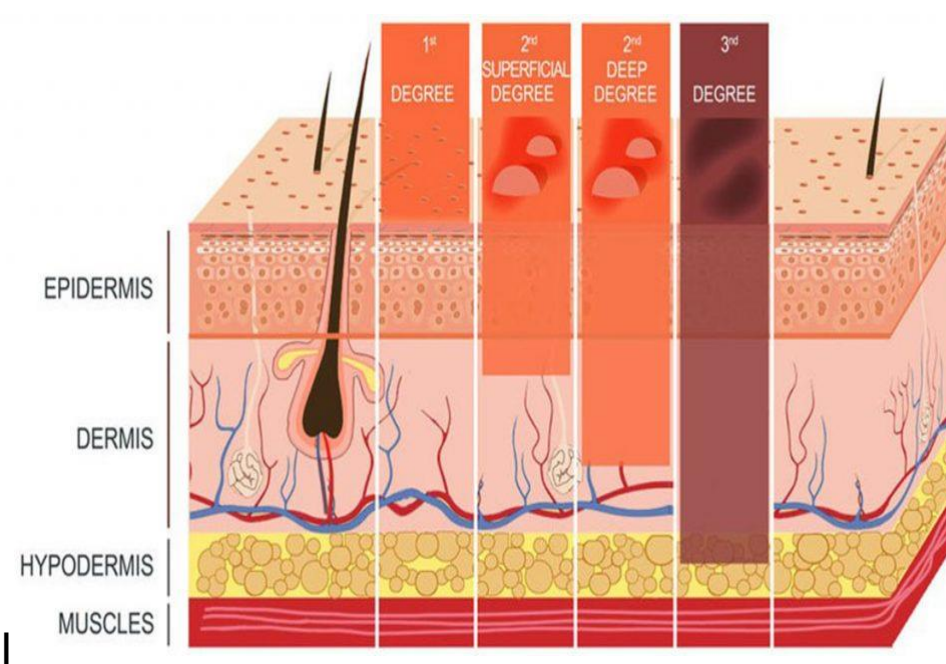
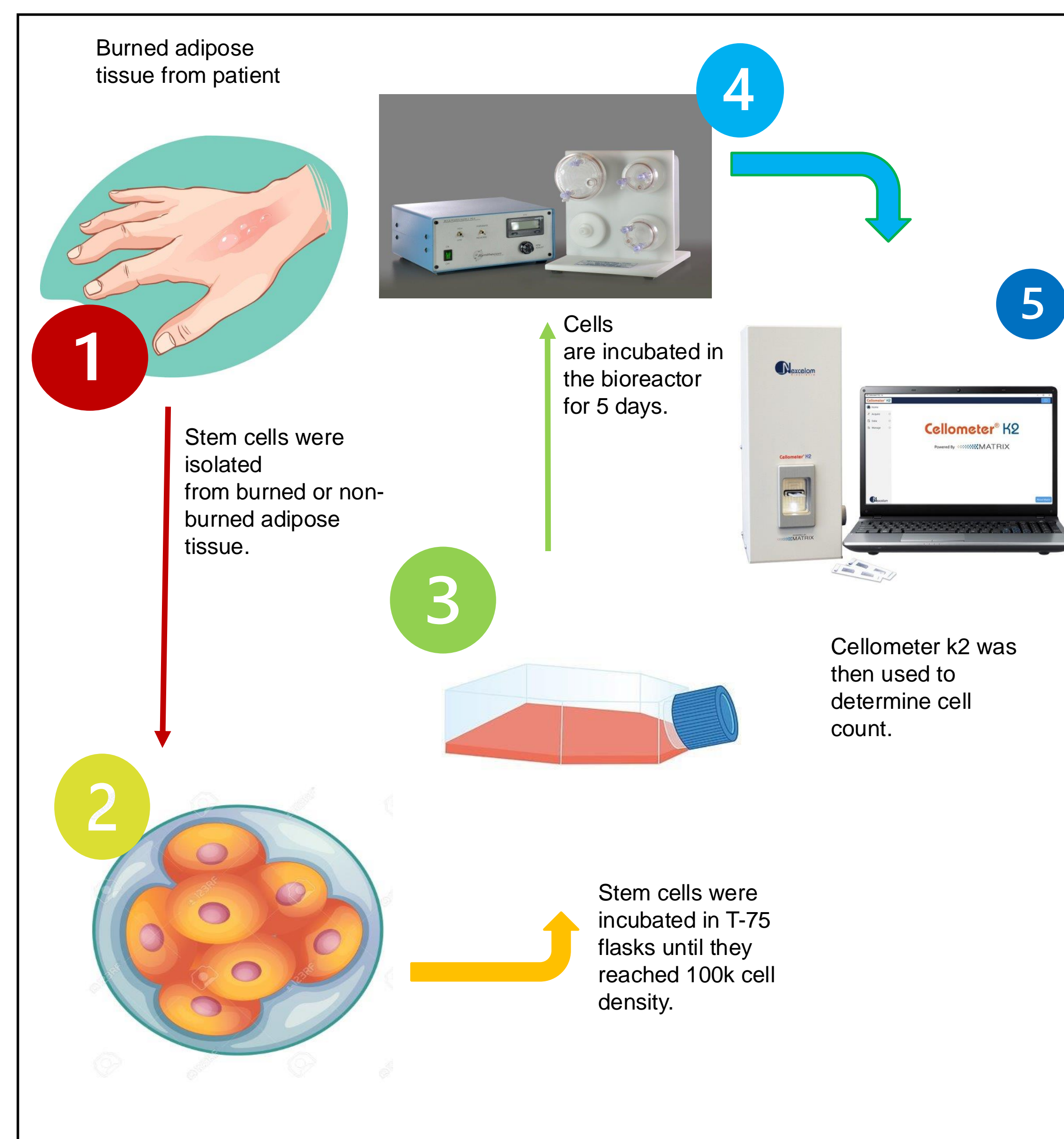


Figure 1). Degrees of Burns
Beaumont Emergency Hospital

Methods



Results

Table 1). Cell count Prior to bioreactor incubation, After incubation and mean diameter

CELL TYPE	Burn	Non-Burn
Initial Cell Count	~100,000 cells	~100,000 cells
Concentration	3.66 x 10 ⁶ Or 3,660,000 Total cells after Incubation	2.24 x 10 ⁶ or 2,240,000 Total cells after Incubation
Mean Diameter	8.4 microns	9.2 Microns

Future Directives

- Only able to do 1 round of testing further trails will be needed to validate results.
- Assessment of cell quality and function: assess phenotype, differentiation potential, cell marker expression.
- Having a more comparable control: comparing growth with 10% media within the bioreactor, To compare with traditional flask passaging .
- Application to damaged tissue: ability of bioreactor-grown cells to repair or regenerate tissue.

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Conclusion

- Stem cells growth optimization was achieved as static flask incubation for a week, along with bioreactors rpm of 5-10 produce large quantity of cells.
- The damaged tissue stem cells had more growth within the bioreactor than the stem cells from healthy tissue.
- The bioreactor is an effective technology/tool for cell expansion and could be utilized for mass production of stem cells derived from damaged tissue in the future.

References

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