**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.

**Methods**

1. Stem cells were isolated from burned or non-burned adipose tissue.
2. Stem cells were incubated in F-75 flasks until they reached 100k cell density.
3. Cells are incubated in the bioreactor for 5 days.
4. Cells were expanded in 6-well plates for 3 to 5 days.
5. Cell count was determined using the Cellometer k2.

**Results**

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

<table>
<thead>
<tr>
<th>CELL TYPE</th>
<th>Burn</th>
<th>Non-Burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Cell Count</td>
<td>~100,000 cells</td>
<td>~100,000 cells</td>
</tr>
<tr>
<td>Concentration</td>
<td>3.66 x 10^6</td>
<td>2.24 x 10^6</td>
</tr>
<tr>
<td></td>
<td>Or 3,660,000</td>
<td>Or 2,240,000</td>
</tr>
<tr>
<td>Total cells after Incubation</td>
<td>~180,000 cells</td>
<td>~120,000 cells</td>
</tr>
<tr>
<td>Mean Diameter</td>
<td>8.4 microns</td>
<td>9.2 Microns</td>
</tr>
</tbody>
</table>

**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.

**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.

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**References**


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