Immune Response and Revascularization of Acellular Nerve Allografts Following Mesenchymal Stem Cell Seeding and Surgical Angiogenesis

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Background

- Increasing evidence demonstrates an interplay between neoangiogenesis and immune cells (1-3).
- An optimal immunotolerant local environment is of importance to enhance revascularization (4).
- We investigated the early immune response and subsequent revascularization of acellular nerve allografts (ANA) at longer follow-up after combined stem cell delivery and surgical angiogenesis in a rat sciatic nerve defect model.

Methods

- The study was approved by the Institutional Animal Care and Use Committee (IACUC A3348-18).
- Nerve allografts were harvested from Sprague Dawley rats and decellularized. Inosogenic MSCs were isolated from the inguinal fat pad of Lewis rats.
- Helper T cells (CD4+) were significantly increased in groups III and IV compared to group II on day 14.
- Regulatory T cells (CD4+CD25+) were significantly higher in groups III-IV compared to group II on day 7.
- Cytotoxic T cells (CD8+) were significantly reduced in groups IV and V compared to group II on day 7.
- Group II demonstrated the highest levels of natural killer cells (CD161+) compared to groups III-V.
- Vascular volume was significantly higher in groups III-V compared to group II at 12 weeks.
- The CD4/CD8 ratio at day 7 and 14 demonstrated a positive correlation to the vascular volume at 12 weeks (r=0.508, CI 0.1814-0.7342, r² =0.2585, p = 0.004 and r = 0.735, CI 0.5097-0.8660, r² =0.5402, p < 0.001, respectively).

Results

- Early favorable immune responses were observed in ANAs treated with surgical angiogenesis with or without stem cell delivery and demonstrated improved vascularity at longer follow-up.

Conclusions

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References

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