**CONCLUSIONS:** This is the first demonstration of above knee cryopreserved rat limb graft survival after frozen storage. Further improvement in muscle cryopreservation is needed. From POD7 onwards the limbs grossly improved demonstrating that the cryopreserved limb tissues had the capacity to regenerate. These studies constitute critical first steps toward banking of complex VCAs to enable better phenotypic and immunologic matching of donor tissues to recipients.

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**Sustained-Release Angiogenic Nanoparticle Increases Union Rates, Vascularity, and Cellularity of the Irradiated Murine Mandible Following Nonvascularized Bone Graft Reconstruction**

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**PURPOSE:** Mandibular reconstruction secondary to oncologic resection remains limited to invasive free tissue transfer (FTT) by the detrimental effects of radiotherapy. Nonvascularized bone grafts (NBGs) represent a practical surgical alternative to FTT, but are precluded from irradiated reconstruction due to sequelae such as diminished capacity for revascularization and the destruction of osteocompetent cells. In order to overcome these principal barriers to irradiated bone healing, our laboratory has developed an implantable, hyaluronic acid (HA)-deferoxamine nanoparticle designed to stimulate angiogenesis during the critically-important weeks following surgery. This study examines the efficacy of this novel therapy in a murine model of irradiated mandibular reconstruction with the goal of ultimately reintroducing NBGs as a viable alternative to FTT in the irradiated setting.

**METHODS:** Male Lewis rats (n = 33) were equally divided into three groups; control bone graft (CBG), irradiated bone graft (XBG), and irradiated bone graft with intraoperative HA-deferoxamine implantation (XHDBG). Irradiated groups received a fractionated dose of 35Gy over 5 days, comparable to 70Gy administered to head and neck cancer patients clinically. Following a 2-week recovery period, all rats underwent creation of a 5 mm critical-sized segmental defect in the left hemi-mandible and reconstruction with a NBG from the iliac crest of an isogenic donor. On post-operative day 60, all mandibles were perfused and evaluated for bony union upon dissection. Vascularity was evaluated throughout the bone graft and healing interfaces through microcomputed tomography prior to histologic analysis of osteocyte proliferation and mature bone volume. Statistical analysis was performed using ANOVA, with p values less than 0.05 considered significant.

**RESULTS:** Bony union rates were improved by HA-deferoxamine treatment in the XHDBG group (82%) compared to the XBG group (64%) and were similar to union rates observed in the CBG group (91%). Radiotherapy resulted in decreased vessel number, vessel volume, vessel volume fraction, and vessel thickness in the XBG group compared to CBG. Implantation of HA-deferoxamine significantly increased all metrics of bone vascularity compared to the XBG group. No significant differences were observed between the XHDBG and CBG groups. Radiotherapy-induced cell depletion at the bone graft interfaces was evidenced through a significant reduction of osteocytes in the XBG group compared to CBG. Mature bone formation was also significantly decreased in XBG in comparison to CBG. Osteocyte proliferation and mature bone formation were significantly increased in the XHDBG group compared to XBG and were not statistically different from non-irradiated control levels.

**CONCLUSION:** The results of this study demonstrate the ability of HA-deferoxamine implantation to significantly improve the vascularity and cellularity of NBGs in reconstruction of the irradiated mandible. Given the pre-existing status of deferoxamine on hospital formulary, this treatment represents a highly translatable method of enhanced bone healing in the setting of radiotherapy that may expand the utility of NBGs in mandibular reconstruction following tumor ablation. While further investigations are necessary, such translation would offer the practical benefits of NBGs to both surgeons and head and neck cancer patients including reduced donor site morbidity and technical demand in comparison to FTT procedures.

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**Melting the Plastic Ceiling: Quantifying Resources for and Identifying Barriers to Women Seeking Academic Plastic Surgery Leadership Positions**