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**INTRODUCTION:** The primary goal of face transplantation is to restore normal face structure and improve function, offering patients with severe facial deformities a better quality of life and increased social integration. Research regarding factors affecting donor suitability remains lacking. There has been no investigation of the long-term effects of transplanting an obese donor face onto a normal recipient or vice versa. The aim of this study is to determine how an obesity mismatch between donor and recipient affects transplanted facial fat graft retention and cellular properties, potentially increasing the donor pool substantially.

**METHODS:** 60 male mice were utilized in this study: 30 C57BL/6J wild-type (WT) and 30 diet-induced obese (DIO) mice. 175ug of fat was harvested from the perigonadal fat pads of 10 euthanized mice from each group. The 20 remaining mice in each group served as recipients. A small incision was made between the ears of each recipient mouse and a subcutaneous pocket formed. Harvested fat was implanted in this location and the incision closed. 10 DIO mice were implanted with fat from a DIO donor, 10 with fat from a WT donor. 10 WT mice were implanted with DIO fat and 10 with WT fat. Recipient mice underwent micro-CT scans at 2 days, 2, 4, 6, and 8 weeks postoperative. Scans were 3d reconstructed and fat transplant volume assessed. At 8 weeks, mice were euthanized and transplanted fat analyzed histologically.

**RESULTS:** Volume retention of the facial fat graft was entirely dependent on the recipient phenotype, confirmed through ANOVA analysis and Student-Newman-Keuls Test. Volume of the graft when the recipient was DIO increased with both a DIO and WT donor (25.6% and 24.4% increase respectively). When the recipient was WT, the graft volume decreased when the donor was WT (-54.0%) and DIO (-53.0%). Average cellular volume also demonstrated the same trend, with a lower volume when the recipient was WT and higher volume when the recipient was DIO, regardless of the donor phenotype.

**CONCLUSION:** This study demonstrates that fat transplanted to the facial region responds to the surrounding microenvironment both macroscopically and microscopically. This indicates that adipose cells respond to the metabolic environment of the recipient. Furthermore, this study demonstrates that microscopically, fat cells adapt to their recipient host environment as well through cellular volume. This study has large implications in donor suitability in face transplant, as it indicates that a donor-recipient obesity mismatch may be acceptable.

**An Algorithm for Treatment of Radiation-Induced Soft Tissue Damage with Products Based on Autologous Adipose Tissue**

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**PURPOSE:** Even though efficiency of fat grafting and adipose-derived stromal vascular fraction injection for radiation-induced soft tissue injury treatment was supported by clinical practice, there are some questions concerning using of these methods still remains unsolved. The aim of our study was to develop an algorithm for management of radiation-induced soft tissue damage with products based on autologous adipose tissue.

**METHODS AND MATERIALS:** Since 2010 123 patients with late soft tissue radiation damage were treated by injection of products based on autologous adipose tissue. In group 1 containing 44 patients with chronic radiation wounds (LENT-SOMA grade 4) the goal was to completely heal a sore. In group 2 including 21 patients with radiation fibrosis (LENT-SOMA grade 2,3) the treatment was directed to prevention of radiation necrosis. For the rest of 58 patients (group 3) primary goal was to correct contour deformities after previous surgery combined with radiotherapy. Radiolesions were localized in breast, head and neck, trunk, extremities and rectovaginal septum in 59, 24, 21, 11 and 18 patients respectively. Liposuction was performed with barbed cannula 2,5 mm in diameter with fourteen 1,5 mm holes. Three different products based on autologous liposapirate were used depending on clinical needs: centrifuged at 1250 g force for 3 minutes microfat,
nanofat obtained by mechanical emulsification and filtration of decanted microfat, and stromal-vascular fraction isolated by collagenase type 2 digestion of fat. Overall number of surgical procedures was 523. Photography, elastosonography, magnetic resonance imaging and histology were used for results assessment.

RESULTS: Favorable outcome have been achieved in all cases. In the first group complete healing was observed in 98% (43 out of 44 patients). From one to three procedures was performed to get final result. Average healing time depended on size and depth of the wound and ranged from 8 to 14 weeks. Only in one case only VRAM flap was performed due to progressive osteoradionecrosis of the ribs. In the second group decreasing of LENT-SOMA grade was observed in all patients. Density of fibrotic tissues measured with elastosonography decreased from 220–650 kPa to 30–50 kPa. In the third group from 2 to 4 procedures were necessary to restore soft tissue flexibility. As far as density level becomes less than 60 kPa, additional 2–6 fat grafting sessions were performed to attain necessary volume and shape.

CONCLUSION: Late adverse effects of radiation therapy can be successfully prevented and treated with injection of products based on autologous lipoaspirate. This minimally invasive approach demonstrates extremely high efficiency rate and allows to avoid major surgery in most of the cases. As far as treatment of severe chronic radiation wounds may be associated with well-known issues it is seems to be reasonable to apply described techniques for patients with initial signs of late radiation-induced soft tissues damage in order to prevent necrotic complications. Proposed treatment algorithm, that takes into account LENT-SOMA stage, anatomical site and wound bed features, can be helpful for developing an effective management protocol for patients with soft tissue radiolesions.

Local Administration of FK506 with Impregnated Nerve Wraps Accelerates Peripheral Nerve Regeneration

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PURPOSE: Peripheral nerve injuries can be devastating, leading to permanent functional disabilities. Systemic FK506 administration has been shown to hasten recovery and improve functional outcomes after nerve injury repair. However, high systemic levels of FK506 can result in adverse side-effects. Localized administration of FK506 could provide the neuroregenerative benefits of FK506 while avoiding systemic, off-target side-effects. The purpose of this study is to investigate the utility of a novel FK506-impregnated nerve wrap in treating peripheral nerve injuries in a previously validated rat infraorbital nerve transection and repair model.

METHODS: Infraorbital nerve transection surgeries were performed on two groups (n=5 per group) of adult Lewis rats. In both groups, the infraorbital branch of the trigeminal nerve was transected. The transected nerve was then repaired primarily with 10-0 nylon suture with (treatment group) or without (no treatment group) the addition of a Poly(ester urethane) urea (PEUU) wrap impregnated with 20 mg of FK506. To evaluate neuroregeneration, trigeminal ganglion cell recordings, objective sensory testing, directional sensitivity, maximal response, and receptor compositions were analyzed from five rats in each group at four and six weeks postoperatively. Recordings from the trigeminal ganglion in naïve rats were taken for comparison. To assess local FK506 administration, blood and tissue samples (infraorbital nerve, muscle) were analyzed for FK506 concentration using liquid chromatography-mass spectrometry at four and six weeks postoperatively in the treatment group.

RESULTS: Data were analyzed using custom software written in Excel Visual Basic and the Excel add-on statistical package, Analyze-it (Analyze-it Software, LTD). Peri-stimulus time histograms (PSTHs) having 1 ms bins were constructed from spike times of individual single units. Responses to stimulus onsets (ON responses) were calculated during a 20 ms period beginning 1 ms after deflection onset; this epoch captures the initial, transient phase of the whisker evoked response. Rats within the treatment group (FK506 wraps) were found to have increased response magnitude at 4 weeks after implantation in the infraorbital