data suggested a potential increase in frequency with the more distal lymphatics. Further study with larger cohort of subjects is needed to observe possible correlation and patterns of lymphatic contraction and disease progression.

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QS49
Effect of Post-Operative Heparin on Digit Replant and Revascularization Success

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PURPOSE: The use of intravenous (IV) heparin following digital replantation or revascularization (DRR) varies greatly. The lack of evidence does not provide the clinical equipoise needed for a randomized trial; as such, a matched propensity score analysis was performed to evaluate the use of post-operative heparinization following DRR.

METHODS: A retrospective cohort of patients who underwent DRR from 2005 to 2016 was identified. A propensity score was calculated based on age, smoking, injury mechanism, procedure type, vein graft and number of digits injured. Patients were matched 1:3 by one standard deviation caliper width of the propensity score, to create two groups of patients with similar risks of receiving IV heparin post-operatively. McNemar test was used to determine differences in failure rates between groups.

RESULTS: DRR was performed on 282 patients (92% male; median age: 43 years; 37% smokers). Post-operative heparin was administered in 69 patients (25%), with continuous IV heparin in 34 (49%) and IV heparin with dextran in 35 (51%). Failure occurred in 88 patients (31%), of whom 30% received IV heparin. Heparin-related complications were noted in 6 patients (2%). After propensity score matching, any heparin, heparin alone or with dextran was not found to be associated with failure (p=0.71, p=0.74, p=0.89).

CONCLUSION: Among DRR patients with similar predisposing characteristics for post-operative heparin, the use of therapeutic heparin does not appear to have a protective effect against digital failure. Studies are needed to define the role of post-operative heparin in DRR and to justify the risk of its administration.

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QS50
Dermal Lymphatic Backflow Pattern in Rat Hind Limb Chronic Lymphatic Dysfunction Model

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PURPOSE: The purpose of our study was to create a rat chronic lymphedema model that could be used for the evaluation of vascularized lymph node transfer (VLNT) effects on the lymphedematous limb.

METHODS: Sprague Dawley rats underwent surgical resection of lymphatic structures in the right hind-limb followed by local groin irradiation (n=7). The inguinal and popliteal lymph nodes and deep lymphatics were identified and resected. An unfractionated dose of 20Gy was delivered to the rat limb with an effective field size of 3.5 x 2.5 cm. The skin edges were sutured to underlying muscles creating a 5-10mm gap to prevent spontaneous lymphatic regeneration. The animals were followed-up one year.

RESULTS: All animals developed clinical lymphedema in one-month post-op, however, they spontaneously recovered following three-months post-op. ICG lymphangiography revealed a distinct difference in a lymphatic drainage pattern between two sides at one-year post-op. A diffuse superficial reticular pattern reached the border of the surgical scar on the experimental side, whereas the control side had a normal linear pattern. The wave pattern of the lymph flow generated by the physiologic contraction of the lymph vessels was present on the control side but was absent on the experimental side.

CONCLUSION: Considering the lack of good alternative models of secondary lymphedema, this method could be effectively used to investigate the potential benefits of VLNT.
Skeletal Muscle Regeneration by Fibromodulin Reprogrammed Cells without Tumorigenic Risks

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PURPOSE: Skeletal muscle, one of the most commonly injured tissue, is easily lost by severe injuries from car accidents, natural disasters, or salvage surgeries for tumors. Unfortunately, the skeletal muscle mass has limited repair capacity. Direct transplantation of committed myoblasts is hindered by inadequate cell availability, limited cell spreading, and poor survivability of implanted cells. In addition, using mesenchymal stem cells for tissue regeneration is always accompanied by the painful, invasive procedures (i.e., tissue biopsy, bone marrow aspiration, and liposuction) that potentially cause severe complications or fatal outcomes. The tumorigenic risk of pluripotent cells also remains as the major concern for clinical application, and intramuscular injection is one of the most common routes for teratoma formation that validates the pluripotency in vivo in skeletal muscle regeneration. Previously, we have established a novel platform technology using a single molecule, fibromodulin (FMOD), to reprogram human dermal fibroblast into a multipotent state while circumventing oncogene usage and genome integrating. The yielded FMOD ReProgrammed (FReP) cells hold significant potential for myogenic differentiation both in vitro and in vivo. Our current study focused on its tumorigenic risk assessment.

METHODS: RNA-seq was performed to compare global gene expression of FReP cells and induced pluripotent stem cells (iPSCs) which holds the high tumorigenic risks. Differential mRNA expressions were identified by TopHat-Cufflinks package, functionally annotated via DAVID Bioinformatics Resource, and aligned with human proto-oncogenes and tumor suppressor genes listed in the UniProt database. Soft agar colony formation assay, the standard tumorigenicity test, was used to examine the cellular survival ability in an anchorage-independent manner under low nutritional and oxygen concentration microenvironment in vitro. On top of intramuscular injection, intratesticular injection was also carried out to further evaluate the tumorigenic potential of FReP cells, as intratesticular stromal cells produce more supportive environment that fosters implanted cells in comparison with subcutaneous and intramuscular microenvironment.

RESULTS: Functional analysis of more than 2300 differential genes between FReP cells and iPSCs by KEGG pathways revealed enrichment of genes involved in the ‘Pathways in cancer’ with significant similarity of term overlap (Kappa value = 1.0). Notably, FReP cells showed lower expression of more proto-oncogenes but higher expression of more tumor suppressor genes when compared to iPSCs. Unlike iPSCs, FReP cell neither proliferated nor formed colonies in soft agar after 14-day cultivation. Furthermore, in intramuscular injection, 2 of 8 iPSC-implanted animals (25%) ended up with tumor formation instead of skeletal muscle generation, while none of FReP cell-implanted animals presented tumor formation. Intratesticular injection of iPSCs resulted in 100% (10/10) teratoma formation, but FReP cells showed 0% (0/10) tumor formation in 4 months.

CONCLUSIONS: Our in vitro and in vivo studies collectively showed that FReP cells are less likely to generate tumors in vivo, which suggested that FReP cells is a safe cell source for skeletal muscle regeneration.

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