the operating room. Non-enzymatically isolated stromal vascular fraction contained cells expressing CD44, CD73, CD90 and CD105 that when expanded in culture differentiated along adipogenic and osteogenic lineages. When compared to enzymatic isolation, mechanical isolation methods required less time but produced lower cell yields. Two articles reported improved volume retention in fat grafts supplemented with mechanically isolated stromal vascular cells.

CONCLUSIONS: Stromal vascular fraction isolated by non-enzymatic methods contain regenerative cells that may be analyzed in vitro or applied in vivo. Because lower cell yields are observed, they may be suitable and expedient for cases in which there is an abundance of adipose tissue that may be directed towards stromal vascular fraction isolation. Additionally, further randomized case-control studies to compare and improve these techniques are needed to optimize the number and quality of isolated cells and to identify the ideal clinical applications for these cells.

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INTRODUCTION: Evidence demonstrates the role of adipose tissue in support of the stem cell niche and driver of the complex hair growth cycle. Additional evidence supports that the growth factors from adipose-derived stem cells can promote hair growth. Furthermore, a number of investigators reported an increase in hair growth after subcutaneous fat grafting.

This paper reports on a prospective, single blinded clinical trial of the effect of autologous and SVF enhanced fat grafting on hair growth for alopecia androgenica.

MATERIAL AND METHODS: Nine healthy patients (eight men and one woman) with pattern hair loss were treated by autologous fat transplantation enriched with stromal vascular fraction (SVF) to the scalp. Harvested lipoaspirate was separated into two aliquots. One aliquot was purified using the Puregraft system (Puregraft®, Puregraft LLC). The remaining tissue was digested to obtain concentrated stromal vascular fraction cells (SVF, Kerastem Technologies, LLC). The SVF was mixed with the purified fat tissue and injected into the affected areas of the scalp.

Patients were followed for safety, tolerability and differences in hair growth. We employed global photography and macrophotography with trichoscan analysis, to quantitatively track hair count, hair density, anagen/telogen rates (48 hours later), and cumulative hair thickness. Follow-up was at 6 weeks, 12 weeks, and 24 weeks.

RESULTS: 6 patients were analyzed at 6-month, 3 patients were lost to follow-up. 6-month trichoscan analysis revealed an average of 14% increase in hair count compared to baseline (p=0.01) (mean difference of 28 hairs) along with a 34% average increase in the anagen percentage (p=0.09). An analysis of hair growth limited to individuals with Grade I-IV hair loss (n=5) showed an average of 17% (p=0.02) in hair count (mean difference of 30 hairs) at 6-months.

CONCLUSION: Initial data demonstrates that cell-enriched fat grafting to the scalp may represent a promising alternative to treating baldness in men and women. STYLE is an actively enrolling phase II study in the United States further investigating this promising therapeutic approach.

Stromal Vascular Fraction Enhanced Adipose Transplantation in Hair Loss: Early Experience & Active Phase II FDA Investigation

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Isolation and Characterization of a Fibroblast Sub-Population Responsible for Cutaneous Scarring in the Ventral Dermis

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PURPOSE: Recent studies have demonstrated the functional heterogeneity of fibroblasts, particularly in terms of their activities during wound healing. Both location within the dermis and embryonic lineages1 provide a means by which we may now identify the sub-populations of fibroblasts chiefly responsible for connective tissue deposition during scar formation in the dorsal dermis.1,2 However, whether these findings translate to the ventral dermis have yet to be elucidated.

METHODS: Prrx1Cre/Rosa26mTmG mice, were used to trace two fibroblast lineages restricted to the ventral dermis. Fibroblasts of different embryonic lineages—based on Prrx1 expression—were isolated from ventral fetal and adult dermis at a series of time points, including the late-gestational transition from scarless to scar-forming wound healing. ATAC-seq (Assay for Transposase-Accessible Chromatin with high throughput sequencing) was also performed in isolated pre- and post-gestational fibroblasts.

RESULTS: Histological analysis revealed that the Prrx1-positive lineage contributed to the majority of connective tissue during scar formation. Flow cytometry demonstrated a shift in fibroblast sub-populations over the course of gestation. Differential patterns of chromatin accessibility shown by ATAC-seq further demonstrated the heterogeneic nature of fibroblasts within the ventral dermis at an epigenetic level.

CONCLUSIONS: As in the dorsal dermis, fibroblasts of the ventral dermis demonstrate functional heterogeneity. Further studies may allow targeting of specific sub-populations to improve wound healing.

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Effects of Topical Hyaluronic Acid Injection in Surgical Site Infection Caused by Staphylococcus Aureus

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PURPOSE: Surgical site infection (SSI) is a common post-operative complication, mainly caused by Staphylococcus aureus (S. aureus).1 In some cases, antibiotics are insufficient for the treatment of S. aureus infection. S. aureus produces hyaluronidase which degrades hyaluronic acid (HA) and is one of its virulence factors in wound infection.2 HA prevents bacterial proliferation and has anti-inflammatory effects to promote wound healing.3 Herein, we studied the effects of HA injection with systemic antibiotics treatment on SSI caused by S. aureus.

MATERIALS AND METHODS: A single 2x1cm² open wound was created on each dorsum of 40 Sprague-Dawley rats. The wound bed was stitched three times with 3-0 vicryl suture inoculated with S. aureus (2x10⁸ CFU/ml) to induce SSI.4 The test group was treated with 200μg/kg of HA(n=20) and the control group received a subcutaneous injection of normal saline (n=20) in the infected wound. All groups were then treated with intraperitoneal 30mg/kg injections of cefazolin. The stitches were removed two days after the procedure. The gross pathology and bacterial count were assessed at days 2, 4, 6 and 8 post-procedure. The histologic grading and inflammatory cytokines in wound were assessed at day 8 post-procedure. Histologic grading was from 0 to 3 (0: none, 1: minimal, 2: moderate, 3: marked) based on the proportion of each finding within the entire wound.5