PURPOSE: Despite a lack of high-level evidence to support improved skin and scar quality, interest in autologous fat grafting for such continues to grow. This multi-center, double-blinded, randomized, placebo-controlled trial aimed to evaluate the effect of autologous fat grafting in patients with cutaneous scars.

METHODS: 17 patients with cutaneous scars affecting quality of life underwent Coleman-type fat grafting, completed with autologous fat/saline at a density of 1mL/cm². Outcomes were measured at baseline, and 6/12 months. Scars were subjectively and objectively evaluated using POSAS, durometer (hardness), cutometer (elasticity), colorimeter (wavelength absorbance), and single-observer histological analyses.

RESULTS: POSAS score totals, cutometer and durometer analyses were not significantly different between grafted (fat) and control (saline) scar appearance, elasticity or hardness at 0, 6, or 12 months, respectively. A single significant colorimetric difference in the a* color coordinate at 6 months (p = 0.037) was demonstrated, but was not durable at 12 months (p = 0.49). Single-observer histological 5-point scale ranking revealed no significant differences between AFT-treated and control scar vascularity or inflammation, nor epidermal thickness at baseline, six or twelve months. There was no statistically reliable difference of categorical evaluations, including vascular orientation, collagen organization and remodeling, and inflammation chronicity at the 0.05 level.

CONCLUSION: In conclusion, these results suggest that autologous fat transfer can improve the qualitative profile of scar from a patient and observer perspective, consistent with a large body of level-III and -IV scientific work. These qualitative improvements, however, are not corroborated by measurable differences in skin hardness, elasticity, color, or histology. Further rigorous, large volume, randomized-controlled trials are required to elucidate the quantitative effects of autologous fat transfer. Insight into these effects may yield the clinical treatment requisites, and subsequently, the realization autologous fat transfer’s potential for scar prevention and remodeling.

J.C. Brown: None. H. Shang: None. N. Yang: None. A.J. Katz:; The GID Group, Ltd..

QS33

Composite-Mediated Angiogenesis for Soft Tissue Regeneration in a Large Animal Defect Model

Michelle Seu, BA, Xiaowei Li, PhD, Zhengbing Zhou, MD, Russell Martin, PhD, Kevin Colbert, MS, Chi Zhang, BS, Hai-Quan Mao, PhD, Justin Sacks, MD, MBA

Johns Hopkins School of Medicine, Baltimore, MD, USA

PURPOSE: Soft tissue defects from aging, trauma, or congenital malformation affect millions of people each year. Existing options for soft tissue restoration have significant drawbacks: autologous flaps cause donor-site defects; prosthetics are prone to foreign-body response; and fat grafting and dermal fillers are limited to small volume defects and provide transient volume restoration. To address these limitations, we developed a nanofiber-hydrogel composite to promote angiogenesis and cellular infiltration for soft-tissue regeneration, specifically in a large defect.

METHODS: We have developed a novel composite scaffold resembling the architecture and mechanical properties of adipose tissue by interfacial bonding of biodegradable poly (caprolactone) fibers with hyaluronic acid. To examine the superior ability of our composite for soft tissue regeneration, we aim to create a large soft tissue defect model within the inguinal fat pads of female New Zealand White rabbits. Histology, immunohistochemistry, and bromodeoxyuridine (BrdU) assay were performed to investigate the ability of our composite to regenerate soft tissue in this large defect model.

RESULTS: We previously demonstrated robust angiogenesis and host cell infiltration within our composite after subcutaneous injection into Lewis rats. We successfully developed a large soft tissue defect model by designing standardized lesions in the rabbit inguinal fat pad. At post-operation day (POD) 7, we found that a large number of macrophages infiltrated our composite, many of which were polarized toward the M2 or “pro-healing” macrophage phenotypes; such macrophages could promote the vascular ingrowth at later timepoints. Now, using our novel inguinal fat pad model, we are testing the long-term effects of our composite for soft tissue regeneration in this large defect model.

CONCLUSION: We have demonstrated robust angiogenesis and host cell infiltration within our composite after subcutaneous injection into Lewis rats. We successfully developed a large soft tissue defect model by designing standardized lesions in the rabbit inguinal fat pad. At post-operation day (POD) 7, we found that a large number of macrophages infiltrated our composite, many of which were polarized toward the M2 or “pro-healing” macrophage phenotypes; such macrophages could promote the vascular ingrowth at later timepoints. Now, using our novel inguinal fat pad model, we are testing the long-term effects of our composite for soft tissue regeneration.

CONCLUSION: We have demonstrated that our composite can facilitate blood vessel ingrowth and cellular infiltration 1 week after injection into a large soft tissue defect. Our nanofiber hydrogel composite represents a potential solution for soft-tissue reconstruction in the setting of acquired or congenital soft-tissue defects obviating the need for donor site morbidity.
QS34

Prospective Isolation of a Functional Human Cartilage Progenitor Capable of Forming Hyaline Cartilage In Vivo

Lauren Koepke, BS
Cellular/Molecular Biology. Stanford University, San Jose, CA, USA

PURPOSE: Over the past century, the average life span has increased by nearly 30%, leading to an overall aging population and an increase in degenerative diseases, including osteoarthritis. Due to a lack of vasculature and low cellularity in articular cartilage, regeneration does not occur. Since we have identified three human chondroprogenitor (CP) populations, we have the ability to functionally characterize these CPs to identify if these populations give rise to unique types of cartilage.

METHODS: Prospective FACS analysis was performed on digested fresh human bone specimens. The gating strategy was verified in vivo and in vitro. The isolated cell gene expression profile of each population was performed using q-PCR and microarray. In vitro differentiation was performed and analyzed via FACS. Cellular proliferation using CFU in vitro and EdU both in vitro and in vivo was performed. In vivo differentiation was performed using our previously published renal capsule model as well as our xenograft model. The in vivo samples were then FACS sorted for analysis and corresponding IHC (col2, col10, mmp13) and histology (safranin-o fast green and penta-chrome) was performed.

RESULTS: Three distinct populations were successfully isolated. Each cell population had a unique gene expression profile signifying a possible variance in differentiation capability. In vitro as well as in vivo differentiation varied between each population CP1-3. The relative proliferation variability also suggests inherent population differences.

CONCLUSION: The potential to isolate a particular CP population that is most proliferative and has the capacity to give rise to articular cartilage is exciting and may provide a new therapeutic strategy for treating patients with osteoarthritis. FACS gating strategy for our three human chondroprogenitor populations, CP1-3.

L. Koepke: None.

QS35

Use Of Nicotine Replacement Therapy In Active Smokers Is Associated With Increased Complication Rate In Breast Surgery

Zhenzhen Xu, BA, Sifron Ndon, BA, Rance JT Fujiwara, BS, Lisa Fucito, PhD, Steven Bernstein, PhD, Henry C. Hsia, MD
Yale School of Medicine, New Haven, CT, USA

PURPOSE: This study aims to determine the effect of nicotine replacement therapy (NRT) on surgical outcomes such as rates of complications in patients undergoing breast surgery.

METHODS: A retrospective chart review of female smokers undergoing breast surgery between January 2014 and April 2017 within the Yale New Haven Health System spanning across four hospitals was performed. Active smoking was defined as cigarette use within one month before or after surgery. Statistical analyses were performed using Stata software.

RESULTS: 254 patients were identified, 34 of whom had documented NRT use six months within their breast surgery. For patient demographics. 52.9% of those with NRT use developed complications—such as infections, wound dehiscence, seromas, hematomas, tissue necrosis, fat necrosis, and lymphedema—compared to 30.5% of their non-NRT counterparts. Multivariate logistic regression accounting for covariates including age, race, BMI, Charlson comorbidity index, insurance type, race, and presence of multiple procedures resulted in a statistically increased risk of complication development in smokers with NRT use [OR 2.42 (1.10–5.33), p=0.027].

CONCLUSION: In our experience, concurrent NRT use in active smokers undergoing breast surgery was associated with an increased risk of postoperative complications.