volume retention on MRI volumetric analysis (38%, 41% respectively) on POD84. The 100% composite only group had the poorest volume retention (14%) on POD 84. On IHC, groups containing the nanofiber-hydrogel composite demonstrated superior rates of angiogenesis and blood vessel ingrowth into the graft as compared to lipoaspirate and lipoaspirate/hydrogel only groups. Furthermore, adipocyte morphology was better preserved in groups containing the nanofiber-hydrogel composite.

**CONCLUSION:** Both groups containing a combination of lipoaspirate/composite exhibited superior volume retention at POD 84 compared to solely lipoaspirate or lipoaspirate/ hydrogel combination. Furthermore, the combination of lipoaspirate and composite results in better volume retention compared to either group alone. As demonstrated through IHC, our nanofiber-hydrogel composite promotes higher degrees of angiogenesis than does 100% lipoaspirate or 50% lipoaspirate/50% hydrogel. The nanofiber-hydrogel composite better preserves adipose cell morphology in fat grafting. This has important clinical implications, as improved fat graft retention would save the patient the additional morbidity of undergoing multiple bouts of anesthesia and multiple surgical procedures.

**Autologous Adipose Tissue-Derived Mesenchymal Stem Cell Therapy Improves Skin Photo-Ageing**

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The purpose of the present clinical study was to investigate the effects of ADSC therapeutic introduction into the facial skin of patients with overt photo-ageing, with special attention to morphological modifications of the dermal extracellular matrix. The chosen strategy was to compare histology and histopathology of the treated and non-treated skin, harvested from patients that were going to be submitted to facial rejuvenation through surgical face-lifting.

This prospective, clinical, randomized study involved twenty healthy subjects, 4 males and 16 females, candidates for facial rejuvenation surgery (face lifting). They aged from 45 to 65 years. The study was done between September 2012 and June 2014. They were inhabitants of the northeast region of Brazil, where an extensive exposure to sun is expected, and they presented class IV (n= 9), and V (n= 11) Fitzpatrick’s classification of the skin [21]. Patients were treated according to the ethical principles of the Declaration of Helsinki 2000, and the present study was approved by the Brazilian Medical Investigation Ethical Board (Protocol no. 28063) and the Brazilian Clinical Trials Registry (RBR-2mn9y2).

Mesenchymal stem cells were obtained from lipoaspirates, expanded *in vitro*, and introduced into the facial skin of patients to be submitted after four months to a face-lifting surgery. The retrieved face skin was analyzed by immunocytochemistry for identification and quantification of the elastic matrix components, cathepsin-K, metalloelastase M-12, and macrophage M2 markers CD68, CD206 and heme-oxygenase-1.

**RESULTS:** A full de novo formation of oxytalan and elaunin fibers was observed in the sub-epidermal region, with full reconstitution of the papillary dermal-epidermal junction. Elastotic deposits in the deep dermis were substituted by a normal elastin fiber network. The coordinated removal of the pathologic deposits and their substitution by the normal ones was concomitant with activation of cathepsin-K and MPP12, and expansion of the M2 macrophage infiltration.

**CONCLUSION:** Adipose Derived Stem Cell therapy of solar elastosis fully regenerates skin extracellular matrix, with restoration of a normal elastin network in the sub-epidermal zone and substitution of elastic deposits by normal elastin fibers in the deep dermis. This may be a promising cell-therapy for sun-aged skin regeneration.

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Development of Injectable Allograft Adipose Matrix for Soft Tissue Filling: From Conception to Clinical Trial

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BACKGROUND: There is a clinical need for an off-the-shelf bioinductive soft-tissue replacement in reconstructive surgery. Our group developed injectable Allograft Adipose Matrix (AAM) as a solution, derived from cadaveric human subcutaneous adipose tissue through a decellularization and milling process. The final form is lyophilized powder rehydrated before use. The aim was to demonstrate the translational development of AAM from conception to clinical study.

METHODS: In vitro and animal studies (using immunocompromised and wild type rodent models) were conducted to determine cellular ingrowth, vasculogenesis, adipogenesis and volume retention. A 16-week prospective clinical study evaluated subcutaneous AAM injection (2.5-5cc) of the dorsal wrist of 15 subjects to determine patient safety, graft retention, and histological characteristics. A clinical trial was then conducted by injecting 20cc of AAM into 6 individual abdominal subcutaneous sites of 10 subjects. Subjects were randomized to panniculectomy either 3 or 6 months after injection, and biopsies were taken at 1 and 2 months. Safety of AAM and histology of specimens obtained at biopsy and surgery were determined.

RESULTS: In vitro seeding of ASCs on AAM, showed attachment and proliferation of ASCs for 3 days, followed by production of new matrix within 7 days and changes to adipocyte morphology. AAM injected on the dorsum of immunocompromised nude mice supported adipogenesis at 6 weeks, with progressive increase in adipocyte frequency at 12–24 weeks and graft retention of 44±16% at 24 weeks. AAM injected in the dorsal flanks of immunocompetent Fisher rats showed higher graft retention (89±16%) up to 3 weeks, and induction of anti-inflammatory M2a macrophages as early as 72 hours compared to controls and alternative ECM derived products. The prospective clinical study evaluating dorsal wrist injections showed a graft retention of 47.14% at 16 weeks, with no histological evidence of inflammation or necrosis and no adverse events. The clinical trial demonstrated that larger volumes of AAM injections were tolerated well with no reactions. Clinical safety and graft retention were demonstrated at 6 months with histological evidence of adipogenesis and presence of endothelial cells. The only adverse event was surgical site infection in one out of 60 sites, which occurred after a biopsy.

CONCLUSION: AAM is a novel off-the-shelf adipose-derived injectable matrix, which represents a safe alternative for soft-tissue reconstruction. Bio-inductive AAM shows favorable volume retention, cellular infiltration, and de-novo adipogenesis from endogenous precursor cells.

The Immunophenotype of Adipocyte Stromal Vascular Cells Varies between Patients with Breast Cancer, Lipodystrophy and Macromastia

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BACKGROUND: Stromal vascular fraction (SVF) cells are embedded in adipose tissue and work synergistically when used in reconstructive and cosmetic breast procedures. SVF cells have been shown to promote tissue regeneration leading to improved wound healing and graft retention. SVF cells have become an attractive option for autologous applications in regenerative medicine due to easy access and processing. However, there is inherent