event, as was longer hospital length of stay in days (aOR 1.1, 95% CI 1.0–1.1; HLOS). Similarly, perioperative blood transfusion (aOR 270.3, 95% CI 63.2–1,156.6), and cerebral palsy (aOR 10.5, 95% CI 1.9–59.1) were found to be significantly associated with reoperation, as was longer HLOS (aOR 1.1, 95% CI 1.0–1.2). ASA class IV (aOR 4.5, 95% CI 1.1–19.0), bronchopulmonary dysplasia/chronic lung disease (aOR 2.4, 95% CI 1.1–5.2) and cerebral palsy (aOR 5.6, 95% CI 1.5–20.9) were significantly associated with readmission, as was HLOS (aOR 1.1, 95% CI 1.0–1.1). Perioperative blood transfusion (aOR 8.3, 95% CI 1.7–41.0) was significantly associated with wound dehiscence.

**CONCLUSION:** Adverse events following cleft palate surgery are rare. Systemic disease remains the greatest predictor for readmission and reoperation, while intraoperative adverse events requiring blood transfusion predispose patients to post-surgical complications.

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**Understanding the Role of Adipocytes and the Tumor Microenvironment on Doxorubicin Therapy of Breast Cancer in a Tissue Engineered, Patient Specific, High-throughput Biomimetic Platform**

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**INTRODUCTION:** Breast cancer (BC) research encompasses not only the study of tumor behavior, but also requires understanding the innumerable interactions that occur between breast cellular components and the extracellular matrix (ECM) in the development and progression of the disease. Despite extensive research, BC continues to be a leading cause of morbidity and mortality for women across the globe. The lack of three-dimensional models that are able to accurately replicate the tumor microenvironment and tumor-associated stroma has resulted in the unsuccessful translation of most preclinical studies into the clinic. It has been suggested that adipose tissue is a drug-metabolizing organ that protects tumor cells from chemotherapeutic agents. We have developed a tissue engineered, three-dimensional, high-throughput, patient specific, biomimetic model of BC that incorporates patient-derived adipocytes, adipose stromal cells, breast-duct organoids, and BC cells, and studied the effect of treatment with the chemotherapeutic agent doxorubicin on BC cell survival.

**METHODS:** Under an approved IRB, breast tissue was acquired from patients and differentially processed to isolate mature adipocytes, stromal cells, and breast organoids which were subsequently co-cultured with cancer cells in a 0.6% type I collagen matrix. Mixtures containing fluorescently tagged MDA-MB-231 or MDA-MB-468 triple negative BC cells at a concentration of 200,000 cells/mL were plated onto 96 well plates. BC cells in plain collagen and biomimetic hydrogels without BC served as controls. Groups composed of three replicates of both Biomimetic and collagen only controls were treated with one time with serially diluted doses of doxorubicin at 0, 0.001, 0.01, 0.1, 1, and 10 uM, in cell culture media and fixed after 3 days in culture, stained, and fluorescently imaged using confocal microscopy. Tissues from three patients were used to test each cell line. Analysis was performed using Imaris™ software.

**RESULTS:** After 3 days of doxorubicin treatment, MDA-MB-231 and MDA-MB-468 cell lines showed increased survival at 10mM doxorubicin (p<0.05) in the biomimetic platform derived from patient tissue, when compared to BC cells cultured in the collagen only controls. Moreover, fluorescent confocal microscopy demonstrated doxorubicin uptake by adipocytes that was directly proportional to increasing doxorubicin concentrations. No increased doxorubicin fluorescence was detected within the collagen-only controls.

**CONCLUSION:** When cultured within a tissue engineered biomimetic platform comprised of patient tissue components, we observed significantly increased survival of two different triple negative breast cancer cell lines (MDA-MB-231 and MDA-MB-468) when compared to cultures in collagen alone. These data clearly demonstrate that the tumor microenvironment and neighboring tissue components modulates the effect of doxorubicin therapy on two different BC cell lines at least partially through adipocyte
sequestration of doxorubicin. The ability of our platform to be personalized for individual patients may allow us to not only elucidate how the microenvironment affects BC cells, but also how patient specific tissue impacts the effects of various chemotherapeutic agents.

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The Anti-fibrotic Role Of Cd74+ Ascs In Grafted Fat In The Irradiated And Non-irradiated Setting

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PURPOSE: Fat grafting is gaining popularity as a technique to reconstruct soft tissue deficiencies and reduce soft tissue fibrosis. In the setting of irradiated, hypovascular, and fibrotic recipient sites, however, fat graft retention can be significantly impaired. We have previously shown enrichment of fat grafts with adipose-derived stromal cells (ASC) can enhance fat graft survival and reverse radiation-induced injury to the surrounding soft tissue. Given the inherent heterogeneity of ASCs, however, identifying a subpopulation with enhanced antifibrotic effects may be of therapeutic benefit in the treatment of radiation-induced fibrosis.

METHODS: We performed single cell transcriptional profiling to cluster ASCs based on expression of key antifibrotic genes and then used linear discriminant analysis to identify surface markers correlating with these clusters. Dermal fibroblasts were incubated with conditioned media from CD74+, CD74-, or unsorted ASCs. Ten ng of TGF-β1 was then added to stimulate the fibroblasts and assess for procollagen type 1 production. Adult immunocompromised CD-1 nude mice were treated with 30 Gy external beam irradiation to their scalp, delivered as six fractionated doses of 5Gy over a period of 12 days. After a 5-week recovery period, irradiated mice and non-irradiated control mice were grafted with 200ul human lipoaspirate enriched with CD74+, CD74-, or unsorted ASCs. Fat graft retention was monitored radiographically over 8 weeks, at which point the mice were sacrificed and the grafted fat and overlying skin were processed for histology.

RESULTS: Single cell transcriptional profiling identified multiple surface markers which correlated with expression of antifibrotic genes. Subsequent analysis of bulk transcriptional data revealed CD74+ to identify a subpopulation of ASCs with high expression of the antifibrotic genes HGF, FGF2, and TGF-β3 (*p<0.05). Dermal fibroblasts cultured in CD74+ ASC conditioned media exhibited decreased procollagen type 1 production upon stimulation, compared to fibroblasts cultured in media from CD74- or unsorted ASCs. Grafted fat enriched with CD74+ ASCs was less fibrotic, contained less vacuoles and cysts, and had increased vascularization compared to fat supplemented with CD74- or unsorted ASCs. The CD74+ ASC-enriched fat also exhibited the greatest retention rates. These effects were more apparent in the irradiated setting.

CONCLUSION: CD74+ ASCs are a subpopulation of ASCs with anti-fibrotic qualities, and supplementation of lipoaspirate with CD74+ ASCs can improve graft retention and enhance fat graft quality. These results suggest that fibrotic remodeling in the recipient site may play an important role in the integration and vascularization of the grafted tissue.

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Tissue Monitoring with Novel Broadband Light Emitting Diode-Based Near-Infrared Spectroscopy Device

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PURPOSE: Near-infrared spectroscopy (NIRS) monitoring devices are a widely used adjunct to serial physical exams for microsurgical flap monitoring. Currently available two wavelength NIRS devices do not directly measure tissue ischemia but use the relative amount of oxidized hemoglobin to deoxyhemoglobin to calculate blood oxygen saturation (StO2). Although NIRS devices clinically improve early detection of flap compromise, StO2 readings have significant artifactual variation requiring vigilant clinician interpretation to avoid unnecessary flap re-exploration. We have previously reported the performance characteristics of