Outcomes of retained probes, as well as safety when using MRI have not been studied. We present a series of retained Cook Swartz devices examining outcomes, clinical MRI safety and image quality.

**METHODS:** A retrospective chart review was conducted of patients who underwent microvascular free tissue transfer and placement of an implantable Cook Swartz Doppler probe from July 2007 to August 2018. Routine postoperative imaging was reviewed for all patients to identify incidental findings of a retained probe. Demographics, post-operative complications, and follow up period were reviewed. Any subsequent MRIs performed on patients who we positively identified to have a retained probe were reviewed by a radiologist to detect any degradation of image quality.

**RESULTS:** A total of 323 patients underwent microsurgery followed by Cook Swartz monitoring. Eighteen (5.6%) patients were identified with an incidental radiographic finding of a retained probe and were included in this study. The retained device was detected on various imaging modalities on average 21 months (1–65) following surgery. Mean age was 49 years (25–67) with mean follow-up of 34.4 months (2–122). The indications for free tissue transfer were esophageal reconstruction (n=5), breast reconstruction (n=5), extremity reconstruction (n=5), and facial reconstruction (n=3). Removal of the device was attempted on average 36 days (5–165) following surgery. Device-related complications occurred in only 1 patient who underwent lower extremity reconstruction when the filament caused a draining sinus that resolved after surgical device removal. One other asymptomatic patient who underwent lower extremity reconstruction when the filament caused a draining sinus that resolved after surgical device removal. One other asymptomatic patient underwent elective device removal due to concerns with potential imaging quality for cancer follow-up. A total of 32 MRIs were performed in 8 patients with retained devices, including 6 patients who underwent MRIs of the surgical site. On independent review of these MRI images and the medical record, there were no complications related to the scans, and we found no significant degradation of image quality.

**CONCLUSION:** Retained Cook Swartz Doppler probes were not associated with substantial negative clinical outcomes after free tissue transfer for extremity, breast and esophageal reconstruction. Retained filaments did not affect MRI image quality of the surgical site at follow-up. Additionally, no patient who underwent MRI with a retained probe experienced any MRI-related complications due to heating or motion. If MRI is to be considered in situations with a known retained probe, we recommend that patients should be awake and communicative for the study due to the potential heating effects.

**QS36**

**A Vascularized, Three-dimensional Biomimetic Platform for Patient-Specific, ex-vivo studies of Breast Cancer Invasion and Metastasis**

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**INTRODUCTION:** Breast cancer (BC) is the most common non-skin cancer in females, affecting 12.5% of women throughout their lifetime. Partly due to a lack of models that accurately mimic the tumor microenvironment of individual patients, many preclinical successes fail translation into the clinic. Current two-dimensional models fail to replicate the cellular behaviors and interactions that occur in vivo, and newer three-dimensional systems, though promising, all lack vasculature which is crucial to understanding the mechanisms of tumor cell invasion and metastasis. We have engineered an advanced three-dimensional biomimetic platform derived from patient specific tissues that contains all components of the breast tumor microenvironment (glandular organoids, adipocytes, stromal vascular fraction (SVF)) surrounding engineered vascular structures that can be precisely positioned at predetermined distances from BC spheroids (BCS) allowing for highly novel ex-vivo investigations of the interactions between human tumor cells and blood vessels.

**METHODS:** Polydimethylsiloxane (PDMS) wells were created using 3D-printed molds that include stages for localization of BCS, and putative vascular channels (VC). Type I collagen was neutralized at 0.3% and 0.6% w/v. Red-fluorescent MDA-MB-231 cells were mixed with 0.6% collagen at a density of 40,000 cells/mL. Red-fluorescent MDA-MB-231 cells were mixed with 0.6% collagen at a density of 40,000 cells/uL; 1uL of the collagen/cancer cell mix was plated on stages of the PDMS molds and allowed to nucleate. A biomimetic platform made with BODIPY stained adipocytes and all other patient-derived tissue components mixed within both
concentrations of collagen was plated in the pre-designed well, surrounding the BCS and VC. Twenty-four hours after plating, fluorescently labeled endothelial cells (EC) and smooth muscle cells (SMC) were seeded within the channel at a concentration of 5 million cells/mL. Control constructs were made by generating vascular structures and BCS within a collagen-only matrix, and by creating full biomimetic platforms with vascular channels in the absence of cancer cells. Constructs were cultured for 7 days, formalin-fixed, counterstained with DAPI, and analyzed with confocal microscopy.

RESULTS After 7 days in culture, confocal microscopy revealed successful fabrication of biomimetic platforms with a type I collagen (different concentrations) extracellular matrix containing patient-derived adipocytes, SVF and breast duct organoids. Patent VC lined with fluorescently labeled SMC and EC were visualized within the platform, with vascular walls located within 1mm of the red fluorescent, triple-negative MDA-MB-231 cancer foci. Invasion of BC cells into the surrounding tissue was identified by the presence of red fluorescent cells within the biomimetic platform in constructs containing type I collagen at both 0.3% and 0.6% w/v. Decreased vascular integrity was observed in constructs containing BCS when compared to those without BC cells.

CONCLUSION With the aid of three-dimensional printing technology, we have successfully engineered an advanced, patient-specific, biomimetic platform of the breast cancer microenvironment that not only replicates patient tissue characteristics, but also includes vascular structures and cancer foci that closely resemble early tumors. Observed BC invasion into the surrounding microenvironment, and the platform’s ability to mimic patient specific tissue with extremely high fidelity, make this platform a highly versatile and powerful tool that holds significant promise for diagnostic and therapeutic applications in the study of breast cancer.

QS37

Induction Of Delayed Immune Tolerance After Reconstructive Transplantation By Combining Donor Bone Marrow Transplantation And High-dose Cyclophosphamide Treatment

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PURPOSE: Developing novel treatment concepts to minimize/avoid immunosuppression by induction of immune tolerance represents a primary goal in the field of transplantation. Immunosuppression-free allograft survival has been achieved in several animal models as well as in humans in living-related combined kidney and donor bone marrow transplantation by inducing mixed hematopoietic chimerism. However, success of this concept relies on extensive pre-transplant recipient preconditioning which is not feasible in VCA. Many VCAs though inherently contain vascularized donor bone marrow and thus a vital bone marrow niche home to donor-derived hematopoietic progenitor cells facilitating chimerism induction. In this study we therefore explored a novel approach to induce delayed immune tolerance subsequent to conventional immunosuppressive treatment combining high-dose cyclophosphamide treatment and donor bone marrow transplantation.

METHODS: Orthotopic hind limb transplantation from Balb/c to C57BL6 mice is performed across a full MHC mismatch barrier. Recipient animals are assigned to a course of long-term treatment with conventional mTOR inhibitor-based immunosuppression. Induction treatment comprises non-myeloablative total body irradiation (TBI) and T-cell depletion and a single dose of cyclophosphamide (Cy) on POD 30 combined with donor bone marrow transplantation (dBMT) in selected groups. Animal survival, donor bone marrow engraftment, and frequency of memory T cells are assessed via flow cytometry on a weekly basis prior and after the application of the delayed tolerance regimen.

RESULTS: Untreated animals rejected their grafts acutely within 8±1 days. In treated animals, allograft survival was maintained over 30 days with conventional immunosuppression (Rapamycin) followed by Cy +/- dBMT which prolonged graft survival to 76.5d (±25.89d) without dBMT.