interactions between primary human breast adipocytes and BC cells. Transfer of fluorescently-labeled lipids directly from adipocytes to BC cells may induce aberrant metabolism to fuel malignant growth and adaptive survival, while the presence or absence of ASCs and adipocytes enables analysis of their effect on metastatic progression. Our novel, 3D platform can untangle the complex interplay within the entire breast cancer tumor microenvironment for high-throughput analysis and can help elucidate the safety of adipose tissue transfer, with and without ASC enrichment, in breast reconstruction in post-oncologic breast reconstruction.

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Vascularized Bone Grafting for Reconstruction of Oncologic Defects in the Spine: A Systematic Review and Pooled Analysis of the Literature

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PURPOSE: Resection of primary spinal tumors inevitably requires reconstruction of the resultant defect for restoration of spinal column stability. Traditionally, some combination of bone grafting and instrumentation is implemented. However, delayed healing environments are associated with complications including pseudoarthrosis and failure with use of these modalities. Implementation of vascularized bone grafting (VBG) in lieu of avascular grafts to complement hardware may present a solution to this dilemma. In order to assess the efficacy of and indications for VBG in oncologic spinal reconstruction, we performed a systematic review and pooled analysis of relevant literature.

METHODS: We searched PubMed/MEDLINE, Embase, Cochrane, and Scopus databases for relevant studies published through September 2017, according to PRISMA guidelines. We performed a pooled analysis of studies with n &gt; 5, to estimate the percentage of overall complications, wound complications, fusion, and reoperation rates using RevMan software.

RESULTS: We identified 21 eligible studies and ultimately executed a pooled analysis of 12. Our analysis indicates an 89% rate of successful union (95% CI: 0.75–1.03) when VBG is employed in spinal reconstruction after primary tumor resection. The associated overall complication rate was 42% (95% CI: 0.23, 0.61) and reoperation rate was 27% (95% CI: 0.12, 0.41) in the pooled cohort. According to our review only 15 out of a total 209 patients (7.2%) had instrumentation failure and mean time to union was 5.97 months. Overall, consensus in the literature is that introduction of vascularized bone into previously irradiated or infected tissue beds proves advantageous given decreased bone resorption, increased capacity for load bearing, and faster consolidation as compared to other methods. Reported downsides to this technique included longer operative times, potential donor site morbidity, and difficulty in coordinating care to ensure access to a microsurgeon.

CONCLUSION: Our results demonstrate that overall complication rates after use of VBG is not wildly different from those reported in studies using non-VBG for similar spinal reconstructions, however fusion rates are better. In particular 89% fusion is demonstrated in our analysis versus rates ranging from 37–49% in studies using non-VBG. Given these rapid fusion rates and even the possibility of hardware independence, VBG may be particularly useful in reconstructing large defects in patients with longer life expectancies and therefore higher anticipated strain on constructs. This technique is also worth consideration for patients with a history of chemoradiation and/or infection at the site of tumor resection. Our experience supports use of VBG for creating strong, stable spinal constructs, particularly in said higher risk patients.

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Structural Analysis of Murine Versus Human Adipose Tissue Via Three-Dimensional Confocal Microscopy
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PURPOSE: Murine models are commonly employed to simulate aspects of human adipose physiology. Tremendous advances in our understanding of human obesity and endocrinology have been made possible by comparative studies in mice. However, fat depots — both within and between species — differ dramatically in their transcriptional properties. Understanding the fundamental differences between human and mouse adipose tissue, and thus the inherent limitations of murine models, begins with comparing their basic architecture. This study employs whole tissue mounting and confocal microscopy to characterize the three-dimensional architecture of the mouse inguinal fat pad, and two significant human fat depots, the lower abdomen and gluteofemoral regions.

METHODS: Abdominal and gluteofemoral adipose tissue specimens were obtained from three operative patients each, in accordance with Stanford Institutional Review Board policy. The patients ranged in age from 35 to 60 years and had no significant prior medical history. Bilateral inguinal fat pads were harvested from three Crl:CD1-Foxn1nu CD-1 Nude mice. The human samples were incubated in Human CD34 PE-Cy 5.5 Conjugate and Phosphate Buffered Saline (PBS) for 24 hours. Similarly, the mouse inguinal fat pad samples were incubated in purified anti-mouse CD34 antibody and PBS for 24 hours. The mouse and human specimens were separately incubated in a staining master mix containing Isolectin endothelial cell stain, LipidTox adipocyte stain (Thermo Fisher Scientific; Waltham, MA), and Hoechst nuclear stain for two hours and then whole-mounted. Laser scanning confocal microscopy was performed using the Leica TCS SP8 X. Three-dimensional volume rendering and analysis was performed on Imaris software (Bitplane AG; Zurich CH).

RESULTS: In general, there are significantly more vessels per adipocyte in mouse compared to human abdominal or gluteofemoral fat (p < 0.05). Quantification of ASC as normalized to adipocyte number shows similar ASC density between species (p = 0.31). Moreover, the ratio of ASC to blood vessels is significantly reduced in mouse compared to human fat (p < 0.05); however, the mean distance between ASC and blood vessels in human fat is significantly greater compared to mouse (p < 0.05). Expectedly, human adipocytes were generally larger and more heterogeneous in size. Frequency distribution of adipocyte volume in mouse and human samples demonstrates significantly greater diversity in human tissue (p < 0.05).

CONCLUSION: The basic architecture of human adipose tissue differs significantly from that of mice. These differences likely confer variance in functional properties between the two sources. Thus, caution should be exercised when drawing parallels between the two species, particularly when designing murine models of human disease.

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Proximal and Distal Recipient Vessels Are Associated with Equivalent Outcomes in Lower Extremity Trauma Free Flap Reconstruction: A 312 Patient Series and Systematic Review

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PURPOSE: Recipient vessels proximal to the zone of injury have traditionally been preferred in traumatic lower extremity free flap reconstruction. This is due to presumed changes in the caliber and quality of vessels within and distal to the site of trauma that may result in less favorable outcomes and higher rates of flap failure. However, more recent data have shown mixed outcomes when performing anastomoses distal to the zone of injury. This study investigates the impact of lower extremity recipient vessel location on free flap outcomes.