there is a reversal of tension-induced skin growth characteristics, specifically if the Lgr6 stem cell population recovers after tension is removed. Our results will guide future research in therapeutic interventions for optimal skin recovery following tension, such as seen with bariatric surgery and the resulting excess skin from rapid weight loss.

**METHOD:** Genetic Lgr6-EGFP-Cre-ERT2;tdTomato mice (EGFP=Lgr6, tdT=Lgr6 descendants) underwent controlled expansion (E) of the back skin. A tissue expander was surgically placed under the back skin on day zero, rested for 7 days, expanded over 10 days with a total of 24mL saline, rested for 14 days, then deflated of saline at post-injection day 14 (PI-14) or deflation day zero (DF-0). Skin over the expander was resected, embedded in paraffin, and sectioned at 4µm. Cell populations were defined using immunofluorescence and quantified by relative expression and cell counting (ImageJ). Control mice underwent expander surgery but did not undergo saline expansion (non-expanded, NE). NE and E mice (n=3 each) were compared for PI-14, DF-14, and DF-56. We used two-tailed t-test with alpha set at 0.05.

**RESULTS:** Relative expression of EGFP decreased from NE to both DF-14 (p=0.0474) and DF-56 (p=0.0477), while relative expression of tdT increased from NE to DF-56 (p=0.0125). EGFP+ cells decreased from NE to PI-14, DF-14, and DF-56 (p=0.0114 for all), while tdT+ cells increased from NE to PI-14, DF-14, and DF-56 (p=0.0086, p=0.0133, p=0.00002). Proliferating cells (Ki67+) increased from NE to PI-14, DF-14, and DF-56 (p=0.0007, p=0.0001, p=0.0417), but decreased from DF-14 to DF-56 (p=0.0278). Of the proliferating cell population, the [Ki67+tdT+] population increased from NE to DF-56 (p=0.0002). Cytokeratin 5 (K5) relative expression increased from NE to PI-14, DF-14, and DF-56 (p=0.0109, p=0.00001, p=0.00001). The number of epidermal keratinocyte layers increased from NE to PI-14, DF-14, and DF-56 (p<0.00001, p<0.00001, p=0.0043), with a decrease from DF-14 to DF-56 (p=0.0020).

**CONCLUSION:** The epidermal Lgr6 stem cell population remained severely depleted following discontinuation of mechanical tension. Conversely, both the Lgr6 descendant population and K5 stem cell expression continued to increase while under tension and following release of tension. A prolonged history of discontinued tension revealed that the majority of the proliferating cell population was from Lgr6 progeny. Together, these observations suggest that in skin with a history of tension: (1) the Lgr6 population is permanently depleted, (2) the majority of the epidermis will be from Lgr6 progeny, and (3) Lgr6 progeny and K5 stem cells will be preferentially and progressively activated over Lgr6 stem cells to maintain the epidermis. Overall, these results imply that specific stimuli will prioritize responses from specific stem cell populations, and possibly to the detriment of an existing stem cell population.

**REFERENCES:**
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**TRACK: BREAST**

**Post Mastectomy Tissue Expander Placement followed by Radiation Therapy: A Cost-effectiveness Analysis of Staged Autologous vs. Implant-based Reconstruction**

**Presenter: Joshua Alex Bloom, MD**

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**PURPOSE:** There is no clearly preferred approach to breast reconstruction in patients with locally advanced breast cancer who require post-mastectomy radiation therapy (PMRT). Staged implant and deep inferior epigastric perforator (DIEP) flap reconstruction each have unique risks and benefits. No previous study compares the cost-effectiveness of these approaches with validated utility scores.

**METHOD:** A literature review looking at prospective trials determined the probabilities and outcomes for mastectomy and staged implant reconstruction or staged DIEP flap reconstruction. Utility scores were used to calculate the quality adjusted life years (QALYs) associated with a successful procedure and post-operative complications. Medicare current procedure terminology and diagnosis-related group codes were used to assess the costs for a successful surgery and associated complications. A decision analysis tree was constructed with rollback analysis to highlight the more cost-effective strategy. An incremental cost-effectiveness ratio (ICER) analysis was performed with a willingness
to pay at $50,000. Deterministic and probabilistic sensitivity analyses were performed to validate the robustness of the results, and to account for uncertainty in the data.

RESULTS: Mastectomy with staged DIEP flap reconstruction is costlier ($14,104.80 versus $3,216.93), but more effective (29.96 versus 24.87) compared to staged implant reconstruction. This resulted in an ICER of 2141.00, which favored DIEP flap reconstruction, indicating a dominant strategy. In one-way sensitivity analysis, DIEP flap reconstruction was the more cost-effective strategy if the cost was less than $257,444.13. Monte Carlo analysis showed a confidence of 99.99% that DIEP flap reconstruction is more cost-effective.

CONCLUSION: For patients with locally advanced breast cancer who require PMRT, mastectomy followed by staged DIEP flap reconstruction is significantly more cost-effective when compared with staged implant reconstruction. Despite the decreased morbidity, staged implant reconstruction has much greater rates of complication in irradiated fields including capsular contracture and infection.

TRACK: PRACTICE MANAGEMENT
Streamlining and Consistency in Surgery: Lean-Six-Sigma to Improve Operating Room Efficiency

Presenter: Rebecca Claire Suydam, BA
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PURPOSE: Improving peri-operative efficiency helps reduce unnecessary surgical expenditure, increase operating room (OR) throughput, improve patient safety, and enhance staff and patient satisfaction. Lean Six-Sigma (LSS) is a quality improvement model that has been successfully applied to eliminate inefficiencies in the business sector but has not yet been widely adopted in medicine. This study investigates the adaptation of LSS improving operative efficiency for plastic surgery procedures.

METHOD: The authors followed the Define, Measure, Analyze, Improve, and Control (DMAIC) phases to implement LSS. The key outcome measures gathered were operative times, including the cut-to-close time and the total time the patient spent in the operating room.

RESULTS: The study included a total of 181 patients who underwent immediate bilateral DIEP flap breast reconstruction between January 2016 and December 2019. The LSS interventions were associated with a decrease in total operative time from 636.36 minutes to 530.35 minutes, and a decrease in the time between incision to closure from 555.16 minutes to 458.85 minutes for a bilateral mastectomy with immediate DIEP flap breast reconstruction.

CONCLUSION: This study demonstrates that Lean-Six-Sigma is useful to improve peri-operative efficiency during complex plastic surgery procedures. The workflow of the procedure was improved by determining the optimal spatial positioning and distinct roles for each surgeon and preparing surgeon-specific surgical trays. Two process maps were developed to visualize the positioning of the surgeons during each stage of the procedure and depict the parallel workflow that helped improve intraoperative efficiency.

TRACK: RESEARCH/TECHNOLOGY
PAPER
Targeting Persister Hyperbiofilm Forming Bacterial Infection: The GelATA Wound Care Dressing

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PURPOSE: Management of chronic wounds resistant to antibiotics is a clinical challenge. Persister bacterial phenotypes such as small colony variants (SCV) are a subpopulation of antibiotic-tolerant bacterial cells that are often hyperbiofilm forming in nature. The key to managing such hostile biofilms of persister bacteria is complete eradication and one approach is to dismantle the structural framework of these biofilms. Extracellular DNA is a major component of the biofilm. DNase treatments can eradicate standard biofilms but not