of an animal model that mimics severe FBR could be used to identify which factors give rise to this exaggerated response and to identify cellular and molecular targets for prophylaxis and therapy. Our lab has previously shown that applied mechanical stress can increase the severity of fibrotic reaction during wound healing by activation of mechanotransduction pathways. Here we hypothesized that application of mechanical stress by vibration of motorized implants might induce hyper FBR.

**METHODS:** We manufactured cylindrical polydimethylsiloxane (PDMS) implants which could be adapted to house small, prefabricated coin motors. The coin motors can be powered using an external battery to induce vibration of PDMS implants in situ. These vibration-enabled implants were implanted in the subcutaneous space of WT C57/BL6 mice. Non-vibrating PDMS implants were used as controls. Beginning on post-operative day 4, mice with vibration-enabled implants were sedated and their implants vibrated 1 hour daily for 8 days. Subsequently, mice from each group were euthanized at 2-week and 4-week endpoints, and implants were resected en-bloc with surrounding capsule and tissue intact. Fibrotic tissue surrounding the implants was analyzed using: 1. immunohistochemistry to analyze tissue fibrosis, 2. mass spectrometry to analyze protein content of FBR capsules, and 3. single-cell RNA sequencing to identify cells that mediate hyper FBR. Additionally, patient-derived FBR capsules from explanted biomedical devices were analyzed for validation of the animal model.

**RESULTS:** Histological analyses of tissue around the implants sections revealed that mechanical vibration of PDMS implants leads to an increased fibrotic reaction. At the 2-week timepoint, tissue surrounding control implants was predominantly granulation tissue, characterized by an early inflammatory response with increased vascularization. In contrast, tissue surrounding vibration-enabled implants displayed a more mature collagenous capsule formation. Additionally, analysis of trichrome-stained tissue sections revealed a significant increase in average collagen density around vibration-enabled implants as compared to controls. Comparison of FBR capsules from mice and humans revealed that the vibration-enabled implants in mice more closely resembled the tissue architecture of human FBR capsules than controls.

**CONCLUSION:** Our data suggests that this novel Hyper FBR mouse model may approximate clinical implant encapsulation and rejection seen in human patients. We are currently investigating specific mechanotransduction pathways activated during hyper FBR, which could serve as potential targets for therapy. Further research may lead to the development of specialized treatments which attenuate FBR and prolong optimal function of biomedical implants.
known role of these cells in homeostasis. Importantly, Treg depletion also led to a 1.4-fold increase in bacterial clearance ($P=0.042$) and a 4.5-fold increase in antibody production ($P=0.0089$) as compared to ALND-treated mice with intact Tregs. In addition, compared to Treg-intact mice, Treg-depleted mice had significantly more activated dendritic cells (DCs) both in the ipsilateral forelimb ($P<0.0001$) and cervical lymph nodes (the closest drainage lymph node basin after ALND) ($P<0.0001$) following ALND. LNT resulted in a similar mitigation of local immunosuppression. Furthermore, analysis of the transplanted axillary lymph nodes demonstrated that these lymph nodes actively participated in bacterial clearance and DC trafficking.

CONCLUSIONS: The accumulation of Tregs in lymphedema impairs bacterial phagocytosis and DC activation, thus contributing to local immunosuppression. LNT results in restoration of these important immune responses.

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Novel Antibiotic Thin Films Prevent Surgical Implant Infections

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PURPOSE: Many common procedures in plastic surgery involve implantation of foreign bodies to achieve a cosmetic or functional goal. These materials can range from silicone breast implants, to expanded polytetrafluoroethylene (ePTFE) facial implants, to titanium plates, screws, and wires for hand and craniofacial reconstruction. Surgical implant-associated infections are not common, but can be the cause of significant morbidity when they occur. We have developed a novel method of coating surgical implants that is cheap, easy, and effective at preventing implant infection in vivo.

METHODS: Pieces of silicone breast implant were coated with doxycycline; pieces of ePTFE vascular grafts and titanium screws were coated with doxycycline, erythromycin, chloramphenicol, and levofloxacin using our novel dip-coating method which results in an evaporative-induced molecular crystal film on the surface. Wildtype mice underwent sterile subcutaneous implantation of either antibiotic-coated or vehicle-coated silicone, ePTFE, or titanium after which meticillin resistant S. aureus (MRSA) or P. aeruginosa in saline were directly inoculated into the wound. After three days, mice were sacrificed, and the implants were harvested and subjected to bath sonication to release adherent bacteria. Bacterial counts then were quantified using a plate dilution method.

RESULTS: Silicone coated with doxycycline reduced implant colonization by 1.7 log after MRSA inoculation and by 2.7 log after $P. aeruginosa$ inoculation ($p<0.05; n=8$). ePTFE coated with erythromycin, doxycycline, chloramphenicol, and levofloxacin reduced MRSA and $P. aeruginosa$ implant colonization by 3.2, 4.7, 2.3 and 3.7 log, and 3.3, 2.7, 2.8 and 3.7 log, respectively ($p<0.05; n=9$). Titanium coated with erythromycin, doxycycline, chloramphenicol, and levofloxacin reduced MRSA and $P. aeruginosa$ implant colonization by 2.5, 2.6, 2.3, and 2.9 log and 0.3, 2.8, 2.4 and 3.3, respectively ($p<0.05; n=9$) compared to vehicle-coated controls.

CONCLUSION: Wound infection is the dreaded complication of foreign body implantation due to the significant pain, suffering, and prolonged subsequent treatment. We present a novel, cheap, easy, and effective method for coating surgical implants that demonstrates marked reduction of implant infection against MRSA and $P. aeruginosa$ in a murine model.

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Lymphatic Endothelial Cell Tubule Formation in 3D Culture is Inhibited by Increased Matrix Pressure

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