The purpose of the study was to demonstrate the antimicrobial property of integrating taurolidine, a taurine derivative, into the matrix of two types of monofilament fibers to simulate sutures with e-caprolactone (the major component of Monocryl) and p-dioxanone (PDS II).

Taurolidine was successfully loaded at 2.6 and 10% by weight throughout the matrix of the fibers. 400 ul of early phase Pseudomonas aeruginosa (PA01), the Staphylococcus epidermidis (S.epi 35984), and the multidrug resistant Staphylococcus aureus strain SA BAA-44) were plated separately into square plates. 200 ul of each were introduced into 25cmX25cm plates. Four pieces of each fiber were individually placed in the plates. The fibers tested were taurolidine loaded at 2, 6 and 10% dispersed in poly e-caprolactone and 2, 6, and 10% dispersed in p-dioxanone. After 24 hours of exposure the zone of inhibition surrounding each fiber sample was measured in mm. In order to demonstrate quantitative bacteria kills with living microorganisms, each of the fibers were placed in 12 well bottom culture discs that had 1 ml of Tryptic Soy Buffer containing 100 ul of each of the fibers were placed in 12 well bottom culture discs that had 1 ml Tryptic Soy Buffer containing 100 ul of each of the 3 bacteria: Pseudomonas aeruginosa (PA01), Staphylococcus epidermidis (S.epi 35984) and multidrug resistant Staphylococcus aureus strain SA BAA-44). After 24 hours of exposure, kills were measured for each micro-organism tested using a quantitative analysis.

Results from the zone of inhibition study revealed a statistically significant increase in the zone of inhibition, as measured in mm, of all three bacteria tested in 6% and 10% taurolidine loaded e-carolacone fibers and in 2%, 6% and 10% taurolidine loaded p-dioxanone fibers versus control fibers containing 0% taurolidine. Quantitative determination of Pseudomonas aeruginosa bacteria showed total kills for fibers that contained 6% or greater taurolidine in e-caprolactone fibers. Measurements for Staphylococcus aureus total kills were observed for all the e-caprolactone fibers that contained 2% or greater taurolidine and 6% or greater taurolidine in p-dioxanone fibers. Quantitative analysis of Staphylococcus epidermidis cultures demonstrated total bacteria kills for fibers containing 6% or greater taurolidine in e-caprolactone.

Taurolidine loaded fibers resist growth of bacterial in the vicinity of fibers as evidenced by zone of inhibition studies. Taurolidine loaded fibers have the ability to kill representative microorganisms that have great clinical significance. Taurolidine is an effective anti-microbial, non anti-biotic, where organisms are unlikely to develop resistance.
polarized to the M2 phenotype in vitro and in vivo. Full-thickness excisional wounds all healed significantly faster (*p<0.05) when treated with macrophages seeded onto the IL10 scaffold.

CONCLUSION: Our results demonstrate that our novel proprietary scaffold can polarize macrophages to the M2 phenotype and deliver supraphysiologic levels of macrophages to wounds to significantly accelerate wound healing in the absence of adverse effects on scar size and quality. Polarizing macrophages on a scaffold in vivo minimizes time in cell culture and is a desirable method for simultaneous directed differentiation and cell delivery. With further studies, this could prove to be a novel therapeutic for wound regeneration.

DISCLOSURE/FINANCIAL SUPPORT: Supported by the Howard Hughes Medical Institute Medical Research Fellowship, the California Institute for Regenerative Medicine (CIRM) Clinical Fellow training grant TG2-01159, the American College of Surgeons (ACS) Resident Research Scholarship, the American Society of Maxillofacial Surgeons (ASMS)/Maxillofacial Surgeons Foundation (MSF) Research Grant Award, NIH grant R01 GM087609, the Hagey Laboratory for Pediatric Regenerative Medicine and The Oak Foundation, and the Gunn/Olivier fund. None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Bioactive Peptide Amphiphilic Gels Enhance Burn Wound Healing: In Vitro and In Vivo Studies

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INTRODUCTION: More than 2.5 million Americans suffer burn injuries annually. Many methods have been used to manage burn injuries including skin grafts, various dressings, and a variety of systemic and topical agents. Despite this, burn wounds continue to be a major health problem. Our previous report showed that peptide amphiphilic (PA) gels promote cell proliferation and have great potential in regenerative medicine for rapid repair of peripheral nerve. In this study we hypothesized that the PA gels are capable of accelerating the wound healing in the burn injury.

MATERIALS AND METHODS: The thermal damaged fibroblasts and human umbilical vein endothelial cells (HUVECs) models were artificially manufactured, then seeded onto the various PA gels. The cell proliferation was assessed via WST-1 assay at different time points. To determine the in vivo effects, the burn wounds of rats were treated with RGDS PA gel or non-treatment. The wound closure was observed every other day, and skin samples were harvested each week for histologic and immunohistochemical analysis.

RESULTS: The cell proliferation in both E2-NH2-RGDS PA and E3-NH2-RGDS PA were each significantly higher than that in backbone-PA gel and collagen gel. The E3-NH2-RGDS-PA gel significantly enhanced re-epithelialization during the burn wound healing process between day 7 and day 21.

CONCLUSION: The application of PA gels accelerates the recovery of deep partial thickness burn wounds by stimulation fibroblasts and epithelial cells proliferation and promoting wound closure. We believe that this novel biomaterial represents new therapeutic strategies to challenges we currently face in treating clinical burn diseases.

DISCLOSURE/FINANCIAL SUPPORT: None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Open-Source, Customizable, 3D-Printed Ocular Prosthetics as a Viable Alternative to Traditional Ocular Prosthetics

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INTRODUCTION: Disfiguring eye conditions cause significant psychosocial distress. For enucleation, phthisis bulbi, or even disfigured blind eyes, among other conditions, ocular prosthetics not only serve an extremely valuable cosmetic purpose, but also help maintain the anatomic integrity of the orbit. Current ocular prosthetics are costly and are time consuming to produce with an average cost ranging from $1500–8000 and production time between 4–6 weeks. We developed a 3D-printed