was used to subtract head movement (translation and rotation) from the facial markers. The analyses in this study were restricted to two markers: midline lower lip and a virtually calculated midline jaw marker. A marker at the top of the nose bridge was used as the origin point. The following kinematic variables were obtained from each lip-jaw movement time-series: peak movement speed (mm/s), and displacement (mm). Each patient was instructed to perform 10 repetitions of the phrase "buy bobby a puppy" at his or her typical speaking rate and volume. Sentence-level intelligibility was obtained using the Sentence Intelligibility Test (SIT) and word-level intelligibility was obtained using the Word Intelligibility Test, using standard procedures. Intelligibility, measured in percentage of words correctly transcribed, and speaking rate, measured in words per minute (wpm), was derived from the SIT sentences for each patient. Intelligibility, measured in percentage of words correctly chosen via multiple choice was derived from the Word Intelligibility Test. RESULTS/ANTICIPATED RESULTS: Effect sizes (Cohen's d) across the 10 trials of "buy bobby a puppy" were computed to assess the effects of recovery time on range of motion and speed of the lower lip alone, the jaw alone, and the lower lip and jaw together for both range of motion and for speed. The largest effect sizes were observed for increased range of motion and increased speed of the articulators for participants within 24 months of surgery. Smaller effect sizes were observed for these parameters for the participants in the later stages of recovery, with some participants showing declines in range of motion and speed of some but not all articulators. Descriptive statistics indicate that both speech and word intelligibility improvements are most notable in the first two years following transplantation and appear to plateau during the later stages of recovery. Only two out of five of our participants achieved "normal" speech intelligibility (i.e., >97%) at five years post-transplantation. DISCUSSION/SIGNIFICANCE OF IMPACT: Biomechanical assessment revealed that kinematic recovery of articulator range of motion and speed appears most significant in the first two years following surgery, but that improvement continues to some degree as far as five-years post-transplant. Clinically-based assessments suggest that gains in intelligibility appear to plateau by 3-years post-surgery.

3559

Mechanisms of sebaceous skin microbial community remodeling through microenvironment modulation.

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OBJECTIVES/SPECIFIC AIMS: To understand the mechanisms of how a non-antimicrobial can reshape a commensal microbe community to cure a ubiquitous human disease. METHODS/STUDY POPULATION: Whole genome sequencing of bacterial isolates, metabolomic investigations of previously collected skin microbe isolates from patients, and structural investigations of a protein from these skin microbes. RESULTS/ANTICIPATED RESULTS: Metabolic pathways associated with adaptation to a changing skin microenvironment, novel antimicrobial characterization, and a structural understanding of a novel nutrient acquisition protein. DISCUSSION/SIGNIFICANCE OF IMPACT: Multiple angles of this investigation are poised to improve current non-antimicrobial dermatologic treatments and they have the potential to impact microbe-related diseases in other human microenvironments.

3496

Mesenchymal Stem Cell Extracellular Vesicle Delivery in a Shear-Thinning Hydrogel For Therapy in an Acute Myocardial Infarction Model: A Comparative Analysis

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OBJECTIVES/SPECIFIC AIMS: The primary aim is to assess differences in therapeutic effect between MSC and EPC EVs on acute ischemic rat hearts through delivery in a biocompatible and shear-thinning hydrogel. Primary outcomes for therapeutic assessment include an in-vitro angiogenesis assay and in-vivo hemodynamic analysis, mainly identifying differences in ejection fraction and contractility. Secondary hemodynamic outcomes include cardiac output, stroke volume, and end-diastolic pressure volume relationship (EDPVR). Secondary structural outcomes include post-mortem scar analysis and immunohistochemistry (IHC) staining for angiomyogenesis. METHODS/STUDY POPULATION: MSCs and EPCs will be cultured according to previously published protocols. EVs will be isolated from cultured cell lines through precipitation methods with polyethylene glycol. EVs will be qualitatively analyzed with nanoparticle tracking analysis (NTA) and flow cytometry. The shear thinning hydrogel (STG) will be constructed using a hyaluronic backbone conjugated to adamantane or beta-cyclodextrin, ultimately facilitating guest-host interactions with shear thinning properties. Controls and treatment groups mixed with the hydrogel will be injected into the border zone of infarcted Wistar rat hearts immediately following a left anterior descending artery ligation. Hemodynamic assessment will be performed at four weeks through left ventricular catheter based pressure-volume recordings. Ex-vivo analysis will include scar thickness assessment using Masson collagen staining and IHC stain for vessel (anti-vonWillebrand factor; anti-Isolectin) and myocyte formation (anti-cardiac Troponin I). RESULTS/ANTICIPATED RESULTS: We hypothesize that, in-vitro, MSC-EVs will demonstrate non-inferior angiogenic potential as compared to EPC-EVs. We posit that MSC-EVs will demonstrate superior therapeutic effect to EPC-EVs in-vivo as measured by functional hemodynamics and structural assessment. We have successfully isolated MSC and EPC EVs and have validated uniformity across EV populations (Figure 1). Preliminary data from the angiogenesis assay (n=3) demonstrated that MSC-EV and EPC-EV produce non-significantly different angiogenic potential as measured by number of vascular meshing extremes (p=0.144) and length of master vascular segment (p=0.193), with significant differences compared to either positive or negative controls. DISCUSSION/SIGNIFICANCE OF IMPACT: Novel regenerative therapies are needed for patients with a history of AMI given current limitations to therapy and sequelae of ischemic heart disease. Delivery of extracellular vesicles through a shear-thinning gel is a novel "off-the-shelf" translational approach to address the current clinical need.

3019

Metabolomic Markers of Methotrexate Response in Juvenile Idiopathic Arthritis

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OBJECTIVES/SPECIFIC AIMS: In this study, a semi-targeted metabolomics approach is used to identify metabolic markers of