**POSTER**

**The Use of Fluorescent and Heat Generating Polymer Nanoparticles As a Novel Treatment for S. Aureus Skin Lesions**

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**INTRODUCTION:** Skin infections due to bacteria represent significant morbidity and mortality in healthcare. *Staphylococcus aureus* (SA) is of particular importance because it is the most commonly isolated pathogen in surgical site infections, diabetic foot ulcers, and chronic wounds. The current treatment for skin infections ranges from empiric antibiotic therapy to aggressive surgical debridement. Mild hyperthermia, defined as temperatures less than 42°C, has been shown to enhance antimicrobial activity and represents a new approach for the treatment of local infections. The aim of this study was to investigate whether novel polymer nanoparticles, capable of producing localized mild hyperthermia when exposed to infrared light, can be used to more effectively treat infectious skin lesions while sparing the surrounding healthy tissue.

**AIM:** Evaluate the efficacy of nanoparticle-mediated mild hyperthermia to augment localized antibiotic activity and reduce bacterial colonization in an infectious skin lesion mouse model.

**METHODS:** Sixteen Balb/C mice received subcutaneous injections of live bioluminescent SA to develop the skin lesions. After three days, the mice were randomly sorted to receive standardized concentrations of intraleisional gentamicin, intraleisional nanoparticles, and/or localized infrared laser therapy. Twenty-four hours after treatment, the animals were imaged with the *in vivo* imaging system (IVIS) to detect SA bioluminescence and nanoparticle fluorescence within the lesions. Each lesion was analyzed using region-of-interest photon emission from the SA colonies.

**RESULTS:** Bacterial bioluminescence was detected using IVIS and allowed for the identification of bacteria within and outside the visible lesion. Nanoparticle fluorescence was also detected and demonstrated successful co-localization with bacteria in the skin lesions. Treatment with nanoparticles, gentamicin, and infrared light resulted in a 92% reduced detection of bacterial colonies compared to treatment with gentamicin alone.

**CONCLUSION:** This project establishes an innovative animal model to investigate the use of mild heat-generating nanoparticles as a novel treatment for infectious lesions. Treatment with nanoparticles, gentamicin, and infrared light was the most successful in limiting bacterial proliferation as detected by luminescence signal. Now that a preclinical animal model utilizing bioluminescent bacteria and fluorescent nanoparticles has been established, this study can be expanded to include larger sample sizes, as well as to explore the effects of localized mild hyperthermia on antimicrobial activity, long-term wound healing, aesthetics, and pathogen eradication. In addition, the successful use of bioluminescent bacteria for *in vitro* colony identification and differentiation can be expanded to other non-sterile infectious models and those with a risk of sample contamination.

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**Retrospective Study Comparing Efficacy of Enzymatic Debridement with Nexobrid with Traditional Treatment in Circular Deep Burns in Prevention of the Compartment Syndrome**

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INTRODUCTION: Deep circular burns may threaten viability of an extremity, among other reasons, as a consequence of the compartment syndrome caused by fluid leakage and the restriction of compartment expansion caused by a rigid eschar. The enzymatic debriding agent Nexobrid® allows for the performance of an early and selective debridement of burned tissues by the first evaluation of a burned patient. One of its most supported indications are circular deep burns, with the aim of preventing and also treating the compartment syndrome.

MATERIAL AND METHODS: A retrospective review of the medical records of 33 patients attended at the Great Burns Unit of the Hospital La Fe of Valencia, Spain, was performed. The review included patients suffering deep second-degree and third-degree circular burns caused by either scald, contact or flames, affecting lower or upper limbs, treated from January 2014 to January 2017.

RESULTS: 33 patients were included in the study, from which 25 were managed with the traditional treatment, and 11 treated with the enzymatic debriding agent Nexobrid®. In the traditional treatment group, 11 scharotomies were performed, while the Nexobrid® group required none. This difference proved to be statistically significant (p<0.05).

CONCLUSIONS: According to the results of this study, the use of the enzymatic debriding agent Nexobrid® can avoid or reduce the need of the performance of scharotomies in patients suffering from circular deep burns affecting limbs, preventing the morbidity associated to this procedure.

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Special Considerations for Upper Lip Reconstruction: A Systematic Review

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INTRODUCTION: The upper lip plays a significant role in facial animation and aesthetics. For that reason, reconstruction of defects involving the upper lip can be challenging. The purpose of this review is to analyze the mechanics of local flaps and provide a methodical approach for reconstruction of upper lip defects.

METHODS: A systematic review of the literature was performed using the PubMed database from 1978 -2017. Articles focused on the anatomy, histology and function of the upper lip, as well as reconstruction of defects with local flaps were included. Non-human studies and articles analyzing free flap reconstruction were excluded.

RESULTS: The primary role of upper lip is coverage of dentition and facial animation, while lower lip is critical for oral competence, speech and eating. In addition to the orbicularis oris, several muscles contribute to upper lip function. Elevation is executed by the coordinated action of the levator nasii septi, levator labii superioris alaeque nasi, levator labii superioris, zygomaticus major and minor, levator anguli oris and risorius. Eversion is performed solely by levator labii superioris. Anatomic studies have shown that animation muscles have various insertion points,