Combinational Effects of Early Laser Treatment and Pirfenidone on Hypertrophic Burn Scar Reduction

Introduction

- Lasers: promising set of tools for treatment of burn scars
- Evidence-based data to guide therapy lacking
- Topical therapies including pirfenidone gel shown to improve scar pliability, vascularity, and color
- Fractional CO₂ (FxCO₂) laser may aide drug delivery by increasing skin’s permeability
- Goal: Examine effectiveness of early laser treatment of burn scar and skin graft alone or in combination with pirfenidone

Methods

- Red Duroc porcine model
- Eight third-degree contact burns on dorsum
- Wounds excised and grafted with split thickness skin autografts
- Grafts allowed to heal for 4 weeks to pulsed-dye laser (PDL) and/or FxCO₂ treatment
- Half of the sites treated with topical pirfenidone
- Therapy repeated every 4 weeks with a total of 3 treatments
- Immediately prior to each treatment, non-invasive measures
  - Clinical appearance
  - Physical properties
  - Tissue biopsy taken for biochemical characterization
- PDL settings: Fluence 7-9 J/cm², 10ms pulse duration
- FxCO₂ settings: 5% fractional coverage, 396 J/cm²

Results

- Grafted burn sites appear similar to burns in humans
- Overall appearance of combinational laser therapy superior
- Combinational therapy appears to be decreasing contracture
- Combinational laser therapy appears to be decreasing excess erythema
- PDL may be most promising treatment for stiffness of grafted burn wound

Discussion/Future Work

- Early results suggest that treatment effect is observable within study period
- Laser use and pirfenidone treatment alter average biomechanics (strength and stiffness) and erythema in pilot data
- Six pigs remain in the study which will reach completion in 6 weeks
- Additional analyses of scar architecture and inflammation to commence after all pigs have completed study

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