**CARBON DIOXIDE LASER TREATMENT FOR BURNS SCARRING: INTERIM RCT RESULTS FROM THE WESTERN AUSTRALIA BURNS SERVICE (008)**

*Harms K.- A.1, Murray A.2, Fear M.3, Wood F.2,3, Rea S.2,3

1 Monash University, Anatomy and Developmental Biology, Clayton, Australia
2 Royal Perth Hospital, Western Australian Burns Service, Perth, Australia
3 University of Western Australia, Burn Injury Research Unit, Perth, Australia

**Introduction:** Hypertrophic scarring (HS) is a major long-term complication of burn injury, but there is no definitive therapy. A promising novel treatment for HS is laser treatment. Current clinical consensus is that ablative fractional carbon dioxide laser (CO2 AFL) provides the best outcomes in the treatment of HS with laser. However, there is no level 1 evidence to support this at present. The Western Australian Burns Service initiated a pilot prospective randomized control trial (RCT) to evaluate the efficacy of CO2 AFL in treating HS at least 6 months post burn injury.

**Hypothesis:** CO2 AFL treatment induces measurable clinical improvement in scar outcome of hypertrophic scars - this improvement is the result of changes to collagen structure induced by thermal modulation of hypertrophic scar tissue.

**Aims:** To determine the effect of CO2 AFL on the clinical outcome of hypertrophic burn scars versus standard scar therapy. Furthermore, to correlate the observed clinical changes induced with quantifiable changes in the histological morphology of biopsies of treated burn scars.

**Methods:** 15 participants with a 10x10cm area of confluent scar (which met inclusion criteria) were recruited. This ‘trial area’ was demarcated and divided randomly into two zones, along one of four axes. One zone was randomised to 3 treatment interventions (10,600nm ultra-pulse fractional ‘Ultrapulse’ CO2 Laser (Lumenis Ltd) with the energy settings of 50mJ with a 5% density). The other zone continued to receive standard care. Clinical outcomes used in this study were Vancouver Scar Scale (VSS), Patient and Observer Scar Scale (POSAS), Dermalab Combo®, Semmes Weinstein monofilament testing of light touch thresholds and standardised photography. Histological outcomes were based on 4 biopsies taken from both the control and treated halves of the trial area (2 from each half). Assessment of collagen orientation was performed using fast fourier transform (FFT) analysis of polarised light images of sections stained with picrosirius red. Vascular and inflammatory responses were characterised on H&E stained sections.

**Results:** Both zones of all scars showed clinical improvements in terms of VSS, POSAS and sensation. There was not a significant difference in improvements between the 2 zones. There was however a trend observed in the relative improvement of treated zones in terms of pliability. FFT demonstrated statistically significant change (p=0.0371) in the deep dermis of treated biopsies, with the orientation of collagen moving towards a ‘normal’ morphology. A similar improvement in orientation was noted in the superficial dermis - this was not significant. The description of the histology highlighted micro-vessel dilatation, peri-vascular infiltrate and reactive stromal cells in the treated biopsies taken acutely post treatment. Ongoing low-grade inflammation was noted at final follow up in treated biopsies.

**Conclusions:** The interim results of this study demonstrate a statistically significant improvement in the collagen orientation of deep dermis of laser treated HS tissue. In terms of clinical significance, there is a suggestion of improvement in pliability observations. Further recruitment for this trial continues, but interim results suggest a correlation between CO2 AFL and improved pliability of HS. Future trials might utilise objective measurement of pliability and thickness to ascertain definitive benefit of CO2 AFL.