

Reciprocity of exposure time and irradiance on energy density during photoradiation on wound healing in a murine pressure ulcer model

Background: Energy density and exposure time reciprocity is assumed and routinely used in low-level light therapy (LLLT) regimens. This study examined dose reciprocity effects on wound healing. **Methods:** Pressure ulcers were created on seven groups of C57/BL mice (n = 18). Photoradiation was administered (18 days; 5 j/CM²/day @ 670 nm) using a custom LED apparatus and treatment matrix varying both intensity and exposure. Control animals were treated similarly, without photoradiation. Ulcer staging was performed using a standardized scale. Changes in stage, wound area and wound closure rates were measured. Histology was performed.

Results: Photostimulatory effects at day 7 occurred with parameters of 125 seconds (a) 40 mW x 1/day; 625 seconds @ 8 mWx1/day; 62.5 seconds @ 40 mWx2/day; and 312.5 seconds @ 8 mW x 2/day; and at day 18 using 625 seconds @ 8 mW and 312.5 seconds ea 8 mWx2/day. Statistically significant increases in wound closure rates occurred using 625 seconds @ 8 mW; 62.5 seconds @ 40 mWx2/day; and 312.5 seconds (aD 8 mWx 2/day treatments. Mean ulcer grade scores were similar to controls.

Conclusions: Varying irradiance and exposure time to achieve a specified energy density affects phototherapy outcomes in this model. Variation of exposure time and irradiance may account for conflicting results in the literature. Further studies of these effects are warranted.