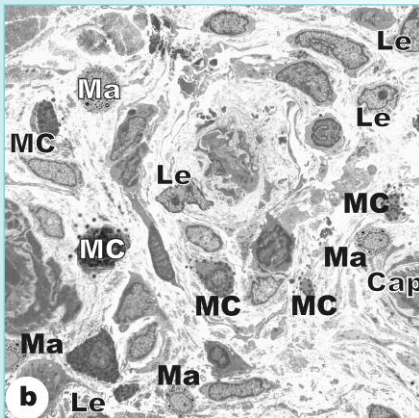
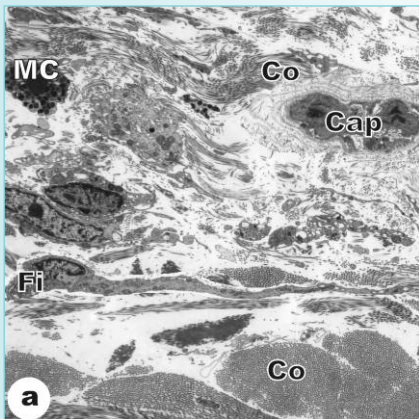


# Studies Find Omnilux Plus Plays Important Role in Skin Rejuvenation Tx

“The 830 nm LED photo-modulated degranulation of mast cells ‘kick-starts’ the wound healing process in an athermal and atraumatic manner.”



Representative transmission electron photomicrographs of healthy human forearm skin (a) before and (b) 48 hours after a single irradiation with 830 nm LED energy (20 min., 66 J/cm<sup>2</sup>). Pre-irradiation, the skin shows normal morphology with a tightly organized matrix. Collagen bundles (Co) can be seen both in cross and longitudinal sections. There is a capillary (Cap) in the field and a fibroblast (Fi). A mast cell (MC) is seen in the upper left. Forty-eight hours after irradiation, the morphology of the skin is essentially normal, but there are signs of an inflammatory response, with many interstitial spaces and perivascular edema seen around a capillary. The number of mast cells has increased and the majority are in the process of degranulation. Macrophages (Ma) and leukocytes (Le) have been recruited into the field, typical of an inflammatory response but which has been 830 nm LED phototherapy-induced without heat or damage (dermis, TEM, uranyl acetate stain, original magnification x 26,000).

By R. Glen Calderhead, MSc., Ph.D., FRSM

Near infrared light at 830 nm, delivered in a continuous wave, has previously been identified as an effective wavelength to stimulate inflammatory stage cells in the wound healing cycle, namely macrophages<sup>1</sup> and leukocytes.<sup>2</sup> A recent study of 830 nm light emitting diode (LED) therapy<sup>3</sup> on eight healthy male subjects showed conclusive evidence of the role of LED therapy in skin rejuvenation.

In this study the volar aspect of the left forearm was irradiated once for 20 minutes at 66 J/cm<sup>2</sup> with the Omnilux® Plus™ – a continuous wave 830 nm LED system from Photo Therapeutics Ltd. (Fazeley, U.K.). The contralateral right forearm served as the unirradiated control. Transmission electron microscopy (TEM) of specimens from the left arm at baseline and 48 hours post-irradiation from both the left and right arms showed no difference in morphology. However, in the left arm's post-irradiation specimen, a mild inflammatory response was noted with a high, statistically significant number of macrophages, leukocytes and mast cells, compared with controls. All mast cells were in the degranulation stage, having shed at least 50% of their granules into the surrounding normal tissue 48 hours after a single irradiation with 830 nm. No such degranulation was noted in the contralateral control specimen.

Given that the first set of granules from mast cells are strongly proinflammatory,<sup>4</sup> their appearance in otherwise normal tissue constitutes a quasi-wounding phenomenon following the LED treatment, but without heat or damage. The same inflammatory process was also noted by Seung Yoon Lee, M.D., et al in their study of combination 830 nm

and 633 nm LED phototherapy for skin rejuvenation,<sup>5</sup> even though the LED treatment was clearly athermal and atraumatic. In the wound healing cycle, inflammation is followed by proliferation. The 830 nm LED photomodulated degranulation of mast cells ‘kick-starts’ the wound healing process in an athermal and atraumatic manner. This has implications in both wound healing and skin rejuvenation, which depends on the wound healing process for accelerated and enhanced collagen and elastin deposition.

Mark Taylor, M.D., director of Gateway Aesthetic Institute and Laser Center in Salt Lake City, Utah, U.S. is in the process of publishing his recently completed study which shows the efficacy of pre-emptive 830 nm LED phototherapy before ablative laser resurfacing. Other dermatologists and plastic surgeons are finding the same in this and other surgical applications, and it has been hypothesized that the pre-emptive 830 nm LED phototherapy is preparing the inflammatory stage cells for the actual wound. This has now been proven in normal human skin *in vivo* – at least in mast cells – and further research on leukocytes and macrophages is planned.

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4. Holgate ST (1983): Mast cells and their mediators. In Holborow EJ and Reeves WG (Eds) *Immunology in Medicine* (2nd Edition). Academic Press, London. pp 79-94.
5. Lee SY, Park KH, Choi JW, Kwon JK, Lee DR, et al. (2007): A prospective, randomized, placebo-controlled, double-blinded, and split-face clinical study on LED phototherapy for skin rejuvenation: Clinical, profilometric, histologic, ultrastructural, and biochemical evaluations and comparison of three different treatment settings. *J Photochem Photobiol (B)*: 88: 51-67.