

## Science References on Light Therapy with LED's:

There are over 2,000 references on light therapy. Most are basic science studies dealing with Low Level Laser Therapy (LLLT). These studies show light therapy can reduce pain after molar extractions, improve immune function, heal wounds that won't heal, accelerate wound healing, speed healing of fractures, relieve itching of eczema, increase mitochondrial ATP production (related to cell energy), improve the appearance of stretch marks, heal venous leg ulcers, increase production of DNA and collagen, and increase the activity of fibroblasts. Studies are beginning to appear in which LEDs were used with similar results. Both LLLT and LED treatments appear to trigger the same responses as reported in reference #2. This may be because the amount of light energy delivered is similar and when laser light hits the skin it scatters and does not stay coherent.

Karu, Tiina, Photobiology of Low-power Laser Effects. Health Physics 1989/56(5):691-704. Monochromatic visible light stimulated DNA production, growth of normal cells, and many other basic functions of living organisms. The same effects were found with low-level laser light as with non-coherent light (non-laser light) leading the investigator to conclude that coherent (laser) light is not needed to achieve these results.

Marshall Space Flight Center press release 00-336 (12-18-00).

<http://www.msfc.nasa.gov/> .Describes how LEDs are being used to heal hard to heal wounds such as diabetic skin ulcers, serious burns, oral sores, and musculoskeletal training injuries.

Drollette, Dan, Can Light Hasten Healing in Space? Biophotonics International Sept/Oct 2000, 46-49. Describes NASA space applications of materials described in reference #3.

Whelan HT, et al, Effect of NASA light-emitting diode irradiation on wound healing. J Clin Laser Med Surg 2001 Dec;19(6):305-15. Treatment with red LEDs reduced pain and speeded healing in humans.

Gupta, AK, et al., The Use of Low Energy Photon Therapy (LEPT) in Venous Leg Ulcers: A double-blind, Placebo-controlled Study. Dermatol Surg 1998;24(12):1383-6. Light therapy with LEDs speeded the healing of leg ulcers.

Seidman, DS, et al., A New Blue-light-emitting Phototherapy Device: A Prospective Randomized Controlled Study. J Pediatr 2000;136(6):771-4. A panel of blue LEDs controlled jaundice of the newborn better than standard light therapy.

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Thomasson, TL, Effects of Skin-Contact Monochromatic Infrared Irradiation on Tendonitis, Capsulitis, and Myofascial Pain, J Neurol Orthop Med Surg (1996) 16:242-245. Panels of infrared LEDs were used with success in the above mentioned conditions.

Clark, Sir Arthur, Beyond Gravity, National Geographic Jan. 7, 2001, p2-29.

Reports that Dr. Harry T. Whelan of the University of Wisconsin Medical School has successfully treated wounds, third degree burns, and brain cancer with LEDs.

Enwemeka, CS, et al., Biomechanical effects of three different periods of GaAs laser photostimulation on tenotomized tendons, Laser Ther 1994;6:181-188. Rabbit tendons healed much faster and stronger with LLLT.

Personal Communication: In an unpublished study tendons were cut, sutured together, then half of the rabbits were treated with pulsed LEDs with the C frequency. At 3 weeks, generally the weakest point in healing, tension was applied to the breaking point. LED treated tendons healed so well they pulled out of their bony attachments rather than pull apart where they had been cut. Tendons in control animals pulled apart easily.

Pontinen, PJ, Low-Energy Photon Therapy, in Complementary and Alternative Veterinary Medicine, Mosby, St. Louis, 1998 pp. 247-274. Dr.

Pontinen summarizes the successful use of low energy photon therapy (includes both low level lasers and LEDs) in the treatment of many conditions.

\*FDA Cleared for temporarily increasing circulation and reducing pain, stiffness and muscle spasm.