

[ LIGHT THAT HEALS ] Weakened by chemotherapy in his fight against Hodgkin's disease, Eric Tydd (above) gets a 91-second dose of near-infrared light from light-emitting diodes (LEDs) at the children's hospital in Milwaukee, Wisconsin. The light penetrates tissue to energize cells and prevent the growth of chemo-induced mouth sores that keep patients from eating. Waving the magic LEDs (left), neurologist Harry T. Whelan has successfully treated wounds, third-degree burns, and brain cancer on Earth and thinks the same can be done in space.

## ***Infrared Therapy***

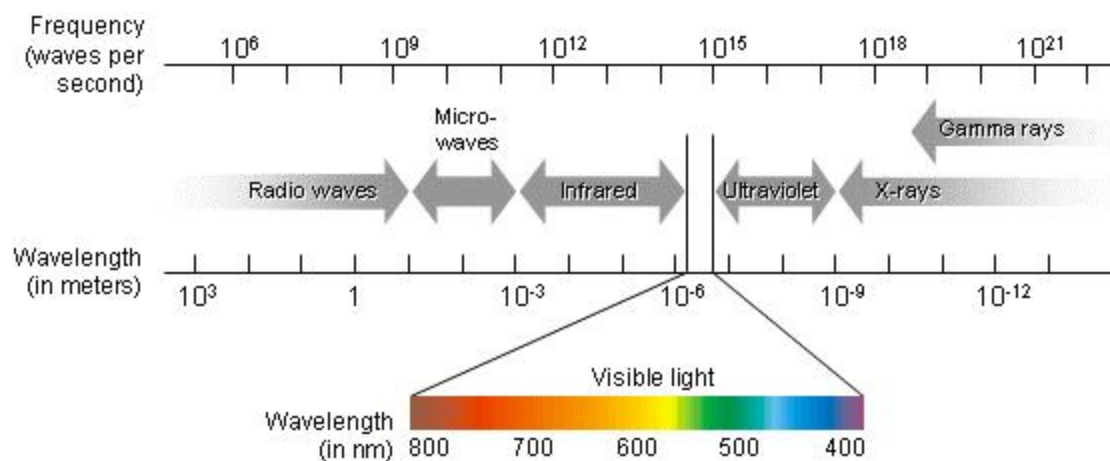
### **The Following Definitions Are Commonly Used with Light Therapeutic devices**

- 1) Visible Light: light that is within the visible spectrum, 400nm(violet) to 700nm(red)
- 2) Infrared Light: light in the invisible spectrum below red, from 700nm to 2,000nm
- 3) Frequency: number of cycles per second measured in Hz.
- 4) Coherency: wavelengths of light traveling in phase with one another
- 5) Monochromatically: light that is of one color, or one wavelength
- 6) Collimation: light focused in a beam, maintaining a constant diameter regardless its distance from the object or surface directed toward
- 7) Nanometer (nm): a unit of measure of wavelength of light (one billionth of a meter)
- 8) Nanosecond: one billionth of a second
- 9) Joule (J): unit used to measure the energy delivered
- 10) Watts (w) and milliwatts (mw, 1/ 1000th of a watt): units used to measure the power capability
- 11) Peak power: output: the maximum output of power, measured in milliwatts and watts
- 12) Average power: amount of power actually delivered in a given period of time
- 13) Duty cycle: the amount of time the light is actually on during a given period of time

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## **Overview of Research and Literature**

Light therapy has been shown in over 40 years of independent research worldwide to deliver powerful therapeutic benefits to living tissues and organisms. Both visible red and infrared light have been shown to effect at least 24 different positive changes at a cellular level. Light radiation must be absorbed to produce a biological response. All biological systems have a unique absorption spectrum which determines which wavelengths of radiation will be absorbed to produce a given therapeutic effect. The visible red and infrared portions of the spectrum have been shown to be highly absorbent and produce unique therapeutic effects in living tissues.



## **LELT – Low Energy Laser Therapy or “Phototherapy”**

Light therapy has also been given the name “phototherapy.” A study done by the Mayo Clinic in 1989 suggests that the results of light therapy are a direct effect of light itself, generated at specific wavelengths, and are not necessarily a function of the characteristics of coherency and polarization associated with lasers. In a study entitled *Low-Energy Laser Therapy: Controversies and New Research Findings*, Jeffrey R. Basford, M.D. of the Mayo Clinic’s Department of Physical Medicine and Rehabilitation, suggests that the coherent aspect of laser may not be the source of its therapeutic effect. He states “firstly, the stimulating effects (from therapeutic light) are reported following irradiation with non-laser sources and secondly, tissue scattering, as well as fiber optic delivery systems used in many experiments rapidly degrade coherency... Thus any effects produced by low-energy lasers may be due to the effects of light in general and not to the unique properties of lasers.” This view is not difficult to accept when it is remembered that wave-length dependent photobiochemical reactions occur throughout nature and are involved in such things as vision, photosynthesis, tanning and Vitamin D metabolism. In this view, laser therapy is really a form of light therapy, and lasers are important in that they are convenient sources of intense light at wavelengths that stimulate specific physiological functions (*Lasers in Surgery and Medicine* 9:1-5, Mayo Clinic, Rochester, Minnesota, 1989).