Class III Laser Therapy (LLLT, Low Level Laser Therapy, Cold Laser Therapy, Light Therapy, LED Therapy)
VS. Class IV Laser Therapy, HILT, High Intensity Laser Therapy
by Paul Schwen

Many more clinical research studies exist with low level laser therapy (LLLT, or so-called cold laser therapy) than with high intensity laser therapy. This is because LLLT is applied with either LED (light emitting diode), SLD (superluminous diodes), or extremely low powered laser devices that only cost a fraction of the price of high intensity lasers to manufacture (see below, LED Light Therapy versus HILT, or High Intensity Laser Therapy).

With a very low production cost and artificially high sales prices (often much more expensive than high intensity lasers), LLLT manufacturers have a personal stake in doing whatever necessary to maintain market share. This includes sponsoring a plethora of so-called clinical studies, designed to present LLLT as a viable clinical treatment alternative, when it is proven through studies commissioned by insurance companies to be ineffective (see attached Aetna, Blue Cross Blue Shield papers).

The primary problem with most class III, or LLLT clinical studies is that they are all in vitro, with almost no in-vivo clinical studies present. When stimulating tissues in a petri dish, very low levels of energy are necessary to produce a cellular response; when stimulating tissues in the body, a threshold of energy transference must be achieved for stimulation to occur. This is well defined in the Bunsen Roscoe Law of Reciprocity, as well as other physical laws. Simply put, a cold laser device lacks the energy necessary to achieve the necessary threshold of energy transference to stimulate a cellular response in targeted tissues.

HI LT, or high intensity laser therapy is relatively new, but still represents a threat in the form of lost market share to cold laser manufacturers. Instead of producing their own high intensity laser devices, these manufacturers elect to continue to sponsor a variety of studies to make their devices appear functional in a clinical environment, when it is proven that they are not.

LED Light Therapy versus HILT, or High Intensity Laser Therapy
Since both THERAPY LASERS and LIGHT THERAPY devices use LEDs, most people think that the volume of energy delivered by both types of devices is similar. Many distributors of LIGHT THERAPY DEVICES call their devices “Cold Lasers”, “Low Level Lasers”, or even just “Lasers”. These descriptions are factually INCORRECT, and MISLEADING:

Class 3, Class 3B, Class 4, etc. refers to LUMINOSITY, rather than power output; in fact, the luminosity and collimation of a ‘Cold-Laser’ beam makes it far more dangerous to the eyes than a real therapy laser, even though the output energy is quite low. In fact, the nominal hazard zone around a 15Watt laser is less than 12’, while the same zone around a ‘Cold Laser’ is many hundreds of feet.

Many Light Therapy product manufacturers claim that their devices are ‘LASERS’ because their LEDs, or SLDs’ have a combined output of more than 500milliWatts – again, just because a LED or SLD is brighter does not make it more powerful. Case-in-Point: a multi-probe Class IV ‘cold laser may be described as having 4,000-5,000Mw (4-5Watts), but the total energy directed to targeted tissues will still be less than 1/30 than that of a 15Watt Laser (and in many cases, the ‘Cold Laser’ is more expensive than the real laser).

LED – Light Emitting Diode
SLD – Super-luminous Diode
SLDs are more luminescent than LEDs)

Laser – or L.A.S.E.R., is an acronym for **L**ight **A**mplification by **S**timulated **E**mission of Radiation
LEDs and SLDs, emit NON-STIMULATED light energy in very low volumes

How can one tell the difference between a THERAPY LASER and a LIGHT THERAPY DEVICE, or 'COLD LASER'? The volume of energy from a Light Therapy Device (Cold Laser) is so weak that it cannot be felt unless it remains in place for several hours. The energy from a real therapy laser can be felt immediately.

The energy from LIGHT THERAPY DEVICES flows directly from the LED/SLD) to targeted tissues; the energy from LASERS flows from the LASER DIODE to the lasing chamber, where it is greatly amplified, creating much larger volumes of photonic energy which is directed via a fiber-optic cable to the targeted tissues. Through this process, photon density is greatly enhanced (more photons per treatment area), and targeted tissues are irradiated with large-enough volumes of photonic energy to stimulate a cascade of biochemical reactions that produce the many beneficial effects on human tissues.

Clinical implications are that Light Therapy Devices take far longer to deliver similar volumes of energy (doses) to targeted tissues than do Therapy Lasers. In fact, to deliver the 10-minute dosage of a 15Watt therapy laser would take the typical 'Cold Laser' several days of continuous treatment; however, since almost ALL 'Cold Lasers' operate on pulse-mode only; even THAT is not possible.

IN ADDITION:

Light emitted from an LED/SLD is monochromatic but not coherent. In a therapeutic environment, this means the limited light energy from LED/SLD will be scattered in ALL directions rather than directed downward like a true laser. This means very little volume of the 'already-low' light energy from a LED/ SLD/Cold Laser will impact targeted tissues.

Why is this important?

LED/SLD Light Therapy Devices (any therapy device with LEDs on the outside of the device, usually included in a "probe") are NOT the same as Therapy Lasers. In other words, they are not *therapy lasers* at all, but simply *therapy lights* - it is erroneous to call these devices lasers as they are not lasers at all but simply light therapy devices.

A light emitting diode (LED) is a special type of semiconductor diode that emits visible light when an electric current passes through it. As its name implies, a superluminous (SLD) diode is simply a brighter LED.

As electricity passes through it, the diode gives off energy in the form of photons. The wavelength of the energy, and thus the color of the emitted light, is determined by the chemical composition of the LED materials. LEDs and SLD's are covered by plastic cases of varying colors. The plastic case has no bearing on the color of the light; it simply is used to indicate the specific wavelength of energy emitted by the diode, and therefore the color of light.

Since both semiconductor-based lasers and light therapy devices use LEDs and SLD's, one might think that the light delivered from the two devices is similar, but that is not the case. The light therapy device emits energy directly to a patient's targeted tissues. In contrast, the therapy laser emissions are further processed by the laser to stimulate or enhance production of a much greater volume of additional energy photons. When the photons escape via the laser's half-silvered mirrors and silica glass fiber cables to the lens in the laser handpiece, they are coherent but also have a much greater photon density than light

therapy devices. The volume of photonic energy in a therapy laser it is usually hundreds, or even thousands of times more powerful than that of a LED/SLD light therapy device.

The lesser energy of Light Therapy devices on tissues means minimal therapeutic outcome, especially when compared to the optimal therapeutic outcome provided by powerful therapy lasers such as those manufactured by Aspen lasers.

Researchers who support the use of low level lasers and light therapy devices are quick to point out the thermal ablation properties of high intensity lasers, claiming that high intensity laser therapy is "dangerous" and will "damaged DNA". These statements are intrinsically false, and not supported by science - these researchers have limited vision, failing to understand that the laws of fluid dynamics apply to light energy, which acts as wave energy without mass but with acceleration. The smaller the aperture which light energy is directed through, the more intense the light energy beam. A small aperture is used in surgical applications, where a 550 µm fiber-optic cable is utilized as a surgical tool, with the tip of the fiber extruding the energy in a 550 µm spot size and thermal ablation or vaporization, is the means whereby unwanted tissue is excised in a very careful and precise manner. In laser therapy, a divergent beam is directed through a 65% diverged 30 mm aperture, negating the thermal ablation properties of the energy beam and utilizing the extruded energy as a means to penetrate and be absorbed by chromophores in targeted tissues, effectively stimulating a cellular response.

It is important to know that clinical researchers who support low level laser therapy have never studied or utilized high intensity laser in a therapeutic environment. Their sole aim is to manufacturer data that supports the continued usage of their ineffective low energy devices, while ignoring evidence that shows that their devices are inadequate in the clinical setting. Maintaining market share is their primary goal - never mind that patients who could be benefited by the use of effective high intensity lasers are denied access to viable care in order to maintain their market share in the sales of their devices.

Many of the clinical research studies I share with you are done utilizing low level laser energy - with the results of the study inadvertently stating that while cellular stimulation does occur in vitro, further studies are needed to verify the clinical value of laser therapy in a real-world setting.

At the conference you may have noticed the several exhibitors light therapy devices for $3-$5000 each. All 4 of the exhibitors showing these light therapy devices were all parts of the same group - most of them were foreigners, none of them were aestheticians or clinicians, none of them had done any clinical research on the effects of light energy in an aesthetic environment, they were simply picking doctors' pockets. These light therapy devices, sold for many thousands of dollars, are available online for $200 or less. The LEDs used in these devices cost around $0.50 apiece, the power source, circuit boards and controls cost under $100 to manufacture. While low level light energy may induce a temporary tightening of skin and erasure of fine wrinkles, the effects last less than one hour whereupon the skin returns to its previous state. Even if the device is used for a longer time on the same area of skin, because of the extremely low level of energy transferred by these devices, the effects will never last more than one hour.

If aesthetic lasers are important to you, we produce a dual wavelength 570 nm and 605 nm 3W laser that will produce permanent improvements in targeted tissues. With aesthetic lasers, at wavelengths of 570 nm and 605 nm and an energy level approximately 1000 times that of the light therapy devices, the energy beam is quickly and immediately absorbed by melanin in the skin. As a result, thermal increase quickly occurs, negating the need for more than 3W of energy. A dual wavelength 15W high intensity laser with 810 nm and 980 nm energy beams will stimulate improvement in underlying tissues, the combination of the 2 dual wavelength lasers offer the most complete and effective approach to aesthetics, pain control, neurorehabilitation, and more.