

Low Intensity Laser Therapy - Myths and Realities

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Frequently, we are asked to compare Low Intensity Laser Therapy Systems with regard to power, frequency and other parameters. Accordingly, we are hereby attempting to inform readers about the significance of these factors.

Aside from this, one should always keep in mind that the most important objective of any therapy is:

- To provide maximum clinical benefit in the shortest possible period of time.
- To do no harm to the patient.

The Bioflex Low Intensity Laser Therapy System has several proprietary features particular to its unique design which cannot be revealed for purposes of patent protection. Nevertheless, it should be understood that its flexible treatment arrays, the ability to modulate output over an infinite range and total accuracy are critical to an effective, efficient delivery system. The ability to customize treatment for any individual patient is also essential.

Discussion of the following criteria should assist in the clarification of many issues. The principals at Meditech hope that the reader will be enlightened by these explanations.

1. **Myth:** Higher powered devices mean better therapy.
Reality: Power is not the only factor for effective treatment using laser therapy. Other important parameters are: frequency, duty cycle, waveform, treatment duration and of course energy density (J/cm^2).
2. **Myth:** LEDs (Light Emitting Diodes) or SLDs (Super Luminous Diodes) are not effective.
Reality: The differences between the characteristics of lasers and SLDs are:
 - Lasers are monochromatic, producing light output at a single wavelength. In contrast, SLDs, output a band of wavelengths. The band of wavelengths is the spectral width of the device.
 - Lasers are coherent. Basically, coherence is defined as the light waves being in phase.
 - Lasers are highly directional and can be easily focused to a point. In other words, lasers are less divergent than other light sources.

The higher power ratings of lasers are not obtainable with SLDs. However, the properties of lasers do not make a

significant impact on the therapy when compared to SLDs for the purpose of irradiating cellular pathologies in an appropriate manner.

Wavelength(s): of the Light Source: A bandwidth that starts at approximately 600nm and ends at approximately 900nm (red-to-NIR region) has been identified as containing the wavelengths appropriate for laser therapy. No adverse effects have been documented for any wavelengths over this range. Therefore, even though SLDs emit most of their power at the rated wavelength, the additional wavelengths emitted are also a beneficial part of the therapy.

Coherence: Specially designed experiments at the cellular level have provided evidence that coherent and noncoherent light with the same wavelength, intensity, and irradiation time create equivalent biological effects. This is further supported with successful studies where SLDs were the only light sources.

Divergence: Since SLD light sources diverge more than laser sources, the SLD source spreads the light over a broader treatment area. However, the SLD would only require additional treatment time to match the dosage for an area treated by the laser source. Therefore, the energy delivered to an area can be equally produced by a SLD or a laser source with duration being the only variant.

3. **Myth:** Only certain wavelengths are effective.
Reality: Through many clinical trials and studies it has been documented that a range of wavelengths that starts at approximately 600nm and ends at approximately 900nm (red-to-NIR region) has been identified as the wavelengths appropriate for laser therapy to produce positive tissue response.
4. **Myth:** Frequency and duty cycle do not make a difference.
Reality: Clinical trials and basic research studies have revealed the importance of frequency and duty cycle with regard to treatment outcome. The ability to vary these over a wide range is essential.
5. **Myth:** Flexibility and contact are not important.
Reality: The power of the light decreases with the distance from the source and also attenuates as it passes through different media due to refraction and reflection.

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Applying the light source as close as possible to the injury produces the most effective energy transfer and therefore, the best results.

6. **Myth:** One protocol can be used to heal many ailments.

Reality: Clinical experience reveals that different medical conditions respond better to certain protocols than others; in addition, each individual is genetically different, therefore the ability to customize protocols is required for proper treatment.

7. **Myth:** Laser therapy simply modulates the symptoms and does not heal.

Reality: Light is absorbed by a variety of cellular components including chromophores, flavoproteins and other micromolecules in the tissue being irradiated. In essence, light energy is transformed into biochemical energy resulting in the restoration of normal cellular function. All tissue consists of cells and all cells respond to LILT in varying degrees.

8. **Myth:** All laser therapy does is heat the area being treated.

Reality: The primary healing mechanism is caused by the interaction of the light with tissue causing a number of physiological reactions. Although all light sources generate some heat, a properly designed laser therapy system minimizes the temperature rise of the treated area. Inadequately engineered devices may overheat the tissue, a substantially undesirable feature.

9. **Myth:** High power pulsed devices are more effective than others.

Reality: Some manufacturer's instruments pulse light at very high power and for extremely brief duration. There is no evidence that this method produces actual improvement or any significant clinical effect in cells.

10. **Myth:** Frequency controls depth of penetration.

Reality: The wavelength of the light is one factor that controls the depth of penetration. This myth is the result of confusion between the rate of repetition (frequency) of the applied waveform and the wavelength of the light (frequency of light equals the inverse of wavelength). The power of the light source also affects the penetration depth.

11. **Myth:** Shorter treatment times at higher power are better than lower power for a longer treatment period in order to reduce therapy time.

Reality: There is an overdose range at which too much power inhibits recovery of the cell and therefore the cure of the pathology being treated. One cannot concentrate power into too short a time interval in order to reduce treatment times. Tissue has physiologic limitations resulting in a prolonged period of recovery if inappropriate therapy is utilized.

12. **Myth:** Place many different diodes with varying wavelengths into the same treatment head for efficient use of treatment time!

Reality: Basic researchers have shown that tissue processes light stimulation more efficiently utilizing diodes of similar wavelength at any one time. Indeed it has been noted that combining diodes of different wavelengths is contraindicated if effective therapy is to be achieved.

13. **Myth:** Laser therapy stimulates cancer development or variants of cancer cells.

Reality: In our experience there is no evidence that shows that laser light, either causes cancer or stimulates cancer cells to divide. Indeed, with correct usage of laser light patients with metastases suffering from severe pain, pleural effusions and other complications have responded extremely well with regard to pain reduction and other problems associated with malignancies. At the same time more research is essential in order to formulate permanent conclusions in the field of cancer treatment using Laser Therapy. This is an area that must be explored.

14. **Myth:** Laser Therapy damages tissues.

Reality: High powered devices can definitely denature proteins and damage molecules. Laser therapy is only effective if used in an appropriate, clinically effective time-tested fashion.

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