COMPARING LED VS LASER FOR INTRANASAL LIGHT THERAPY DEVICES

The issues on LED vs Laser

This discussion is in the context of intranasal light therapy.

Vielight and MedicLights offer the light emitting diode (LED) as well as the low level laser (laser) versions of the intranasal light therapy. What are the differences between the two versions?

There are several papers that suggest that low level lasers are more effective than LEDs. Several websites publish these to support their products. These studies are based on transcutaneous/transdermal (applied to the skin) applications, not on intravenous or intranasal blood irradiation. There are anecdotal reports claiming the superiority of the laser version for certain conditions; the two in particular are sleep disorder and chronic anxiety.

For a better appreciation, one has to revert to actions at cellular and molecular levels.

Mechanisms of actions

The actions of the enzyme in the electron transport chain in the mitochondria, cytochrome c oxidase is now commonly accepted as the photoacceptor that catalyzes cellular level activity when red to near-

infrared red light hit the cells.[1] The mechanisms involved in intranasal light therapy involves a somewhat different process as explained in another web page but the point is, whether there is a difference in the outcomes between LED and laser.

Basically, the cells and the body systems respond to the combination of the wavelength of the light and the energy dosage. The coherent light in lasers can have more concentrated energy than the normal non-coherent light in LEDs, even though most commercially available semi-conductor low level laser diodes have a built-in divergence of about 57 degrees. At low level intensity, does it matter?

The real experts' views

One of the most vocal about this matter, advocate for photobiology and Professor Emeritus of Stanford University, Kendric Smith have this to say, "All too often the laser phototherapy literature is written as if a laser is magical. Lasers .. emitted radiation follows (except for coherence) all of the same laws of physics and chemistry that the same wavelength of radiation from a conventional (non-coherent) light source follows. [2]

In addition, leading scientist in low level laser therapy, Tiina Karu says, "No significant difference was found for growth stimulation regardless of whether the light used was generated by a laser or from light of the same wavelength from a filtered incandescent lamp. [3]

In a landmark NASA-sponsored study published in 2001, scientists have found LED therapy to be effective for faster wound healing and significantly more pain reduction. [4]

Difference in power leads to same cellular effect

When using LED instead of laser diodes, we compensate for the lost coherency by increasing the energy output so that we can compensate for the difference in efficiency. In the end we will see the same dosage at cellular level.

In the case of intranasal light therapy applications, because we are in the realm of well under 10 mW in energy output and dealing with much thinner dermal layers, the increase is so small that the user would not feel that difference. The membrane inside the nasal cavity is thin enough that a LED diode with some recalibration will achieve the same result as the laser diode.

Conclusion

The bottom line is that our LED device (Qi-Light) has the same effective outcomes as the laser device (RadiantLife LT) but the LED device is a bigger drain on the battery (by roughly as much as 30%) because of the additional energy requirements.

And for the anecdotal reports on the better efficacy of laser over LED? We have designed the laser to point more towards the limbic system in the mid-brain area. Neurons have mitochondria, and as discussed above, they respond to red light leading to efficacious effects. That could explain the stronger effect that the laser device has over the LED.

References

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