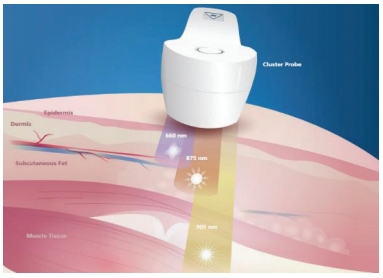
New Scientific Monograph: The Comparative Pillars Paper

By Douglas Johnson, ATC, EES, CLS and Ernesto Cesar Pinto Leal-Junior, Ph.D.

Light as a therapeutic physical agent just celebrated its fiftieth anniversary. The use of photobiomodulation (PBM), or the use of light-based devices to stimulate or inhibit biological processes, was introduced in the United States in 2002, with the first clearances granted by the Food and Drug Administration (FDA). Since that introduction, PBM, or low-level laser/light therapy (LLLT), continues to gain popularity among physicians and therapists, as it has proven to be a superior adjunct or mono therapy in rehabilitation. Extensive research exists to support the use of light-based modalities for a variety of conditions. Nearly all positive studies have been done with the use of low-powered lasers. Anecdotal evidence, expert opinion reports, and an occasional case study provide some insight into clinical use. However, they are not adequate replacements for quality, controlled randomized trials.

While the efficacy of laser therapy should no longer be in question, the effectiveness of many commercially available devices should be. Clinicians should not confuse the efficacy of a technology with the effectiveness of a product or device. All good products should have a proof of concept (POC) and detail the steps to prove the effectiveness of the product in both laboratory and clinical trials. Without the proper POC, including biphasic dose validation, thermal profiling, and depth of penetration, direct side-by-side comparisons are not possible.

Multi Radiance Medical embarked on the POC process in early 2012 to validate the MR4, a combined multiwavelength and magnetic laser and light device. All experiments, trials, and studies were supervised by the Laboratory of Phototherapy in Sports and Exercise (Sao Paulo, Brazil). The POC was able to validate the combined synergistic effects of the different light sources (laser and LEDs) found in the Multi Radiance Medical devices and identify the optimal doses and treatment parameters for the safe delivery of consistent, clinically relevant patient outcomes. All research articles are either published in peer-reviewed journals or pending future publication. The intention of this work is to unravel many of these false claims and clear any dogma that is based on unscientific principles by presenting only peer-reviewed evidence in an effort to understand the best practices of PBM. Additionally, we will discuss the POC process that all devices should undergo and how basic device testing and validation can create not only superior clinical devices, but also move the field of PBM forward into greater use and acceptance in the community.



From Validation to Separation

Multi Radiance Medical develops patented, unique devices that maximize the advantages of multiple wavelengths, light sources, and electromagnetic energy. All devices share a common core comprised of 905 nm super-pulsed lasers, 870 nm infrared emitting diodes, 640 nm red light emitting diodes, and a static magnetic field of 35 mT. This unique "mix" or synergy of the device's parameters was validated by the Pillars proof of concept (POC) studies completed from 2012 to 2014. This scientific monograph not only detailed the clinical validations studies, but also crucial details on dose response, absorption characteristics to determine depth of penetration, and thermal profiling to ensure safe operation. Extensively tried and tested over 20 years in both lab and in the clinic, the MR4 and TerraQuant product lines continue to consistently deliver the most reliable and significant results available.

Working in Synergy

Wavelength selection, light source, and power output all play a crucial role in achieving optimal therapeutic benefits from light treatments. Many commercially available devices select laser or LED diodes based upon commercial availability. Selected parameters should work constructively to create a synergistic effect, that when combined with others, summates greater than the individual effects.[1]

There is strong evidence to suggest that one of the basic mechanisms of photobiomodulation (PBM) is the acceleration of electron transfer by electromagnetic radiation in the visible and near infrared region of the spectrum[2 3] via the modulation of cytochrome c oxidase (CCO) activity. It was believed that CCO had a peak of activity at 825 nm, and that is thought to be due to the relatively oxidized CuA chromophores[4]. Single wavelength probes (both point and clusters) are limited by the specific absorption spectrum of that specific wavelength. It was suggested that a combination of wavelengths may provide a more robust means of triggering the phototherapeutic response. Albuquerque-Pontes et al.[5] investigated the effect of different wavelengths on cytochrome c oxidase (CCO) activity and identified a previously unknown profile for CCO. Not only do multiple wavelengths have the capacity to stimulate CCO activity, they also pose an activation time profile that details times of peak stimulation. The findings suggest that the concurrent use of different wavelengths provides an overlapping effect of peak activation that enhances CCO activity. Friedmann, Lipovsky, Nitzan, and Lubart confirmed this observation utilizing the Multi Radiance Medical TQ Solo, and state that the combination of multiple wavelengths produced enhanced adenosine triphosphate (ATP) production more efficiently than a single red wavelength with a comparatively larger dose. The combined use of multiwavelength low-powered light sources benefits increased CCO activity without having to resort in increased doses from a single wavelength light source. Friedmann et al.[6] found similar increases in ATP production from a smaller dose delivered by a multiwavelength, lower-powered device as compared to Eichler, Lavi, and Friedmann's[7] outcomes with a single-wavelength, higher-powered device. This suggests that multiple wavelengths can prolong the time profile activation of CCO with much smaller doses delivered across many wavelengths with much lower average powers rather than one single wavelength of higher power.

In the Balance of Comparative Pillars Paper, a scientific monograph, the authors consider three key metrics:

- Chromophore peak activation time profile (CPATP)
- Depth of penetration time profile (DPTP)
- Thermal time profile (TTP)

In addition, the paper continues to redefine the concept of "deep tissue therapy" with a compelling argument surrounding the use of excess energy on the surface of the skin.

Conclusion

Multi Radiance Medical devices have the most favorable mix of the available parameters to maximize therapeutic outcomes in the clinic for consistent and reliable results. With virtually no side effects and minimal contraindications, Multi Radiance Medical lasers are classified in the safest category of therapeutic lasers to use without concern or worry over photocytoxicity.

Combining design and engineering, Multi Radiance Medical does not compromise between power and heat—it maximizes it. This provides clinicians with the confidence that Multi Radiance Medical products are supported by science and clinically proven to produce consistent, positive patient outcomes. Extensively tried and tested over 20 years, Multi Radiance Medical's MR4 and TerraQuant product lines are patented, unique devices that combine multiple wavelengths, light sources, and electromagnetic energy to provide the most tested, reliable, and clinically significant results available. Each wavelength and light source creates a synergistic effect that, when combined with others, summate greater than the individual effects.

Multi Radiance Medical, in two scientific monographs, has proven how and why our technology works—without limitations. There are currently more than 30 clinical trials around the world being funded and supported by Multi Radiance Medical. This commitment will yield many new discoveries and move light-based medicine forward into the future and toward mainstream acceptance.

Scan the QR code to request a full copy of "The Comparative Pillars Paper."

References:

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