

PHOTOBIMODULATION (PBM) THERAPY

A proven way to regenerate tissue at the cellular level

Photobiomodulation therapy (PBMT) is a form of light therapy based on the photochemical process called photobiomodulation (PBM). In photobiomodulation therapy, a light source is placed near or in contact with the skin, the light energy penetrates the skin reaching the mitochondria of damaged or diseased tissue leading to photobiomodulation. This process results in beneficial therapeutic outcomes such as the alleviation of pain, the regulation of inflammation, immunomodulation, and the promotion of tissue regeneration.<sup>1-3</sup>

PBM Mechanisms of Action

The application of a therapeutic dose of light to impaired or dysfunctional tissue leads to a cellular response mediated by mitochondrial mechanisms that reduce pain and inflammation and speed healing.<sup>2</sup>

The primary target (chromophore) for the process is the cytochrome c complex which is found in the inner membrane of the cell mitochondria. Cytochrome c is a vital component of the electron transport chain that drives cellular metabolism. As light is absorbed, cytochrome c is stimulated, leading to increased production of adenosine triphosphate (ATP), the molecule that facilitates energy transfer within the cell.<sup>2-4</sup>

In addition to ATP, laser stimulation also produces free nitric oxide and reactive oxygen species. Nitric oxide is a powerful vasodilator and an important cellular signaling molecule involved in many physiological processes. Reactive oxygen species have been shown to affect many important physiological signaling pathways including the inflammatory response. In concert, these molecules have been shown to increase growth factor production and promote extracellular matrix deposition. The resultant increase in cell proliferation and motility leads to pro-survival pathways for the cell.<sup>2-4</sup>

PHYSIOLOGICAL EFFECTS

- Anti-inflammatory, analgesic, and anti-edematous
- Increased tissue oxygenation and nutrition
- Increased synthesis of ATP
- Increased rate of tissue regeneration
- Increased microcirculation

APPLICATIONS & DELIVERY

Versatile applications, maximum results

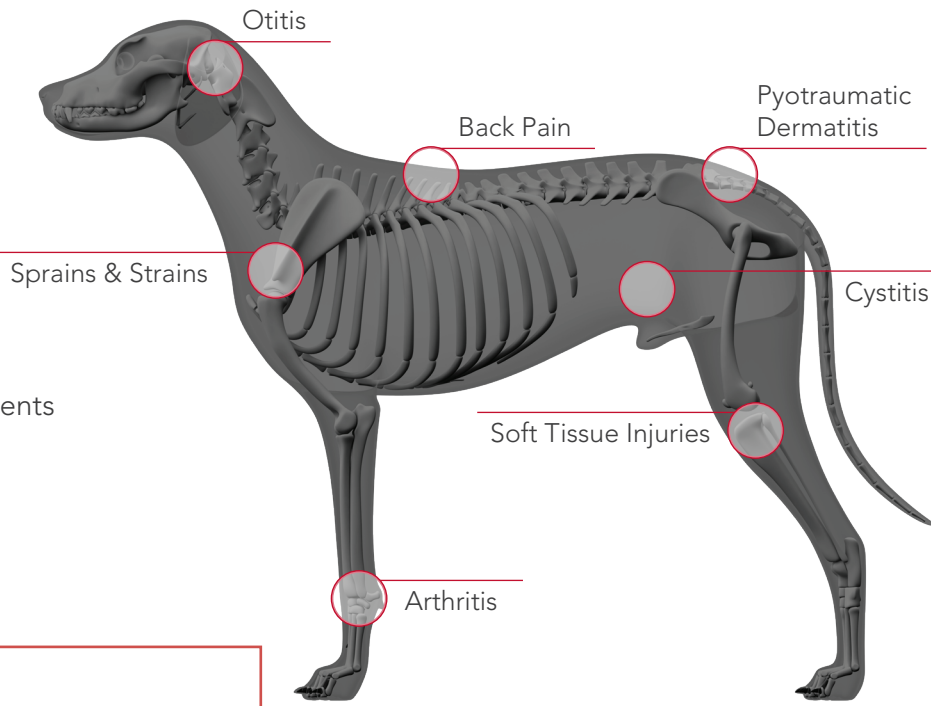
Improve Recovery For...

Use photobiomodulation therapy in conjunction with other modalities and treatment techniques with no side-effects.

- Acute conditions
- Chronic conditions

Multiple Tissues:

- Nerves
- Muscles
- Skin
- Tendons & Ligaments
- Joint Capsules
- And More



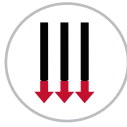
The Benefits of the Deep Tissue Applicator

Maximize clinical results with the benefits of Companion Animal Health's patented, on-contact photobiomodulation therapy treatment application.



Compression

Gets you closer to target tissue. Blanching reduces obstacles of superficial absorbers.



Collimation

The deep tissue applicator acts to collimate the delivery of light to tissue, reducing energy loss.



Refractive Index

The fused silica composition of the deep tissue applicator minimizes light losses as it passes from the applicator into the skin due to similar refractive indices.



Reflection

Contact application of delivery to tissue minimizes energy loss due to reflection.



Soft Tissue Work

Allows you to do manual soft tissue work with the deep tissue applicator while delivering energy.



PHOTOBIMODULATION DOSING

A drug-free, surgery-free, non-invasive pain solution

PBM Dosing - The Key To Results

Dosimetry in photobiomodulation (PBM) therapy is highly complicated - no single "dose" will work for all possible PBM therapies, and in some cases, different dosimetries can be equally effective. Safe and effective PBM dosimetry must consider multiple treatment parameters including: wavelength, irradiance (often called power density or brightness), tissue type being treated (including pigmentation of patient's skin and coat), and irradiation time.<sup>4</sup>

Furthermore, it is important to recognize that PBM is challenged by energy loss that occurs as light enters the skin and travels from superficial to deeper tissues. At the skin's surface this is primarily due to reflection, and below the surface by absorption from different tissues competing for different wavelengths of light. Proper configuration of the laser is a key factor in getting sufficient energy to target tissues.

Factors that Impact Dose Delivery at Depth

- Wavelength
- Irradiance (power & beam area)
- Mechanism of delivery (contact vs. non-contact)
- Treatment time
- Size of treatment area
- Type of tissue

Laser Classes - What Do They Mean?

Lasers are classified by the FDA according to their output power. In the field of photobiomodulation therapy, there are two common laser classifications:

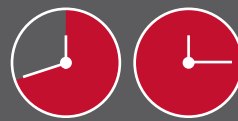
- Class IIIb, Maximum power output of 0.5 watts
- Class IV, Maximum power output of over 0.5 watts

Both Class IIIb and Class IV lasers require that safety eye protection be worn during emission.

The Impact of Power on Treatment Times

Power is a key factor when delivering a therapeutic dose to deep target tissues because of the irradiance (brightness) required to produce a clinical effect. Not only do Companion lasers have higher output powers, but they also have larger beam areas, making them more capable of delivering a therapeutic dose to larger treatment areas.

For example, to effectively treat a 300 cm<sup>2</sup> thoracic spine at 10 J/cm<sup>2</sup>, 3,000 joules of energy are required at the surface of the skin to deliver a therapeutic dose at depth. How long would that treatment take with a Class IIIb laser vs. a Class IV laser?



Class IIIb  
3,000 J at 0.5 W = 100 min



Class IV  
3,000 J at 15 W = 3.3 min





## Companion Therapy Lasers



CTS-DUO

Companion's premium therapy laser

**Includes:**

- 4 Year Warranty
- Empower IQ
- XL Deep Tissue Applicator
- Backup Fiber
- Jump Start Program
- Mobility Kit
- Text Book & Training DVDs
- Optional Companion Nanotherapy Bundle

Power: 0.5 - 25 watts



CTX-IQ

Companion's flagship therapy laser

**Includes:**

- 4 Year Warranty
- Empower IQ
- Backup Fiber
- Jump Start Program
- Mobility Kit
- Text Book & Training DVDs

Power: 0.5 - 15 watts



CTX

Superior outcomes, affordable entry point

**Includes:**

- 3 Year Warranty
- Empower DS
- Backup Fiber
- Standard Marketing Kit
- Mobile Case

Power: 0.5 - 15 watts

### What's in a Name?

The Evolution of PBM Therapy

"Cold Laser", "Low-Level Laser Therapy (LLLT)", what do these terms mean? In general, such terms refer to "treatment using irradiation with light of low power intensity so that the effects are a response to the light and not due to heat."<sup>5</sup> Many of the terms used to commonly describe this process do not ideally reflect the mechanisms involved. They also don't adequately distinguish the therapy from other laser-based therapies that rely on heating tissue to achieve an effect. This lack of clarity has led to significant confusion about the modality and a need for better nomenclature.<sup>1</sup>

In September 2014, the North American Association for Light Therapy (NAALT) and the World Association for Laser Therapy (WALT) convened and agreed upon the term "Photobiomodulation Therapy" as the preferred nomenclature for this modality. The term was added to the MeSH database in November 2015 and is the preferred name for researchers and key opinion leaders in the field because it more clearly characterizes the modality.<sup>1,6</sup>



### Companion Jump Start

Your road map to implementation success. The Companion Jump Start Program guides you through your first 90-days of therapy laser implementation to ensure both clinical and financial success with your new technology.

302-709-0408

info@CompanionTherapy.com



250 Corporate Blvd, Suite B  
Newark, DE 19702

CompanionAnimalHealth.com

### The Companion Promise

#### Evidence

Products based in evidence that provide superior clinical outcomes.

#### Education

Educational opportunities for every stage of your learning journey.

#### Partnership

Our team of sales, clinical, business, and customer support resources are here for you - every step of the way.



### References

1. Anders JJ, Lanzafame RJ, Arany PR. Low-level light/laser therapy versus photobiomodulation therapy. Photomedicine and Laser Surgery. 2015; 33(4): 183-184. doi:10.1089/pho.2015.9848
2. Karu TI. Low power laser therapy. In: Vo-Dinh T, editor. Biomedical Photonics Handbook. Boca Raton (FL) CRC Press; 2003: 48-1-48-25.
3. Hamblin MR, Demidova TN. Mechanisms of low level light therapy. Proc. of SPIE Photonics. 2006; 6140: 614001-01-12. doi: 10.1117/12.646294.
4. Chung H, Dai T, Sharma SK, Huang Y-Y, Carroll JD, Hamblin MR. The nuts and bolts of low-level laser (light) therapy. Ann Biomed Eng. 2012; 40(2): 516-533. doi:10.1007/s10439-011-0454-7.
5. National Center for Biotechnology Information website. Ncbi.nlm.nih.gov. Low-Level Light Therapy – MeSH – NCBI. 2016. Available at: <http://www.ncbi.nlm.nih.gov/mesh/?term=photobiomodulation>.
6. Anders JJ. Nomenclature Consensus Meeting, WALT-NAALT 2015. Available at: [www.naalt.org](http://www.naalt.org)

## Photobiomodulation (PBM) Therapy

Reduce Pain & Inflammation, Accelerate Recovery

