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Marietjie Venter qualified as a physiotherapist from the University of Pretoria, South Africa, in 1982. She also obtained a BA Degree from UNISA, South Africa. She has been working in the clinical field since then and has a special interest in phototherapy, including therapeutic laser and LED therapy. Marietjie currently works in physiotherapy private practice and lectures at training institutions and other health care facilities.

Light therapy in veterinary practice

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ABSTRACT: Many veterinary clinicians around the world are having great success using light therapy on small animals, cattle, wildlife and horses following numerous positive studies on people. Vets, physiotherapists and equine therapists are turning to the healing benefits of light therapy to speed up healing (up to 60% faster), shorten recovery time, minimise scar tissue and proud flesh formation, reduce swelling and bruising and to offer a non-invasive, safe and natural approach to pain control.¹⁻³

Clinicians may be familiar with devices termed low level laser therapy or laser-based light therapy. Lasers, however, have some inherent characteristics that make their use in a clinical setting problematic – mainly limitations in beam width, heat generation, high cost and fragility.⁴

The size of wounds and areas that can be treated is limited because of time constraints, because heat production from the laser light itself can damage tissue, and the pinpoint beam of laser light will damage the eye if used inappropriately; therefore protective eyewear must be worn by the patient and therapist.

The modern LED-based light therapy devices offer an effective alternative to lasers (Figure 1). These diodes can be configured to produce suitable

Figure 1. Simple treatment with a modern LED device



wavelengths that produce a more diffuse light so that larger areas can be treated at a time. The diodes are very robust, lightweight, and produce virtually no heat.

Light therapy has the advantage that the patient does not feel any sensation from the treatment, resulting in good patient compliance.

For over 30 years, light therapy (photobiomodulation) has been applied clinically in the treatment of soft tissue injuries and to accelerate wound healing, resulting in the publication of approximately 2,000 studies on the effects.

Analysis of these studies can be found in *Low Level Laser Therapy, Clinical Practice and Scientific Background* by Tuner, J. & Hode, L. (1999); and increasing numbers of clinical studies, such as those referenced in this article, have shown that many conditions can be treated effectively using light therapy.

The application of light therapy in veterinary care is relative new, but is increasing steadily as veterinary surgeons from a number of countries are learning about the advantages of its use when treating patients.

How does it work?

Light therapy (laser and LED-based) stimulates the basic energy processes in the mitochondria (energy compartments) of each cell, particularly when near-infrared light is used to activate the wavelength sensitive constituents inside (chromophores, cytochrome systems).⁵⁻⁷ Optimal light wavelengths lie in the range between 600 nanometers to 1,000

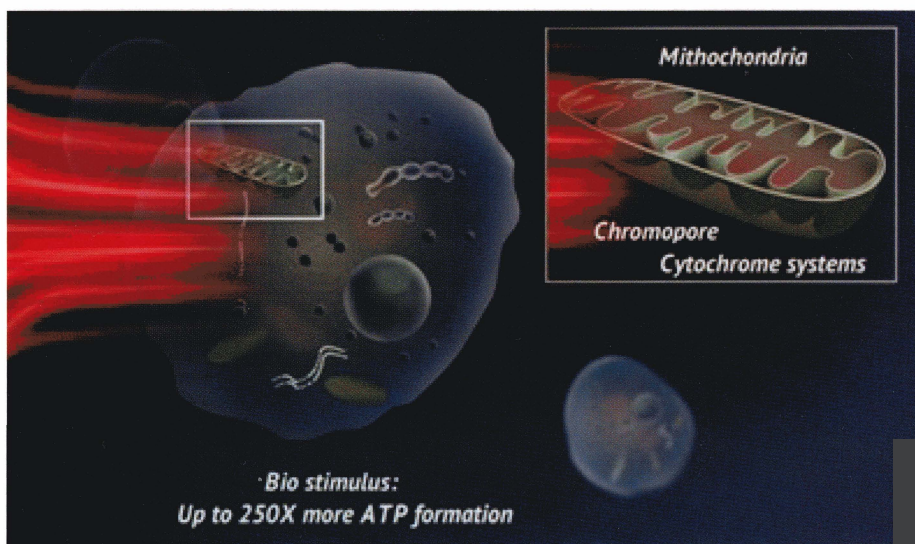


Figure 2. A simple graphic to show light absorption by the cell (Photon Therapy Systems (PTY) Ltd.)

nanometers – LED-based devices can produce these wavelengths accurately (Figure 2).⁸

Light therapy provides low-energy stimulation of tissues by lasers or LED-based light therapy devices which results in increased cellular activity during wound and tissue healing. These activities include collagen production and angiogenesis (formation of new capillaries).

Wound and tissue healing has three phases: first, a substrate is laid down; second, cells proliferate; and third, there is remodelling of tissue. It would appear that light bio-stimulation produces its primary effect during the

cell proliferation phase of the healing process.⁵⁻⁷

It has also been demonstrated that the mitochondria are receptive to near-infrared light and that light increases respiratory metabolism of certain cells.

Processes such as fibroblast proliferation, attachment and synthesis of collagen and pro-collagen, growth factor production (including keratinocyte growth factor [KGF]), transforming growth factor [TGF], and platelet-derived growth factor [PDGF]), macrophage stimulation, lymphocyte stimulation, and greater rate of extracellular matrix production have been reported with light treatment.^{1, 8-21}

Light therapy can also be regarded as a complementary/extra treatment modality that will greatly enhance the effectiveness of conventional treatment used in practice. The major advantage of LED light therapy is that it is practical, easy to use, lightweight and portable, affordable and durable.

Light therapy complements traditional treatment in both acute and chronic conditions with the following effects being demonstrated:

- ATP stimulation⁵⁻⁷
- stimulation/regulation of DNA and RNA production^{5-7, 21}
- stimulation/regulation of the immune system²²⁻²³
- analgesic effect (acute and chronic)¹⁻³
- anti-inflammatory effect²⁴⁻²⁶
- reduced scar/proud flesh formation²⁷
- cell repair if treated within 4-6 hours of injury.^{4, 28}
- regeneration of skin, nerve, muscle, and bone cells²⁹⁻³⁴
- reduced muscle spasms and trigger point release³⁵
- increased blood supply³⁶⁻³⁷
- increased lymph vessel diameter.³⁸

The following illustrations demonstrate the use of a Photizo Light Therapy device. They are all case studies from the Mayville Animal Clinic, Pretoria.

CASE ONE

An 8-week-old puppy with severe skin necrosis, sloughing of the skin and subcutaneous tissue.

Figure 3. Following debridement

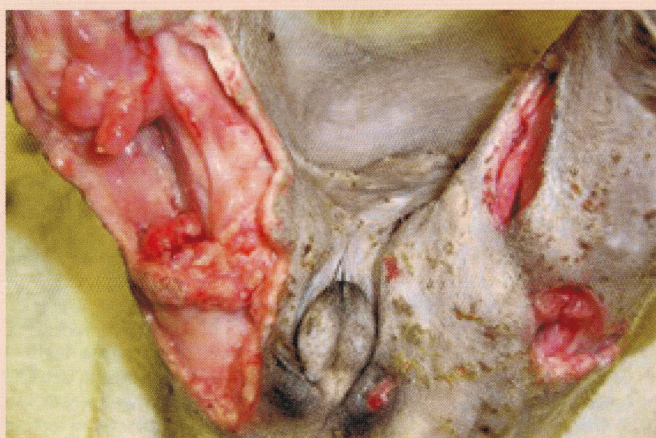


Figure 4. Appearance 12 days later after eight sessions of light therapy treatment. Note there is no excess scar tissue



CASE TWO

A cat presented with necrosis after the owner secured the bandage with a dental elastic band.

Figure 5. Presenting necrosis



Figure 6. Appearance 48 hours later after two light therapy treatments



CASE THREE

A 9-year-old horse with swelling and pain between the front limbs.

Figure 7. Initial swelling on presentation

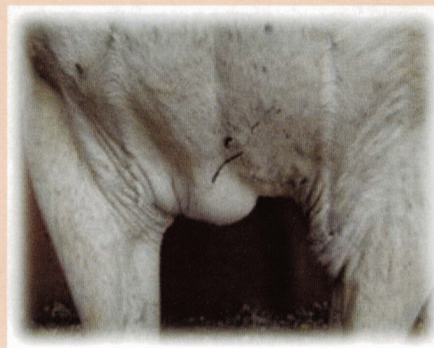


Figure 8. No swelling or pain after four light therapy treatments



Conditions shown to respond to LED

Owing to its mechanism of action, light therapy can be used as a treatment option on wounds, infectious and inflammatory conditions. Some examples include:

- **Skin conditions** – wounds, bruising, saddle sores, otitis externa, pyoderma, and pododermatitis
- **Musculoskeletal** – arthritis, tendonitis, myositis, sprains, strains, back and neck pain, splints, synovitis, muscle spasms
- **Postoperative** – on wounds, skin grafts
- **Other** – swellings, haematoma, seroma, ulcers, cellulitis, proud flesh, phlebitis.

Light therapy devices

There are many different light therapy devices available throughout the world. Most clinicians and therapists are, however, not light therapy specialists and have great difficulty in choosing a suitable device or calculating/setting

doses for effective treatments. This could be a contributing factor as to why this modality has been under-utilised for so long.

However, there are now light therapy devices available that have effective pre-programmed dose protocols. These pre-programmed devices create the opportunity for all clinicians to safely and effectively treat their patients with the potential for excellent treatment outcomes.

Summary

LED light therapy devices offer an effective complementary treatment option – scientifically proven, non-invasive, safe and practical. The availability of affordable devices with pre-programmed dose settings now enables veterinary practices to offer this effective treatment for a wide array of pathologies. ■

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