What is Class IV laser therapy?

Class IV laser therapy is the use of an intense beam of laser light directed into tissues to reduce pain, reduce inflammation and accelerate healing.

Laser therapy is the result of electromagnetic energy interacting chemically and biologically with tissue causing “photobiostimulation” or “photobiomodulation.” The involvement of electromagnetic energy in biological processes is not a novel concept – it fills our environment as photosynthesis occurs in plants and literally surrounds us as Vitamin D is formed in our skin cells.

The idea of light producing healthful tissue effects is as old as science itself, noted, but not understood, by early Greek physicians. Medical use of light in the modern era predates the development of lasers, which have transformed light therapy. Lasers allow light therapy to be targeted, specific and quick.

Lasers produce a single wavelength (monochromatic) beam of light, collimated as it is generated. Laser light has the property of being coherent, or in phase, which in simple terms means it is uniform and very orderly light. Class IV laser therapy uses a simple beam of light - monochromatic, coherent, collimated light – to penetrate deeply into tissues and produce positive tissue changes.

What does the term “Class IV” mean?

Lasers are classified as Class I, II, IIIa, IIIb and IV based on their ability to do harm if used improperly. Class I are enclosed lasers as in CD players and laser printers. Class II are diffuse beam lasers as in grocery store scanners and bar code readers.

Class III lasers are higher in power, ranging from 5 milliWatts to 500 milliWatts (0.5 Watt). Laser pointers are Class III, as are some medical devices.
Class IV lasers – those over 500 milliWatts in power – are used in medicine and surgery, as well as in military and industrial applications.

**What equipment is used for Class IV laser therapy?**

Class IV therapy lasers are usually diode lasers emitting light in the 790 – 980 nanometer wavelength range. The longer wavelengths in this spectrum have the deepest tissue penetration and produce excellent photobiomodulation. Class IV therapy lasers currently range in power from as low as 1.1 Watt up to 12 Watts.

Low power Class IV therapy lasers, those with 1 to 2 Watts of power, are applicable for treatment of superficial lesions and wounds. Although they *can* be used for treatment of deeper tissue and musculoskeletal conditions, to achieve effective target doses, required treatment times are prolonged.

The better quality and more effective Class IV devices have power capabilities of 6, 8, 10, 12 or 15 Watts, with wavelengths in the far end of the diode laser spectrum. Those Class IV devices with power lower than 6 Watts, or, with shorter wavelengths, have limited applicability in veterinary practice because of the long time required for treatment of deep tissue conditions.

**What about Class III Therapy lasers?**

Class III therapy laser devices are available, but have limited applicability for the diversity of deep tissue conditions seen in general veterinary practices. Under 500 milliW in power, they are referred to as “low power”, “LLLT” (Low Power Laser Therapy) or “cold laser” devices. Very low power Class IIIa therapy laser devices use the same 5 milliWatt laser diodes used in laser pointers.

Like lower power Class IV therapy lasers, Class III therapy lasers are applicable for treatment of superficial lesions and wounds only. They *can* be used for treatment of deeper tissue and musculoskeletal conditions, but, like the lower power Class IV therapy lasers, to achieve effective target doses, treatment times are prohibitively long.

**Why am I just now hearing about Class IV laser therapy?**

Class IV laser therapy is a new technology in the United States. Although therapy laser devices have been used outside of the United States for many years, Class III therapy lasers were FDA approved in the United States in 2002. Because of their low power, use of Class III therapy lasers has been limited.

After the FDA approved Class IV therapy lasers in 2005, the science of laser therapy really began emerging in this country. Acceptance has been rapid on the human side in rehabilitation, wound care and sports medicine programs. In the veterinary profession Class IV laser therapy
has rapidly developed, with practitioners leading the way in beta testing, protocol development, case reporting and dissemination of information about the technology.

**What does Class IV laser therapy accomplish?**

Laser therapy reduces pain, reduces inflammation and accelerates healing.

How does it reduce pain? Through its effect on nerve cells and nociceptors, increased stimulation thresholds, reduced neuronal impulses, and increased release of tissue endorphins, pain perception is decreased.

How does it reduce inflammation? Inflammation is reduced by decreasing release of prostaglandins and inflammatory mediators, by increasing macrophage activity and leukocytic phagocytosis, and, by reducing edema through dilation of lymphatics.

How does it accelerate healing? Healing is accelerated by increased blood flow from vasodilation, by increased angiogenesis and capillary production, by increased release of cytokines, and by stimulation of fibroblast activity and collagen production.

How do photons (little packets of electromagnetic energy) produce such dramatic biological changes? The list of documented mechanisms and effects in laser treated tissue is extensive. Electrical, temperature and pressure gradients are created as coherent laser light is polarized by the mixed density of tissue. Chromophores - photon absorbing chemicals and structures in tissue, cells, and sub-cellular organelles - absorb the electromagnetic energy. Electron chain transport mechanisms in mitochondria, cell membranes and epithelial tissues are stimulated. ATP production increases, and DNA and RNA synthesis is increased. Enzymes (such as the cytochrome oxidases) are directly stimulated. With further research, a more complete understanding of this exciting technology will emerge.

**What patients can I treat with Class IV laser therapy?**

Patients presenting with pain, inflammation or healing tissue are candidates for Class IV laser therapy.

Incorporation of Class IV laser therapy into routine pain control protocols is appropriate. As an adjunct to medical protocols, laser therapy is helpful in reducing pain and inflammation and accelerating healing after surgery and dental procedures.

Patients with a wide variety of acute problems benefit from Class IV laser therapy. Common to these problems are the components of pain, inflammation and tissue healing. These conditions may be treated only once, or, multiple times over several days or weeks. A few examples include wounds, fractures, abscesses, anal sacculitis, acute otitis, hematomas, sprains, strains, muscle discomfort, cystitis, urethritis, injection site soreness, pyotraumatic dermatitis, venomous bites and pododermatitis.
Chronic conditions involving pain, inflammation and healing may also be helped, although treatment has to extend over a longer time, and frequently will be followed by on-going treatment to maintain effect. Osteoarthritis, elbow hygromas, lick granulomas and neuropathies are examples.

**How do I treat patients with Class IV laser therapy?**

The laser hand piece is moved in a scanning motion over the affected tissue. Treatments take 3-5 minutes for each affected area. Patients tolerate treatments very well, experiencing a gentle and pleasant warming sensation in the tissue. Most patients relax as treatments are administered.

Treatment success depends on delivering an appropriate amount of laser energy to affected tissues. Laser energy is measured in Joules, one Joule being one Watt delivered for one second. Total energy delivered to an area of affected tissue is expressed in Joules per square centimeter (J/cm²). Treatments should deliver 3-5 J/cm² for wounds and conditions affecting superficial tissues, and 8-10 J/cm² for musculoskeletal conditions and those affecting deeper tissues.

Protocols for treatment are available in menu format in therapy laser devices. These software defined treatment protocols have proven very effective when used to treat appropriately sized areas of affected tissues.

In addition, treatments can be administered using operator-defined protocols. Experienced veterinary laser therapists shorten treatment times by increasing the rate of delivery of energy to the target tissues using custom settings available in therapy laser devices. Treatment charts and easy to calculate custom protocols have been published and are readily available.

**Are there contraindications and safety concerns with Class IV laser therapy?**

Eye protection is critical when using any Class IV laser. All persons in the treatment area should wear appropriate safety glasses and pay strict attention to avoiding direct exposure of the patient’s eyes.

Darkly pigmented hair and skin more readily absorb diode laser wavelengths of light. To avoid overheating pigmented tissue faster scanning treatment technique is used.

Most contraindications for laser therapy are based on prudence rather than clinical data. Treatment of malignancy, thymus and thyroid glands, epiphysitis, testicles, pregnancy, and active hemorrhage are historical contraindications. Treatment after administration of photosensitizing medications is a definitive contraindication.

**How do I assign fees for Class IV laser therapy treatments?**

When using Class IV laser therapy as part of a pain control protocol, the fee for the entire protocol can be increased by $18.

Treatment for acute conditions usually involves 1-3 treatments. These are invoiced either
individually at $48 per treatment or as a group at $43 per treatment.

Treatment of chronic conditions is invoiced as a protocol that averages $43 per treatment during the induction period. The entire fee for the induction is invoiced at the start of treatment to encourage client compliance through the entire protocol. Individual long term maintenance treatments are invoiced at $48 per treatment.

**Where can I receive in-depth training and certification in laser therapy?**

Online training for a variety of medical laser applications is available from the independent American Institute of Medical Laser Applications ([http://www.aimla.org/](http://www.aimla.org/)). Continuing education credits are available for AIMLA’s on-line multi-media courses. Completion of course modules can lead to certification by AIMLA.

**What are some articles I can read in the scientific literature?**

There is a vast amount of published information about laser therapy. A convenient way to access abstracts of thousands of publications is through the internet search portal [http://www.ncbi.nlm.nih.gov/pubmed/](http://www.ncbi.nlm.nih.gov/pubmed/). The site can easily be found by simply doing an internet search for “PubMed”. A short list of examples of available publications follows:


