

Cold-Laser Therapy: The Healing Power of Light

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Hear the word “laser”, and scenes from your favorite science-fiction or action movie may come to mind. This mysterious energy is shown cutting chains from a captured prisoner, knocking a missile out of the sky, or even blowing up an entire planet. In reality however, lasers have a much wider (and usually more benign) range of applications. They are used in all CD/DVD players, carry vast amounts of data in fiber optic networks, improve eye-sight with laser corrective surgery, and even remove unwanted body-hair or tattoos. Did you know, however, that lasers are now being used for **healing**?

The Healing Power of Light

The role of using light to improve health is not new. Natural sunlight is an essential component to produce vitamin D. UV-light is used to help treat skin conditions such as psoriasis. Lack of sufficient sunlight is known to cause a condition known as seasonal affect disorder (SAD) that is characterized by severe depression. The use of lasers in medicine, however, first became popular as precision cutting tools. A combination of small beam diameter and high power has allowed lasers to replace the scalpel for certain surgery procedures.

The healing power of lasers was first discovered soon after lasers were first invented. During an experiment to determine if laser-light caused cancer in 1967, Endre Mester exposed the shaved backs of several mice to low-powered red laser light. Not only did the laser treatments *not* cause cancer, he noted that the hair grew back much quicker on the treated mice than on the un-treated control group! Over the years, this discovery has led to a field of study called “photo-biomodulation”. Lasers, and in certain applications LED’s (light-emitting diodes), are being used to accelerate healing, reduce inflammation, and reduce pain.

A laser is defined as a device that produces intense radiation in the visible or near visible wavelengths. Laser light is unique in that it is close to one specific wavelength and propagates in-phase; meaning that all of the electro-magnetic waves oscillate together in an ordered and aligned way. Together, these conditions make up the term *coherency*. When the coherent light is columnated, it can travel vast distances with very little loss of power or scattering. How are lasers different than LED’s? While LED’s can produce light of single color (wavelength), the light is neither in-phase nor can it be easily columnated. Lasers are also capable of producing much higher power than LED’s.

Laser treatment used for healing is called “low-level laser” or “cold-laser” therapy. By definition, lasers used for cold-laser therapy range in power from 5 to 500 milliwatts (0.005 to 0.5 Watts). Lasers less than 5 milliwatts lack the power to induce a bio-stimulatory effect, while lasers greater than 500 milliwatts may cause excessive heating and burn the skin. To put this in perspective, laser pointers that can be purchased at

your local drug-store range between 1 and 5 milliwatts. Lasers used for surgery, however, range from 5 to 50 Watts.

Lasers are now being made in virtually every color of the rainbow. Which colors heal?

Cold-laser therapy systems are available in several different wavelengths (colors). They range from green (532 nm) to red (650 nm) to near infra-red (750 to 950 nm). What color is best? A lot depends on what you are trying to heal. Each color reacts differently with the body. Green laser light, for example, is very quickly adsorbed by the skin and blood and can be used only to help heal surface wounds such as bed-sores or diabetic ulcers. Red lasers can penetrate more deeply, but are still generally used for surface conditions such as burns, acne, and hair restoration. IR (infra-red) lasers penetrate much deeper and are used to help heal muscle, ligament, and even bone. Some systems will combine lasers of different wavelengths into a cluster to increase their range of uses.

How do they work?

The health benefits of cold laser therapy can be roughly divided into three categories:

- 1) *Reduce inflammation*
- 2) *Reduce pain*
- 3) *Accelerate tissue repair*

Reduce inflammation

Immediately after an acute injury, the body undergoes a complex series of reactions designed to stop bleeding and initiate the tissue repair process. This process normally includes edema, inflammation, and pain. These reactions are designed to protect the damaged area while the body repairs itself. Laser therapy has been shown to reduce inflammation by increasing the amount of vaso-dilating and anti-inflammatory compounds such as prostaglandin PGI₂. It has also been shown to reduce Interleukin 1 (IL-1), a pro-inflammation component that is connected to inflammatory diseases like rheumatoid arthritis.

Reduce pain

Laser treatments have been shown to stimulate increased levels of beta-endorphins. B-endorphins are neuropeptides that serve as natural analgesics to reduce pain.

Accelerate tissue repair

To speed tissue repair, laser light affects the mitochondria. The mitochondria is the part of the cell responsible for producing ATP (adeno-triphosphate); the chemical energy of

the cell. Laser light has been shown to greatly accelerate the production of ATP, thus speeding up the overall activity of the cell. In cells responsible for repairing tissue, including bone, muscle, ligament, skin, and even nerves, this results in an increase rate of repair.

These explanations are only a sample of a large list of mechanisms shown to be influenced by laser therapy.

What are the dangers? Risks?

One of the greatest risks of laser therapy is damage to the eyes. Cold-laser therapy treatments should always be conducted with proper safety glasses worn by both the patient and the practitioner. Other potential risks include:

No treatment over suspect tumors or cancer cells

No treatment over the thyroid

No treatment over the fontanelle of infants

No treatment if the patient is using photo-sensitive or immunosuppressant drugs.

These potential risks are a conservative precaution and have not been completely proven. Special exceptions are already being discovered including the use of laser-therapy in the eyes to help with macular degeneration

The future of cold-laser therapy.

The body of evidence showing the benefits of laser therapy is growing at an exponential rate. Much of today's research is directed towards understanding all the physiological mechanisms that are affected during laser exposure. As cold-lasers with high output power are becoming more popular, it has been discovered that the risk of over-dosing does exist. The result of over-dosing, however, seems to be simply a decrease in healing-rate. In response, optimizing treatment times and laser power are being vigorously investigated.

Combining ancient chinese medicine with modern technology: Laser Acupuncture

An increasing body of evidence suggests that laser treatments on specific acupuncture points can stimulate a similar effect as acupuncture needles. Successful studies include laser acupuncture as a means to successfully treat osteoarthritis of the knee and the use of laser acupuncture in the ears to help smoking addiction. This discovery provides a unique alternative to patients who are terrified of needles, but still seek the powerful healing benefits of acupuncture.

Cold-laser therapy: Inexpensive, effective, and safe

Laser therapy is an exciting and relatively new field that can offer people a very safe and effective option to help with speeding up injury repair and reducing pain. Next time

you seek help from a physical therapist, chiropractor, orthopedist, or acupuncturist, ask them if they also use cold-laser therapy. It may end up being your best option!