

# Low Level Light Therapy

## “Cold Laser”

Low Level Laser Therapy, commonly known as LLLT or cold laser therapy, is a form of phototherapy which involves the application of low power coherent light to injuries and lesions to stimulate healing. Light energy has been used for healing since the earliest recorded medical history. Cold laser therapy is used to increase the speed, quality and tensile strength of tissue repair, resolve inflammation, increase range of motion and give pain relief. Cold laser therapy is a major advancement in healing and is rewriting the medical books on what is possible for chronic injuries, pain management, neurological impairment, and facilitating the healing process in disease conditions.

### **How does Low Level Laser Therapy work?**

The basic premise is that LLLT stimulates cell activation processes which, in turn, intensify physiologic activity. Healing is essentially a cellular process and light energy initiates a cascade of reactions, from the cell membrane to the cytoplasm, to the nucleus and DNA. This is called cellular amplification; a phenomenon whose demonstration earned the Nobel Prize in Physiology of Medicine in 1994.

There are many biological processes that take place in tissues that have been shown to respond to LLLT in the 630-640 nanometer wavelength range. One of these processes is the enhancement of ATP production in the mitochondria, which provides more energy substrate for cellular healing and tissue recovery post-injury. This wavelength has also been shown to decrease inflammatory mediators in wounds and increase endogenous endorphin release.

The effects of LLLT are photochemical (cold), not thermal. Hot lasers in the medical world are used for surgical precision while cold lasers are used for healing precision. During treatment of the tissue with the 635 nm laser, an interaction between cells and photons takes place - a photochemical reaction. Photons from the laser affect the tissue at the cellular level. The cold laser enters the tissue, alters cell membrane permeability, and at the cellular level is absorbed in the mitochondria. The mitochondria are the “Powerhouse” of the cells and make ATP which is needed for the life enhancement process of every cell.

These physiological changes affect macrophages, fibroblasts, endothelial cells, mast cells, bradykinin, nerve conduction rates and the energy communication pathways throughout the fascial network. The energy transferred to the cell can increase its kinetic energy, and activate or deactivate enzymes or alter physical or chemical properties of macromolecules.

Research has shown that the cells of your body actually communicate with each other through coherent light (laser). With our Erchonia Medical laser specific pulsations (hertz) can be programmed with the laser frequency allowing the practitioner to talk “cell talk” with the body. Specific pulsations have been shown to create different physiological responses of the cell. This is extremely important when working with a variety of injury and disease conditions to promote *healing*.

# ***Known Biological Effects of Laser Therapy***

Clinical studies and trials of cold laser therapy technology indicate the following beneficial effects of laser light therapy on tissues and cells:

1. **Accelerated Tissue Repair and Cell Growth.** Photons of light from lasers penetrate deeply into tissue and accelerate cellular reproduction and growth. The laser light increases the energy available to the cell so that the cell can take on nutrients faster and get rid of waste products. As a result of exposure to laser light, the cells of tendons, ligaments and muscles are repaired faster.
2. **Faster Wound Healing.** Laser therapy stimulates fibroblast development (fibroblasts are the building blocks of collagen, which is predominant in wound healing) in damaged tissue. Collagen is the essential protein required to replace old tissue or to repair tissue injuries. As a result, laser therapy is effective on open wounds and burns.
3. **Reduced Fibrous Tissue Formation.** Laser therapy reduces the formation of scar tissue following tissue damage from cuts, scratches, burns or surgery.
4. **Anti-Inflammation.** Laser therapy has an anti-edemic effect as it causes vasodilation, but also because it activates the lymphatic drainage system (drains swollen areas). As a result, there is a reduction in swelling caused by bruising or inflammation.
5. **Anti-Pain (analgesic).** Laser therapy has a high beneficial effect on nerve cells which block pain transmitted by these cells to the brain and which decreases nerve sensitivity. Also, due to less inflammation, there is less edema and less pain. Another pain blocking mechanism involves the production of high levels of pain killing chemicals such as endorphins and enkephalins from the brain and adrenal gland.
6. **Improved Vascular Activity.** Laser therapy will significantly increase the formation of new capillaries in damaged tissue that speeds up the healing process, closes wounds quickly and reduces scar tissue. Additional benefits include acceleration of angiogenesis, which causes temporary vasodilatation, an increase in the diameter of blood vessels.
7. **Increased Metabolic Activity.** Laser therapy creates higher outputs of specific enzymes, greater oxygen and food particle loads for blood cells.
8. **Improved Nerve Function.** Slow recovery of nerve functions in damaged tissue can result in numbness and impaired limbs. Laser therapy will speed up the process of nerve cell reconnection and increase the amplitude of action potentials to optimize muscle action.
9. **Immunoregulation.** Laser therapy has a direct effect on immunity status by stimulation of immunoglobins and lymphocytes. Laser light is absorbed by chromophones (molecule enzymes) that react to laser light. The enzyme flavomono-nucleotide is activated and starts the production of ATP (adenosinetriphosphate), which is the major carrier of cell energy and the energy source for all chemical reactions in the cells.
10. **Trigger Points and Acupuncture Points.** Laser therapy stimulates muscle trigger points and acupuncture points on a non-invasive basis providing musculoskeletal pain relief.