

LASER

A **laser** is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons.

The term "laser" originated as an acronym for *Light Amplification by Stimulated Emission of Radiation*.

Simply applying electrical energy to a material caused the repeated release of photons.

The first actual physical model for coherent stimulated radiation emission was in sophisticated microwave equipment developed to produce radar.

Properties of laser

- 1-Coherent- in phase in space & time
- 2-Monochromatic- one color/wavelength
- 3-Collimated- single direction, tight beam, parallel paths

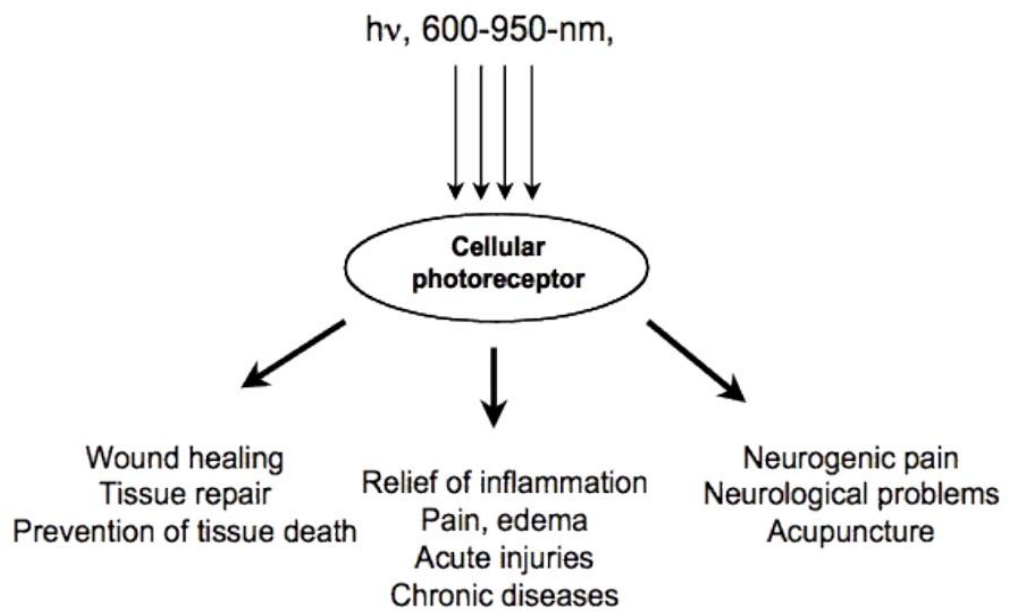
Low level laser therapy

1. Relatively a new biotechnology that uses the science of photobiostimulation to speed healing
2. Cold laser therapy or soft laser therapy
3. Painless
4. Non-invasive
5. Works with the body's own healing mechanisms
6. No harmful side-effects.
7. Different colours are used in veterinary medicine
8. Infra-red, at about 800 nm or greater
9. Red, at about 610 - 800 nm
10. Gives body the pure energy to use for healthy cellular regeneration

Procedure

The laser handset is held over the skin for a few minutes in each setting, although it can be used through clothes for intimate areas. Different programmes use a range of settings with various wavelengths and phasing to penetrate to the best level within the body and interact directly with the appropriate cells. Sessions last no more than an hour and most clients notice the benefits from the very first session.





Physiological Effects

- 1- Stimulation of wound healing
 - Promotes faster wound healing/clot formation
 - Helps generate new & healthy cells & tissue
- 2- Increase collagen production
 - Develops collagen & muscle tissue
- 3- Increase macrophagic activity
 - Stimulates immune system
- 4- Alter nerve conduction velocity
 - Stimulates nerve function
- 5- Biostimulation – improved metabolism, increase of cell metabolism
 - Increases speed, quality & tensile strength of tissue repair
- 6- Improved blood circulation & vasodilatation
- 7- Increases ATP production
- 8- Analgesic effect
 - Relieves acute/chronic pain
- 9- Anti-inflammatory & anti-edematous effects
 - Reduces inflammation
- 10- Immunoregulation
 - stimulates IMMUNOGLOBINS and LYMPHOCYTES

Mechanism of Action

1. The light-induced increase in ATP synthesis and increased proton gradient leads to an increasing activity of the Na^+/H^+ and $\text{Ca}^{2+}/\text{Na}^+$ antiporters, and of all the ATP driven carriers for ions, such as Na^+/H^+ ATPase and Ca^{2+} pumps.
2. ATP is the substrate for adenylyl cyclase
3. Controls the level of cAMP
4. Both Ca^{2+} and cAMP are very important second messengers
5. Ca^{2+} regulates almost every process in the body (muscle contraction, blood coagulation, signal transfer in nerves, gene expression, etc.).

Indication

1. **Less Pain** - The laser seals nerve endings as it cuts. So the patient will have less pain.
2. **Less Bleeding** - The laser seals small blood vessels during surgery and speeds up surgery by minimizing bleeding.
3. **Less Swelling** - No physical contact except the invisible laser beam. The tissue will not be crushed.
4. **Sterilization** - The laser sterilizes the surgical site as it cuts. Bacteria and viruses are vaporized by the laser during laser surgery.
5. **Faster Recovery** - Less bleeding and swelling will result in faster healing.
6. **Precision** - The beam direction and power can be controlled precisely to remove thin layers of tissue and produce minimal side effects on the surrounding healthy tissue.
7. **Reduced hospitalization time** - All of above factor will greatly reduce the procedure time

Operations

- 1- Declaws : Scalpel blade or a nail trimmer is the traditional way of declaws, that was painful and time consuming. Laser surgery to declaw will make cats have little pain
- 2- Ear Hematoma : One of the CO2 laser features, selectively and gently going through layers of tissue, makes the CO2 laser excellent for ear hematoma due to the small opening needed to drain the fluid.
- 3- Skin Tumor: Laser can completely ablate the small tumors lesion and make pets have less discomfort during the recovering time.
- 4- Dog Neuter : CO2 laser can also treat dog neuters due to the advantages of minimal bleeding and less pain.
- 5- Amputation : The laser is particularly good at amputations. Minimal bleeding during the laser surgery allows the surgery to perform much faster.