

LASER SURGERY

The word laser is actually an acronym for “Light Amplification by Stimulated Emission of Radiation.” The laser generates and amplifies light energy. It stimulates electrons to give off photons of light in an organized fashion and then channels them with mirrors to form a single beam. Instead of many colors of randomly directed light, like the light emitted from a light bulb, the light waves are emitted at the same wavelength, heading in the same direction at the same frequency. This coordinated beam of light may then be used for many applications.

Laser physics was theorized as far back as the late 1800’s and Albert Einstein also developed theories about the possibilities of lasers. The technology did not exist to actually build a laser until the 1950’s. During the cold war, laser technology was developed for use by the military and then was adapted for use in medicine and industry. Today, lasers are used to scan your groceries at the supermarket, survey for highway construction, cut materials from plastic to steel precisely and quickly, and of course, for surgery.

The most common laser type in veterinary use is the CO₂ laser, although diode, ruby and other types of lasers are also used. The development of small, practical and affordable laser units has caused an explosion in their use, from only a dozen or so clinics in 1998 to over 1000 today.

Surgical lasers emit a slender beam of laser light that is very hot. This light beam is used to vaporize the tissue in its path. In other words, it cuts through or removes tissue by causing individual cells to literally explode. Although it sounds dangerous and brutal, lasers actually provide for a precise incision with very little pain and bleeding.

The common CO₂ laser beam is dissipated by water molecules, so it cannot penetrate dangerously far into tissues – it is stopped quickly by the water molecules contained in every cell in the body. The higher the wattage of the laser beam the farther it will penetrate but it is still a very safe way to make an incision or remove precise, small amounts of tissue.

Lasers allow an incision as fine as that achieved with a scalpel blade but without the bleeding that accompanies a cut through tissue and blood vessels. In the direct beam of the laser the cells it contacts are vaporized, sealing nerve endings and blood vessels. This means there will be little bleeding and little pain produced. A little farther out from the main beam of the laser, cells will coagulate and die, but the zone of tissue damage produced by a laser is much smaller than the zone produced by electrocautery. Electrocautery is used to stop bleeding and make incisions as well but it is much less precise and leads to more tissue damage.

Lasers used for surgery have many different applications. Common uses are for declawing cats with minimal pain and bleeding; treatment of corneal (eye) ulcers; removing excess tissue or tumors in the mouth, where bleeding is a major problem; healing chronic sores such as lick granulomas; removing lumps and tumors; surgery of the face or ears, where bleeding may again be a problem; or removing small pieces of tissue for biopsy. Almost any routine procedure such as a spay or neuter can be done with less pain and bleeding with a laser. The integration of laser technology and flexible fiberoptics allows the use of lasers in all areas of the body via an endoscope.

The use of lasers in animal surgery is becoming more and more common but most veterinary hospitals are not yet equipped with a laser. This technology is still expensive for a small business like a veterinary clinic, costing \$30-50,000 just for the equipment. Training in laser use is also necessary and there are ongoing costs of replacing tips and cables. If your veterinarian offers laser surgery, expect to pay an additional fee, usually under \$100, for its use. The fee is offset by a reduced need for pain medication and often a shorter stay in the hospital.

The unique properties of the laser provide the clinician with an exciting new therapeutic and diagnostic tool. Research and ongoing development of laser technology will continue to produce innovative and new methods for managing diseased tissue. Some laser techniques now in development include laser hyperthermia for treatment of cancer; minimally invasive urological techniques for treating tumors in the bladder, prostate or urethra; lithotripsy (stone breakdown) to remove bladder or gallstones; tissue fusion/welding of blood vessels, intestine, urethra, skin or bone; and new techniques in dentistry and tooth extractions. Reduction in both the price and size of laser equipment will continue to foster the growth of laser use in veterinary medicine.