

AESTHETICA



Reveal your inner beauty

**Laser Surgery Center
Cosmetic and Plastic Surgery
Cosmetics and Skin Care**

Gregory G. Caputy, M.D., Ph.D.
chief surgeon
Joy A. Bliss, R.N., B.N., M.Sc., Ph.D.
clinic administrator

About your surgery

Laser Surgery

Laser surgery is nothing more than the use of a specialized tool (the laser) in order to perform a specialized function. Two truths must be emphasized in this regard. First, if a person owns a hammer, then everything requiring repair will be in the form of a nail. In other words, if a given surgeon has only classic surgical technique, or even one type of laser at his disposal, then that is what is used for every problem, even if it may not be the optimal solution to that surgical problem. At **AESTHETICA** we strive to provide the optimal solution to your surgical problem, whether, *for you* that involves the use of classic surgical techniques, innovative techniques or the use of one or more types of lasers. Second, any sufficiently advanced technology will appear to be magic. Well, lasers are not magic and they are not a panacea for all of the surgical problems in the world. They do, however, offer real advantages over other methods of treatment for a number of lesions. Their drawbacks are, first, they are expensive, approximately \$100,000.00 per machine initially with expensive upkeep, safety and maintenance considerations. Second, they require expertise and training for their proper

application and use. Third, the technology has only advanced to the point that several machines are necessary for each of many applications. Fourth, and finally, many non-trained medical practitioners use lasers as marketing tools for their practices and obtain poor results with their use. It then becomes widely known that “lasers are bad” and only yield poor results. Again, lasers are a tool and only are as good as the person who wields them.

Now, let’s talk about lasers. Laser is an acronym for Light Amplification by Stimulated Emission of Radiation. Albert Einstein conceived the principles upon which lasers were initially made around 1916. The first laser made was a ruby laser in 1960. Without getting too technical, a laser is simply a light source. The light is made by some substance after which the laser is named (e.g. ruby, CO₂, YAG, etc.) which has been excited by some energy emitter (e.g. a flashlamp). The light that is produced has some very useful properties. First, it is a *single wavelength* i.e. it is all the same “color” (if visible) or the same energy if invisible. White light is a mixture of all wavelengths of light, both visible and invisible. In the visible range, red is light with a wavelength around 770nm while violet light, at the other end of the visible spectrum, has a wavelength of around 390nm i.e. this is the visible spectrum seen in our rainbows. Infrared light extends from the longer wavelength side of this spectrum and ultraviolet, radio and x-rays from the shorter wavelength side. The shorter the wavelength, the higher the frequency and the higher the energy of the light. Second, the light is *coherent*, that means that it travels in a single beam for a very long distance. This is why laser pointers work. The third property of

laser light is that it is very *intense* and therefore has a great deal of energy. These three properties of laser light of monochromaticity, coherence and intensity are what make them so useful to us for surgery and dermatologic applications.

All substances in nature do different things to light. The light can be *reflected*. This is what determines the color of something when we look at it. In other words, a red car is that color because the red wavelength of light is reflected back into our eyes for us to see. The light can be *transmitted* or pass through the substance; like glass or the top layers of the skin. The light can be *scattered* and thereby dissipate widely in the substance and on its surface. All of the other colors are *absorbed*. The substances in our bodies have particular light absorption patterns. For example, hemoglobin that is oxygenated has peaks of light absorption at 418, 542 and 577nm. This does not mean that these are the only energies that are absorbed but that these are where the peaks occur. For example, it has been found clinically that a particular laser which produces light at 585nm is more useful for port-wine stains in infants than when the light is emitted at 577nm because of better tissue penetration and less tissue reaction. As in most cases, the direct clinical application of physical principles is often tempered by the complexity of the human being!

Once the light energy is absorbed, it heats up the substance which absorbed it. If the energy in the light is *pulsed*, which means it is produced intermittently, then the energy and heat are produced intermittently. The *thermal relaxation time* of the particular substance and surrounding tissue

is the time it takes for this heat to dissipate. If the pulses are further apart than this length of time, then no heat damage or scarring will occur to the surrounding tissue and only the substance absorbing the light will heat up. For example, when a KTP laser is aimed at a tiny blood vessel beneath the skin, the hemoglobin in the blood vessel absorbs the light energy, heats up the vessel walls to the point that the vessel occludes permanently yet the vessel wall does not rupture so as to produce bruising and also so that the tissue around the vessel does not heat up to the point that a burn scar is produced within the skin

Let us now discuss the myriad of lasers out there. The lasers which are useful for *vascular* lesions e.g. port-wine stains, “spider” veins, small prominent leg veins and hemangiomas are Argon (415nm), KTP (532nm), Copper Vapor (578) and Flashlamp Pulsed Tunable Dye (577 & 585nm) lasers. Those lasers useful for a lesion with melanin (natural pigment) in them e.g. freckles, age spots, nevi and macular lentiginos are Ruby (694nm) and Yttrium Aluminum Garnet or YAG (1064nm) lasers. Other lasers produce wavelengths of light absorbed by other substances in tissue. Notably, CO₂ lasers produce a wavelength of 10,600nm that is absorbed by water (like your microwave at home). Other than the wavelength of light produced, each laser also has particular characteristics of power capabilities, light transmission, pulse width (length of time of the pulse of light), pulse amplitude (light intensity) and various mechanical specifics such as types of handpieces and delivery systems available. We have chosen the lasers

that provide the optimal performance and best characteristics for the treatment of the various lesions our patients wish treated. We have an Orion laser by Laserscope that is actually like six lasers in one machine. It is the optimal laser for the treatment of blood vessels and some pigmented lesions as well as various skin growths. It incorporates a Q-switched YAG laser within it for tattoo removal of black and blue pigment and a green wavelength for red pigment. The Ultrapulse CO₂ laser is the mainstay for deep resurfacing while an Erbium:YAG laser is used for superficial resurfacing. A long pulsed ruby laser, recently FDA approved, is used for hair removal and a Q-switched ruby laser is used for removal of black, blue and green tattoo pigment as well as natural pigmented lesions, particularly in non-Caucasian patients. A long-pulsed YAG laser is used for hair removal after Dr. Caputy participated in the FDA approval process of hair removal lasers. A long-pulsed YAG laser is also being used for the non-resurfacing rejuvenation of skin – the newest and perhaps most exciting use of laser light energy. A diode laser with a wavelength of 1,450 nm and cryogen spray cooling (Smoothbeam) is now FDA approved for the treatment of acne and fine facial lines.

There are risks with any procedure. With laser surgery, when properly conceived and performed, the risks are minimal. There is a particular danger to the eyes when light of this intensity is used. We carefully adhere to all OSHA guidelines regarding signage, goggle and protective eyewear use, door placement and other recommendations for protection of staff and patient vision. When

operating around the eyes, special eye protection is always provided to the patient. There is a small risk of scarring with any of the laser procedures as we have discussed at length, above. There is a risk of bleeding beneath the skin but this is usually minimal and, at its worst, often only leads to bruising. It is possible for overlying skin to be damaged by the laser and subjacent bleeding which could lead to skin necrosis. I have never had this complication nor have I ever seen it. There is a very small risk of infection that is treated prophylactically. There has been found to be no risk of carcinogenesis from any form of laser treatment. Surgical risks are particular for the given procedure and will be discussed individually for each procedure with each patient preoperatively. Proper training of the laser surgeon minimizes risks. Dr. Caputy is fully trained and accredited in laser surgery. He trained for over 4 months with the most modern laser systems in Europe and has had more than 3 years of training specifically in aesthetic surgery *after* board qualification in plastic surgery. He is **board-certified** in laser surgery in plastic surgery by the American Board of Laser Surgery. He is a member of the American Society for Laser Medicine and Surgery. He has privileges to perform laser surgery at Kapiolani and Queen’s Medical Centers. Dr. Caputy is a world-renowned lecturer and teacher of laser techniques having given extensive training courses in his office as well as traveling to the mainland to teach courses to other physicians on laser treatments. He traveled to China, India, Korea and Thailand and Japan to instruct physicians and

*One Kapiolani Building, 600 Kapiolani Boulevard
Suite 409, Honolulu, HI 96813
Phone: (808) 536-8866, (800) 488-9855
Facsimile: (808) 536-8867
e-mail: caputy_bliss@msn.com*

give clinical demonstrations on laser use in non-Caucasian patients.

I hope that this short informational brochure answers some of the questions which you have about laser surgery. Please ask either the staff of **AESTHETICA** or Dr. Caputy should you have any other questions about laser surgery.

*One Kapiolani Building, 600 Kapiolani Boulevard
Suite 409, Honolulu, HI 96813
Phone: (808) 536-8866, (800) 488-9855
Facsimile: (808) 536-8867
e-mail: caputy_bliss@msn.com*