

## Laser System Shopping Information

A laser system is a very important tool in an aesthetic practice. It can generate a substantial revenue stream and the demand is increasing every year. Even in down economies, there are many patients who will find the money to pay for their aesthetic treatments. When you talk to a sales representative from an aesthetic laser company, keep in mind that these devices all operate under the same laws of physics regarding how a specific light wavelength affects targets in the skin. These targets are called chromophores and are items such as the pigment in a sunspot, or the pigment in a hair follicle, the hemoglobin in the blood or the water in a cell. Clinical studies, performed by experts outside of the laser manufacturers, have discovered which wavelength is more highly absorbed by which chromophore. How to determine which laser will work best for you is something you can determine, if you know what to look for and what questions to ask. But where do you begin? First of all, you must understand how these systems work.

LASER stands for **L**ight **A**mplification by the **S**timulated **E**mission of **R**adiation. Lasers were developed in the 1960s and the technology has been continually advanced since, especially in medical applications. The discovery that specific wavelengths of light can be used to target tissue for the purpose of altering that tissue has led to the use of lasers for medical and cosmetic purposes. A light-based system can remove unwanted hair, tattoos, hyperpigmentation, leg and facial veins and are also used to rejuvenate and resurface skin, reduce wrinkles, fine lines and acne.

Lasers come in different wavelengths and interact differently with various tissues. There are multiple types of lasers to choose from. Here are some of them:

Nd:YAG	Neodymium Yttrium Aluminum Garnet lasers operate at 1064nm and are excellent for hair removal on all skin types and can perform exceptionally in skin rejuvenation and vascular treatments.
Er:YAG	Erbium Yttrium Aluminum Garnet lasers operate at 2940nm and are the most popular choice for ablative skin resurfacing.
Q-Switched	Q-switched lasers are perfect for tattoo and pigmented lesions removal and come in different wavelengths.
KTP	Potassium Titanyl Oxide Phosphate lasers operate at 532nm and are specifically effective for red ink tattoo removal and vascular lesion treatments.
Diode	These lasers can be configured in a range of wavelengths and can treat a variety of conditions.
Pulsed-Dye	These lasers operate between 585 to 595nm and are used for vascular and skin rejuvenation treatments.
Alexandrite	Operating at 755nm, the Alexandrite is one of the earliest cosmetic lasers that have been used for hair and pigmented lesion removal and skin rejuvenation.

CO2            Operating at 10600nm, the CO2 was the premier skin resurfacing technology. Due to extended downtime issues, the CO2 has been mostly replaced by the erbium 2940nm technology.

As you can see from the above list, how to begin your search for a laser is to decide what treatments you believe will be most in demand with your patient base. The light-based aesthetic treatments that are currently in the highest demand are:

- Hair Removal
- Skin Rejuvenation
- Vein Removal
- Acne Treatments
- Fractional Resurfacing

(Don't get overly concerned about offering one of the "in" treatments, such as cellulite reduction or invasive procedures such as laser-assisted liposuction. See below for more information on this point.)

This is how they work. The light is delivered as an intense beam and is converted to heat energy when the target tissue, the chromophore, absorbs it. The amount of light a target absorbs dictates the amount of heat that is generated. This heat damages the cells of the target tissue while leaving the surrounding tissue relatively unaffected. The cells absorb the heat energy based on the color or composition of the target and the wavelength of the light. Wavelengths of light are measured in nanometers (nm). Pigment in the target tissue (i.e. dark hair, hyperpigmented spots, blood in vascular lesions or veins, ink in tattoos, etc.) absorbs the heat energy more than the surrounding tissues, resulting in the damage of those pigmented cells. In the case of hair removal, the hair transfers the heat down to the follicle, damaging the follicle so it will no longer produce hair.

The laser light is generated in a specially designed component within the laser system, the lasing chamber. The lasing chamber contains a substance, the lasing material, which can be a crystal that is doped/combined with a specific element. This element is the source of the laser light. As an example, a lasing chamber that contains erbium generates light in the 2940nm wavelength. The light is released from the lasing material by introducing a high amount of energy into the lasing chamber. The source of this energy could be light, electricity or electromagnetic current. The most common source of this energy is a flash lamp. This energy alters the path of the electrons orbiting the nucleus of the molecules in the lasing material. When the electrons are "bumped" from their orbital path, photons are released. These photons are collected in the lasing chamber, amplified with specially designed mirrors within the lasing chamber, and released as a beam of laser light.

The amount of energy that is "pumped" into the lasing chamber (by the flash lamp), combined with the quantity and quality of the lasing material dictates the quality and power of the outgoing light beam. The power supply that delivers the electricity to the flash lamp is important in terms of its energy output capabilities. Small, compact/tabletop laser systems, or the systems that have the lasing chamber built into the handset, cannot deliver nearly the same level of power as a full sized laser system. These types of systems simply do not have components with the size/capacity to deliver

a reasonably powered laser beam. A small lasing chamber combined with a low amount of energy being pumped into that lasing chamber results in a low powered laser light.

There are companies that specialize in the manufacture of lasing chambers. Aesthetic laser companies purchase this item from these other companies. The component that generates the laser light in all aesthetic lasers is made by a limited number of companies.

So how can one laser manufacturer say their light is better than another?

Some laser sales representatives will tell you that their system is more effective than another is and give some irrelevant reason why. Light affects tissue based on established clinical research results, is a matter of physics and will not vary. A laser that emits a light beam in the wavelength of 2940nm will be putting out the same type of laser light as any other 2940nm system. This wavelength of light will affect one type of tissue target (water) and that fact will not vary from one manufacturer to the next. No manufacturer's 2940nm light will target anything other than what all the other manufacturer's 2940nm light will target. Simple as that. The difference between one system to the next will be the parameters. The parameters of the light are what determine to what extent the target tissue will be affected. In addition to the wavelength, the parameters are: Fluence (power, measured in Joules per cm squared, J/cm<sup>2</sup>), Spot Size (how big of an area the light beam covers), Pulse Width (how long can the system maintain each light pulse at the fluence setting, measured in milliseconds, ms), and Repetition Rate (how fast the system can deliver each pulse of light, measured in Hertz, Hz). Another consideration for the usefulness of a light-based system is how to keep the skin cool to avoid a thermal injury to the epidermis.

After choosing the type of laser you need, you must look into the different manufacturers who offer that type (or types) of laser and find out who offers the system with the best parameters. The system with the largest spot size means you will be able to treat any condition faster (than a smaller spot size system) because you cover more area with every pulse. Choosing a system with the highest potential fluence (power, measured in Joules per centimeter squared, J/cm<sup>2</sup>) gives you the flexibility to increase the light's power if necessary. Fluence is one parameter that is sometimes misrepresented because, as you shrink the spot size without reducing the output of the laser, the J/cm<sup>2</sup> increases. Make sure the system can deliver a high fluence at a reasonably large spot size. If a system can deliver a high number of pulses per second (repetition rate), you can perform a treatment in a short period of time. The pulse width is also an important parameter, so you need to know what pulse width range is needed for each type of treatment you plan to perform with this laser. There should be pretty straightforward answers to your questions about these options. However, keep this in mind: many manufacturers do not publish their specifications on their web site or their literature and you should ask yourself, why? Those specifications are an easily determined bit of information that should be something they don't keep hidden. As we mentioned earlier in this paragraph, some manufacturers will claim their laser has a maximum fluence of over 1,000J/cm<sup>2</sup> but, when you get down to the true information, it can only do this with a very small spot size. The only thing you can do with a pinhead-sized spot at 1,000J/cm<sup>2</sup> is cause complications, with negative aesthetic results. Every manufacturer should be able to give you exact information regarding these parameters so you can compare one system to the next without any misunderstanding.

The last parameter you must evaluate is the skin cooling option. Because lasers create heat, it is very important that you provide thermal protection for the skin surface. The three major options are; contact probe, cold air, and cryogen spray. Make sure you know the true temperature of the cooling technology you are evaluating. Some people don't stop to think about just how cold 20° C is (or, should we say how warm it is). 20° C converts to +68° F, which is not very cold (when you compare that to the cold air system at -22° F or even chilled gel at +35° to 40° F).

The contact probe usually has a chilled liquid circulating in a plate that is in contact with the skin. The liquid has a low freezing point (similar to anti-freeze) and can chill the skin very effectively. The contact probe and the component that chills the liquid can be a separate unit or integrated with the system. It makes the treatment comfortable for the patient since the cold surface is in contact with the skin right where the laser beam is striking the skin, reducing the pain. The down side to that point is the skin is only chilled when the probe is in contact with the skin, so to cool the skin pre and post firing the laser means you have to hold the probe in place, which increases the treatment time and operator wage costs. The other downside to the integrated unit is that it is an additional component that can break down, causing the entire laser system to require servicing (see further down in this section on the subject of service concerns). If the contact probe is attached to the laser handset, it can make the handset pretty heavy and cumbersome. If the contact probe is not connected to the handset, it may require the operator to have an assistant handle the probe while the operator handles the laser handset and performs the treatment. The lasers with the integrated contact probe cooling system are usually on the high end of the price spectrum.

The cold air system delivers a stream of super chilled air directed onto the skin that is being treated. The air could be delivered at a very low temperature, -22° F, and will do an effective job of cooling the skin. The chilling unit is usually a separate piece of equipment and the air delivery component is simply a hose that can be attached to the laser handset, held on an adjustable arm or by the operator. The air stream can be directed to cover a large area, cooling the skin in both the area that was already treated and pre-cooling the area about to be treated. From a service standpoint, this is desirable. If the air hose can be attached to the laser handset, make sure the hose is not too heavy and makes the handset cumbersome. Most of the air hoses are made of lightweight material and do not negatively affect the handling of the handset. If the hose cannot be attached to the handset or doesn't have an adjustable arm, the operator may need an assistant to hold the hose in place, although the hose is usually not difficult for the operator to hold in their free hand. These systems can also be used to chill the skin prior to injection treatments, so it has multiple uses. The down side to the cold air system is that the unit can be somewhat sizeable so space in the room is a consideration.

The cryogen spray system is one of the newest cooling techniques. An operator and system controlled spray of cryogen is directed onto the skin just prior to the laser pulse. The dispenser that is located in the laser handset is lightweight and will not negatively affect the handling of the handset. However, the amount of cryogen spray that is applied to the skin is critical. Cryogen is frozen carbon dioxide with a temperature of less than -100° F. Applying too much cryogen spray may result in hypopigmentation or other negative side effects. Knowing how much is too much is difficult to determine since some skin types and some individuals are prone to

hypopigmentation so you may end up repairing one abnormal skin condition only to create another. Depending on the mechanism required to disperse the cryogen spray, there could be a service concern. Additionally, since the cryogen spray is a consumable, cryogen canisters will need to be purchased on an ongoing basis.

Regarding offering one of the “in” treatments: consider the fact that, in the past, many of the highly hyped treatments were proven to be not as effective as touted. Don’t get pulled in by the powerful, and possibly deceptive, marketing. Know what your patients really want and what they will pay for, otherwise you could end up with an expensive piece of equipment that only gathers dust in a corner of your office. The media will report on an “exciting, new treatment”, which creates a buzz in the public market, but sometimes the demand for those treatments will fade within a short period of time. Most often, that buzz is created by the manufacturer through advertisements and paid appearances on talk shows or similar media outlets. Don’t feel like you are missing out if you don’t offer that “new” treatment. Just wait a few months to see if any of the systems that perform this “new” treatment are being offered on the used equipment marketplace. That will give you a good idea of the efficacy of the procedure. If it is found to be effective and the demand grows, you can capitalize on an established market. If a treatment is effective, the demand will only grow, not fall. Not only that, but your reputation is on the line: if you promote a treatment solely because some laser manufacturer convinced you to be the “pioneer” in this new technology, you may end up looking like a used car salesperson. You would be lucky if you get a second chance to repair your reputation once it is tarnished. The treatments we listed earlier in this information are the main, revenue generating treatments you should first consider.

Additionally, don’t get caught up in the “it will be obsolete by the time you get it into your office” syndrome. There are lasers from the very early years of aesthetics that are still in use in successful aesthetic practices today. If a salesperson tells you that you should only lease a laser with a huge buyout option because you will want to upgrade when new technology is released, beware. Ask them these simple questions: Does your system remove hair (or whatever treatment it is designed to perform)? They will, of course, say yes. Then ask them if it will remove hair 10 years from now. They had better say yes to that question too. Why would you sign a lease for equipment with the intention of paying out all that money only to turn it in and sign another lease when the first piece of equipment still works and is almost paid off? The salesperson that says you should plan to do a trade-in for an upgraded laser is looking for the multiple commissions they will receive. They get paid when you buy your first machine, they get paid when you trade in that machine for the next one, and they may even get a commission to sell your used, first machine. Get the best deal you can, with the best terms you can qualify for, and pay off that machine. You will still be able to use it years from now, it will be paid off so the revenue is mostly profit, and it may help you afford that new laser with a little bit better performance or some new feature. You will now have two rooms operating at the same time, doubling your revenue potential.

Servicing the system can be a big concern. Many systems require “calibration” on a regular basis and cannot be moved around very much or they may fall out of calibration. For the most part, if a system is designed properly and the best internal components are utilized, there should be little to no need for “calibration”. The most delicate components of a laser system are the handset and the fiber optic cable that attaches the handset to the laser itself. Dropping the handset or damaging the cable are the two main factors that require a service call. If the system requires an operator to change

handsets or adjust components on a regular basis, the chances for improper installations or dropping a component increases. Also, as you add more components or options to your laser, you increase the probability of a problem simply by the fact that there are more parts that can fail. If the system you purchase requires a lot of maintenance or repairs, you will be very frustrated because you will have to reschedule your patients and service calls can be very expensive. Many laser companies can provide a loaner system within 24 hours, but that means you have to cancel your appointments for the majority of one full day. "Keep It Simple" may be a very appropriate term, or way of thinking, while shopping for a laser.

Before you sign the sales agreement, make sure you know how much a service contract is on an annual basis when your original factory warranty expires. There are some lasers with huge annual service contracts because they are prone to problems and it costs the manufacturer a lot to send technicians to your site to keep the system functioning properly. Get the cost for your annual service contract in writing before you buy, it will tell you right up front what possible headaches you would have in store for yourself if you bought that device. The annual service contract should be around 8% of the list price of the machine.

The upgradable, multiple wavelength systems are a good way of saving you space, if you want to offer a wide range of light-based treatments but you only have one treatment room with limited space and you will only have one person operating the laser. You must first determine if their basic system is exceptional enough to warrant the unusually high price that comes with these "platform" systems. Also price out the various handsets required to get you to that position of having all the wavelengths you plan to utilize. You may find that another manufacturer's single wavelength laser will work just as well at a lower price, opening the option of getting a second system with a different wavelength (if you have the space), without spending more than what you would pay for one multiple wavelength system. Owning one multiple wavelength system means you are planning for limited success. Having separate units will give you a higher potential for revenue because you can add treatment rooms and book procedures simultaneously. If you have one high priced system that can do multiple treatments, what good is that if you want to book two treatments at the same time? You most certainly won't want to buy two of the high priced multiple wavelength systems. Also, if you have a multiple wavelength system and one wavelength/function fails, you will have to get the whole system serviced.

Some laser manufacturers have created a unique way of delivering light to the skin. Some have a computerized delivery system that allows for a faster treatment for, as example, hair removal or skin resurfacing. Some have added radio frequency modulation to their light treatments. There are various forms of technology being added to lasers and some may or may not be a benefit to your patients or your practice. You have to get past the sales hype and try to determine if you really need that extra technology (and another component to possibly fail). As an example: There are laser system manufacturers that claim their system can perform a laser hair removal treatment faster than any other system on the market. Do you need to spend that extra few (or many, many) thousands of dollars to perform these fast hair removal treatments? If you have a new aesthetic practice, chances are you will not have a backlog of appointments so it doesn't matter if it takes you 45 minutes to do a man's back in instead of 30. Speed will not make a big difference to you until you have a very established and busy aesthetic practice and even then may not matter that much. By saving 10's of

thousands of dollars on your laser purchase in the first place, you will have the money for advertising and promoting your business, resulting in a very profitable aesthetic business in a shorter period of time.

Don't buy the story that you should only deal with one of the larger laser companies. Being publicly traded does not mean security and stability. Enron is a great example. There is more than one publicly traded laser company going through really rough financial times and may not survive. There are some big companies that are great to work with and some small ones too. Large companies, with layers of management, do not always move very fast when it comes to resolving issues as compared to smaller, more nimble companies. Large infrastructures do not allow companies to make adjustments easily, resulting in major, even fatal, problems in tough economic times. Do your homework when it comes to picking the company. Check to see if they are in any lawsuits, financial difficulties or major employee downsizing by going online for this information. If they are publicly traded, that information is relatively easy to find.

After you have chosen a system type and options and maybe narrowed it down to 2 or 3 manufacturers, cost is going to be your next consideration. Prices range from \$60,000 to \$250,000 depending on the laser type or types and options. Laser companies spend millions of dollars to advertise and promote their products and the treatments those systems deliver. Some will heavily promote a treatment, give it a special name, and attempt to get the general public to believe this treatment is unique and can only be performed with their laser. First remember that light is light and don't let any salesperson convince you otherwise. If you find a laser that operates at the wavelength you desire and it has an acceptable spot size, maximum fluence and pulse width, it will perform the required treatments just as well as a system with the same parameters that is twice the price. Who do you think ultimately pays for all the advertising expenses that goes into marketing the lasers? It is not your patients; they will not pay much more than the going rate in your area. The high price you are paying for a laser system is not only paying for the technology, it is paying for the marketing and advertising costs the manufacturer incurred while trying to get you to buy it. Very rarely (if ever) will a patient call and ask if you have a specific brand of laser. As we said in a previous paragraph, if you save money on the purchase of the laser, you can spend it on promoting your business. You don't need to pick a laser by name as much as you should choose a laser based on your requirements, the system's parameters and your budget.