

# LASERS AND LIGHT SOURCES FOR SKIN EXPLAINED

By: Todd E. Schlesinger, MD, FAAD

■ The first time lasers were used to treat skin conditions was over 40 years ago. The most commonly used lasers were the Argon and Carbon Dioxide (CO<sub>2</sub>) and these were employed to treat benign blood-vessel related birthmarks such as port-wine stains and hemangiomas. While they were somewhat effective in lightening these birthmarks, an unacceptably high rate of scar formation was the side effect. Major advances have been made in laser technology in the past 20 years that has allowed the safe and extremely effective treatment of a wide variety of skin conditions, including dark spots, red spots, vascular lesions, tattoos, hair removal, scars, wrinkles, skin tightening and skin resurfacing.

In the past few years, there have been a number of new lasers designed to improve upon current liposuction techniques and results by using lasers to “melt” fat safely and with minimal downtime.

“Laser” is an acronym that stands for Light Amplification by the Stimulated Emission of Radiation. Laser light is high intensity and has the following properties:

- 1) Monochromatic – the light is all of a single wavelength or color
- 2) Coherent – the light beam waves all are in phase with one another
- 3) Collimated – the light beams travel in parallel with one another

Therefore, laser light can be focused on a small area with high energy. Some lasers emit light that can be seen (visible wavelengths from 400-700nm) and some emit light that can not be seen (infrared lasers above 700nm). The target of the laser energy in the tissue is called the chromophore.

For example, the blood in blood vessels absorbs light at 418, 542 and 577 nanometers. Melanin, the pigment in the skin, has a broad range of light absorption. Infrared lasers mainly target the water that makes up 70-90% of the skin by weight. Lasers work by heating up their specific tissue target in a specific way that prevents damage to surrounding structures. Short pulses keep the heat focused to the target cells.



There are several types of lasers used in dermatology. Most modern lasers emit light as pulses and may even divide the pulses into yet smaller pulses within each main pulse. These perform common tasks such as hair removal, vascular lesion removal, laser resurfacing and skin tightening. Others are Q-switched, meaning that they emit very high energy in a very short pulse. These are often used to remove dark spots and tattoos. You may often see names of lasers that include their wavelength of light. Examples include the alexandrite 755nm (Candela Gentlelase) and the 1064nm YAG (Candela Gentleag). YAG stands for yttrium aluminum garnet, the type of crystal that is energized to make the light.

Taking technology a step further, we have learned how to make lasers “fractional.” As the term implies, the laser light pulses are further divided into smaller beams that leave some normal and untreated tissue between them. This allows for the fastest healing of all and makes for a new generation of lasers. For example, the Palomar Starlux 1540 laser uses fractional light at the 1540nm wavelength, which is invisible to the naked eye. This laser effectively treats acne scars, wrinkles and sun damage with minimal downtime. The Palomar Starlux 2940 takes a step further and fractionally removes the top layer of skin. While this laser is very effective at wrinkle reduction and sun damage removal, a four-to-six day healing time is required. By the seventh day, the skin is pink and renewed and complete healing is visible at two weeks.

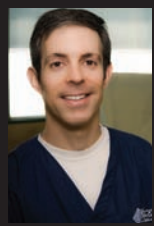


In addition to lasers, other light sources are commonly employed that work like lasers, yet they are not lasers. Referred to as intense pulsed light or IPL, these devices emit visible light at multiple, specially filtered wavelengths. IPL devices have a wide variety of uses and are excellent at skin rejuvenation, treatment of rosacea or redness in the skin and dark spot removal. While the light is not coherent, collimated or monochromatic, the effects are very positive just the same.

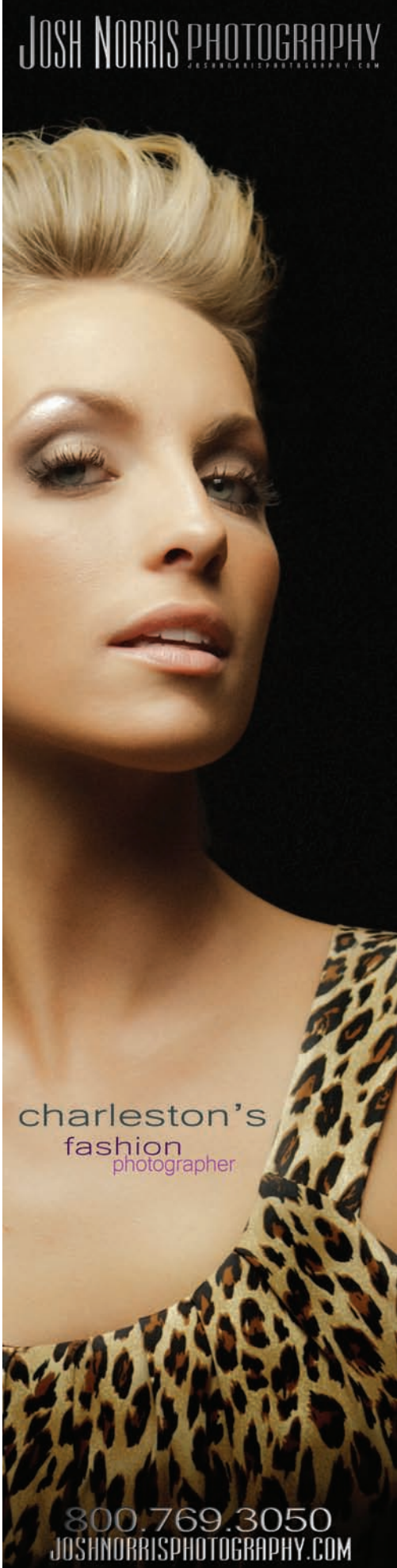
The most commonly used IPL targets several parts of the skin at once, namely water, pigment and blood. Other IPL's are specific to one purpose and in the example of hair removal, specifically target the hair follicle. Fractional technology has even come to IPL. For example, the Palomar Starlux, utilizing the LuxIR handpiece, is an IPL that emits fractionated infrared light that is very useful for skin tightening of the face and neck as well as other areas such as thighs, arms and abdomen.

One thing to always remember about lasers is that they are powerful devices to be used only by trained professionals. It is best to make sure your provider or laser technician has experience as well as the proper background and training to give you the best results from your laser treatments. Make certain that there is a medical physician in the office during your treatment and ask about their training and board certification. What specialty is the physician board certified in? Is it a specialty that receives core training in the use of lasers and light devices from residency and beyond? How many procedures has the provider performed? South Carolina Board of Medicine guidelines state that the physician must be in the office while laser or light source treatments are being performed. Make sure a physician is in the office, while you are having any treatment with a qualified and trained physician or qualified laser technician.

So, if you find yourself tired of razors, the big furry sweater “you can never take off” or the neck and face that remind you of your aging process, consider your options for laser treatments. Hopefully, this article has been helpful in your understanding of how lasers and light sources can be used in dermatology. We have come a long way in terms of safety so you can rest assured that you will have the best result possible in the hands of your trained provider. ■



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