



LASERS

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This is a general discussion of lasers; for specific skin disease treatments see the individual skin disease listings. Laser is an acronym that stands for **L**ight **A**mplification by the **S**timulated **E**mission of **R**adiation. Simply put the energy produced by a laser is light energy, photons that are amplified through the device and emitted to produce the desired effects. While radiation is part of the acronym this is not ionizing radiation such as used in X-rays and does not pose long term health hazards or any increased risks of malignancy.

All lasers have the same basic four components. They have an optical cavity or resonator, a laser medium, a power source and a delivery system. The laser medium can be a liquid, solid or a gas. The gas lasers include the carbon dioxide, krypton, copper vapor and argon lasers. The liquid lasers use dye, usually in the form of rhodamine dye as their medium. The solid lasers use ruby, alexandrite or Nd:YAG as well as solid state diodes as their medium. The choice of laser medium usually gives the laser its name, for example the Nd:YAG laser uses neodymium:yttrium-aluminum-garnet as its medium.

For lasers to produce a desired effect the laser energy must interact with the tissues that make up the skin. The laser beam can have different results depending on the optical properties of the intended target. The energy can be reflected, transmitted, scattered or absorbed. Absorption is the desired and required effect in order for the laser to produce an optimal photothermal or photochemical effect in the tissue. If the light is scattered an imprecise effect can result in uneven or undesired changes in the tissue; if the light is reflected or transmitted no effect is seen. So it is important to understand the absorption properties of the tissue being treated so that those properties can be matched with the appropriate laser that will give the desired results.

Most of the effects caused by lasers are due to thermal reactions in the target tissues that can be reproduced reliably. Another way of saying this is that not all skin lesions/problems can be treated with lasers. Also not all skin lesions/problems can be treated with the same laser. A laser used for treatment of the skin has to be chosen based on the problem being considered for treatment and the expected or desired result. There are a large number of skin conditions that can be considered for laser treatment.

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