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A Brief Introduction Into Cosmetic Lasers and IPL (Intense Pulsed Light) & E-Light and RF

Lasers are used for cosmetic applications such as laser hair removal and tattoo removal. The efficacy of laser hair removal is now generally accepted in the dermatology community, and laser hair removal is widely practiced in clinics, and even in homes using devices designed and priced for consumer self-treatment. Many reviews of laser hair removal methods, safety, and efficacy have been published in the dermatology literature.

Intense pulsed light (IPL) epilators, though technically not containing a laser, use xenon flash lamps that emit full spectrum light. IPL-based methods, sometimes called "AFT", "phototricholysis" or "photoepilation", are now commonly (but incorrectly) referred to as "laser hair removal".

Several wavelengths of laser energy have been used for hair removal, from visible light to near-infrared radiation. These lasers are characterized by their wavelength, measured in nanometers (nm):

Argon: 488 nm (Turquoise/Cyan) or 514.5 nm (Cyan) (no longer used for hair removal)

Ruby laser: 694.3 nm (Deep Red) (no longer used for hair removal; only safe for patients with very pale skin)

Alexandrite: 755 nm (Near-Infrared) (most effective on pale skin and not safe on darker skin at effective settings)

Pulsed diode array: 810 nm (Near-Infrared) (for pale to medium type skin)

Nd:YAG laser: 1064 nm (Near-Infrared) (made for treating darker skin types, though effective on all skin types)

IPL, intense pulsed light: 810 nm (Not a laser but used for hair removal) (for pale to medium type skin)

Pulse width (or duration) is an important consideration. Longer pulse widths may be safer for darker skin, but shorter pulse widths are more effective in disabling hair follicles. Repetition rate is believed to have a cumulative effect, based on the concept of

thermal relaxation time. Shooting two or three pulses at the same target with a specific delay between pulses can cause a slight improvement in the heating of an area. This may increase the "kill rate" for each treatment.

Spot size, or the width of the laser beam, affects treatment. Theoretically, the width of the ideal beam is about four times as wide as the target is deep. Hair removal lasers have a spot size about the size of a fingertip (8-18mm). Larger spot sizes help laser light penetrate deeper and make treatments faster and more effective.

Fluence or energy level is another important consideration. Fluence is measured in joules per square centimeter (J/cm^2). It's important to get treated at high enough settings to heat up the follicles enough to disable them from producing hair.

Epidermal cooling has been determined to allow higher fluences and reduce pain and side effects, especially in darker skin. Three types of cooling have been developed:

Contact cooling: through a window cooled by circulating water or other internal coolant

Cryogen spray: sprayed directly onto the skin immediately before and/or after the laser pulse

Air cooling: forced cold air at -34 degrees C

Multiple treatments depending on the type of hair and skin color have been shown to provide long-term reduction of hair. Most patients need a minimum of seven treatments. Current parameters differ from device to device but manufacturers and clinicians generally recommend waiting from three to eight weeks depending on the area being treated. The number of sessions depends on various parameters, including the area of the body being treated, skin color, coarseness of hair, reason for hirsutism, and gender. Coarse dark hair on light skin is easiest to treat. Certain areas (notably men's faces) may require considerably more treatments to achieve desired results. Hair grows in several phases (anagen, telogen, catagen) and a laser can only affect the currently active growing hair follicles (early anagen). Hence, several sessions are needed to kill hair in all phases of growth. This problem is countered by spacing appointments sufficiently so that inactive follicles will start to grow again. Laser does not work well on light-colored hair, red hair, grey hair, white hair, as well as fine hair of any color, such as vellus. For darker skin patients with black hair, the long-pulsed Nd:YAG laser with a cooling tip can be safe and effective when used by an experienced practitioner.

Usually treatments are spaced three to eight weeks apart depending on the body area and the hair cycle length for that area. The face usually requires more frequent treatments three to four weeks apart, whereas legs require less frequent treatments and patients should be advised to wait at least six weeks. Typically the shedding of the treated hairs takes about two to three weeks. These hairs should be allowed to fall out on their own and should not be manipulated by the patient.

Hair removal lasers are effective treatment for pseudofolliculitis barbae, commonly called "ingrown hairs" or "shaving bumps". They have recently been reported as helpful treatment for pilonidal cysts, since they eliminate the ingrown hairs that produce the troublesome foreign body reactions in this malady.

Some normal side effects may occur after laser hair removal treatments, including itching, pink skin, redness, and swelling around the treatment area or swelling of the follicles (follicular edema) . These side effects rarely last more than two or three days. The two most common serious side effects are acne and skin discoloration.

Some level of pain should also be expected during treatments. Numbing creams are available at most clinics, sometimes for an additional cost. Some numbing creams are available over the counter. Use of strong numbing creams over large skin areas being treated at one time must be avoided, as this has seriously harmed, and even killed, patients. Typically, the cream should be applied about 30 minutes before the procedure. Icing the area after the treatment helps relieve the side effects faster.

Unwanted side effects such as hypo- or hyper-pigmentation or, in extreme cases, burning of the skin call for an adjustment in laser selection or settings. Risks include the chance of burning the skin or discoloration of the skin, hypopigmentation (white spots), flare of acne, swelling around the hair follicle (considered a normal reaction), scab formation, purpura, and infection. These risks can be reduced by treatment with an appropriate laser type used at appropriate settings for the individual's skin type and treatment area.

Some patients may show side effects from an allergy to either the hair removal gel used with certain laser types or to a numbing cream, or to simply shaving the area too soon in relation to the treatment.

Rare side effects include blistering, scarring and skin texture changes.