

Blue Light and Photodynamic Therapy: Is it worth it? Shilpa Makhija L.E.

Acne blue light therapy has recently been approved by the FDA as an effective treatment for mild to moderate acne, and is rapidly becoming a more popular treatment choice. But can you really treat acne by simply shining a blue light on your skin?

Common acne, or *Acne vulgaris*, is caused when sebum produced by the sebaceous glands in the skin gets trapped within the follicle and mixes with cell debris to create a "plug". This plug causes a backup and creates an environment that the *P. acnes* bacteria thrive in. The pore then becomes inflamed and may rupture and develop into a pimple, papule, whitehead or cyst depending on the unique physiology of one's body. The acne blue light is thought to work by obliterating the *P. acnes* bacteria within the pore thus reducing inflammation and over time clearing the skin of blemishes.

It has long been observed that sunlight has been known to improve acne. Although this is debatable, it was thought to be due to antibacterial effects of the ultraviolet spectrum which cannot be used as a treatment due to the likelihood of skin damage in the long term. It was discovered that some of the visible violet light present in sunlight (in the range 405-420 nm) activates a group of organic compounds in the bacterium called porphyrins which damage and ultimately kill the bacteria by releasing singlet oxygen very much like ozone used in a steam session during an esthetic treatment. This discovery ultimately led to the development of concentrated blue light both for in home use (hand held LED) and for in-patient procedures at a dermatology office.

So is bluelight therapy a laser treatment, a light treatment or chemical treatment? This is confusing for a lot of people including many estheticians. In many cases it could be considered all three. Bluelight administered in a doctor's office is performed via *intense pulsed light* using a *laser* that activates a *chemical*. In contrast, hand held bluelights for home use are just light based and do not involve the use of chemicals. The hand held units are composed of neatly arranged light emitting diodes(LEDs). Basically, these diodes are just tiny light bulbs that fit easily into an electrical circuit. But unlike ordinary incandescent bulbs, they don't burn out or get very warm. They are illuminated solely by the movement of electrons within a material that conducts electricity.

Blue light therapy, also known interchangeably as photodynamic therapy started as an office-based procedure only. Patients with acne would see their dermatologist for treatment. The physician would often apply a sensitizer to the skin called Levulan (amino levulinic acid) for about 30 minutes before the procedure. Then the patient would sit in front of a blue light source, typically a

laser that was calibrated for pulsed light for several minutes. This was repeated several times each week for about 6 weeks. The mode of action is as follows: the sensitizing agent penetrated the skin and when activated with the blue light, it absorbed the energy from the light, killing the bacteria and shrinking the sebaceous glands to effectively decrease oil production.

The initial data had been very encouraging. In October 2002 the American Academy of Dermatology reported the following; "A low intensity blue light source (405 nm to 420 nm) has been studied for the treatment of mild to moderate inflammatory acne. In the study, two 15-minute exposures a week for a period of four weeks produced a 60 percent reduction in acne in 80 percent of patients".

Interestingly enough blue light without the use of levulinic acid has also been developed. Recent clinical papers suggest that the success rate was a more modest 30-40%. A study published in March 2009 by the Journal of Clinical and Aesthetic Dermatology entitled "the clinical efficacy of self applied blue light for mild-moderate acne" suggested that overall improvements on average showed a decrease of up to 40% in the number of lesions by day 28 of the treatment.

These numbers sound pretty convincing. So what's the other side? First, the cost factor is relatively high. Not unlike many other acne therapies including corrective peels and benzoyl peroxide usage, continuing treatments will be more than likely needed to stay clear. With an average treatment cost of \$200-\$300 per treatment, an entire course can run you in the upwards of \$2000 in contrast to \$700 for corrective peels and topical products.

Secondly levulan treatments, now unavailable, can be uncomfortable. The combination of the light and the sensitizing agent causes a stinging sensation. For many, the sensation may be tolerable but some people find it too painful and consequently abandon therapy. Anecdotal research suggests that the pain is akin to laser treatments and the aftermath can leave you swollen, red with generalized sensitivity for a prolonged length of time in comparison to a peel and extraction session. Levulan also sensitizes you to light in general, especially right after treatment. As a result extreme care must be taken not to expose the skin and failure to protect can result in serious burns and permanent pigmentation issues.

Thirdly, many studies and anecdotal evidence suggest that the therapy worked well for those suffering from inflamed acne and abnormally high oil production. It failed to show significant improvement in non-inflamed acne sufferers who had moderate oil production. Up to 40% of all acne sufferers have non-inflamed acne. This means that blue-light therapies basically fail to address these clients at all.

Fourthly, because the sensitizing agent is no longer necessary, you're not forced to the doctor's office to get treated. Several companies have developed hand-held blue light devices that you can use yourself. A well made unit can cost an upwards for \$300--\$400 and in order for it to be effective you must hold it up against the skin for about 10-15 minutes twice a day, every day. Considering that the average person brushes their teeth for less than a minute, 10-15 minutes can seem tedious. Although handhelds are highly recommended in the aid of inflamed acne, the onus is on the user to be diligent.

And finally, despite the statistical claims of the publications from fore mentioned dermatology journals, the authors are very careful to state that the reduction was not statistically significant. Notwithstanding, its initial clinical data, popularity and wide spread availability, on October 2008 Dusa Pharmaceuticals announced that it was no longer developing Levulan for the treatment of acne after the phase II results failed to show statistically significant results.

In conclusion the argument that can be made is that bluelight is not a replacement for other more proven therapies such as peels in combination with benzoyl peroxide or vitamin A products. Rather it could be used as an accessory to these other treatments. In our clinical setting we have observed the following : 50% of our moderate to severely inflamed clients who were given hand held units to use on half the face in addition to our unique topical program showed significant improvement in comparison to their other side that had not been treated with the light. Therefore photodynamic therapy has a reasonable chance of benefitting someone with moderate to severe acne but for best results should be used as an adjunct to managed homecare of appropriate skincare products.