



**WALEED MOHAMMAD AL BALAT, AMIRA NASRALLA
SELIM NASRALLA *, MAI AHMAD SAMIR**

Amira Nasralla Selim Nasralla^{1*}

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Abstract:

Alopecia areata is a common, non-scarring, autoimmune T cell mediated disease with patchy loss of hair from the scalp and other parts of the body. The use of excimer laser is a new modality in the treatment of alopecia areata due to its immunosuppressive effect on pathologically relevant T-cell which are involved in the pathogenesis of AA.

Keywords: 308nm Excimer Laser, Alopecia Areata, UVB.

^{1*}Department of Dermatology, Venerology & Andrology, Faculty of Medicine, Zagazig University, Egypt

***Corresponding Author:** Amira Nasralla Selim Nasralla

*Email:princessamiranasralla@gmail.com, 308nm Excimer Laser in the Treatment of Alopecia Areata

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Introduction:

Ultraviolet B rays (UVB 290-320 nm) radiation has been used in the treatment of different skin diseases. Light sources with narrowband UVB output spectrum have been developed with the aim of increasing the rates of "beneficial to side effect" profile of the treatment. Narrowband UVB phototherapy using fluorescent lamps (TL01, 311±2 nm) has been widely adopted over the past 10 years. (1)

Excimer laser in which "excimer" is a terminological reference of "excited dimer" composed of a noble gas (xenon) and halide (chloride) which repel each other and emits its total energy at the wavelength of 308 nm and therefore is regarded as a "super-narrowband" UVB light source. Of these ultraviolet B rays which comprise beams of varied wavelengths, the 308nm xenon-chloride is the most practical in dermatology. Monochromatic Excimer Light (MEL) represents a new source of narrow-band UVB emitting at 308 nm which guarantees a safe and effective approach to different chronic and recurrent skin diseases due to its potent and selective immunosuppressant action. (1)

Recent studies stated the advantages of using this novel light MEL 308 nm as accurate lesion targeting, avoidance of UV damage to healthy skin, short treatment time, faster clearance and reduced UV cumulative dose, probably reducing oncological risks. (2).

Regarding its mechanisms of action, clinical remissions have been reported through the decrease of cytokine expression, significant T-cell depletion. Furthermore, many reports show immune modulative mechanisms. These proposed hypothetic mechanisms of action are similar to those described following broadband UVB but with low risk profile (1)

Applications of Excimer laser in dermatological diseases

Different clinical studies reported the use of excimer laser in a wide variety of chronic and resistant localized dermatoses. These comprise psoriasis, palmoplantar pustulosis, vitiligo, mycosis fungoides, alopecia areata, genital lichen sclerosus, prurigo nodularis, localized scleroderma, and granuloma annulare. Many of these diseases share a common pathogenetic pathway, and this may explain their response to UV treatments (3)

The 308-nm excimer radiation is used at a high fluence rate only on affected areas. The minimal erythematous dose calculated on healthy unexposed skin in order to determine the starting dose (usually 0.5–0.7 MED), and the treatments

are usually carried out with one or two sessions per week until clinical remission occurred. In the majority of cases, clinical improvements are evident after few treatment sessions (3)

The different studies demonstrated the effectiveness and the advantages of excimer radiations such as the selective use of high doses on targeted skin lesions without affecting the surrounding healthy skin, and reduction in the number of treatment sessions compared with traditional phototherapy for the treatment of psoriasis, vitiligo, and MF. (4, 5)

Excimer laser in alopecia areata

Although the exact mechanism is unclear, excimer laser is thought to induce apoptosis of T cells, thereby leading to therapeutic effects in inflammatory diseases, such as psoriasis. With the discovery of AA as an autoimmune disorder with T cell-mediated inflammation of the hair follicle the use of excimer lasers has been suggested. Since the benefit of the excimer laser on AA first reported by Gundogan et al., 2004 numerous studies have confirmed its efficacy. (5) Several studies discussed the protocols of the use of MEL in treatment of alopecia areata. Some studies considered the starting dose as 50-70% of the Minimal Erythema Dose (MED) then the doses increased by 50J/cm² every week. The treatments are usually carried out with one or two sessions per week until clinical remission occurred or after 24 sessions maximally reached. A control patch was left untreated on each subject. (3)

In other studies the treated patches are exposed to radiation at regular intervals once weekly for 3 months (12 sessions). Depending on the skin type, the initial radiation exposure usually between 100 and 200 mJ. If an adverse event didn't happen, the dose of following radiation is increased by 100 mJ for each session. When erythema persisted for 24-48 hours, the dosage is maintained. The dosage is decreased by 100mJ in the following session if the erythema persistent for more than 48 hours or accompanied by itching. Additionally, the next course of treatment will be delayed when erythema became painful or if accompanied with vesicle or bullae. The largest study so far was done on 18 patients with refractory AA that involved the scalp, beard, arms and legs. Each alopecia patch was treated twice a week for a maximum of 24 sessions. Hair regrowth has been shown in 41.5% of the patches, whereas no growth of hair was observed in the control patches, confirming the efficacy of the treatment. Another study has been done on 11 children with recalcitrant AA of the scalp, in which regrowth

was noted in 60% of patches treated with the excimer laser for 12 weeks versus no regrowth in untreated control patches, suggesting that excimer lasers are safe and effective not only in adults with refractory AA, but in children as well. (6)

Recently, a comparative study was done by dividing a single alopecic patch into control and treated side and applying the excimer laser for 12 weeks, twice a week. The diameter of the hair was found to be significantly increased in the treated area when compared with the control side (1)

Based on these findings, excimer laser can be a safe and effective therapeutic method for AA confined to the scalp. However its therapeutic results seem to be poor in patients with alopecia universalis and alopecia totalis. (1)

The possible adverse effects of the use of excimer laser in alopecia areata including erythema, itching, mild peeling, hyperpigmentation which are generally considered minimal and tolerable even in children. (6).

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