Therapeutic Efficacy of 308-nm Excimer Light in the Management of Inflammatory Acne Vulgaris: A Comprehensive Review

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ABSTRACT

Background: Acne vulgaris is one of the most prevalent inflammatory skin conditions globally, affecting up to 85% of adolescents and persisting into adulthood in many cases. While the pathogenesis involves multifactorial elements such as follicular hyperkeratinization, *Cutibacterium acnes* colonization, and sebum overproduction, inflammation plays a central role. Conventional therapies—such as antibiotics, retinoids, and hormonal agents—pose challenges including antimicrobial resistance, irritation, systemic side effects, and inconsistent adherence. In recent years, phototherapy and laser-based modalities have emerged as promising non-invasive alternatives. Among them, the 308-nm excimer light has gained attention for its potential anti-inflammatory and immunomodulatory effects in dermatological conditions including vitiligo, psoriasis, and more recently, inflammatory acne. This review aims to provide a comprehensive analysis of the therapeutic efficacy, mechanism of action, clinical applications, safety profile, and patient outcomes associated with the use of 308-nm excimer light in the treatment of inflammatory acne vulgaris. Peer-reviewed clinical trials, observational studies, case reports, and meta-analyses from major dermatological databases (PubMed, Embase, Scopus) were reviewed to extract data relevant to the efficacy, safety, and application protocols of 308-nm excimer light therapy. Comparative studies with other phototherapeutic options were also examined. Clinical evidence supports that 308-nm excimer light significantly reduces both inflammatory and non-inflammatory acne lesions with minimal side effects and high patient tolerability. Its primary mechanisms include targeted immunosuppression, suppression of pro-inflammatory cytokines, and direct antibacterial effects. Compared to other phototherapies, the excimer light offers a more focused beam and requires fewer sessions for visible results. Its compatibility with topical agents further enhances outcomes in combination regimens. Nevertheless, variability in treatment protocols, small sample sizes, and lack of long-term data remain limitations.

Conclusion: 308-nm excimer light represents a safe, effective, and promising adjunctive or alternative treatment modality for inflammatory acne vulgaris, especially in cases resistant to conventional therapies. Further large-scale randomized trials are warranted to establish standardized guidelines and elucidate long-term benefits and risks.

Keywords*:* 308-nm Excimer Light, Inflammatory, Acne Vulgaris.

INTRODUCTION

Acne vulgaris is a multifactorial, chronic inflammatory skin disease that primarily affects the pilosebaceous unit. It is prevalent across all age groups but especially affects adolescents and young adults, often contributing to significant psychological distress, social anxiety, and diminished quality of life. The pathogenesis of acne involves a complex interplay between increased sebum production, follicular hyperkeratinization, *Cutibacterium acnes* colonization, and an ensuing inflammatory cascade. Traditional therapies—topical and systemic antibiotics, retinoids, hormonal treatments, and benzoyl peroxide—are the cornerstone of acne management. However, each carries limitations ranging from antimicrobial resistance and irritation to teratogenicity and poor patient compliance [1,2].

In response to these challenges, alternative and adjunctive therapeutic modalities have gained increasing attention. Phototherapy, in particular, has emerged as a non-invasive treatment option for acne, offering anti-inflammatory and antimicrobial effects without systemic exposure. The 308-nm excimer light, originally developed for treating psoriasis and vitiligo, has recently been explored in the context of acne vulgaris. This monochromatic ultraviolet B (UVB) light source delivers focused, high-intensity energy directly to inflamed lesions, offering targeted therapeutic benefits [3,4].

Several clinical studies have demonstrated promising results regarding lesion reduction, inflammation control, and enhanced cosmetic outcomes with 308-nm excimer light therapy. Its mechanisms involve immunomodulation, apoptosis induction in pathogenic T cells, suppression of interleukin-1 (IL-1), IL-6, and tumor necrosis factor-alpha (TNF-α), and direct bactericidal effects on *C. acnes*. The unique capability of delivering high-dose UVB to limited areas without affecting adjacent healthy skin further enhances its appeal [5].

Despite growing interest, standardized guidelines for excimer light use in acne remain lacking, and questions persist about long-term efficacy, cost-effectiveness, and optimal treatment protocols. Therefore, the objective of this review is to synthesize existing clinical and mechanistic evidence surrounding the use of 308-nm excimer light in treating inflammatory acne vulgaris. We aim to provide a detailed analysis of its therapeutic potential, compare it with other light-based interventions, and highlight areas where further research is needed.

Pathophysiology of Inflammatory Acne

Inflammatory acne vulgaris originates from the pilosebaceous unit and involves several interrelated pathogenic factors. The process typically begins with follicular hyperkeratinization, wherein keratinocytes within the follicle fail to desquamate normally, leading to comedone formation. Sebum production, primarily driven by androgens, provides a lipid-rich environment that supports the growth of *Cutibacterium acnes* (formerly *Propionibacterium acnes*). The proliferation of this bacterium contributes to the rupture of the follicular wall, triggering an inflammatory response [1].

The inflammatory component of acne is predominantly mediated by innate immune responses. *C. acnes* activates Toll-like receptors (TLRs), especially TLR2, on keratinocytes and macrophages, which in turn release pro-inflammatory cytokines such as IL-1β, IL-6, IL-8, and TNF-α. These cytokines recruit neutrophils and monocytes to the site of infection, exacerbating inflammation and leading to the clinical manifestations of papules, pustules, and nodules [2].

Additionally, sebocytes themselves have immunological roles. Upon activation by *C. acnes*, they produce cytokines and antimicrobial peptides, thereby acting as immunocompetent cells. Sebaceous glands also undergo lipid peroxidation, which further amplifies inflammation. This oxidative stress plays a crucial role in sustaining the inflammatory loop, contributing to persistent lesions and post-inflammatory hyperpigmentation (PIH), especially in darker skin types [3].

The adaptive immune system also contributes to acne pathology. CD4+ T-helper cells infiltrate acne lesions and perpetuate chronic inflammation. Furthermore, *C. acnes* antigens can stimulate specific antibody responses, which have been implicated in prolonged lesion activity and scarring. The chronicity and recurrence of acne in some individuals can thus be attributed to this intricate immune activation and dysregulation [4].

Given this complex interplay of microbial, hormonal, and immunological factors, inflammation is now recognized as both an initiating and perpetuating factor in acne vulgaris. This reclassification from a primarily bacterial disease to an inflammatory condition justifies the exploration of targeted anti-inflammatory therapies, such as 308-nm excimer light, which can directly modulate immune responses without systemic side effects [5].

Conventional Treatment Modalities and Their Limitations

Conventional treatment of inflammatory acne involves a multi-pronged approach, incorporating topical agents, systemic medications, and in some cases, procedural interventions. Topical therapies such as retinoids (e.g., adapalene, tretinoin), benzoyl peroxide, and topical antibiotics (e.g., clindamycin, erythromycin) serve as first-line options. These agents work by modulating keratinocyte proliferation, reducing bacterial load, and exerting mild anti-inflammatory effects. However, their use is frequently limited by irritation, dryness, and photosensitivity, which can impair adherence in many patients [6].

Systemic treatments are often required for moderate to severe cases. Oral antibiotics, particularly tetracycline derivatives like doxycycline and minocycline, are widely used due to their antimicrobial and anti-inflammatory properties. However, the rise of antibiotic-resistant strains of *C. acnes* has become a significant concern, rendering long-term monotherapy inappropriate. Guidelines now recommend limiting antibiotic use to no more than 3–4 months and combining them with topical agents to minimize resistance [7].

Isotretinoin, a systemic retinoid, remains the most effective option for severe, nodulocystic, or treatment-resistant acne. It acts on all major pathogenic factors including sebum suppression, comedogenesis inhibition, and inflammation reduction. Despite its efficacy, isotretinoin carries notable adverse effects such as teratogenicity, mucocutaneous dryness, dyslipidemia, and rare psychiatric symptoms. Mandatory pregnancy prevention programs and routine lab monitoring increase its complexity and cost [8].

Hormonal therapies, including oral contraceptives and antiandrogens like spironolactone, are especially useful in female patients with hormonally mediated acne. However, side effects like menstrual irregularities, breast tenderness, and thromboembolic risks often restrict their long-term use. Furthermore, these treatments are not appropriate for all demographics, including men and adolescents [9].

Light- and laser-based therapies, including blue/red LED, intense pulsed light (IPL), and photodynamic therapy (PDT), have emerged to overcome the limitations of pharmacological approaches. However, the inconsistent efficacy, high cost, and lack of standardized protocols have restricted their widespread adoption. This backdrop of treatment limitations underscores the clinical need for targeted, safe, and effective therapies like 308-nm excimer light, particularly for patients unresponsive or intolerant to conventional regimens [10].

Mechanism of Action of 308-nm Excimer Light

The 308-nm excimer light is a monochromatic ultraviolet B (UVB) source that emits a focused beam of high-intensity light. Originally developed for the treatment of psoriasis and vitiligo, it has demonstrated significant potential in modulating local immune responses in various inflammatory skin conditions. In the context of acne, its mechanism of action involves both **immunosuppressive** and **antimicrobial** effects that directly target core pathogenic processes [11].

A key mechanism is the induction of **apoptosis in activated T lymphocytes**, which are central mediators of inflammation in acne lesions. Upon exposure to 308-nm UVB, DNA damage occurs in activated T cells, triggering their programmed cell death. This leads to a reduction in cytokine release, including IL-1β, IL-6, and TNF-α, all of which are implicated in the recruitment of neutrophils and formation of papules and pustules [12].

The excimer light also exerts a **direct antimicrobial effect** against *Cutibacterium acnes*. While the UVB spectrum is not typically considered strongly bactericidal compared to UVC, the high local energy delivered by the 308-nm beam appears to reduce bacterial colonization in treated lesions. This effect may also disrupt biofilm formation, a known contributor to treatment resistance and chronicity in acne [13].

Additionally, excimer light reduces **sebaceous gland activity** and **follicular keratinization** indirectly by altering the inflammatory milieu. UVB exposure modulates lipid peroxidation and downregulates

sebocyte activation, contributing to decreased sebum output. Furthermore, it alters keratinocyte proliferation and differentiation, thus reducing comedone formation [14].

One unique advantage of excimer light over other forms of phototherapy is its **targeted delivery**. It allows high fluence application to specific inflamed lesions without damaging surrounding healthy skin. This localized approach minimizes adverse effects such as erythema or post-inflammatory hyperpigmentation—making it suitable even for patients with darker skin phototypes or sensitive skin conditions [15].

Collectively, these mechanisms position 308-nm excimer light as an effective anti-inflammatory and lesion-directed therapy in acne vulgaris, particularly in cases where systemic therapies are contraindicated or poorly tolerated.

Excimer Light vs Other Light-Based Therapies

The use of light-based therapies in acne management has gained prominence due to their non-invasive nature and ability to modulate both microbial and inflammatory pathways. Among the most common modalities are blue light (415 nm), red light (633 nm), intense pulsed light (IPL), photodynamic therapy (PDT), and lasers such as pulsed dye laser (PDL) and Nd:YAG. While each of these treatments offers unique advantages, the 308-nm excimer light provides a more targeted, lesion-specific approach with distinct immunomodulatory properties [16].

Blue light therapy is effective primarily through its action on *C. acnes*, which produces porphyrins that, when activated by blue light, generate reactive oxygen species leading to bacterial cell death. However, its shallow penetration limits its efficacy to superficial lesions and requires frequent sessions for sustained results. Red light, on the other hand, penetrates deeper and offers modest anti-inflammatory benefits but lacks significant antibacterial effects. Combining blue and red light improves outcomes but still requires prolonged treatment duration and may yield inconsistent results across patients [17].

IPL devices emit a broad spectrum of wavelengths and can target hemoglobin and melanin, reducing erythema and post-acne pigmentation. However, IPL lacks selectivity for acne-specific structures and may inadvertently stimulate melanogenesis in darker skin types, posing a risk of hyperpigmentation. Photodynamic therapy (PDT), typically involving a photosensitizing agent like aminolevulinic acid (ALA), is more potent but is often associated with pain, erythema, and desquamation, making it less tolerable for many patients [18].

Lasers such as PDL (595 nm) target vascular components and are beneficial for erythematous acne lesions and scarring, while Nd:YAG (1064 nm) offers deeper penetration for nodular lesions. Despite their benefits, these modalities are expensive and often require multiple sessions and combination strategies to be truly effective. Furthermore, downtime and discomfort can limit their appeal [19].

In contrast, the 308-nm excimer light offers a unique advantage by combining localized precision with sufficient depth of penetration to affect both superficial and mid-dermal structures. Its ability to induce T-cell apoptosis and modulate local immune responses is unmatched by blue or red light therapies. Additionally, treatment is rapid, tolerable, and suitable for focal application, making it ideal for localized inflammatory lesions without widespread exposure or systemic side effects [20].

Clinical Studies Evaluating 308-nm Excimer Light in Acne

Several clinical studies have investigated the efficacy of 308-nm excimer light in the management of inflammatory acne, demonstrating significant lesion reduction, improved patient satisfaction, and minimal adverse effects. These studies, though limited in sample size, provide early yet promising evidence for the clinical utility of this targeted phototherapy modality [21].

In one of the earliest studies by Elman et al., a small cohort of patients with moderate inflammatory acne was treated with 308-nm excimer light twice weekly for four weeks. The study reported a mean reduction of inflammatory lesions by 70% with minimal discomfort or downtime. The investigators noted rapid improvement in erythema and papule size, suggesting both anti-inflammatory and cosmetic benefits [22].

Similarly, a prospective open-label study conducted by Gold et al. assessed excimer light in 20 patients with inflammatory acne resistant to conventional therapy. Patients received 6 to 8 treatment sessions over a month. By week four, over 80% of patients experienced a reduction in lesion count by more than 50%. Importantly, no serious adverse events were recorded, and treatment was well tolerated, with only transient erythema and mild scaling reported [23].

A 12-week split-face study by Khoury et al. compared excimer light therapy on one side of the face with standard topical retinoid therapy on the other. The excimer-treated side showed faster lesion resolution and improved skin texture by week six, whereas the retinoid side lagged in both response time and patient-reported outcomes. This finding underscores excimer light's potential role in combination or rotational regimens, especially for rapid inflammation control [24].

In a recent randomized controlled trial involving adolescents with moderate acne, excimer light was administered twice weekly for six weeks. Compared to the placebo group, the treatment group showed statistically significant reductions in inflammatory lesion count, Global Acne Grading Scale (GAGS) score, and sebaceous activity on dermoscopic evaluation. Follow-up at 12 weeks indicated durable improvements with no relapse, suggesting a sustained anti-inflammatory effect [25].

Despite promising results, most studies are limited by small sample sizes, lack of blinding, and short follow-up durations. Moreover, variability in treatment parameters—such as energy fluence, session frequency, and skin types—hampers direct comparison across studies. Nonetheless, these trials provide foundational evidence supporting the therapeutic potential of 308-nm excimer light in acne management and justify further large-scale, controlled investigations.

Efficacy Across Acne Grades and Skin Types

The effectiveness of 308-nm excimer light therapy has been explored across various grades of acne vulgaris, with emerging evidence suggesting that it provides the greatest benefit in cases of mild to moderate inflammatory acne. The targeted nature of the therapy makes it particularly suitable for localized papulopustular lesions, though some studies have also reported efficacy in more severe nodular presentations when used adjunctively [26].

For patients with mild to moderate acne (Grades I–II), excimer light has shown a consistent reduction in lesion count and erythema after 4 to 6 sessions, with improvements often noted within the first two weeks. This makes it a favorable option for patients seeking rapid cosmetic results without systemic exposure. In one comparative study, patients with Grade II acne demonstrated a greater than 60% reduction in lesion count by the third week of biweekly excimer sessions, outperforming both benzoyl peroxide and clindamycin monotherapy [27].

In higher-grade acne (Grade III or IV), excimer light alone may not suffice as monotherapy, but it serves effectively as an adjunct to systemic treatments such as oral antibiotics or isotretinoin. By reducing inflammation locally, it allows for decreased systemic dosages, thereby minimizing adverse effects. Additionally, its lesion-specific targeting can accelerate resolution in persistent nodules, which are otherwise slow to respond to oral treatments [28].

The influence of skin phototype on efficacy and safety is another important consideration. Unlike broadband UVB, the 308-nm wavelength has shown a favorable safety profile across Fitzpatrick skin types I–V. Studies involving darker skin tones (Types IV and V) report low incidences of post-inflammatory hyperpigmentation (PIH), provided that conservative energy fluences and careful lesion targeting are employed. This positions excimer light as a safer alternative to IPL or blue light therapies in patients with ethnic or pigmented skin, who are generally at higher risk of PIH and scarring [29].

Furthermore, patients with acne in cosmetically sensitive or high-risk areas (e.g., perioral, chin, jawline) particularly benefit from the precision delivery system of excimer light. Unlike topical therapies that may cause irritation or systemic drugs with broader impact, excimer light minimizes off-target exposure and maximizes localized anti-inflammatory effects, making it ideal for focal, stubborn lesions [30].

Safety Profile and Side Effects

One of the defining strengths of 308-nm excimer light therapy is its favorable safety profile. Unlike systemic acne therapies, which may cause gastrointestinal distress, photosensitivity, hepatotoxicity, or teratogenic effects, excimer light delivers treatment locally, limiting systemic exposure and associated risks. This makes it particularly attractive for adolescents, pregnant individuals, or patients contraindicated for oral medications [31].

The most commonly reported side effects in clinical studies include transient **erythema**, **mild burning**, **scaling**, and **dryness** at the treatment site. These effects are generally self-limiting and resolve within 24 to 72 hours without intervention. They are dose-dependent and more likely to occur at higher fluence levels (>500 mJ/cm²). However, most protocols now adopt conservative fluences (ranging between 200–400 mJ/cm²) to optimize the balance between efficacy and tolerability [32].

Concerns regarding **UV-induced carcinogenesis** have been raised in theoretical contexts, given that UVB radiation can cause DNA damage. However, this risk is significantly minimized with excimer light due to its **targeted, localized exposure** and **limited cumulative dose**. Unlike traditional NB-UVB or PUVA therapies used in widespread conditions like psoriasis, acne treatments typically require only a small number of focused sessions, which keeps the total UV burden low. Long-term follow-up studies in vitiligo and psoriasis patients using excimer light for years have shown no increase in skin cancer incidence, reinforcing its safety profile [33].

Another safety advantage lies in its minimal impact on surrounding tissue. The device's precision handpiece allows for circumscribed delivery, reducing the risk of post-inflammatory hyperpigmentation or scarring that can occur with more diffuse light-based therapies like IPL or PDT. This makes it particularly suited for patients with Fitzpatrick skin types IV to VI, who are otherwise at elevated risk for pigmentary alterations with other interventions [34].

Allergic reactions, photosensitivity, or blistering are exceedingly rare and usually linked to preexisting photosensitive conditions or improper device calibration. With proper patient selection, protocol adherence, and protective measures (e.g., shielding of uninvolved skin), the 308-nm excimer light remains a safe therapeutic tool with high tolerability and minimal downtime compared to both systemic and procedural alternatives [35].

Patient Compliance, Satisfaction, and Treatment Adherence

Patient adherence is a critical determinant of treatment success in acne management. Traditional therapies often suffer from poor compliance due to prolonged duration, side effects, and complex regimens. The 308-nm excimer light, by contrast, offers a simplified and non-invasive alternative that can enhance adherence, particularly among patients who are hesitant to use oral medications or find topical treatments irritating or cumbersome [36].

One of the main factors driving patient satisfaction with excimer light therapy is the **rapidity of clinical improvement**. In many cases, visible reductions in erythema, swelling, and lesion count occur within the first few sessions. This early response is psychologically rewarding and motivates patients to complete the full treatment course. In a survey-based study, over 85% of patients reported high satisfaction with excimer light due to faster results and minimal side effects compared to their prior treatments [37].

Furthermore, the **short duration and low frequency of sessions** enhance convenience. Most protocols involve two to three sessions per week, each lasting only a few minutes. This is in stark contrast to daily topical applications or systemic therapies requiring monitoring and dose adjustments. Such simplicity is particularly beneficial for teenagers, students, and working individuals who often struggle with complex routines or experience embarrassment related to visible drug side effects like skin peeling or dryness [38].

Another significant factor influencing adherence is the **pain-free nature** of excimer light therapy. Unlike PDT, which is often associated with stinging, burning, or post-treatment desquamation, excimer sessions are well tolerated. Most patients describe only mild warmth during application. This comfort contributes to repeat session attendance and overall therapeutic satisfaction [39].

Finally, the **cosmetic acceptability** of excimer light therapy—owing to its lack of residue, no systemic symptoms, and minimal visible irritation—makes it more appealing to appearance-conscious populations. This is especially relevant in treating facial acne, where aesthetics and social confidence are major concerns. These features collectively position excimer light as a high-compliance option that addresses not just the pathology of acne but also the behavioral and psychological aspects of treatment [40].

Combination Therapies Involving Excimer Light

Given the multifactorial nature of acne vulgaris, monotherapy often falls short of achieving complete clearance, especially in moderate to severe cases. Integrating 308-nm excimer light into combination regimens can enhance therapeutic outcomes by targeting multiple pathogenic mechanisms simultaneously. Several studies and clinical reports suggest that excimer light, when used alongside topical or systemic treatments, provides additive or synergistic benefits in lesion resolution, inflammation control, and recurrence prevention [41].

One effective approach involves combining excimer light with **topical retinoids**. Retinoids normalize follicular keratinization and reduce comedone formation, while excimer light mitigates the associated inflammation. A pilot study combining adapalene gel with twice-weekly excimer sessions over four weeks showed superior reductions in papule count and erythema compared to either treatment alone. Moreover, the light therapy appeared to accelerate early results, reducing the typical retinoid-induced irritation period [42].

Similarly, the adjunctive use of **benzoyl peroxide (BPO)** or **topical clindamycin** with excimer light has been explored. BPO's bactericidal effect against *C. acnes* complements the light's immunomodulatory action. In one split-face study, the side treated with excimer light plus BPO achieved a 75% lesion reduction, compared to 50% on the BPO-only side after four weeks. The combination was also associated with better patient-reported satisfaction and fewer flare-ups during follow-up [43].

Excimer light has also shown promise as a **rescue or bridge therapy** during isotretinoin or oral antibiotic tapering. In patients undergoing dose reduction to minimize systemic side effects, focal excimer treatment can help maintain inflammatory control and prevent lesion relapse. This strategy has been particularly useful in adolescent or female patients prone to side effects from long-term systemic use [44].

Emerging data also suggest potential in combining excimer light with **chemical peels** or **microneedling**, though evidence is still preliminary. The rationale is that excimer light can suppress post-procedural inflammation and reduce the risk of PIH in darker skin types. However, proper sequencing and interval management are critical to avoid epidermal barrier disruption or UV sensitivity [45].

These findings support the growing consensus that excimer light is best used as part of an **integrated treatment strategy**, tailored to acne severity, lesion type, and patient skin type. Combination therapy not only enhances outcomes but also allows for dose minimization of pharmacological agents, thereby improving safety and adherence.

Advantages and Limitations of Excimer Light Therapy

The 308-nm excimer light offers a distinct set of advantages that make it an appealing therapeutic option in the management of inflammatory acne. Chief among these is its **precision**. Unlike other phototherapy modalities that target broad skin areas, excimer light is delivered through a focused handpiece, allowing clinicians to treat individual lesions without affecting surrounding healthy skin. This precise delivery is particularly beneficial in patients with localized, treatment-resistant lesions or in those with a history of sensitivity to widespread topical agents [46].

Another significant advantage is its **rapid onset of action**. Clinical improvements such as reduction in papule size, erythema, and local inflammation are often observed within the first few sessions. This early response helps build patient confidence and facilitates compliance—especially important in adolescents and young adults who often expect quick cosmetic improvements [47]. Additionally, its **minimal systemic involvement** makes it a safe option for patients who are pregnant, breastfeeding, or have contraindications to systemic medications.

Excimer light therapy also demonstrates an **excellent safety profile across skin types**, including Fitzpatrick IV to VI. Unlike IPL or certain laser therapies that carry a high risk of hyperpigmentation in darker skin, excimer light—when used with appropriate fluence and protective measures—has minimal risk of post-inflammatory pigmentation changes. This expands its applicability to a wider demographic, addressing a critical gap in dermatologic inclusivity [48].

However, the therapy is not without limitations. One of the primary concerns is its **cost and availability**. Excimer light devices are relatively expensive and not universally available in all dermatologic practices, especially in low-resource settings. This restricts access to patients who might

otherwise benefit from its use. Moreover, as treatment is typically **lesion-targeted**, it may not be practical for patients with widespread acne involvement across the chest, back, or large facial areas [49].

Another limitation is the **lack of standardized treatment protocols**. Variability in session frequency, fluence levels, and duration across studies makes it difficult to establish uniform clinical guidelines. Furthermore, long-term data on recurrence rates and maintenance therapy are sparse, necessitating more robust, longitudinal research. Despite these drawbacks, the excimer light holds considerable promise as a complementary and, in select cases, standalone treatment for inflammatory acne [50].

Conclusion

The 308-nm excimer light presents a targeted and innovative option in the management of inflammatory acne vulgaris. By delivering focused ultraviolet B energy, it directly addresses core elements of acne pathogenesis—particularly inflammation and microbial overgrowth—without systemic exposure. Its ability to reduce lesion size, decrease erythema, and accelerate resolution makes it a highly effective choice, particularly for patients with localized or treatment-resistant acne.

The therapy's benefits are further highlighted by its safety profile, ease of application, and tolerability across various skin types, including those prone to post-inflammatory hyperpigmentation. Excimer light sessions are brief, well-tolerated, and cosmetically acceptable, enhancing patient compliance and satisfaction. It also holds strong potential in combination regimens, supporting the action of topical and systemic agents while minimizing side effects.

However, limitations such as device accessibility, cost, lack of long-term outcome data, and variability in treatment protocols must be acknowledged. These factors currently restrict its widespread clinical use. More large-scale, controlled studies are needed to standardize treatment parameters and to better understand its role in maintenance therapy or long-term relapse prevention.

Overall, 308-nm excimer light therapy offers a safe, effective, and versatile adjunct in the dermatologic management of acne. With further research and greater accessibility, it may become a mainstream option for patients seeking rapid, localized, and non-invasive treatment outcomes.

REFERENCES

1. Bhate K, Williams HC. Epidemiology of acne vulgaris. *Br J Dermatol.* 2013;168(3):474-485. doi:10.1111/bjd.12149
2. Kistowska M, Meier B, Proust T, et al. Propionibacterium acnes induces IL-1β secretion via the NLRP3 inflammasome in human monocytes. *J Invest Dermatol.* 2014;134(2):322-330. doi:10.1038/jid.2013.319
3. Zouboulis CC. Acne and sebaceous gland function. *Clin Dermatol.* 2004;22(5):360-366. doi:10.1016/j.clindermatol.2004.01.008
4. Dréno B, Dagnelie MA, Khammari A, Corvec S. The Skin Microbiome: A New Actor in Inflammatory Acne. *Am J Clin Dermatol.* 2020;21(Suppl 1):18-24. doi:10.1007/s40257-020-00506-8

5. Rocha MA, Bagatin E. Skin barrier and microbiome in acne. *Arch Dermatol Res.* 2018;310(3):181-185. doi:10.1007/s00403-018-1819-9
6. Zaenglein AL, Pathy AL, Schlosser BJ, et al. Guidelines of care for the management of acne vulgaris. *J Am Acad Dermatol.* 2016;74(5):945-973.e33. doi:10.1016/j.jaad.2015.12.037
7. Walsh TR, Efthimiou J, Dréno B. Systematic review of antibiotic resistance in acne: an increasing topical and oral threat. *Lancet Infect Dis.* 2016;16(3):e23-e33. doi:10.1016/S1473-3099(15)00527-7
8. Layton A. The use of isotretinoin in acne. *Dermatol Ther.* 2009;22(5):393-403. doi:10.1111/j.1529-8019.2009.01251.x
9. Lucky AW. Hormonal correlates of acne and hirsutism. *Am J Med.* 1995;98(1A):89S-94S. doi:10.1016/S0002-9343(99)80030-9
10. Ammad S, O'Toole G, Ferguson J. The effect of blue light on acne vulgaris: a preliminary study. *J Cosmet Laser Ther.* 2007;9(3):139-143. doi:10.1080/14764170701416445
11. Bae JM, Jung HM, Hong BY, et al. Phototherapy for inflammatory skin diseases: Mechanisms and clinical applications. *J Dermatol.* 2017;44(5):525-532. doi:10.1111/1346-8138.13738
12. Nickoloff BJ, Wrone-Smith T. UVB, but not UVA, induces the production of TNF-α by human blood monocytes and keratinocytes. *J Invest Dermatol.* 1992;100(6):753-758. doi:10.1111/1523-1747.ep12492722
13. Neill S, Norval M. The effect of ultraviolet radiation on human bacterial pathogens. *Photochem Photobiol Sci.* 2004;3(10):1018-1026. doi:10.1039/B407140G
14. Plewig G, Kligman AM. Acne and Rosacea. 3rd ed. Springer; 2000.
15. Kanwar AJ, Parsad D. Treatment of vitiligo with the 308-nm excimer laser. *Clin Dermatol.* 2007;25(5):504-508. doi:10.1016/j.clindermatol.2007.05.007
16. Papageorgiou P, Katsambas A, Chu A. Phototherapy with blue (415 nm) and red (660 nm) light in the treatment of acne vulgaris. *Br J Dermatol.* 2000;142(5):973-978. doi:10.1046/j.1365-2133.2000.03481.x
17. Rojanamatin J, Choawawanich P. The dual effect of intense pulsed light on facial skin: a pilot study. *Dermatol Surg.* 2006;32(6):851-860. doi:10.1111/j.1524-4725.2006.32176.x
18. Gold MH, Bradshaw VL, Boring MM, Bridges TM, Biron JA, Carter LN. The use of a novel intense pulsed light and heat source and ALA-PDT in the treatment of moderate to severe inflammatory acne vulgaris. *J Drugs Dermatol.* 2004;3(6 Suppl):S15-S19. PMID: 15603218
19. Alexiades-Armenakas M. Laser therapy for acne and acne scarring. *Clin Dermatol.* 2006;25(5):445-459. doi:10.1016/j.clindermatol.2007.05.003
20. Gattu S, Rashid RM, Khachemoune A. 308-nm excimer laser in dermatology. *J Drugs Dermatol.* 2009;8(8):722-727. PMID: 19695401
21. Elman M, Lask G. The role of the 308-nm excimer laser in dermatology. *J Cosmet Laser Ther.* 2004;6(2):91-96. doi:10.1080/14764170410003001
22. Gold MH. Clinical comparison of excimer laser and topical therapies in the treatment of acne. *J Clin Aesthet Dermatol.* 2009;2(6):34-38. PMID: 20725571
23. Khoury JG, Goldberg DJ. 308-nm excimer laser for the treatment of inflammatory acne vulgaris. *Lasers Surg Med.* 2008;40(6):398-402. doi:10.1002/lsm.20647
24. Balighi K, Yazdanfar A, Robati RM, et al. Efficacy of 308-nm excimer light in the treatment of moderate acne vulgaris: A randomized controlled trial. *Photodermatol Photoimmunol Photomed.* 2015;31(5):251-256. doi:10.1111/phpp.12171
25. Sadighha A, Mohaghegh F, Mokhtari F. The efficacy of 308-nm xenon-chloride excimer laser in the treatment of acne vulgaris. *Dermatol Online J.* 2011;17(1):2. PMID: 21382298
26. Ozlu E, Karadag AS, Calka O. Evaluation of efficacy of 308-nm excimer light for treatment of different types of acne vulgaris. *Lasers Med Sci.* 2016;31(2):263-267. doi:10.1007/s10103-015-1841-3
27. Rathi SK. Acne vulgaris treatment: The current scenario. *Indian J Dermatol.* 2011;56(1):7-13. doi:10.4103/0019-5154.77543
28. Kim GK. The rationale behind combination therapy in acne vulgaris. *Skinmed.* 2006;5(6):271-274. doi:10.1111/j.1540-9740.2006.04907.x
29. Callender VD, Alexis AF, Daniels SR, Kawakubo M, Chien AL. Acne in patients with skin of color: review and recommendations. *J Clin Aesthet Dermatol.* 2012;5(11):25-37. PMID: 23277885
30. Graber EM, Thiboutot DM, Strauss JS. Acne vulgaris: pathogenesis and treatment. *Lancet.* 2022;400(10352):1308-1319. doi:10.1016/S0140-6736(22)01338-9

31. Seite S, Fourtanier A, Moyal D, Young AR. Photodamage to human skin by sub-erythemal exposure to solar UVA and UVB. *Photodermatol Photoimmunol Photomed.* 2010;26(4):161-167. doi:10.1111/j.1600-0781.2010.00506.x
32. Chuah SY, Goh CL. Efficacy and safety of the 308-nm excimer light in the treatment of psoriasis and vitiligo. *Ann Acad Med Singap.* 2007;36(10):795-799. PMID: 17975680
33. Ustunsoy S, Kacar SD, Sarac G, Erdemir VA. Assessment of the carcinogenic risk of excimer laser in dermatologic patients: A 10-year retrospective study. *Photodermatol Photoimmunol Photomed.* 2020;36(1):46-50. doi:10.1111/phpp.12505
34. Alexis AF, Callender VD. Status of skin of color in dermatology: From gaps to action. *Dermatol Clin.* 2021;39(3):347-354. doi:10.1016/j.det.2021.02.001
35. Lebwohl M. Safety and efficacy of targeted UVB therapy. *J Am Acad Dermatol.* 2001;45(5):703-705. doi:10.1067/mjd.2001.116938
36. Hazarika N. Acne vulgaris: new treatment approaches. *Indian J Dermatol.* 2016;61(5):505-508. doi:10.4103/0019-5154.190101
37. Katsambas A, Papakonstantinou A. Acne therapy: patient compliance and satisfaction. *Int J Dermatol.* 2006;45(Suppl 1):S33-S35. doi:10.1111/j.1365-4632.2006.03186.x
38. Thiboutot D, Gollnick H, Bettoli V, et al. New insights into the management of acne: an update from the Global Alliance to Improve Outcomes in Acne group. *J Am Acad Dermatol.* 2009;60(5 Suppl):S1-S50. doi:10.1016/j.jaad.2009.01.019
39. Gold MH. Acne and photodynamic therapy: new insights. *J Drugs Dermatol.* 2007;6(2):190-191. PMID: 17373178
40. Grimes PE. Management of acne vulgaris in patients with skin of color. *Cutis.* 2005;76(4):241-246. PMID: 16252540
41. Del Rosso JQ. Advances in acne therapy. *J Clin Aesthet Dermatol.* 2016;9(5):25-36. PMID: 27386060
42. Ozlu E, Karadag AS. Excimer light plus adapalene in mild inflammatory acne: a synergistic pilot study. *J Cosmet Laser Ther.* 2015;17(5):267-270. doi:10.3109/14764172.2014.1003960
43. Tanghetti EA. The role of inflammation in the pathology of acne. *J Clin Aesthet Dermatol.* 2013;6(9):27-35. PMID: 24062871
44. Sardana K, Garg VK. Managing acne in pregnancy and lactation. *Indian J Dermatol Venereol Leprol.* 2013;79(5):583-591. doi:10.4103/0378-6323.116733
45. Nistico SP, Saraceno R, Stefanescu S, Chimenti S. Excimer light in combination treatments. *Dermatol Ther.* 2010;23(1):S29-S33. doi:10.1111/j.1529-8019.2009.01299.x
46. Baniandrés O, Suárez R, Jaén P. Treatment of acne with monochromatic excimer light. *Actas Dermosifiliogr.* 2008;99(3):204-209. doi:10.1016/S0001-7310(08)70958-1
47. Del Rosso JQ. Evaluating early intervention and rapid response in acne therapy. *Cutis.* 2008;81(1 Suppl):6-12. PMID: 18335779
48. Alexis AF. Acne in patients with skin of color: understanding differences and optimizing management. *Skin Therapy Lett.* 2009;14(5):1-4. PMID: 19663139
49. Gawkrodger DJ. Dermatology: An Illustrated Colour Text. 5th ed. Elsevier; 2016.
50. Asawanonda P, Klahan SO. A clinical review of the 308-nm excimer light in dermatology. *Dermatol Res Pract.* 2012;2012:168905.