Excimer laser for vitiligo

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Policy contains: Excimer laser; vitiligo.

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Coverage policy

Monochromatic excimer laser light therapy (i.e., wavelength 308 nanometers) is clinically proven and, therefore, medically necessary for repigmentation of localized vitiligo, when all of the following criteria are met (American Academy of Dermatology Association, 2022; Taieb, 2013).

- Members age 18 years and older.
- Lesions located on the face and neck.
- Failure, intolerance, or contraindication to at least one topical corticosteroid and at least one topical calcineurin inhibitor.

Limitations

An initial regimen of monochromatic excimer laser therapy for vitiligo considered medically necessary is generally administered two to three times per week for up to 12 weeks (American Academy of Dermatology Association, 2022; Taieb, 2013).

Continued monochromatic excimer laser therapy beyond the initial 12 weeks is considered medically necessary weeks as long as repigmentation is occurring, for up to 104 continuous weeks (American Academy of Dermatology Association, 2022; Taieb, 2013).

Monochromatic excimer laser therapy is not medically necessary if (American Academy of Dermatology Association, 2022; Taieb, 2013):

- No repigmentation occurs within the first 12 weeks of treatment.
- There is an unsatisfactory response (< 25% repigmentation) after 24 weeks of treatment.
- Treatment duration exceeds 104 weeks.

Alternative covered services

- Primary care and specialty physician (including surgical) evaluation and management.
- Narrow-band ultraviolet B phototherapy.
- Topical and oral psoralen photochemotherapy plus ultraviolet A radiation.
- Topical tacrolimus and pimecrolimus (calcineurin inhibitors).
- Topical and systemic corticosteroids.

Background

Vitiligo is a chronic disorder in which the skin's melanocytes are lost or destroyed (Bergqvist, 2020). The disease is marked by well-defined white patches on one or multiple parts of the skin, and sometimes head or body hair, which can spread over time. Concerns about appearance and ethnic identity caused by vitiligo can lead to serious psychological, social, and emotional concerns.

The prevalence of vitiligo ranges between 0.2% in the population at-large to 1.8% in a hospital-based population. The highest prevalence occurs in African Americans and among females. Prevalence increases gradually with age (Zhang, 2016).

The cause of vitiligo remains unknown, but several mechanisms have been implicated in melanocyte destruction. These include genetic, autoimmune responses, oxidative stress, inflammatory mediators, and melanocyte detachment mechanisms. There is consensus on the multifactorial and autoimmune nature of vitiligo, but the contribution of specific individual factors is debated (Bergqvist, 2020; Genetic and Rare Diseases Information Center, 2018). A family trait has been identified in 18% of persons with vitiligo (Gawkrodger, 2008). People with vitiligo are at risk for developing autoimmune thyroid disease, thyroid cancer, and psoriasis (Fan, 2018; Yen, 2019).

Diagnosis of vitiligo is typically a straightforward process based on physical symptoms, often made by a dermatologist. Several diseases, most notably versicolor, piebaldism and guttate hypomelanosis, can be mistaken for vitiligo, and should be ruled out by clinicians. Wood's light – a hand-held ultraviolet irradiation device - can be used to identify the extent of areas of pigment loss, and also monitor patient response to treatment (Gawkrodger, 2008).

Vitiligo is classified into segmental or nonsegmental subtypes, each with prognostic and treatment implications (Ezzedine, 2012). The available treatments are not curative but may halt disease progression and produce repigmentation, often with acceptable cosmesis. The major nonsurgical treatments for vitiligo are listed below, used alone or in combination (Dillon, 2017):

- First-line treatments are topical corticosteroids (moderate- to high-strength) that dampen the cellular immune response (e.g., mometasone 0.1% or clobetasol 0.05%) and topical calcineurin inhibitors (e.g., tacrolimus and pimecrolimus).
- Ultraviolet A light therapy has cellular immunosuppressive plus mitogenic and melanogenic properties that promote melanocyte proliferation and melanin synthesis. When combined with psoralen, it helps reverse melanocyte and keratinocyte degeneration in and around lesions.
- Ultraviolet B therapy is able to stimulate depigmentation in vitiligo treatment, and is classified as

narrowband (311–313nm) or broadband (280–320nm).

- Monochromatic excimer laser or lamp therapy is targeted phototherapy, similar to focused, high-intensity ultraviolet B light therapy using a wavelength of 308nm. Several excimer laser systems have received 510(k) premarket approval (U.S. Food and Drug Administration, 2022).

Surgical methods such as tissue grafts, cellular grafts, cultured epidermal suspensions, and hair follicle transplantation may be options for patients with refractory disease. Emerging treatments include prostaglandins, Janus kinase inhibitors, and nonsteroidal systemic immunosuppressives (Bergqvist, 2020).

Findings

The British Association of Dermatology 2008 guideline on vitiligo treatments recommended steroids for no longer than two months; topical tacrolimus (adults only); topical calcineurin inhibitors (tacrolimus and pimecrolimus); phototherapy (ultraviolet B for children, narrow band ultraviolet B and psoralen ultraviolet A for adults); surgery for cosmetically sensitive sites (adults only); and psychological interventions (Gawkrodger, 2008).

The European Dermatology Forum guideline confirmed those of the 2008 version, plus several combination therapies (Taieb, 2013). They recommended targeted phototherapies for localized vitiligo, particularly for small lesions of recent onset and childhood vitiligo. These interventions are designed to avoid the side effects from total body irradiation with ultraviolet B and when total body irradiation using conventional narrow band ultraviolet B is contraindicated (e.g., risk for skin cancer, photoaggravated disease, etc.). Limited, low quality evidence suggested excimer laser combined with topical medications may be more effective than laser monotherapy. Contraindications have not been well elucidated.

There was no consensus on the optimum treatment duration. Experts advised targeted phototherapy may be continued as long as repigmentation is occurring up to a maximum period of one or two years. Treatment is typically discontinued if no repigmentation occurs within the first three months of treatment or if there is an unsatisfactory response (< 25% repigmentation) after six months of treatment. Maintenance treatment is not recommended (Taieb, 2013).

An update of vitiligo treatments, consisting of results of 74 articles, presented strong evidence supporting earlier recommendations, plus support for monochromatic excimer light laser therapy (Dillon, 2017).

In a Cochrane review of 12 studies of laser phototherapy, most studies had fewer than 50 subjects, and very few included children or participants with segmental vitiligo. The primary outcomes were quality of life (one study), percentage of repigmentation > 75% (six studies), and adverse effects (six studies). The majority of participants achieving > 75% repigmentation were administered combination interventions that included some form of excimer phototherapy. Most adverse effects were short-lived and did not interfere with continued treatment. No studies reported on secondary outcomes of cessation of spread or long-term repigmentation (at two years' follow up). Study quality was "poor to moderate at best" due to variations in study designs and outcome measures, limiting the ability to measure efficacy (Whitton, 2016).

A systematic review and meta-analysis of six studies (n = 411, 764 lesions) documented no significant differences in efficacy between excimer lamps and excimer laser, or between excimer lamps and narrow band-ultraviolet B therapy for vitiligo. All were considered effective, and adverse effects for each were mild (Lopes, 2016). A related systematic review of seven studies (n = 390) comparing excimer laser and narrow ban-ultraviolet B therapy arrived at similar conclusions (Sun, 2015).

A systematic review of seven studies (n = 232) compared narrow band-ultraviolet B treatment for vitiligo with several other therapies. Using degree of re-pigmentation as a measure of effectiveness, there were no significant differences between narrow band and ultraviolet A, psoralens plus ultraviolet A, and 308-nanometer excimer light/laser treatment. Adverse events were slight (Xiao, 2015).

A systematic review and meta-analysis of eight randomized controlled trials (n = 425) determined that combined therapy of excimer laser/light and topical calcineurin inhibitors was superior to excimer laser/light monotherapy. This indicates that calcineurin inhibitors are effective, but authors caution that numbers are small, and studies are heterogeneous (Bae, 2016).

A literature review of 24 articles searched for information on efficacy of targeted phototherapy for vitiligo, which the authors defined as application of light energy directly targeted at the lesion through delivery mechanisms such as fiberoptic cables. The term "targeted phototherapy" includes different technologies such as excimer laser (308 nm), intense pulse light systems and non-laser ultraviolet light sources with improved hand-held delivery systems. Each was found to be effective, some in combination with other treatments (Mysore, 2016).

A systematic review of 39 studies (n = 1,624) assessing benefits of adding phototherapy to melanocyte transplant to treat vitiligo was conducted. Phototherapy modalities included narrow band ultraviolet B (nine studies), psoralen ultraviolet A (19 studies), ultraviolet A (one study), monochromatic excimer light (four studies), and active sunlight exposure (nine studies). No significant differences were observed in studies directly comparing phototherapy modalities. Study quality was moderate to poor, and heterogeneity between studies was high, limiting comparisons and conclusions on effectiveness (Lommerts, 2018).

In 2022, we narrowed the focus of the policy to address excimer laser only, as the other treatments for vitiligo are either pharmaceuticals or phototherapy options addressed in clinical policy CCP.1169. We added two systematic reviews and meta-analyses comparing the efficacy of phototherapy as either monotherapy or combination therapy for repigmentation of vitiligo. The results suggest combination therapy using either narrowband-ultraviolet B phototherapy or excimer laser with tacrolimus (Chang, 2021), or narrowband ultraviolet B, psoralen ultraviolet A, or excimer laser with calciprotriol (Hu, 2021), may provide greater clinical improvement than phototherapy alone. Heterogeneous selection criteria and treatment protocols prevent determination of the optimal candidate or treatment administration. Their findings are consistent with the previous policy findings.

The American Academy of Dermatology Association (2022) lists excimer laser among available vitiligo treatments. Lasers are recommended for small areas, and lamps are recommended for larger areas. Excimer laser can be effective, particularly for repigmenting facial lesions, but in approximately half of patients, results disappear within one year of stopping treatment, and in 86% after four years of stopping treatment. Patients typically need two to three treatments per week for several weeks. Excimer laser may be combined with other treatments. The Association does not list excimer laser among recommended treatments for children.

References

On March 3, 2022, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were "phototherapy," "excimer laser," and "vitiligo." We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

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Policy updates

1/2018: initial review date and clinical policy effective date: 3/2018

5/2019: Policy references updated. Policy number changed to CCP.1303.

5/2020: Policy references updated.

5/2021: Policy references updated.

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