

FROM REDNESS TO RADIANCE



Find out how intense-pulsed light therapy can be an excellent treatment option for patients with ocular rosacea.

BY NABILA GOMEZ, OD, FAAO

Ocular rosacea is a subtype of rosacea that primarily affects the eyes and eyelids, contributing to eyelid erythema and redness, meibomian gland dysfunction (MGD), tear film instability, and persistent inflammation. Although commonly associated with facial rosacea, ocular signs may precede cutaneous symptoms, suggesting skin involvement may exist in a subclinical form.¹ Due to symptom overlap, ocular rosacea is often misdiagnosed as allergies or generalized dry eye disease, leading to delays in appropriate treatment.

Traditional therapies for ocular rosacea, such as artificial tears, warm compresses, and prescription

medications, may offer symptom relief but often do not address the underlying vascular etiology. By targeting abnormal blood vessels, reducing inflammation, and restoring meibomian gland function, intense pulsed light (IPL) therapy is revolutionizing how we manage ocular rosacea, offering a long-term solution for patients. In this article, I review what you need to know to integrate this therapy into your practice.

UNDERSTANDING OCULAR ROSACEA

Ocular rosacea (Figure 1) is characterized by chronic eyelid and ocular surface inflammation and is associated with telangiectatic vessels, which sustain inflammation and ocular

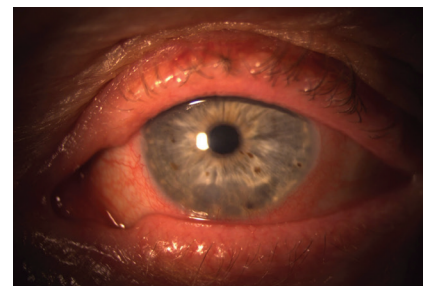


Figure 1. A case of ocular rosacea with conjunctival infection.

surface irritation through abnormal dilation and increased permeability.²

Triggers such as environmental factors, diet, stress, and hormonal fluctuations frequently worsen ocular rosacea. Clinically, patients may present with MGD, blepharitis, recurrent styes, chronic eye redness, foreign body sensation, and ocular irritation. If left untreated, ocular rosacea can develop more severe complications, including corneal involvement and vision loss.³

THE INS AND OUTS OF IPL

IPL is a broad-spectrum, noncoherent light source that emits wavelengths ranging from approximately 500 nm to 1,200 nm.⁴ Its therapeutic effects are based on the principle of *selective photothermolysis*,³ whereby light energy is absorbed by specific chromophores and is converted into heat, inducing controlled thermal damage to targeted structures while sparing surrounding tissue.⁴ Through this mechanism, IPL therapy coagulates abnormal blood vessels and modulates tissue

inflammation, making it effective in treating the vascular and inflammatory components of ocular rosacea.

Chromophores Targeted by IPL

IPL energy absorbed by specific chromophores (hemoglobin, melanin, and water) is thought to initiate the following cascade of therapeutic effects:

- When absorbed by hemoglobin, IPL energy allows targeted destruction of telangiectatic vessels that are involved in ocular rosacea.³
- Melanin absorbs shorter IPL wavelengths and plays a role in surface level energy absorption. Although it is not a treatment target in ocular rosacea, melanin influences the wavelength selection and fluence settings to help ensure safety across certain skin types.³
- Water exhibits minimal absorption at IPL wavelengths compared with hemoglobin and melanin, but it does contribute to heat distribution within tissues, enhancing the photothermal effect.³

Proposed Mechanisms of Action

The precise mechanism of action of IPL is not yet fully understood; however, several pathways have been proposed in the literature to explain its therapeutic effects in ocular rosacea.

Photothermolysis. As previously mentioned, the absorption of IPL by oxyhemoglobin induces selective thermal coagulation and destruction of telangiectatic vessels, reducing erythema and inflammation.⁵

Reduction of proinflammatory mediators. IPL has been shown to decrease levels of interleukin-6, interleukin-8, and TNF-alpha, which contribute to chronic redness and inflammation.⁶

Heat transfer to meibomian glands. While IPL does not directly target the meibomian glands, the heat generated in surrounding tissues can raise peri-glandular temperature, promoting meibum liquefaction and improving gland expression.³



Figure 2. Note the visible reduction in eyelid margin inflammation and telangiectatic vessels associated with ocular and facial rosacea following four sessions of IPL therapy.

Tissue remodeling and collagen production. IPL may stimulate fibroblast activity and collagen remodeling, potentially supporting periocular skin health.⁴

Reduction of microbial load. IPL may reduce the presence of skin microbes, including bacteria and *Demodex* mites, which are believed to contribute to inflammation in ocular rosacea.³

Suppression of matrix metalloproteinases. IPL may also suppress the activity of these enzymes, reducing tissue degradation and chronic inflammation on the ocular surface.³

TREATMENT PLAN, MAINTENANCE, AND ENERGY PARAMETERS

The optimal number of IPL therapy sessions for treating ocular rosacea varies

Photos published with patient consent.

WHEN IPL THERAPY IS NOT APPROPRIATE

Although intense pulsed light (IPL) therapy is a promising treatment for ocular rosacea, it is not recommended for every patient. Consider the following contraindications and precautions before proceeding.¹

Active Ocular or Periorcular Infections. Patients with active bacterial, viral (eg, herpes simplex virus), or fungal infections should not undergo IPL therapy until the infection is fully resolved.

Photosensitive Conditions or Medications. IPL therapy is contraindicated in patients with photosensitivity disorders (eg, lupus, porphyria, etc) or those taking photosensitizing medications and retinoids.

Skin Types IV to VI on the Fitzpatrick Scale. Patients with skin tones in this range are at a higher risk of post-inflammatory hyperpigmentation and burns following IPL therapy.

Recent Tanning or Sun Exposure. IPL therapy should not be performed on recently tanned skin due to the increased risk of burns and pigmentation changes.

Pregnancy. Although there is no definitive evidence against IPL therapy during pregnancy, it is generally avoided due to lack of safety data.

1. Tashbayev B, Yazdani M, Arita R, Fineide F, Utthim TP. Intense pulsed light treatment in meibomian gland dysfunction: a concise review. *Ocul Surf.* 2020;18(4):583–594.

based on the severity of symptoms and patient response. The standard recommended treatment protocol consists of four sessions spaced 2 to 4 weeks apart with additional maintenance sessions as needed.^{7,8} Many patients experience improvement after the second or third session, with maximal benefits generally observed after the fourth treatment. Because ocular rosacea is chronic, patients typically require maintenance IPL sessions once or twice per year to sustain symptom relief and prevent recurrence. Without maintenance treatments, symptoms may return over time.⁷

The energy settings used for IPL treatment differ between ocular

rosacea and facial rosacea due to variations in skin sensitivity and treatment goals. Using the Fitzpatrick scale, accurate skin typing is essential before IPL treatment. It helps guide the selection of safe fluence levels and wavelength filters, minimizing the risks of burns or post-inflammatory hyperpigmentation, especially in patients with darker skin tones.

With ocular rosacea, a lower fluence (10 - 16 J/cm²) is used to target the periorbital area, reducing inflammation while minimizing the risk of burns or excessive thermal damage.⁵ In contrast, with facial rosacea, higher fluence levels, often

in the range of 15 J/cm² to 25 J/cm², are used for treating extensive telangiectasia and persistent erythema in facial rosacea.⁵

For ocular applications, 590 nm to 650 nm cut-off filters are commonly used to target abnormal blood vessels and reduce inflammatory mediators.⁵ Proper eye protection, such as an opaque shield, is essential to prevent unintended exposure to light energy during treatment.

CLINICAL RESULTS: BEFORE AND AFTER IPL THERAPY

The visual transformation following IPL therapy can be significant. Before-and-after images highlight improvements in facial erythema, telangiectatic vessels, and eyelid margin inflammation in patients with ocular rosacea after a series of IPL sessions (Figure). These visual outcomes complement the scientific evidence and illustrate the potential for IPL therapy to improve clinical signs when used appropriately.

With each IPL session, I express the patient's meibomian glands to further improve gland function and oil flow into the ocular surface, a combination that has been shown to significantly enhance both clinical signs and patient-reported symptoms in dry eye due to MGD.^{5,9}

INTEGRATING IPL THERAPY INTO YOUR TREATMENT PLAN

While IPL therapy can significantly reduce inflammation and improve meibomian gland function, it is best used as part of a comprehensive treatment plan, particularly for patients with moderate to severe ocular rosacea. In these cases, IPL can serve as an adjunct therapy to topical and systemic treatments, such as oral doxycycline, topical metronidazole, azithromycin, corticosteroid-antibiotic combinations, and/or immunomodulatory agents. Over time, patients may report a reduced reliance on pharmaceutical

AT A GLANCE

- Intense pulsed light (IPL) therapy may offer a promising long-term solution for ocular rosacea, a subtype of rosacea that can lead to meibomian gland dysfunction, tear film instability, and persistent inflammation.
- IPL therapy uses selective photothermolysis, in which light energy absorbed by specific chromophores is converted to heat, inducing controlled thermal damage to targeted structures while sparing surrounding tissues.
- IPL does not directly target the meibomian glands, but the heat generated in surrounding vascular and dermal tissues can raise the peri-glandular temperature, promoting meibum liquefaction and improving gland expression.

treatments as their symptoms become more manageable with maintenance IPL therapy. (See *When IPL Therapy Is Not Appropriate*.)

POTENTIAL FOR LASTING RELIEF

IPL therapy is not a cure, but it can offer patients with ocular rosacea long-term relief when integrated into

a comprehensive treatment plan, including maintenance sessions. ■

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