

# Intense Pulsed Light (IPL) in the Treatment of Dry Eye Disease and Meibomian Gland Dysfunction

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## Abstract

Intensity Pulsed Light (IPL) is one of the new treatments for patients with Dry Eye (DED) and Meibomian Gland Dysfunction (MGD), showing a high level of efficacy and safety but still we don't know well the exact mechanisms of action and the criteria on how to apply this technology and the type of patient in whom IPL treatment would be indicated.

**Keywords:** Dry eye disease • Meibomian gland dysfunction • Rosacea • IPL • Mechanisms of action

## Description

The use of IPL in ophthalmology began in 2003 as a result of experience in the treatment of dermatological diseases such as Acne Rosacea [1]. Ronaldo Toys was the first to observe that when treating patients with Rosacea who also suffered from DED secondary to Meibomian gland dysfunction MGD, the symptoms of dry eyes improved [2]. From this moment on, multiple studies have appeared showing the benefits of this technology in the treatment of DED and MGD [3].

It is important to remember that DED and MGD represent one of the most frequent pathologies in Ophthalmology, with reports of 5%-20% in western countries and 45%-70% in the Asian population. On the other hand, there is also no fully effective of this disease, hence the need to seek new alternatives that complement classic treatments such as eyelid hygiene, artificial tears or local anti-inflammatory drugs, and antibiotics such as Doxycycline [3].

We still don't know well how IPL works. We know from studies in Dermatology and Aesthetic Medicine, the mechanisms of action but they have not yet been fully demonstrated in Ophthalmology [4].

The review of published articles shows that it would have a mixed action:

- Improving the inflammatory state of the ocular surface and the Meibomian glands.

- Neurotrophic effect, improving the state of the cornea by acting on the parasympathetic nerve fibers.
- Thrombotic effect on the micro vascularization of the eyelids, reducing the presence of telangiectasia.
- Photo modulatory effect based on fibroblasts regeneration and collagen synthesis
- Antimicrobial effect by acting directly on Demodex or indirectly as a vector on bacterial proliferation especially Bacillus Olfens [5].

Another important subject regarding the use of IPL in ophthalmology concerns the type of system used and the parameters selected according to the pathology and skin type. Let us remember that the IPL derives from dermatology and in most cases, they were applied directly in ophthalmology to treat DED associated with MGD. The same parameters as in the treatment of Rosacea, 14 J/cm<sup>2</sup> to 16 J/cm<sup>2</sup>, were selected, placing the hand piece on the periocular skin and protecting the eyes with goggles. Subsequently, IPL systems specially designed for ophthalmological treatment have appeared, such as the Lumens Optima with parameters adapted to the treatment of MGD or the French system, E-EYE the first system for use in ophthalmology. The main problem with these new systems is that they all use pulse parameters that do not allow treating patients with pigmented skin, only grades I to IV in the Fitzpatrick classification, leaving the most pigmented types, V and VI, which are not could use, assuming a real problem in areas where there is a high percentage of patients with this type of skin. Fortunately, this problem is beginning to be solved and there is already a new system, Thermaeye Plus that combines the distribution of micro pulses and the energy and time parameters of each pulse making it possible to treat all types of patients, even with highly pigmented grade VI skin. As has been published in patients with DED and MGD [6,7].

In most studies, it is recommended to perform 3 or 4 IPL sessions, separated by 2 weeks each, with a protective skin gel that helps the pulsed light flash does not damage the dermis and penetrates better into deeper areas, where the Meibomian glands are found. Most authors coincide in reporting an improvement especially in the symptoms rather than the signs of dry eye. This improvement would begin to manifest itself about 2 or 3 weeks after the start of treatment and they also agree that the improvement is maintained for the next 6-9 months.

The IPL is a promising treatment for patients with dry eye and MGD but we need more studies to better understand the mechanism of action and the specific parameters for its ophthalmological use.

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