Getting Started with IPL: Beginners Guide to Intense Pulse Light for On-Label Dry Eye Disease and Other Off-Label Applications

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Vision Expo West
2023

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Douglas K Devries, OD
Disclosures
All Conflicts Have Been Mitigated

Allergan Advisor
Alcon Advisor and Speaker
Asecula Advisor
Aldeyra
Avellino Advisor
Azura Advisor
Bio Tissue Advisor and Speaker
Bruder Advisor
B&L Advisor and Speaker
Dompe Advisory and Speaker
Johnson and Johnson Advisor Speaker
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Novartis Advisor and Speaker
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Oyster Point Advisor and Speaker
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Sight Science Advisor and Speaker
Sun Advisor and Speaker
Tarsus Advisor
Thea Advisor
TruKera Advisor
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Myze
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Olympic Ophthalmics
Quidel Advisor
Quench Method
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SightRx
Sun Advisor and Speaker
TheraMdex
Tarsus Advisor
Visant Advisor
TruKera Advisor
Versea Advisor
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Facts on dry eye

1. **Dry Eye is very common:** 14-20% of population suffer from it
2. **Dry Eye is keeping Eye Care professionals busy:** it is the top reason people visit an Eye Care professional - 25% of visits in a general practice![1]
3. **Dry Eye is complex:** skin, autoimmune, environmental conditions, LASIK/Cataract procedures are all triggers. Sufferers are mostly +50 y/o women, menopausal
4. **Dry Eye feels like:** burning, itchy, watery eyes
5. **Cataract / LASIK surgery:** major catalyst for Dry Eye Disease

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Etiology

- 86% of patients with a classified subtype have evaporative dry eye/MGD as a component

Lemp MA, et al. *Cornea*. 2012;31:472-478.

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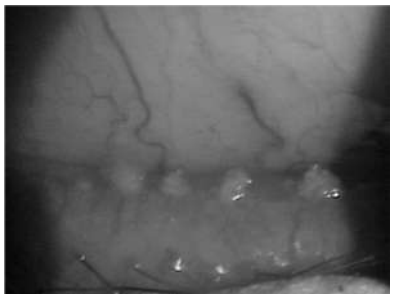

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MGD is Extremely Common

Patient Condition	% with MGD
Dry Eye	86%[1]
Peri-menopause	79%[2]
Polycystic Ovary Syndrome	73%[3]
Glaucoma (on prostaglandins)	96%[4]
Glaucoma (non prostaglandin)	58%[4]
Diabetes	58%[5]
VDT users (4+ hrs per day)	85%[6]
Cataract Patients	59%[7]
Contact lens wearers	60%[8]

1. Lemp MA, Crews LA, Bron AJ, et al. Cornea 2012;31(5):472-8. 2. Jin X, et al. Medicine (Baltimore) 2016;95(31):e4268. 3. Baser G, et al. Curr Eye Res 2016;28:1-5. 4. Mocan MC, et al. J Glaucoma 2016; 25(9):770-4. 5.Yu T, et al. Int J Ophthalmol 2016;9(12):1740-1744. 6.Wu H/ PLoS One 2014;9(8):e105575.

7.Algamadi et al. Cornea 2016;35(6):731-5. 8.Machalińska A, et al. Cornea 2015;34(9):1098-104.

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Impact of MGD on Ocular Health

- MGD Decreases
  - Ocular Health & Protection[1-4]
    - Corneal nerve health[2]
    - Conjunctival health[3]
    - Tear film immunity[1,4]
  - Visual acuity[1,5]
  - Ocular comfort[4-6]
  - Contact lens comfort and wear time[4-6]

1. Baudouin C, Messmer EM, Aragona P, et al. Br J Ophthalmol 2016 ;100(3):300-6. 2. Azizi S, Uçak T, Yaşar I, et al. Semin Ophthalmol 2017;32(3):377-383. 3. Liang Q, Pan Z, Zhou M, et al. Cornea 2015;34(10):1193-9. 4. Mudgil P. Invest Ophthalmol Vis Sci 2014;55(11):7272-7. 5. Epitropoulos AT. J Ophthalmol 2016. 6. Machalińska A1, Zakrzewska A, Adamek B, et al. Cornea 2015;34(9):1098-104.

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Meibomian Gland Dysfunction & the skin

- There is a clear association between MGD and skin inflammatory diseases occurring in close proximity to the eyelids.
- A common example is facial skin rosacea.
- One in ten people are affected by this skin condition, with >80% of these patients having concomitant MGD.

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Meibomian Gland dysfunction & the skin

- In 20% of cases, ocular signs precede skin rosacea – possibly suggesting that skin rosacea could already exist in a subclinical forms

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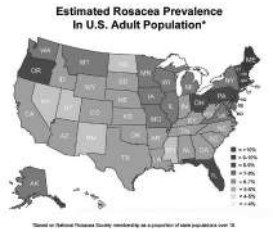
Meibomian gland dysfunction & the skin



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Meibomian gland dysfunction & the Skin

Risk factors
- **Female > Male**
- **fair skin, particularly if it has been damaged by the sun**
- **over age 30**
- **Smoke**
- **family history of rosacea**

Triggers
- **Hot drinks and spicy foods**
- **Alcohol**
- **Temperature extremes**
- **Sunlight or wind**
- **Emotions**
- **Exercise**
- **Cosmetics**
- **Drugs that dilate blood vessels, including some blood pressure medications**

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The international Dry Eye Workshop (DEWS)

2007

2007 Report of the International Dry Eye WorkShop (DEWS)

Management and Therapy of Dry Eye Disease:
Report of the Management and Therapy Subcommittee of the International Dry Eye WorkShop (2007)

Management and Therapy Subcommittee members: **Stephen C. Pflugfelder, MD (Chair)**; Gerd Geerling, MD; Shigeto Kinoshita, MD; Michael A. Lemp, MD; James McCulley, MD; Daniel Nelson, MD; Gary N. Nowack, PhD; Jun Shimazaki, MD; Clive Wilson, PhD.

2017

tfos DEWS II

TFOS DEWS II Management and Therapy Report

Lyndon Jones, FCOptom, PhD [A, 1, *], Laura E. Downie, BOptom, PhD [1], Donald Korb, OD [2], José M. Benítez-del-Castillo, MD, PhD [3], Reza Dana, MD [4], Sophie X. Deng, MD, PhD [5], Pham N. Dong, MD [6], Gerd Geerling, MD, FEBO [7], Richard Yudi Hida, MD [8], Yang Liu, MD [9], Kyoung Yul Seo, MD, PhD [10], Joseph Tauber, MD [11], Tais H. Wakamatsu, MD, PhD [12], Jianjiang Xu, MD, PhD [13], James S. Wolffsohn, FCOptom, PhD [14], Jennifer P. Craig, MCOptom, PhD [J]

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Treatment guidelines recommended by DEWS (2007)

Table 3. Dry eye menu of treatments

Artificial tears substitutes
Gels/Ointments
Moisture chamber spectacles
Anti-inflammatory agents (topical CsA and corticosteroids, omega-3 fatty acids)
Tetracyclines
Plugs
Secretogogues
Serum
Contact lenses
Systemic immunosuppressives
Surgery (AMT, lid surgery, tarsorrhaphy, MM & SG transplant)

Table 4. Treatment recommendations by severity level

Level 1:
Education and environmental/dietary modifications
Elimination of offending systemic medications
Artificial tear substitutes, gels/ointments
Eye lid therapy

Level 2:
If Level 1 treatments are inadequate, add:
Anti-inflammatories
Tetracyclines (for meibomianitis, rosacea)
Punctal plugs
Secretogogues
Moisture chamber spectacles

Level 3:
If Level 2 treatments are inadequate, add:
Serum
Contact lenses
Permanent punctal occlusion

Level 4:
If Level 3 treatments are inadequate, add:
Systemic anti-inflammatory agents
Surgery (lid surgery, tarsorrhaphy; mucus membrane, salivary gland, amniotic membrane transplantation)

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Treatment guidelines recommended by DEWS II (2017)

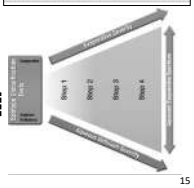
Step 1:
- Education regarding the condition, its management, treatment and prognosis
- Modification of local environment
- Education regarding potential dietary modifications (including oral essential fatty acid supplementation)
- Identification and potential modification/elimination of offending systemic and topical medications
- Ocular lubricants of various types (if MGD is present, then consider lipid-containing supplements)
- Lid hygiene and warm compresses of various types

Step 2:
If above options are inadequate consider:
- Non-preserved ocular lubricants to minimize preservative-induced toxicity
- Tea tree oil treatment for Demodex (if present)
- Tear conservation
  - Punctal occlusion
  - Moisture chamber spectacles/goggles
- Overnight treatments (such as ointment or moisture chamber devices)
- In-office, physical heating and expression of the meibomian glands (including device-assisted therapies, such as LipiFlow)
- In-office intense pulsed light therapy for MGD
- Prescription drugs to manage DED
  - Topical secretagogues
  - Topical non-glucocorticoid immunomodulatory drugs (such as cyclosporine)
  - Topical LFA-1 antagonist drugs (such as lifitegrast)
  - Oral macrolide or tetracycline antibiotics

In-office intense pulsed light therapy for MGD

Step 3:
If above options are inadequate consider:
- Oral secretagogues
- Autologous/allogeneic serum eye drops
- Therapeutic contact lens options
  - Soft bandage lenses
  - Rigid scleral lenses

Step 4:
If above options are inadequate consider:
- Topical corticosteroid for longer duration
- Amniotic membrane grafts
- Surgical punctal occlusion
- Other surgical approaches (eg tarsorrhaphy, …



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IPL – dry eye discovery

- Serendipitous discovery in 2003 by R. Toyos, MD
- Initially recommended for dermatological treatment
- Patients experienced subsequent dry eye relief

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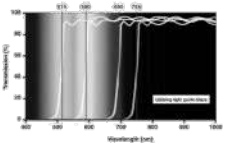
What is Intense Pulsed Light (IPL)?

1. **Light** with wide spectrum (400-1200 nm) that can target different depths and chromophores
2. Intense energy that **photocoagulates** abnormal lesions and blood vessels
3. **Brief pulses** that prevent collateral damage
4. **"Cut off" filters** are used for different skin types, depths, and chromophores. For example, 560 nm filter passes only wavelengths above 560 nm (and below 1200 nm)



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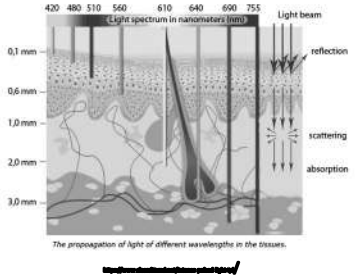
IPL – spectrum of treatment



The propagation of light of different wavelengths in the tissues.

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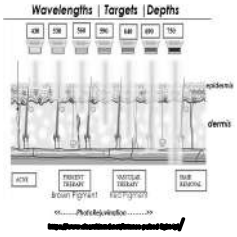
Intense pulse light

Dermatological Uses:

- Vascular lesions
- Hair removal
- Pigmented lesions



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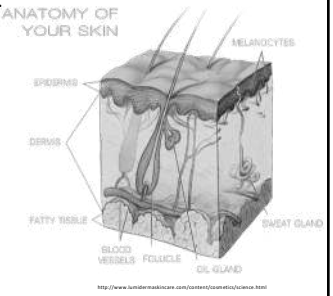
Intense pulse light

Three main chromophores:

- Hemoglobin
- Water
- Melanin



http://www.lumidermaskincare.com/content/cosmetics/science.html

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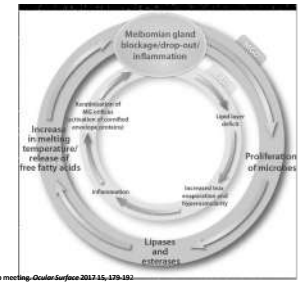
OCEAN-MGD arises from any combo of six separate conditions

- Primary obstructive hyperkeratinization (plugging)
- Abnormal meibomian secretion
- Eyelid inflammation
- Corneal and conjunctival inflammation
- Epithelial damage
- Microbiological changes
  - (Staph sp., P acnes and
  - Demodex sp., B. oleronius)
- Think
- BEISTO
  - Bugs
  - Enzymes
  - Inflammation (IL-6, IL-17, PGE2)
  - Stasis of Meibum
  - Temperature
  - Obstruction



Emerging strategies for the diagnosis and treatment of MGD: Proceedings of the OCEAN group meeting. *Ocular Surface* 2017 15, 179-192

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		CsA LfG	Thermal Pulsation	IPL	Hypochlorous acid	Omega 3/6	TP-03
B	Bacterial burden/ Demodex load			★	★		★
E	Enzymatic: meibum biochem, lipases, gene expression	★		★	★	★	★
I	Inflammation: cytokines, T-cells	★	★	★	★	★	
S	Stasis		★	★		★	
T	Temperature	★	★	★			★
O	Obstruction: hyperkeratinization	★	★	★			★

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Prevalence of OSD In Surgical Patients

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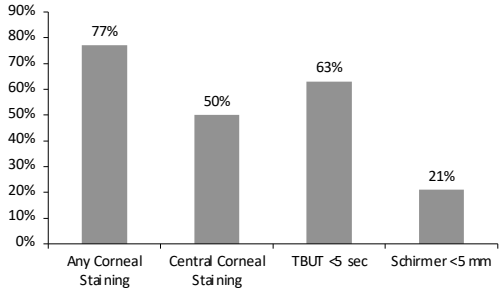
P.H.A.C.O. Study

Prevalence of Dry Eye in Patients Scheduled for Cataract Surgery



Trattler W, et al; Cataract and Dry Eye: Prospective Health Assessment of Cataract Patients Ocular Surface Study; Poster, ASCRS; March, 2011

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P.H.A.C.O. Study: Lessons Learned

- 80.9% of patients scheduled for cataract surgery were diagnosed with OSD
- Majority were **asymptomatic**
  - Blurred vision common
  - Clinical signs common

If you look…..you will find it

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The Role of the Ocular Surface in Surgical Success

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What percentage of cataract patients have MGD?

2014-2017

- Peri-menopausal women study: 91% (n = 471) had DE with 87% having MGD[1].
- PCOS study: 73% with PCOS had MGD vs. 62% of the controls[2]
- MGD 'high prevalence and increased' in smokers[3]
- Cataract Patients: 59% (n-233) had MGD[4]
- Contact lens wearers: 60% had MGD.[5]

2018 Cochener Paper (n=342)

- 52% percent of patients had MGD
- 56% had meibomian gland atrophy equal to or more than Arita grade 1.
- Meibomian gland function correlated significantly with lipid layer thickness, symptoms, age, and gland atrophy (P < .05).
- Fifty percent of patients with meibomian gland dysfunction were asymptomatic.

MGD diagnosed in 86% of dry eye[6]
Over 63% of cataract patients have dry eye symptoms[7]
Over 30% of all patients > 50 years old have dry eye[6]

1. Jin X, et al. Medicine (Baltimore). Hormone replacement therapy benefits meibomian gland dysfunction in perimenopausal women. 2016 Aug;95(31):e4268.
2. Baser G, et al. Evaluation of Meibomian Gland Dysfunction in Polycystic Ovary Syndrome and Obesity. Curr Eye Res. 2016 Oct 28:1-5.
3. Wang S, et al. Impact of Chronic Smoking on Meibomian Gland Dysfunction. PLoS One. 2016 Dec 28;11(12):e0168763.
4. Algarradi et al. Epidemiology of Meibomian Gland Dysfunction in an Elderly Population. Cornea. 2016 Jun;35(6):731-5.
5. Machalińska A, et al. Comparison of Morphological and Functional Meibomian Gland Characteristics Between Daily Contact Lens Wearers and Nonwearers. Cornea. 2015 Sep;34(9):1098-104.
6. Lemp M, et al. Distribution of aqueous-deficient and evaporative dry eye in a clinic-based patient cohort: a retrospective study. Cornea. 2012;31(5):472-478.
7. Trattler WB, et al. Cataract and dry eye: Prospective health assessment of cataract patients ocular surface study. Presented at ASCRS 2011, Sand Diego, CA.
8. Cochener B, Cassan A, Cmiel L. Prevalence of meibomian gland dysfunction at the time of cataract surgery. J Cataract Refract Surg 2018; 44:144-148

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How Does OSD Affect Surgery?

- Keratometry
- Topography
- Refraction
  - Axis and amount of astigmatism
- IOL power selection
- **Patient satisfaction**
  - Poor premium IOL experience if wrong IOL chosen
  - Even if the IOL is right, visual quality may not be ideal
  - Ocular irritation and postop healing

Guess What?
Patients won't just blame the surgeon

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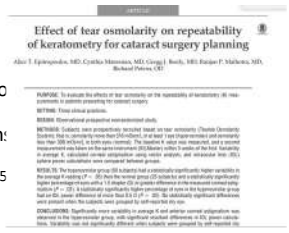
Impact on Outcomes

- Multicenter clinical trial evaluated the effects of tear osmolarity on:
  - K readings (with vecto analysis)
  - IOL power calculation
- Subjects
  - 25 pts normal osmolarity; 5 pts hyperosmolarity


Effect of tear osmolarity on repeatability of keratometry for cataract surgery planning

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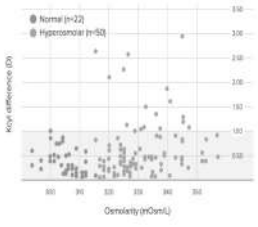
Impact on IOL Outcomes



- 17% of hyperosmolar eyes had >1 D difference in K cyl
- 10% had >0.5 D change in IOL power

Epitropoulos AT, Matossian C, Berdy GJ, et al. J Cataract Refract Surg 2015;41:1672-7.

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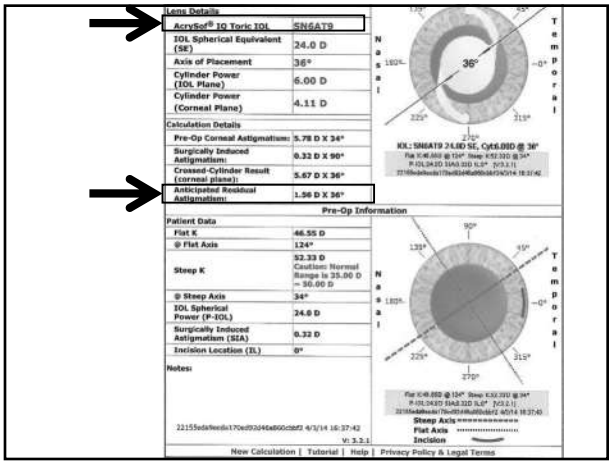

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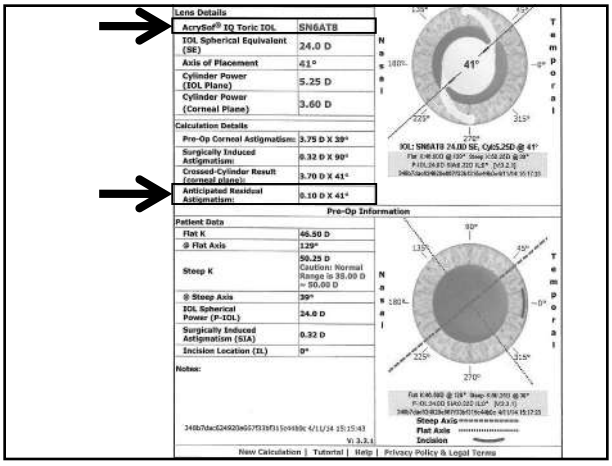

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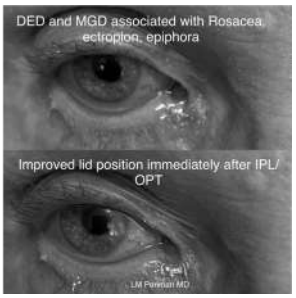
Pre-Op MGD



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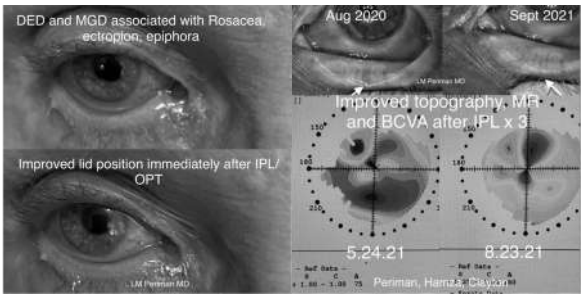

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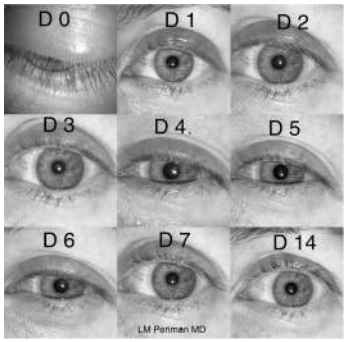

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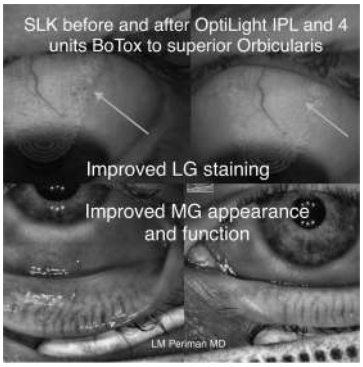

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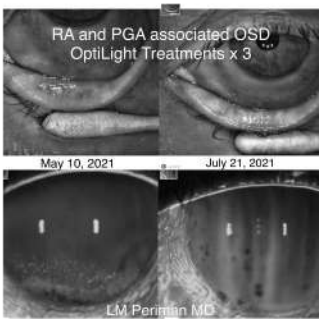

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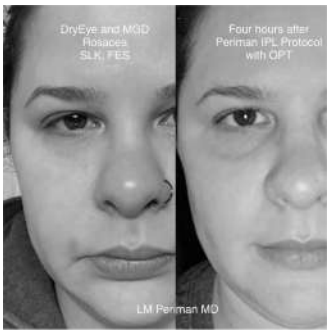

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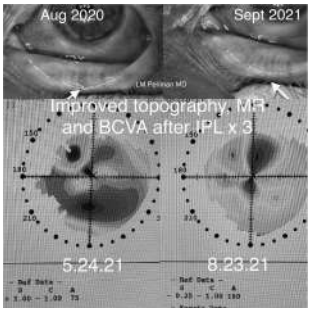

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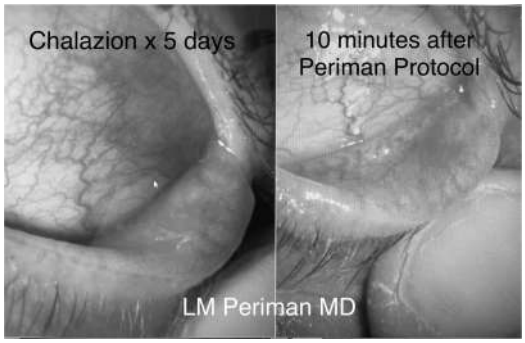

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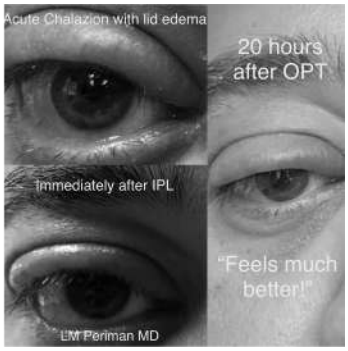

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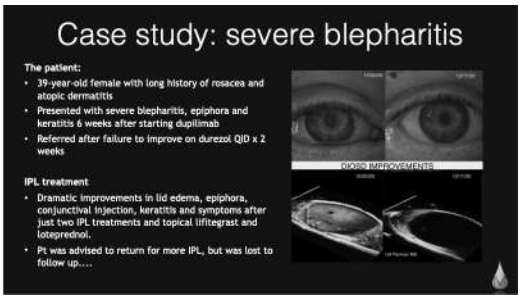
DIOSD



Maiti S, Periman LM, Balani N. Intense Pulsed Light (IPL) treatment for dupilimab induced ocular surface disease (DIOSD). JDryEyeDisease 2022 5(1)

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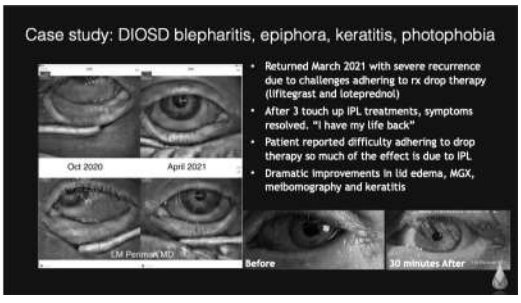
DIOSD



Maiti S, Periman LM, Balani N. Intense Pulsed Light (IPL) treatment for dupilimab induced ocular surface disease (DIOSD). JDryEyeDisease 2022 5(1)

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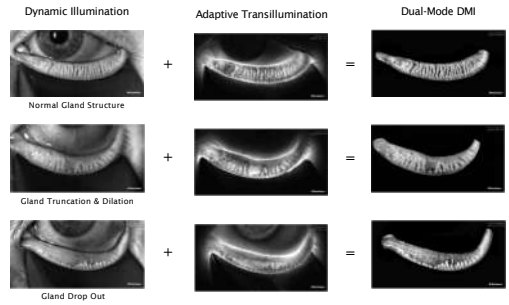
Meibomian Imaging (DMI)



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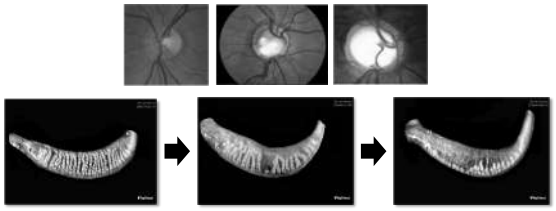
Imaging changes everything



Dynamic Meibomian Imaging (DMI)

Early intervention requires early detection

1. Blackie CA, et al. Nonobvious obstructive meibomian gland dysfunction. Cornea. 2010 Dec;29(12):1333-45. Review.
2. Nichols KK. The MGD Workshop report. Executive summary. IOVS 2011

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Patient Selection

- Get a fully-detailed medical history
- Use of a medical questionnaire and informed consent form is advised
- Exclude any lesion with malignant potential
- For any suspicion on cancerous lesion, excision biopsy may be considered
- Patients with unrealistic expectations should be identified during the consultation and discouraged

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Skin Assessment

- Tanning of all forms (sun, tanning beds) is formally contra- indicated as melanin would be redistributed and migrate towards upper epidermis building a "light-blocker" to any treatment
- Also exclude self tanning lotions which give the skin a competing artificial colouration through a chemical reaction with the amino acids of the stratum corneum
- Tanned skins CANNOT be "defined" by selecting a darker skin type
- On areas with slower "de-tanning" passed the minimum solar eviction of 3-4 weeks, recommend gentle exfoliation of the area 1 week prior treatment

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Contraindications

- Treatment should not be attempted on patients with the following conditions in the treatment area:
  - Active infections
  - Dysplastic nevi
  - Significant concurrent skin conditions or any inflammatory skin conditions
  - Active cold sores, open lacerations or abrasions
  - Chronic or cutaneous viral, fungal, or bacterial diseases
  - Exposure to sun, remaining suntan or artificial tanning in the 3-4 weeks pre-op plan
  - Tattoos
- Treatment should not be attempted on patients with a history of skin cancer or pre-cancerous lesions on the treatment area

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Complications

- Erythema (redness) and edema (swelling) of the treated area can occur
- Irritation, itching,and/or a mild burning sensation or pain similar to sunburn may occur within 48 hours of treatment.
- Pigmentary changes such as hyper pigmentation and hypo pigmentation of the skin in the treated areas can occasionally occur.
- Other known complications of this procedure include blisters, redness, pinpoint pitted scars, bruising, superficial crusting, burns, pain, and infections. These side effects are usually temporary, lasting from five to ten days but can be permanent as well.

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Who is a candidate for IPL treatment?

- Moderate to severe dry eye/ MGD/ Blepharitis
- Fitzpatrick Skin Type Scale types I-IV

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Periman Protocol with M22 "The Dry Eye Master"

- Full face rosacea settings
- Toyos settings to V2 (Double Pass)
- Treat lids (with laser grade corneal shi
- Aesthetic clean-up (spot treat pigment telangiectasias)

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Optima™ IPL Treatment Process

Treatment includes IPL application below eyelids, and then expression of the Meibomian glands

First, IPL (from ear to ear, including nose):

Then, expression (optional):

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Intense pulse light

- Pulse duration
- Pulse Sequence
- Pulse delay
- Dichroic ("Cut-off") Filters
  - 515 – 755nm range

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Intense pulse light

- Speed of treatment
- Limited number of pulses required
- Large handpiece

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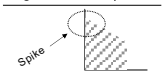
Optimal Pulse Technology (OPT™) - next generation IPL technology

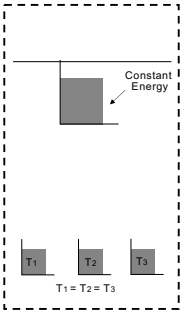
Safety

Homogenous pulses

- No spikes in energy
- Energy you choose is the energy you get

Old generation IPL systems





Efficacy

Reproducible pulses

- Consistent level of energy between pulses, regardless of energy level chosen

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IPL Quality

- **Patented OPT™** (Optimal Pulse Technology): stable and accurate level of energy in every pulse and "all pulse long"
- Hand piece that lasts for **100,000 IPL pulses**
- **Sapphire water cooled chiller tip** allows safer treatment and maximal patient comfort
- **Expert Filters** tailored to the skin type and condition
- Lumenis unique **presets** tailor made for different skin types and indications
- **Upgradable**: you can expand your practice at any time in the future
- **No consumables**

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IPL for Dry Eye: Non-medicated, anti-inflammatory and fast acting

- Root-cause therapy – non medicated
- Multiple mechanism of action to treat multi-factorial disease vs. medications which use a single mechanism
- IPL for safe and repeatable results… with the best patient comfort due to cool contact
- Only IPL with a cooling tip for maximum patient safety and comfort – high patient satisfaction
- No disposables

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IPL Procedure

- Fitzpatrick Skin Typing
- Review All Medications
  - DC Macrolides, Accutane, Retin-A, CA Drugs
- Thoroughly clean skin of moisturizer, makeup, sunscreen
- Apply Coupling Gel
- Apply IPL Grade Eye Shield
- Set Energy/Duration/Delay
- Apply Double Pass (Ophthalmic Settings)
- Express +-
- Remove Coupling Gel
- Apply Moisturizer and Sunscreen
- Reappoint 3-4 weeks

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My Practice Experience

Nearly 8 1/2 Years of experience with IPL
Discuss with any MGD patient with telangiectasia
4 Sessions of IPL 3 to 4 weeks apart
Cosmetic and therapeutic treatment
Package with
BlephEx
Optima IPL
Thermal Pulsation (Lipiflow, Digital Heat, iLux, Tear Care)
Most rapid payback of any major piece of therapeutic equipment

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Workshop

- Lumenis OptiLight
  - Keep glasses on at all times
  - If being treated remove all sunscreen and/or makeup
  - OptiLight setting
  - Aesthetic settings

  - Fitzpatrick Skin Typing
  - Cleaning the skin
  - Application of coupling gel
  - Aesthetic vs ophthalmic setting
  - Recording power, treatment and delay settings

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THANK YOU

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