

Intense Pulse Light (IPL) in treating MGD and combining the aesthetic benefits in the Optometric practice Workshop

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Douglas K Devries, OD
 Disclosures
 All Conflicts Have Been Mitigated


Allergan Advisor	Occuphire Advisor
Alcon Advisor and Speaker	Oyster Point Advisor and Speaker
Asecula Advisor	Orasis Advisor
Avellino Advisor	Ophthalmic Resource Partner
Azura Advisor	Quidel Advisor
Bio Tissue Advisor and Speaker	RVL Advisor and Speaker
Bruder Advisor	Science Based Health Advisor and Speaker
B&L Advisor and Speaker	SightRx
Dompce Advisory and Speaker	Sight Science Advisor and Speaker
Johnson and Johnson Advisor Speaker	Sun Advisor and Speaker
Kala Advisor and Speaker	Tarsus Advisor
Lumenis Advisor and Speaker	Thea Advisor
NeuroLens	TruKera Advisor
Novartis Advisor and Speaker	Versea Advisor
OcuSoft Advisor	Visus Advisor/Quidel Advisor

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Facts on dry eye

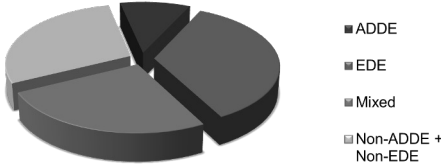
1. **Dry Eye is very common:** 14-20% of population suffer from it
2. **Dry Eye is keeping Eye Care professionals busy:** it is the top reason people visit an Eye Care professional - 25% of visits in a general practice!¹
3. **Dry Eye is complex:** skin, autoimmune, environmental conditions, LASIK/Cataract 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

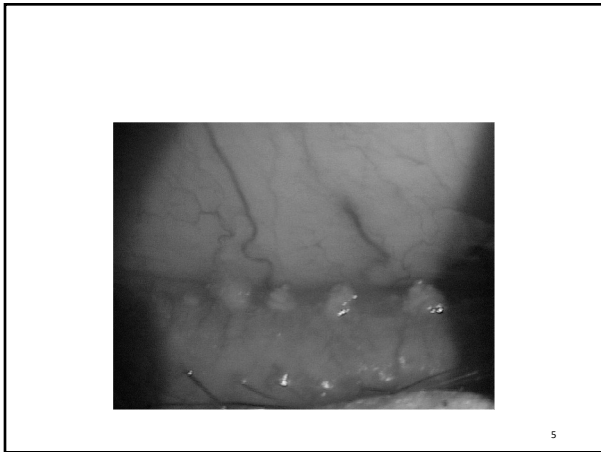


■ ADDE
 ■ EDE
 ■ Mixed
 ■ Non-ADDE + Non-EDE

- 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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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. Moccia 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 health²
 - Conjunctival health³
 - 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, Yazar 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, Adamczak 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.

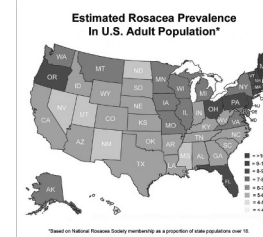
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Meibomian Gland dysfunction & the skin

- 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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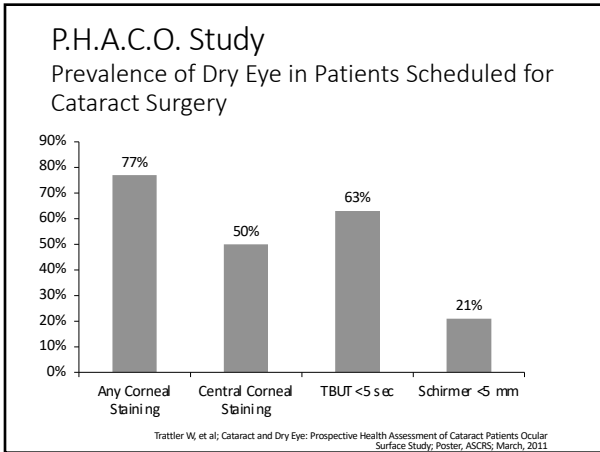
Meibomian gland dysfunction & the Skin

- | | |
|---|---|
| <p>Risk factors</p> <ul style="list-style-type: none"> • Female > Male • fair skin, particularly if it has been damaged by the sun • over age 30 • Smoke • family history of rosacea | <p>Triggers</p> <ul style="list-style-type: none"> • 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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Prevalence of OSD In Surgical Patients

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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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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
Alice T. Epitropaki, MD, Cynthia Makrisian, MD, Gregg J. Beatty, MD, Eagan P. Mathews, MD, Richard Porrova, PhD

PURPOSE: To evaluate the effects of tear osmolarity on the repeatability of keratometry (K) measurements to address uncertainty for cataract surgery.

SETTING: Three clinical practices.

DESIGN: Observational prospective measurement study.

METHODS: Subjects were prospectively recruited based on tear osmolarity. (Florida: Donority; Denver: two K readings more than 2SD below, or at most 1 eye hyperosmolar and normally less than 2SD below; in both eyes normal; The treatment of dry eye symptoms and a variety of medications was used for the study. The study was conducted in three centers in the US. Tear osmolarity in average K, corneal curvature, axial length, and refractive error (IOL) were measured and compared between groups.

RESULTS: The hyperosmolar group (20 subjects) had a statistically significantly higher variability in the average keratometry (K) readings (21.7% greater difference in the median keratometry reading, $p < .05$) compared to the normal group (20 pts) (10.5% greater difference in the median keratometry reading). In addition, the hyperosmolar group had a statistically significantly greater difference in average K, corneal curvature, axial length, and refractive error (IOL) when group comparisons were compared between groups.

CONCLUSIONS: Significantly more variability in average K and greater overall uncertainty was observed in the hyperosmolar group, with significant patient differences in K, power calculations. Variability was not significantly different when subjects were grouped by self-reported dry eye.

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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
- Secretagogues
- 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
Secretagogues
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

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 tarsorraphy).

In-office intense pulsed light therapy for MGD


- Topical secretagogues
- Topical non-glucocorticoid immunomodulatory drugs (such as cyclosporine)
- Topical LFA-1 antagonist drugs (such as lilegrast)
- Oral macrolide or tetracycline antibiotics

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IPL – dry eye discovery

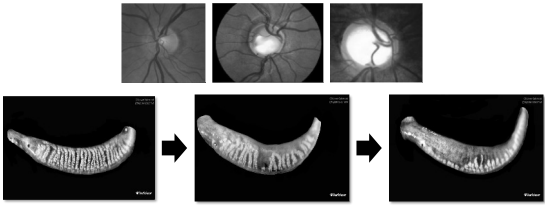
- Serendipitous discovery in 2003 by R. Toyos, MD
- Initially recommended for dermatological treatment
- Patients experienced subsequent dry eye relief



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Imaging changes everything



Dynamic Meibomian Imaging (DMI)

Early intervention requires early detection

1. Bleskie CA et al. Nonobstructive 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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Meibomian Imaging (DMI)

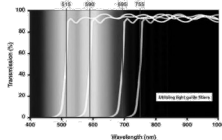
<p>Dynamic Illumination</p> <p>Normal Gland Structure</p>	<p>Adaptive Transillumination</p> <p>Gland Truncation & Dilatation</p>	<p>Dual-Mode DMI</p> <p>Gland Drop Out</p>
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What is Intense Pulsed Light (IPL)?

- Light** with wide spectrum (400-1200 nm) that can target different depths and chromophores
- Intense energy that **photocoagulates** abnormal lesions and blood vessels
- Brief pulses** that prevent collateral damage
- “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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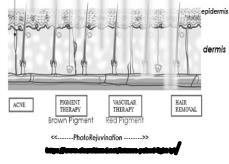
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Intense pulse light

Dermatological Uses:

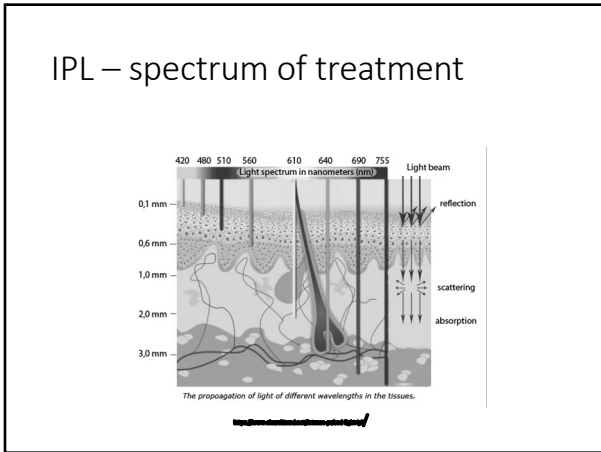
- Vascular lesions
- Hair removal
- Pigmented lesions

Wavelengths	Targets	Depths
431	530	580
590	596	648
695	695	756



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Intense pulse light

Three main chromophores:

- Hemoglobin
- Water
- Melanin

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Rosacea

- Erythematous
- Papulopustular
- Phymatous
- Ocular
- Granulomatous

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Erythematous

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Papulopustular

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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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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 shield)
- Aesthetic clean-up (spot treat pigmentary 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

Efficacy

Reproducible pulses

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

The slide contains two graphs. The left graph, titled 'Old generation IPL systems', shows a pulse waveform with a sharp spike and a jagged, inconsistent energy level. The right graph, titled 'Optimal Pulse Technology (OPT™)', shows a smooth, rectangular pulse with a 'Constant Energy' label. Below the right graph, three pulses labeled T1, T2, and T3 are shown, with the text 'T1 = T2 = T3' indicating consistent energy levels.

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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**

The slide features several images: a handpiece, a sapphire water-cooled chiller tip, two expert filters, and the control panel of the IPL device.

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IPL: Rosacea – Before and After

Universal IPL with OPT™ - Rosacea

The slide shows two sets of 'Before and After' photos. The first set shows a patient's face with significant redness and visible blood vessels before and after treatment. The second set shows a close-up of the nose area with similar redness before and after treatment.

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IPL: Rosacea – Before and After

Universal IPL with OPT™ - Rosacea

Universal IPL with OPT™ - Erythema of Rosacea

The slide shows two sets of 'Before and After' photos. The first set shows a patient's face with Rosacea before and after treatment. The second set shows a close-up of the nose area with Erythema of Rosacea before and after treatment.

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IPL: Vascular – Before and After

Universal IPL with AOPT™ - Vascular Lesions

The slide shows two sets of 'Before and After' photos. The first set shows a patient's face with vascular lesions before and after treatment. The second set shows a close-up of the nose area with vascular lesions before and after treatment.

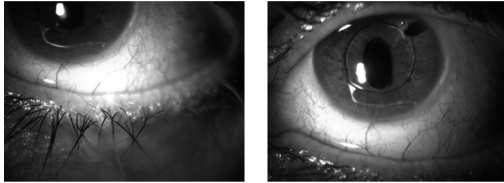
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IPL – Clinical Treatment of dry eye

The slide shows two clinical photographs of the eye. The left photo shows the eye before treatment, and the right photo shows the eye after treatment. A caption below the photos reads 'Photos pre-IPL treatment'.

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IPL – Clinical Treatment of Dry eye



Photos post-IPL treatment

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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 3 1/2 Years of experience
 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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By the Numbers

- Intense Pulse Light
 - Cash Procedure
 - Packages 4 Treatments
 - 3-4 Weeks apart
 - \$1250 to \$2400 a Patient
 - Disposables (gel, shield, tongue depressor, tissue \$2)
 - \$80,000 Investment Payback 43 to 60 patients (4.5 Months)
 - No Click Fee \$6000 replacement head after 100,000 pulses or hundreds of thousands in revenue
 - Training and Dialogue

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Workshop

- Going over basic treatment algorithms with Opti Light (IPL to be used in workshop)
- Review and participate in patient preparation
- Discuss various cosmetic procedures and the necessary settings

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