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Meibomian GLAND Dysfunction

Pearls on diagnosis, treatment & case management decisions

Consensus Panel Faculty

José M. Benitez del Castillo, MD, PhD
is chairman of ophthalmology UCM, Hospital Clinico San Carlos, Clinica Rementeria, Ocumed Clinica Oftalmologica, Madrid, Spain.

benitezcastillo@gmail.com.
His financial disclosures include Alcon, Allergan, Santen, Bausch + Lomb, Thea, Lumenis, and Johnson & Johnson.

José L. Güell, MD
is director of the Cornea and Refractive Surgery Unit, Instituto Microcirugia Ocular of Barcelona, professor of the IMO Master Programme UAB, lead professor and coordinator, Anterior Segment Diseases, European School for Advanced Studies in Ophthalmology (ESASO), Lugano, Switzerland.

guell@imo.es.
He is a consultant for Thea Laboratories and Visiometrics.

Francesco Carones, MD
is physician CEO and medical director Carones Vision, Milan, Italy.

fcarones@carones.com.
He is a consultant for Johnson & Johnson and CSO.

Jesper Hjortdal, MD, PhD
is clinical professor, consultant, medical director for The Danish Cornea Bank, Aarhus University Hospital, Aarhus, Denmark.

jesper.hjortdal@dadlnet.dk.
Dr. Hjortdal has no financial disclosures related to his remarks.

Béatrice Cochener-Lamard, MD, PhD
is past president of the European Society of Cataract and Refractive Surgeons and professor and chairman of the ophthalmology department at the University Hospital of Brest, France.

beatrice.cochener@ophtalmologie-chu29.fr.
She is a consultant for Thea, Horus, Santen, Zeiss, Alcon, Johnson & Johnson, and Hoya.

David Touboul, MD, PhD
is from the National Reference Center for Keratoconus, Bordeaux University and Hospital, France.

touboulD@gmail.com.
Dr. Touboul has no financial disclosures related to his remarks.

Prevalence of Meibomian Gland Dysfunction

Experts share their perspectives on optimizing MGD diagnosis and treatment

Although signs of meibomian gland dysfunction (MGD) have been reported in 86% of patients with dry eye, MGD often remains undiagnosed, adversely affecting patients' vision, lifestyles, preoperative measurements and postoperative outcomes.[1] A healthy ocular surface is necessary to achieve optimal results from premium intraocular lenses and corneal refractive surgery.

"The main reason is many, many patients with MGD have no symptoms," said José L. Güell MD. He explained that patients and surgeons mainly focus on the patient's complaints. If the complaint is visual or refractive, that may be the main focus of the examination.

Respondents to the 2019 ESCRS Clinical Survey reported that 43% of their patients have MGD.[2] However, Cochener et al. showed that 52% of cataract surgery patients had MGD.[3] Fifty-six percent had meibomian gland atrophy of at least Arita grade 1, and 50% of patients with MGD had no symptoms.[4]

Consensus panel

A panel of six experts shared their practices in diagnosing and treating MGD. Sixty-seven percent of these panellists reported that the overall prevalence of MGD is increasing

Prevalence of Meibomian Gland Dysfunction

Is the overall prevalence of MGD increasing, decreasing or staying the same?

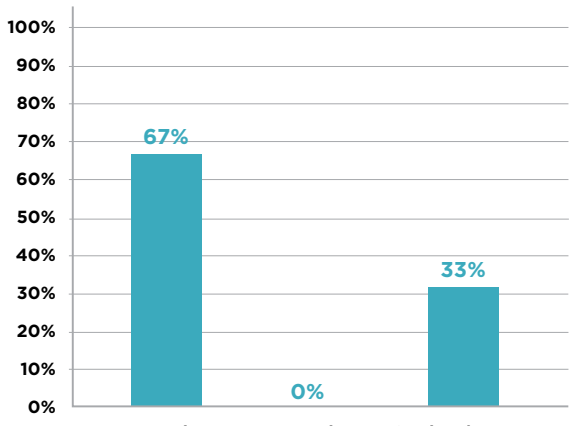

Figure 1. Panellists' responses indicate an overall increase in the prevalence of MGD

and 33% responded that it has remained the same (Figure 1).

"It is well established that alteration of the lipid layer is the source of instability of the tear film, which causes visual fluctuations and variability of images and therefore of ocular measurements, exposing the patient to IOL miscalculation," said Béatrice Cochener-Lamard MD, PhD.[5] Cataract and refractive surgery also may aggravate or reveal the presence of MGD.

David Touboul MD, PhD, explained that some patients with excellent postoperative refractive results may have significant postoperative complaints and ocular surface changes, with symptoms that were not present preoperatively.

"From a pathophysiological point of view, cataract surgery induces ocular inflammation and infection risks that oblige us to prescribe aggressive antibiotic treatment of the ocular surface and anti-inflammatory eye drops — in particular non-steroidal anti-inflammatory drops, which are known for their epithelial toxicity," Dr Touboul said. "Treatment therefore leads to deterioration in the quality of the tears but also predisposes the patient to corneal incisions that have greater difficulty healing."

Increasing awareness

Despite available evidence, some clinicians may question the prevalence of MGD and its impact on surgical outcomes.

"I usually tell them that MGD is part of ageing; that it is also part of our way of life, related to the Western diet, medications and computer use; and that the prevalence is very high," said Jose Benitez del Castillo, MD, PhD. "I also explain that it is a progressive disease, that it's the most frequent cause of dry eye disease. If it is not properly diagnosed and treated before surgery, they will have very unhappy patients."

One reason MGD increases have been attributed to greater use of digital devices is because users blink less often and are more likely to fix their gaze on their screens.[6]

"To this must be added the prolonged wear of contact lenses, environmental factors (including tobacco use and pollution) that increase oxidative stress, as well as the use of psychotropic or sleeping pills," Dr Cochener said.[7]

Dr Cochener pointed out that MGD awareness has increased. "Since we have been thinking about MGD, become aware of the importance of this lipid layer, and are looking for it more systematically, we are discovering its frequency because, as always in medicine, we only find what we are looking for," she said. "This diagnosis is easier since we now have the benefit of meibography tools especially dedicated to the evaluation of the meibomian glands."

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Diagnosis: How to Ensure MGD Detection

Ophthalmologists examine numerous features to pinpoint MGD

A comprehensive examination is necessary to diagnose meibomian gland dysfunction (MGD) so it can be treated early.

"As with any other disease, especially any other clinical situation, prophylaxis is the best treatment," said José L. Güell MD.

Widespread assessment

Because increasing digital device use has been linked to increasing MGD, some panel members recommend widespread meibomian gland assessment, as for conditions like glaucoma.[1,2]

"We need to look even earlier than we do for glaucoma because we have found a lot of contact lens wearers, teenage patients with meibomian gland atrophy," said David Touboul MD, PhD.

In a case-controlled study, Dr Touboul and his colleagues are investigating the prevalence of meibomian gland atrophy in patients with keratoconus. They suspect the prevalence is higher in patients with keratoconus. "It's not really surprising because keratoconus is probably worsened by eye rubbing, and eye rubbing can cause stress on the glands and inflammation," he said.

Do you delay meibomian gland assessment based on the absence of symptoms?

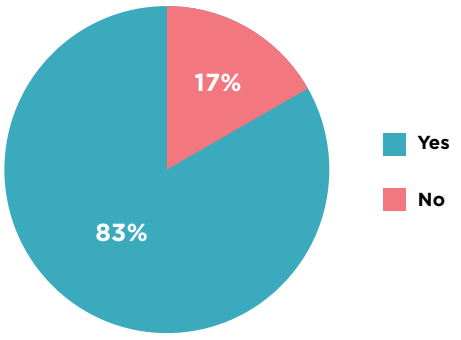


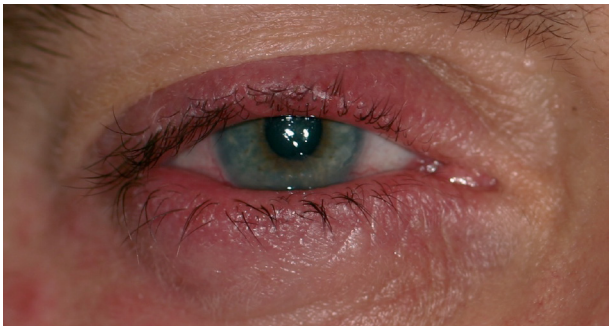
Figure 2. A majority of faculty delay meibomian gland assessment based on the absence of symptoms

Looking beyond

A thorough examination helps clinicians review all important areas. Figure 2 shows whether panellists delay meibomian gland assessment based on a lack of symptoms.

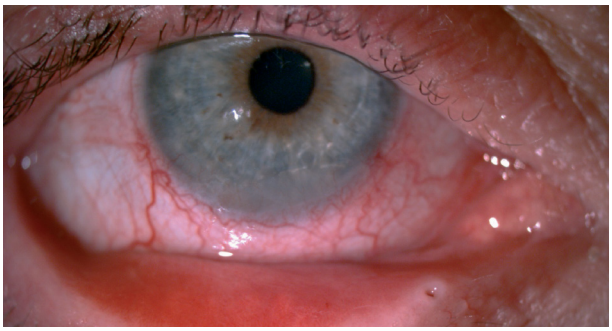
Courtesy of David Touboul MD, PhD

Figure 3. Upper eyelid dysfunction emphasising the need to systematically test the superior eyelid as well.



Courtesy of Jesper Hjortdal MD

Figure 4. Severe eyelid inflammation with redness and swelling of the upper and lower eyelids.



Courtesy of Jesper Hjortdal MD

Figure 5. MGD with severe inflammation of the posterior lower lid. Meibomian gland orifices seem to be absent. Note vascular ingrowth in the inferior cornea.

"Symptoms are very important because we are treating patients that are suffering and have a poor quality of life," said Jose Benitez del Castillo MD, PhD. "Thus, we have to treat all symptomatic patients but also non-symptomatic patients to prevent progression and the development of symptoms in the future."

Jesper Hjortdal MD, PhD, said symptoms such as burning and irritation lead him to examine patients for MGD, but he screens all cataract and laser refractive surgery patients for MGD signs even if they do not have symptoms.

Dr Güell stressed that ophthalmologists need to look beyond obvious signs and symptoms. "There are many circumstances where there are no symptoms and no obvious signs," he said. "If there are obvious signs, most of us will obviously start evaluating the ocular surface. And if there are no obvious signs, only a few of us perform a standard group of tests to evaluate the ocular surface."

Conflicting measurements during the preoperative examination point to the presence of MGD or dry eye. "It is important to repeat corneal topography examinations or aberrometry examinations if there is any doubt about the stability of the images, as this is a warning sign of poor tear film quality and a risk for erroneous measurements," said Béatrice Cochener-Lamard MD, PhD.

It is also helpful to remind staff to be alert for disparities on autorefraction and autokeratometry, indicating tear film instability. "If the tear film is unstable, you can understand patients' problems with fluctuations in their vision, which can be associated with MGD," Dr Hjortdal said.

Examination criteria

All panellists responded that eyelid evaluation should be part of a standard evaluation for all cataract and refractive surgery patients (Figures 3 to 5).

At the slit lamp, Dr Güell recommended looking at the eyelid, base of the eyelashes, the aspect of the mucosa and skin reaching the mucosa and then performing tear break-up time to determine the lubricating status of the eye. "This would be at least the minimum," he said. If abnormalities are detected, he suggested assessing tear film volume, tear osmolarity, inflammation markers and meibography.

Dr Hjortdal examines the position of the eyelids to determine whether there are entropion/ectropion age-related changes and then the eyelids and lashes to determine whether there is anterior blepharitis. "Then you would look at the orifices of the meibomian glands to see if they look normal," he said. "Then you would look at the lower eyelids and see if there is redness or increased telangiectasia on the eyelids. Then you would look on the inner side of the eyelid to see if there are follicles or hyperaemia. Next, you would try to express the meibomian glands if you have any doubt about the function."

Dr Hjortdal recommended following this with tear break-up time. "If you suspect that the actual tear secretion was diminished, you could do a Schirmer's test and you could look at the tear meniscus," he said. This may be followed with fluorescein or lissamine green staining.

"In my opinion, diagnosis is based on symptoms and slit lamp signs, with a lid margin examination and expression of the glands, looking at expressibility and quality of the meibum," Dr Benitez del Castillo said. "Atrophy comes later, after chronic obstruction. Nevertheless, assessment of the lipid layer thickness by interferometry and atrophy by meibography are very useful tools. This is a chronic disease with a chronic therapy, and patients will be more compliant if they see numbers (lipid layer thickness) and images (atrophy and tortuosity)."

> **"We need to look even earlier than we do for glaucoma because we have found a lot of contact lens wearers, teenage patients with meibomian gland atrophy."**
>
> — *David Touboul MD, PhD*

Conclusion

Dr Güell believes more clinicians are beginning to examine the ocular surface even if there are no signs or symptoms, but it is a slow process. "I think it will take a while until every cataract or refractive patient has a proper ocular surface evaluation," he said.

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MGD Assessment

Developing a step-by-step strategy to diagnose MGD

Diagnosing meibomian gland dysfunction (MGD) focuses on assessing gland function and structure.

Functional assessment

"There is no doubt that function is much more important than structure because we have hundreds of our own patients, especially in the older groups, where anatomically, for example, the meibomian glands are significantly atrophied," said José L. Güell MD. He explained that assessment of function also helps clinicians gauge patients' treatment response.

"meibomian gland function testing is very important because it seems to be more correlated with the patient's symptoms than structural changes," said David Touboul MD, PhD. He recommended applying continuous pressure to the meibomian glands to check the level of meibomian gland obstruction, determining whether the meibum is clear, cloudy, thick or absent. He also performs corneal staining and tear break-up time and analyses the patient's blink quality.

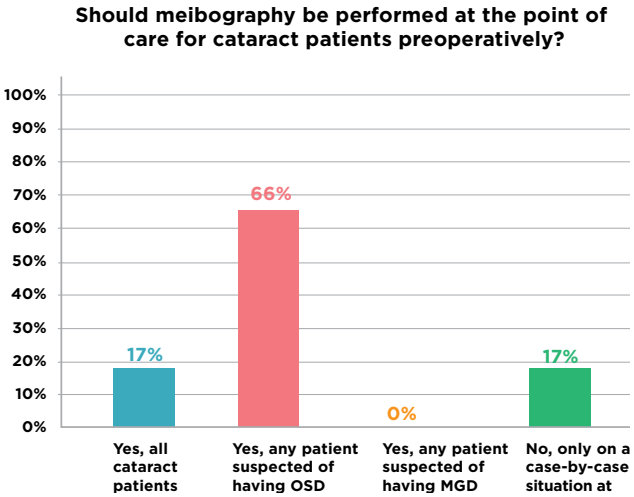

Figure 6. Most panellists believe meibography should be performed preoperatively at the point of care for cataract patients

To assess tear film stability, Béatrice Cochener-Lamard MD, PhD, administers a patient questionnaire (SPEED or OSDI) and performs imaging (corneal topography, aberrometry, ocular surface index of OQAS double-pass aberrometry), optical coherence tomography (assessing tear film thickness, meniscus, epithelial mapping), tear break-up time or non-invasive tear break-up time (from interferometry) and checking the quality of the patient's blink.

According to the 2019 ESCRS Clinical Survey, 20% of respondents perform meibomian gland expression at the initial point of care in most patients; 62% of respondents perform meibomian gland expression on a case-by-case basis, deciding during the examination.

Assessment of structure

In the 2019 ESCRS Clinical Survey, 23% of respondents perform meibography on a case-by-case basis, as decided during the consultation; however, 64% have no access to the technology.

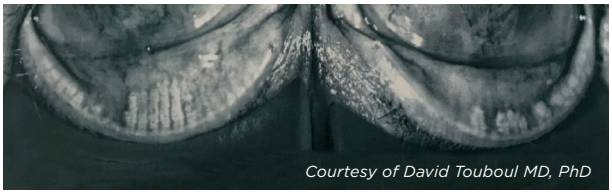

Figure 7. Meibography from patient with post-LASIK neuropathic pain and severe meibomian gland atrophy.

Figure 6 shows panellists' responses regarding the use of meibography at the point of care for cataract patients.

"I perform meibography before any refractive surgical procedure, cataract and refractive lens replacement included," said Francesco Carones MD. "I also do routine meibography in patients with ocular surface disease. To me both function and structure are similarly important. The percentage of gland atrophy that is clinically relevant depends on many factors, like age, sex and hormone status, so each single case is different."

"The best approach for meibomian gland atrophy imaging is to look at the upper and lower eyelids with infrared light using meibography, which is best with transcutaneous illumination," Dr Touboul said (Figure 7). He scores meibomian gland atrophy on a scale of 0 to 3 with the system described by Arita et al.[1] "Surface signs of chronic microinflammation are also important to detect, such as lower corneal sensitivity, surface staining, intracorneal vessels, low tear film meniscus," he said. He explained that imaging is not mandatory for diagnosis, but it helps educate patients and encourage therapeutic compliance.

"Some studies have shown that we need more than 50% of meibomian glands to maintain a healthy ocular surface," said Jose Benitez del Castillo MD, PhD.[2]

To assess gland structure, Dr Cochener-Lamard uses meibomian gland expression, a slit-lamp examination checking for blepharitis, hyperaemia, and occlusion and including a dye test, and examining the conjunctiva. She performs meibography as soon as the patient's symptoms or clinical examination suggests MGD. Her practice commonly performs meibography before cataract surgery or LASIK if there are dry eye symptoms, especially if a contact lens wearer has had them for a long time. In rare cases, she uses confocal microscopy for acini.

Conclusion

Numerous steps will help clinicians pinpoint the presence of MGD. The tests performed will often depend on the practice setting and availability of technology.

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Treatment Timing and Co-Management of MGD

Early treatment is essential because atrophy is irreversible

Experts emphasise the importance of treating meibomian gland dysfunction (MGD) as soon as possible to prevent progression.

"You can have scarring and atrophy of your eyelid margins and so on," said Jesper Hjortdal MD, PhD. "When you reach that stage, it becomes irreversible. You can relieve the symptoms a bit, but you can never have a normal eyelid again."

In addition, as MGD progresses, it becomes more difficult to treat effectively. If MGD is not diagnosed and treated before surgery, it can negatively impact visual and functional outcomes after cataract and refractive surgery.

Treatment timing

David Touboul MD, PhD, suggested that clinicians educate patients about MGD with printed materials and videos so they understand that the only way to avoid progression is to begin treatment as soon as possible.

Dr Touboul emphasised the importance of treating patients before cataract and refractive surgery, particularly treatments to relieve gland obstruction. "It is imperative to control the state of the glands and quality of the lacrimal meniscus before surgery," he said. He continues treatment after surgery but omits eyelid massage after LASIK to reduce the risk of flap dislocation.

Figure 8 shows panellists' responses on whether they ask co-managing ODs and MDs to identify and treat MGD before referring patients for surgery.

Dr Cochener-Lamard recommended treating MGD as soon as it is diagnosed in patients who will have cataract or refractive surgery. Conversely, in other cases, she begins treatment only if the patient complains of ocular surface disease symptoms. "A patient will not accept a long and restrictive or expensive treatment when he does not complain of anything," she said. "Moreover, it will be important to clearly explain the reason for treating preoperatively, which implies an explanation of the impact of the aggravation or appearance of signs of dry eye postoperatively, which can lead not only to disabling functional symptoms but, above all, to a deterioration in visual performance."[1]

> **"We know the positive results of the different techniques for MGD treatment decrease with the severity and percentage of atrophic glands"**
>
> *— Jose Benitez del Castillo MD, PhD*

For surgeons who co-manage cataract surgery, do you routinely instruct your co-managing doctor to identify and treat MGD prior to referring the patient?

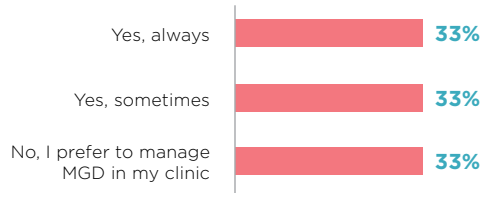

Figure 8. Panellists responses vary when asked whether they instruct co-managing doctors to identify and treat MGD before referring patients for cataract surgery

Jesper Hjortdal MD, PhD, begins considering treatment when patients have MGD symptoms. "If we have a patient that is going to have surgery, if we see typical signs of dysfunction, we would suggest that the patient start treatment before surgery and continue after surgery," he said.

Dr Hjortdal explained that this is especially essential in corneal refractive surgery patients. "These patients are younger than cataract patients, but I think it's even more important in corneal refractive patients to have a perfect ocular surface before treatment because otherwise you can have problems related to the precision of the procedure and you can have problems related to stability of vision afterward," he said.

Conclusion

Dr Benitez del Castillo stressed the importance of early treatment. "We know the positive results of the different techniques for MGD treatment decrease with the severity and percentage of atrophic glands," he said.

Reference

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MGD Treatment Options and Therapies

New MGD therapies continue to emerge

To effectively treat meibomian gland dysfunction (MGD), clinicians need to be ready with a range of options.

Treatment choices depend on the MGD stage, availability of technologies and whether the patient is a surgical candidate. Figure 9 shows results from the 2019 ESCRS Clinical Survey indicating respondents' primary therapies and treatments.

Exploring therapies

At a minimum, David Touboul MD, PhD, believes clinicians should educate patients about MGD and be able to treat

Indicate your primary therapies and treatments for managing MGD
(Select all that apply)

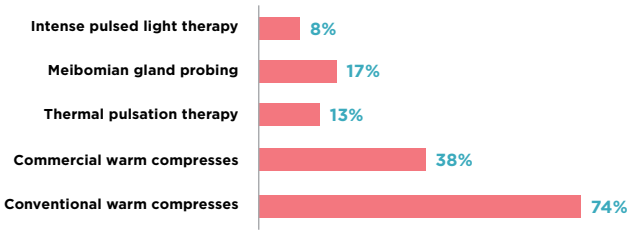

Figure 9. 2019 ESCRS Clinical Survey Results: Respondents' primary MGD therapies and treatments

chronic ocular surface inflammation with eyedrops such as ciclosporin. If they do not have in-office treatments to relieve meibomian gland obstruction, such as thermal pulsation, he recommended referring them to a centre providing these services, if possible.

Béatrice Cochener-Lamard MD, PhD, recommended beginning treatment with warm and moist compresses, a thermal mask, or possibly moisture goggles. Subsequently, she evacuates the meibum using lid massage. She suggested educating patients on proper technique with demonstrations or videos.

Jesper Hjortdal MD, PhD, said patients can use eyelid hygiene, warm compresses, massage and possibly azithromycin drops; oral tetracycline or doxycycline may be used in severe cases. He explained that in Denmark they also use various types of contact lenses and serum eyedrops, as well as a weak topical steroid. Ciclosporin drops are for very severe dry eye. He added that in-office technology is not yet available in most practices in his country.

"We have an ocular surface disease clinic and we try to customise treatments in relation to several factors," said Francesco Carones MD. "Pure MGD is rare. There is almost always both an inflammatory and a deficiency component. Therefore, basic treatments may include ocular lubricants, steroids, antibiotic ointments, omega-3 supplements and warm compresses."

In many patients suffering from MGD there is also a need to address aqueous deficient dry eye symptoms, primarily caused by ocular inflammation. Common treatment recommendations for this type of ocular inflammation include topical anti-inflammatories, such as ciclosporin (Santen) and lifitegrast (Novartis), corticosteroids and oral tetracyclines.

What is the role of in-office devices for the treatment of MGD?

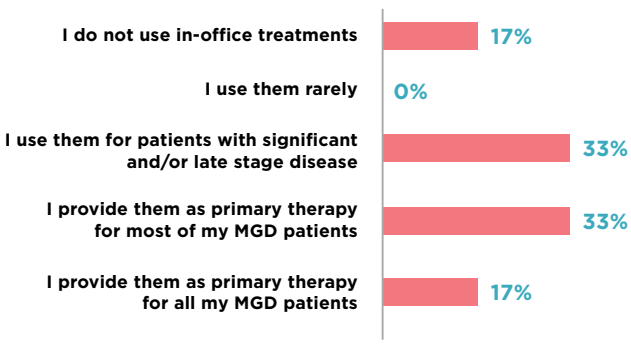

Figure 10. Most consensus panellists offer in-office MGD treatments to their patients

In-office treatments

Figure 10 shows panellists' responses regarding the role of in-office devices.

Using single-use activators applied to the eyelids, thermal pulsation with LipiFlow (Johnson & Johnson Vision) warms and massages the meibomian glands to soften meibum and remove the obstruction.[1]

The handheld iLux MGD Treatment System (Alcon) applies light-based heat to the eyelids, and then the meibomian glands are compressed to express liquefied meibum.

Dr Carones' in-office treatments include thermal pulsation, intense pulsed light and quantum molecular resonance.

José L. Güell MD, uses both laser and thermal pulsation. Thermal pulsation presses on the inner and outer sides of the meibomian glands to massage them.

Dr Cochener-Lamard has also found thermal pulsation to be effective for three-to-six months. She has further used IPL (Intense Pulsed Light) and low-level light therapy (Eye-Light, Topcon) with good results. "Even if the exact mechanism of action needs to be proved, we achieved a significantly good effect," she said.

"The use of topical azithromycin is useful in chronic disease as a periodic monthly cure, as the classical use

> **"Pure MGD is rare. There is almost always both an inflammatory and a deficiency component"**
>
> *— Francesco Carones MD*

of oral cyclin (two-to-three months, once per day, during seasons when it is not sunny)," Dr Cochener-Lamard said. "With the same goal of an anti-inflammatory effect, a short treatment of steroids can help in the acute phase or to potentialise the introduction of ciclosporin (0.1% once a day in the evening) in a chronic symptomatic dry eye. In all cases, an additional lubricant treatment is prescribed, based on lipid layer reconstruction and osmo-protection."

Conclusion

Treatments and therapies continue to emerge for MGD, offering clinicians new options to develop customised treatment strategies to help improve patients quality of life and optimise results from cataract and refractive surgery.

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