

BRUDER® MOIST HEAT EYE COMPRESS

A white paper on meibomian gland dysfunction and the use of warm compresses

Meibomian glands have been studied since the early years of the last century, but it was only in 1980 that the term of “meibomian gland dysfunction” or MGD, was introduced for the first time by Korb and Henriquez. ^[1]

Since then, researchers and clinicians have continued to show an increasing interest in this condition. In 2011, the MGD International Workshop, sponsored by the Tear Film Ocular Society, was conducted to provide an evidence-based evaluation of Meibomian Gland structure and function in health and disease state. The issued report was the result of a 2-year effort by more than 50 leading clinical and basic research experts from around the world. (www.tearfilm.org)

As stated by the MGD International Workshop, “Meibomian gland dysfunction (MGD) is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. This may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease.”

According to the report, among all types of Meibomian Gland Dysfunction, the obstructive form remains the most predominant. ^[2]

The International Workshop reviewed at large the prevalence of the disease described over the years and concluded that the Asian population has the highest prevalence, while in the Caucasian population the rate is about 20%. Overall, this prevalence varies from 3.5% to almost 70%.

Ophthalmic, medical and general risk factors were also carefully analyzed. Among them, chronic blepharitis, contact lens wear, demodex folliculorum, eyelid deformities and anomalies; systemic autoimmune diseases; medications like Isotretinoin, antidepressants, and antihistamines; aging and hormonal changes, environmental factors, such as the temperature, humidity, air quality, and computer use, all play an imperative role in MGD. ^[3,4]

Diagnosis of MGD is certainly a complex one. The use of standardized questionnaires is a good start, but an MGD patient could be symptomatic or asymptomatic, so further workup is needed. Diagnostic protocol must include a systematic assessment of the followings ^[5]:

1. Evaluation of eyelid apparatus (anomalies and abnormalities),
2. Tear film stability,
3. Tear film volume and its lipid layer,
4. Ocular surface inflammation and damage,
5. Meibomian glands morphology and activity,
6. Meibum secretion (volume and quality)

With advanced technology being available, an in-depth evaluation of tears and meibomian glands is possible today. In-office tests such as osmolarity, MMP-9s level, interferometry, and meibography are already familiar names for clinicians. ^[5]

The Subcommittee on MGD Management and Treatment after a thorough review of practice patterns, published evidence of medical, and surgical treatment options, in consensus, compiled the much-needed guidelines and recommendations.

The proposed treatment algorithm is, of course, dependent on clinical signs and severity, but eyelid hygiene, including warming and expression, is actually mainstream for each disease stage. This is for a very good reason, as eyelid warming increases the fluidity of the meibum secretion and will eventually ease the expression during lid massaging and meibum expression. [6]

Their recommendations are in perfect alignment with treatment guidelines provided by Dry Eye Workshop II in 2017, which moreover recognized MGD as the leading cause of Dry Eye Disease.

Eyelid warming, with or without moisture, has always been a very popular treatment, considering its undeniable benefits. These benefits may include symptomatic relief, possible even after the first use [8,9,14], improvement of clinical signs like tear break-up time [7-10,13,14,24], lipid layer thickness [7-11,12], meibography results and meibum secretion, both in volume and quality. [8,9,12,13]

Additionally, eyelid warming is a treatment method that does not interfere with other topical or systemic medications and presents with little to no adverse effects when proper steps are taken, and safe products are utilized. [8]

Despite years of research [13,15-21,24], eyelid warming is a poorly standardized treatment. Selecting a suitable eyelid warming mask could be at times very challenging due to a crowded market, where almost everyone claims to have a cost effective and efficient product.

The MGD workshop and DEWS II 2017, as well as other research investigators, have called for more Level 1 clinical studies to be conducted in the future, hoping to lead to standardization of the warming eye masks.

Our patients however shall not wait until then. So, where do we begin? What do we know about the melting temperature of the meibum, current clinical practice and product quality, patients' safety and needs?

The surface temperature of the eyelids ranges between 33° and 37°C. In normal and healthy patients, meibum begins to melt at 32°C, whereas in patients with obstructive MGD commonly it starts at about 35°C, with a wide range, anywhere between 32°C - 45°C. The wide range may be explained by these two facts ^[8,22,23]:

1. A severe obstruction of the meibomian duct by lipid mixture would require a much higher temperature to melt, than a less obstructed duct.
2. The complex composition of meibum in MGD patients, is represented by altered lipids, and desquamated, keratinized epithelial cells.

Thus, a constant warming of the meibomian glands to 40-45°C for a duration of 10-15 minutes is vital for effective liquefaction of the meibum. ^[15] This is easier said than done though. Not all lid warming methods, compresses and lid warming devices, are able to meet this criteria. ^[13,15-21,24]

The temperature difference of about 5°C between the inner and outer eyelid dictates for much higher heat to be applied on the eyelid. However, a few risks may be associated with it like skin burns, patient discomfort, and more importantly, the cornea could be exposed to unsafe, elevated temperatures. The cornea is not designed to withstand temperatures much higher than that of our body. In such situations, the cornea could become more pliable and vulnerable to injuries and deformations. ^[8,15]

Delivering a constant heat for a duration of 10-15 minutes could also be an issue, as is the case with a few devices and warm towels or facecloths. The warm towels and facecloths typically retain heat for about 2 minutes, thus frequent applications are required. Wrapping several of them in a bundle formation has been also proposed and shown as an efficient method ^[8,15], however from a patient's prospective this could be cumbersome.

Inconsistencies in reaching the right temperature and emitting constant heat for the required time have led to compliancy issues ^[8], with patients often walking away from eyelid warming methods with little to no benefit at all.

What else is important to patients beside efficacy of the eye mask? An affordable, reusable, comfortable, long-lasting eye mask is usually a good fit for most patients. There will be another group, perhaps the busy travelers, who are looking more for a convenient, disposable option. But above all, safety must be the primary concern. Obviously, none of us wants to deal with skin burns, irritations, allergic reactions to materials used, or unpleasant and bothersome odors.

In our practice, we offer an affordable and effective mask, the reusable Bruder[®] Moist Heat Eye Compress.

Bruder[®] Moist Heat Eye Compress is a non-toxic, non-allergenic, environmentally friendly and latex free eye mask. This microwavable mask is completely hand-washable and reusable, thus a cover is not required ^[26]. In our experience, Bruder[®] Eye Compress has shown to deliver constant and uniform levels of moisture and heat, use after use, in a safe manner, at the right temperature, and time.

The company has dedicated special attention to their patented bead technology. The MediBeads[®] inside the Bruder[®] mask are specially formed and treated, resulting in a honeycomb shaped pore that has an enormous capacity to exclusively absorb moisture from the air and store it until released when heated in a microwave. This gives the MediBeads[®] a resilient structure, and the unique advantage of selective and controlled absorption – absorbing only water molecules, while rejecting body oils and any other organic fluids.

The presence of silver in the bead, known for its antibacterial and antimicrobial properties, is another additional feature of the Bruder[®] mask. ^[26] Overall, we find that the material is durable, safe, efficient and hygienic.



The size and design of the pod allows for the beads to evenly distribute over the eye area, making the mask convenient when applied, either in full incline or sitting up position, as per patient's preference. Larger masks often require the patient to be fully inclined, so the beads remain concentrated over the eye area without sliding to the bottom of the mask and thus heating mostly the face.

Patients seem to favor the mask, especially when compared with previously used products. They find the mask to warm up quickly, soft to the touch, and comfortable while on the eyelids. Many patients report the mask provides them with a calming sensation, allowing them to also fall asleep easier. They very much like its design and appreciate the fact that it does not have a plastic or grainy, woody smell as some other brands. They too point out how nicely the Bruder® mask fits around the eye area. Its special shape and smaller size eliminates the issue with other larger masks which end up pressing on patient's nose or face.

They also comment on the fact that the mask is not heavy, making the overall experience an enjoyable one. The majority of our patients find the mask affordable and reasonably priced especially when considering its effectiveness, durability, and its other great features.

Cleaning and caring for the mask is simple, requires little time, and certainly is environmentally friendly, which is greatly appreciated by all our patients. The mask is washable and the MediBeads® do not disintegrate over time. A cover is not required and for most of the patients this is one less thing to worry about.

One of the challenges of using microwavable masks is the difference in the power between microwaves, which could impact how much or how little the mask will heat up. We advise first-time users to heat the mask for 20 seconds. If the mask doesn't feel hot enough, it can be microwaved for an additional 5 seconds. Patients should be cautioned to not exceed 30 seconds though. Once warmed, they must carefully touch the mask and ensure that is not too hot. If so, the patient is advised to wait for 1-2 minutes before applying it. From our experience, it takes two or three attempts to get the warming time

right. Again, patient's safety and treatment efficacy are critical, and no short-cuts should be made.

The most recent published research regarding Bruder® Moist Heat Eye Compress showed the improvement of NIKBUT, TMH and TFLLT shortly after post-application. Investigators concluded that further research could be useful to evaluate whether differences exist with long term use. [24] In another study done by *Ecole d'optométrie, Université de Montréal*, Bruder® Moist Heat Eye Compress reached a maximum of 40°C, being the warmest among all the masks tested. At the 12-minute evaluation, its temperature dropped to 37.9°C, still being 1-2 degrees better than other masks. [20]

Recognizing potential compliance issues, educating the patient is fundamental when addressing eyelid hygiene. In our practice we dedicate special time to describe in detail the purpose of the eyelid hygiene, the necessary steps to be followed from cleaning, to warming and massaging, and how each of them is equally important to achieve successful results. Where appropriate, we discuss cosmetic products, their proper removal, and their real impact on meibomian gland blockage. Supplements and diet, computer use, and blinking rate issues are often part of the patient's consultation as well.

There is no doubt that awareness and education have a positive impact on a person's behavior, compliance and overall outcomes. A great example of this is the way we approach oral health today, when compared with a few decades ago. The dental model, which includes regular screening for gum problems, patient education on the importance of healthy gums, different techniques of maintaining it, recommendations on different devices and products for home use, is probably the best parallelism in the medical practice. [25]

While warming of the eyelids is a simple concept, recommending an efficient and cost-effective eye mask will certainly require some thinking.

Remember, that even when they look and sound similar, they probably do not perform the same. So, ask about technology, clinical-evidence, clinicians' shared-experiences

and patients' testimonials. Your final decision will be surely a better educated one, and hopefully, the best for your patient.

Over the past decade or so, all of us have gained an increased appreciation of how dry eye and meibomian gland disease does negatively affect our patients' quality of life. We have certainly come a long way through researching, discovering, learning, and continuously challenging the pharmaceutical and health technology industry.

Many new treatments have become available to us; some of them still face difficulties with their precision and reliability, while others have yet to be proven. There is no doubt that more advanced remedies will emerge through the pipeline, while the medical community, our empowered patients, regulatory bodies and health industry continues to raise the standards and look for optimal solutions.

References:

1. Korb D.R., Henriquez A.S. *Meibomian gland dysfunction and contact lens intolerance. J Am Optom Assoc.* 1980;51: 243–251.
2. *International Workshop on MGD-Report of the Definition and Classification Subcommittee. IOVS, Special Issue 2011, Vol. 52, No. 4, pg. 1930-1937*
3. *International Workshop on MGD-Report of the Subcommittee on the Epidemiology and Associated Risks Factors of MGD. IOVS, Special Issue 2011, Vol. 52, No. 4, pg. 1994-2005*
4. Arita, R. et al. *Meibomian Gland Dysfunction and Contact Lens Discomfort. Eye & Contact Lens: Science & Clinical Practice: January 2017 - Volume 43 - Issue 1 - p 17–22.*
5. *International Workshop on MGD-Report of the MGD Subcommittee on Diagnosis of Meibomian Gland Dysfunction. IOVS, Special Issue 2011, Vol. 52, No. 4, pg. 2006-2049*
6. *International Workshop on MGD-Report of the MGD Subcommittee on Management and Treatment of Meibomian Gland Dysfunction. IOVS, Special Issue 2011, Vol. 52, No. 4, pg. 2050-2064*
7. Arita R. et al. *Effects of Eyelid Warming Devices on Tear Film Parameters in Normal Subjects and Patients with Meibomian Gland Dysfunction. The ocular surface, Oct. 2015, Vol 13 Issue 4, pg. 321-330.*
8. *TFOS DEWS II Management and Therapy Report. The Ocular Surface, Special Edition, July 2017, 580-634.*
9. *National Dry Eye Disease Guidelines for Canadian Optometrists. CJO, Vol. 76, Suppl.1, 2014*

10. Goto E., Endo K., Suzuki A., Fujikura Y., Tsubota K. Improvement of tear stability following warm compression in patients with meibomian gland dysfunction. *Adv Exp Med Biol.* 2002;506: 1149–1152.
11. Olson M.C., Korb D.R., Greiner J.V. Increase in tear film lipid layer thickness following treatment with warm compresses in patients with meibomian gland dysfunction. *Eye Contact Lens.* 2003;29: 96–99.
12. Nagymihalyi A., Dikstein S., Tiffany J.M. The influence of eyelid temperature on the delivery of meibomian oil. *Exp Eye Res.* 2004;78:367–370.
13. Ishida R., Matsumoto Y., Onguchi T., et al. Tear film with “Orgahexa EyeMasks” in patients with meibomian gland dysfunction. *Optom Vis Sci.* 2008;85:684–691.
14. Guillon M., Maissa C., Wong S., Lane A., Bossard B. Effect of controlled heat delivery to the eyelid margin and eyelid hygiene on symptomatology and the tear film in MGD. *Invest Ophthalmol Vis Sci* 2013; ARVO 2013
15. Blackie C.A., Solomon J.D., Greiner J.V., Holmes M., Korb D.R. Inner eyelid surface temperature as a function of warm compress methodology. *Optom Vis Sci.* 2008;85:675–683.
16. Matsumoto Y., Dogru M., Goto E., et al. Efficacy of a new warm moist air device on tear functions of patients with simple meibomian gland dysfunction. *Cornea.* 2006;25:644–650.
17. Mori A., Shimazaki J., Shimmura S., Fujishima H., Oguchi Y, Tsubota K. Disposable eyelid-warming device for the treatment of meibomian gland dysfunction. *Jpn J Ophthalmol.* 2003;47:578–586.
18. Goto E., Monden Y., Takano Y., et al. Treatment of non-inflamed obstructive meibomian gland dysfunction by an infrared warm compression device. *Br J Ophthalmol.* 2002;86:1403–1407.
19. Ngo W., Srinivasan S., Jones L. The impact of an Eyelid warming device in the management of meibomian gland dysfunction. *AAO Poster* 2015.
20. Bitton E., Lacroix Z., Leger S. In-vivo heat retention comparison of eyelid warming masks. *Contact Lens and Anterior Eye* 39 (2016) 311-315.
21. Murakami D.K., Blackie C.A., Korb D.R., All warm compresses are not equally efficacious, *Optom. Vis. Sci.* 92 (9) (2015) e327–e333.
22. McCulley J.P., Shine W.E. Meibomian secretions in chronic blepharitis. *Adv Exp Med Biol.* 1998;438:319–326.
23. Borchman D., Foulks G.N., Yappert M.C., et al. Human meibum lipid conformation and thermodynamic changes with meibomian gland dysfunction. *Invest Ophthalmol Vis Sci* 2011; 52:3805-3817.
24. Tan J. et al. The effects of a hydrating mask compared to traditional warm compresses on tear film properties in meibomian glands dysfunction. *Contact lens and Anterior Eye* 41 (2018) 83-87.

25. Jose M Benitez-del-Castillo. *How to promote and preserve eyelid health. Clin. Ophthalmol.* 2012; 6: 1689–1698. Published online 2012 Oct 25.

26. www.bruder.com