pharmacy

MDPI

Commentary

Pharmacotherapy of *Demodex*-Associated Blepharitis: Current Trends and Future Perspectives

Aleksandra Czępińska-Myszura [1,2], Małgorzata Maria Kozioł [3,*] and Beata Rymgayłło-Jankowska [1]

[1] Clinic Department of Diagnostics and Microsurgery of Glaucoma, Medical University of Lublin, Chmielna 1, 20-400 Lublin, Poland; ola.czepinska@wp.pl (A.C.-M.); beata.rymgayllo-jankowska@umlub.edu.pl (B.R.-J.)
[2] Students Scientific Association, Department of Medical Microbiology, Medical University of Lublin, Chodzki 1, 20-093 Lublin, Poland
[3] Department of Medical Microbiology, Medical University of Lublin, Chodzki 1, 20-093 Lublin, Poland
* Correspondence: malgorzata.koziol@umlub.edu.pl

Abstract

Demodex-associated blepharitis (DAB) is a common condition in our society. Patients report not only uncomfortable and bothersome symptoms but also decreased self-esteem and confidence. Because of its nonspecific signs, pharmacists are often the first healthcare professionals patients consult. What is most concerning is that DAB can cause serious complications within the eye, such as dry eye syndrome, corneal scarring, or recurrent styes and chalazia. Therefore, we aimed to compile both standard and innovative therapies and compare their effectiveness and safety. As shown, standard methods remain the recommended approach. Alongside antiparasitic agents such as metronidazole or ivermectin, education and improved eyelid hygiene are crucial. However, in recent years, promising new treatments for *Demodex* blepharitis have emerged, such as Lotilaner Ophthalmic Solution 0.25%, which has shown positive results in clinical trials. Mechanical techniques, including Intense Pulsed Light (IPL) therapy and eyelid peeling procedures such as Blepharoexfoliation, have also demonstrated promise. Due to the notable effects of tea tree oil, studies have explored the lethal effects of other essential oils, such as sage, peppermint, and bergamot oils. These are just a few of the interesting examples discussed in this paper.

Keywords: DAB; ocular infections; eye parasitosis; treatment; ophthalmologist; pharmacists; patient's education

check for updates

Academic Editor: Mojtaba Vaismoradi

Received: 1 June 2025
Revised: 8 October 2025
Accepted: 10 October 2025
Published: 15 October 2025

Citation: Czępińska-Myszura, A.; Kozioł, M.M.; Rymgayłło-Jankowska, B. Pharmacotherapy of *Demodex*-Associated Blepharitis: Current Trends and Future Perspectives. *Pharmacy* **2025**, *13*, 148. https://doi.org/10.3390/pharmacy13050148

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

1.1. The Parasite

Demodex spp. is a mite from the arachnid group that often colonizes human skin (Figure 1). There are two main species: *Demodex brevis* and *Demodex folliculorum*. On the face, it prefers areas around the nose, cheeks, forehead, and eyelids. In men, it can also inhabit the hairy skin of the beard and chest. Residing in sebaceous glands, hair follicles, or Meibomian glands on the eyelids, it feeds on sebum and epidermal cells [1,2]. During infestation, it excretes waste and secretes substances that irritate the delicate skin, plug hair follicle ducts, and intensify hyperkeratinization. Then, hypersensitivity is activated by pro-inflammatory cytokines, like IL-1b and IL-17, and enzymes such as matrix metalloproteinase-9 (MMP-9) [3]. Moreover, as recently shown in a study by Pyzia et al., *D. folliculorum* can act as a vector for bacteria such as *Staphylococcus aureus*, *Acinetobacter*

baumannii, Streptococcus pneumoniae, Klebsiella oxytoca, Corynebacterium spp., and *Bacillus* spp.. Alongside patients' comorbidities, they can lead to serious ocular superinfections [4].



Figure 1. The microscope photograph shows a few mites from the *Demodex* spp. group on two epilated eyelashes (the photo is property of the Clinic Department of Diagnostics and Microsurgery of Glaucoma, Medical University of Lublin).

1.2. Epidemiology and Risk Factors

Referring to the introduction, one of the most common and troublesome ophthalmic problems is demodectic blepharitis. It is estimated that this condition affects more than 80% of people over the age of 60 and up to 100% of the population over the age of 70 [5]. Indeed, older age is one of the main risk factors, but not the only one; other triggers include, for example, diabetes, rosacea, alcohol abuse, smoking, sun exposure, and the use of systemic or topical corticosteroids [1]. As the literature shows, demodicosis also easily develops in people with reduced immunity due to the use of immunosuppressive drugs or systemic diseases, such as leukemia, lymphoma, or Acquired Immunodeficiency Syndrome (AIDS) [6] (Figure 2).

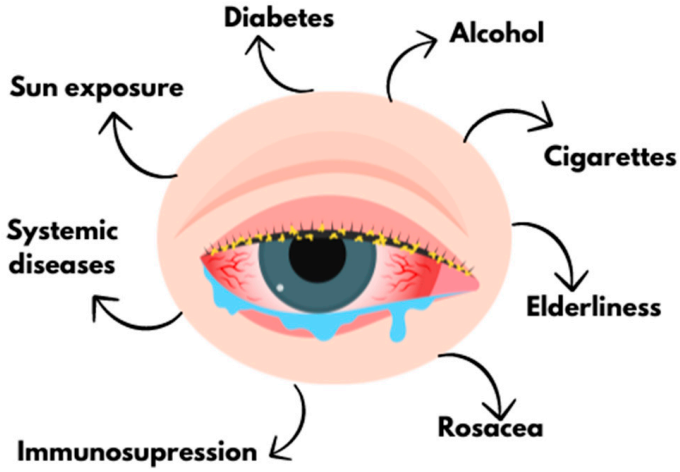


Figure 2. Risk factors of ocular demodicosis (created with Canva.com (https://www.canva.com, accessed on 31 May 2025) based on Refs. [1,6]).

1.3. Clinical Features

Demodex-associated blepharitis (DAB) causes a wide range of symptoms, such as redness of the conjunctiva and eyelid margins, dry eye syndrome, burning, itching (especially at night or in the morning), pain, tearing, excessive eyelash loss, morning eyelash sticking, and the condition's pathognomonic sign—collarettes on the eyelashes, like cylindrical

dandruff [2,7] (Figure 3). These symptoms are nonspecific for most people; so, they often ignore the problem and do not consult an ophthalmologist immediately. Instead, they turn to pharmacists, seeking conservative home remedies.



Figure 3. A photograph of a patient's eye with chronic ocular demodicosis, characterized by redness of the conjunctiva, itching, tearing, excessive eyelash loss, and morning eyelash sticking (the photo is property of the Department of Medical Microbiology, Medical University of Lublin).

1.4. Psychosocial Impact

Moreover, patients often report a decrease in self-esteem and quality of life due to these symptoms. Data indicate that blepharitis negatively affected 80% of patients. The symptoms hindered maintaining eye hygiene (30%), wearing contact lenses or makeup (34%), and driving at night (47%) [8]. Additionally, a multicenter study involving 524 participants ranked the three most bothersome symptoms as itchy eyes, dry eyes, and foreign body sensation. Furthermore, 32.3% of patients visited a doctor for blepharitis at least twice, including 19.6% who saw a specialist at least four times [9]. These findings suggest that DAB is often misdiagnosed, leading to delayed treatment and worsening of the condition.

1.5. Complications

It was found that ocular demodicosis is not just a cosmetic issue or a source of uncomfortable symptoms. It can cause serious problems in the eye's protective structures and its front segment, such as tear film disorders or recurrent chalazia and styes, which sometimes require surgery. Concerning the cornea, infestation by these mites and ongoing irritation can lead to keratopathy, pathological vascularization, clouding, or nodular scarring [10]. Interestingly, preliminary observations by Kurtul et al. even indicated a link between keratoconus and demodicosis. This may be due to constant rubbing caused by chronic inflammation and the symptoms mentioned above [11]. Naturally, more research is needed to confirm this.

1.6. Treatment

Current management strategies mainly rely on symptomatic treatment, lid hygiene, and the use of tea tree oil (TTO) or essential oil derivatives, but they face issues like poor long-term adherence and inconsistent efficacy and tolerability [12]. Therefore, developing new techniques for eradicating and treating *Demodex* blepharitis is essential for improving patients' quality of life. These methods should be effective, free of side effects, easily accessible, and affordable. Is this feasible? New approaches, including exploring alternative pharmacological agents and innovative formulations, have been reported, although clinical evidence is still emerging.

1.7. The Aim

Consequently, this paper aimed to gather available and innovative methods for treating DAB and to compare their effectiveness. It also emphasized the importance of patient education regarding at-home eyelid hygiene procedures and highlighted the crucial role of pharmacists, who are often the first healthcare professionals patients consult.

The analysis was based on papers from the PubMed, Web of Science, and Scopus databases. The following inclusion criteria were used in this review: publication date, reliability of the information, and compliance with the topic.

2. Standard Treatment

2.1. Eyelid Hygiene and the Role of Pharmacists

The primary and essential method for managing *Demodex* blepharitis is maintaining proper eye hygiene, which includes applying warm compresses to the eyelids, cleansing the eyelashes with specially designed disposable wipes, or at least using gentle baby shampoo. Regular eyelid massage is also recommended to ensure adequate drainage of the Meibomian glands [12,13]. Currently, numerous anti-*Demodex* products are available in pharmacies, including wipes, special liquids or gels, and compresses with antibacterial coatings, which can be easily warmed in the microwave [14]. Therefore, pharmacists should be knowledgeable about their proper use to instruct patients appropriately. This is especially important since they are often the first healthcare professionals people approach. Pharmacists should also be able to recognize when to refer a patient to a specialist due to the ineffectiveness of conservative, home-based management. However, in most cases, eye hygiene alone is not enough to eliminate the mites. Pharmacological agents, natural substances, or specialized procedures are necessary [13].

2.2. Antiparasitic Agents

Commonly, antiparasitic medications and antibiotics, such as metronidazole (MTZ) and ivermectin, are used systemically and/or topically. Ivermectin acts by binding selectively to glutamate-gated or γ-aminobutyric acid–gated chloride channels in the peripheral synapses of neurons. The primary result is the inhibition of the parasite's nerve and muscle cells, leading to paralysis and ultimately death [3]. Then, the MTZ acts by reducing and transitioning to nitro radicals. These metabolites, such as N-(2-hydroxyethyl) oxamic acid and acetamide, can react with DNA and form adducts with guanosine [15], causing damage to *Demodex*'s genome and leading to death.

In the study by Choi et al., the efficacy of topical ivermectin 1%, used once a week for 15 min over approximately 15 weeks, in conjunction with eye hygiene, showed a significant reduction in redness, eyelid swelling, and telangiectasia [16]. However, in treatment-resistant cases, the most effective pharmacotherapy is a combination of ivermectin and MTZ used simultaneously. Salem et al. reported that patients receiving both agents for four weeks achieved faster and higher remission rates compared to those treated with ivermectin alone [17].

However, it should be noted that oral therapy with ivermectin and/or metronidazole is associated with potential adverse effects, including nausea, abdominal pain, and diarrhea. In rare cases, neurotoxicity, optic neuropathy, or encephalopathy can even happen [15]. Moreover, relapses following antiparasitic treatment are relatively common [18]. Other antiparasitic agents, such as permethrin, crotamiton, benzyl benzoate, and tetracyclines, have also been used. But their efficacy remains inconsistent, and they pose a higher risk of irritation and side effects [19,20].

2.3. Tea Tree Oil

Therefore, in the development of pharmacotherapeutic methods, focus has been given to tea tree oil, which contains terpinen-4-ol (T4O), as a natural alternative. The full mechanism of TTO against *Demodex* mites remains unclear. It causes the parasite to migrate out of the hair follicles. More specifically, T4O has acetylcholinesterase-inhibiting effects that produce the acaricidal impact [13,21].

It can be applied in the form of wipes, shampoos, eyelid gels, or through direct massage in concentrations ranging from 5% to 50%. It should be noted that higher concentrations are used less frequently (e.g., once a week) due to an increased risk of ocular irritation [21].

In a meta-analysis by Savla et al., a significant variation in the effectiveness of this therapy was observed. Although no major side effects were reported, complete eradication was not consistently achieved [21]. Recently, products containing standardized concentrations of T4O (e.g., 2.5% T4O combined with 0.2% hyaluronic acid) have been shown to be well tolerated by patients and to help reduce symptoms or discomfort associated with blepharitis [22] (Figure 4). Therefore, further research and careful monitoring are necessary.

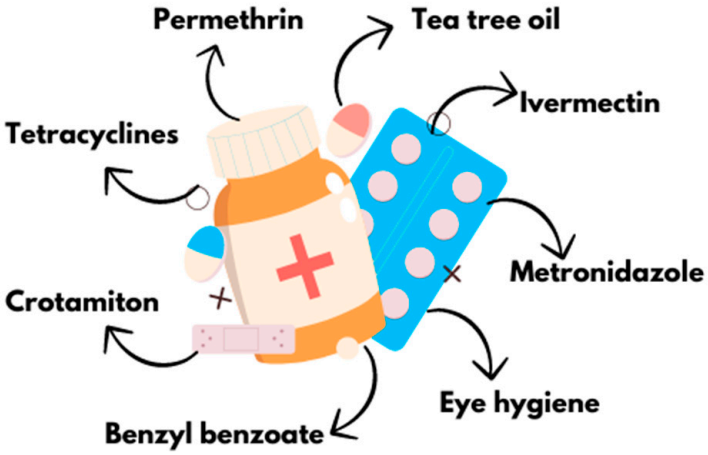


Figure 4. Classic therapies against ocular demodicosis (created with Canva.com (https://www.canva.com, accessed on 31 May 2025) based on Refs. [12–22]).

2.4. Historical Note

Historically, the literature indicates that in the past, sulfur ointment or yellow mercury ointment were used, but their effectiveness was questionable, and these methods have been abandoned in most countries [23]. Nowadays, they are rarely applied due to the systemic toxicity of mercury compounds and the inability to use them safely for prolonged periods [24].

3. Novel Therapies

Demodex blepharitis has gained significant attention in recent years. Researchers from various continents are competing to develop the most effective eradication methods. The market has seen the emergence of artificial chemical substances, mechanical techniques, and natural essential oils. Some of these, such as Lotilaner, have been extensively tested in the United States; others, like blepharoexfoliation and Intense Pulsed Light Therapy, are used sporadically by some centers. There are also interesting alternative substances, such as peppermint oil, sage oil, bergamot oil, okra extract, Povidone-Iodine (PVP-I), or selenium sulfide (Figure 5).

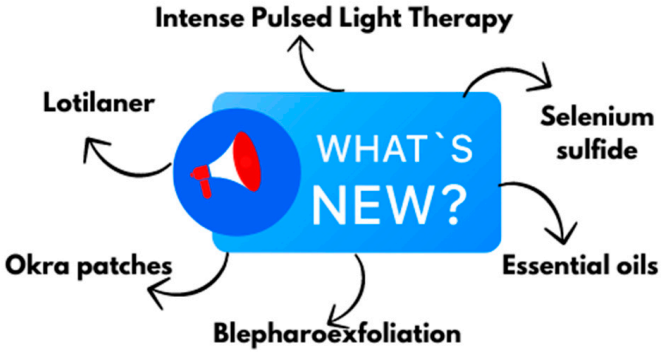


Figure 5. Novel therapies against ocular demodicosis (created with Canva.com (https://www.canva.com, accessed on 31 May 2025) based on Refs. [25–43]).

3.1. Lotilaner Ophthalmic Solution 0.25%

Lotilaner, an isoxazoline compound initially developed as an oral systemic ectoparasiticide for dogs and cats, acts by inhibiting γ-aminobutyric acid (GABA) receptors and L-glutamate-activated chloride channels in *Demodex* cells, leading to spastic paralysis and death [25–27]. Recently, it has been used as the Lotilaner Ophthalmic Solution (0.25%), formerly known as TP-03 (XDEMVY, Tarsus Pharmaceuticals Inc., Irvine, CA, USA). It has been approved by the United States Food and Drug Administration (US FDA) as a treatment for DAB following the completion of randomized, double-blind clinical trials [12,28].

In phase 3 of the study (Saturn-2), involving 412 participants, Gaddie et al. reported that twice-daily application for six weeks led to collarette cure in 56% of patients, mite eradication in 51.8%, and erythema cure in 31.1%. Additionally, 90.7% of participants reported excellent tolerability with minimal adverse effects [29]. Similarly, Talha et al. confirmed the high efficacy and safety profile of Lotilaner Ophthalmic Solution in a meta-analysis, with only mild, transient side effects, such as burning, discomfort, or slight visual blurring [30].

Overall, lotilaner represents a promising and safe therapeutic option for DAB. However, XDEMVY remains difficult to access and expensive in Europe. According to the official website of Tarsus Pharmaceuticals Inc., XDEMVY, a preservative-free formulation, is expected to receive European regulatory approval by 2027 [31].

3.2. Intense Pulsed Light Therapy

Intense Pulsed Light (IPL) Therapy, widely used in dermatology and cosmetology since 1992, delivers a broad-spectrum light beam that penetrates the skin and produces thermal energy. Then, chromophores, such as hemoglobin, water, and melanin, absorb the photons and are subsequently heated, leading to selective photothermolysis [32].

Beyond its established indications, including photorejuvenation, scar treatment, pigmentation reduction, and the treatment of chronic inflammatory skin conditions, recently, it has been explored as an option for DAB, mainly since IPL has been successfully used to treat Meibomian Gland Dysfunction (MGD) and dry eye disease (DED) [33]. In vitro observations by Fishman et al. demonstrated that mite exposure to IPL raised their temperature to approximately 49 °C, resulting in immobility and death, confirming the direct acaricidal effect of the therapy [34]. Huo et al. reported that after four sessions of IPL, there was a significant improvement in the ocular surface disease index (OSDI), the tear film's lipid layer, tear break-up time (TBUT), and the clarity of meibomian gland secretions, accompanied by a marked reduction in mite count and eyelid margin abnormalities [35]. Furthermore, Zhang et al. found that IPL laser achieved faster and more pronounced improvements compared with 5% tea tree oil after one month of treatment [36]. These findings support the idea that this therapy could be used for *Demodex* infestation and MGD.

3.3. Blepharoexfoliation

The more advanced method for eradicating *Demodex* is blepharoexfoliation, which mechanically exfoliates debris, mites, and collarettes along the eyelashes, using a rotating head with a micro-sponge. This process also disrupts the bacterial biofilm, which protects the parasites during infestation [37]. Mohammad-Rabei et al. tested the effectiveness of blepharoexfoliation using the BlephEx device, combined with twice-daily peeling with tea tree oil and topical application of erythromycin, for 8 weeks. The study group achieved faster and better results in comparison to the group without BlephEx, as evidenced by decreased OSDI parameters and mite counts [38]. However, current evidence remains limited, and additional controlled clinical studies are required to confirm the long-term efficacy of this approach [37].

To facilitate a clearer understanding of the aforementioned therapeutic approaches, their mechanisms of action, clinical efficacy, adverse effects, and accessibility are summarized and compared in Table 1.

Table 1. Comparison of therapeutic options for *Demodex* blepharitis, including their mechanisms of action, efficacy, reported adverse effects, and current availability.

Treatment Option	Mechanism	Efficacy	Adverse Effects	Availability
Ivermectine (topical/oral)	Paralysis of the parasite [3]	Most effective when combined [16,17]	Topical: mild irritation, allergic dermatitis, redness Systemic: more severe interactions and hypersensitivity	Widely available (topical gels/creams; oral tablets)
Metronidazole (topical/oral)	Demage of the parasite's DNA by nitro radicals [15]		Topical: irritation, allergic reaction Systemic: Gastrointestinal upset, very rare: neurotoxicity	Widely available (topical gels/creams; oral tablets)
Tea Tree Oil/ Terpinen-4-ol	Acetylcholinesterase-inhibiting effects [13,21]	Variable efficacy. There is uncertainty related to the effectiveness [21]	Ocular irritation, allergic reaction *(the posibility increases with higher concentration)* [13,21]	OTC wipes/gels/shampoos widely available; various concentrations from 5% to 50% [21]
Lotilaner Ophthalmic Solution 0.25% (XDEMVY)	Spastic paralysis of the parasite [25–27]	**The highest proven efficacy. The first and only FDA-approved treatment against *Demodex* spp.** [12,28–30]	Infrequent: mild burning, discomfort, slight visual blurring; sporadically: chalazion [29,30]	**USA** *(In Europe it is expected to be available in 2027)* [31]
Blepharoexfoliation (BlephEx)	Mechanical removal of mites and collarettes [37]	**Unclear* *Further multicenter clinical trials are needed*	*Limited data Generally mild discomfort, burning, itching [37]	Offered only by selected eye centers
Intense Pulsed Light (IPL) therapy	Photothermolysis [32–34]	**Unclear* *Further multicenter clinical trials are needed*	*Limited data mild erythema, warmth, discomfort, pigmentation disorders [32–36]	Offered only by selected eye centers

Bold text indicates the treatment with the highest proven efficacy. Italic text denotes author comments or notes where further clarification or data are needed. "*" marks statements requiring additional explanation or where evidence is limited.

3.4. Essential Oils as Natural Alternatives

Since TTO has been recognized for its effectiveness against *Demodex* mites, efforts have been made to investigate other essential oils containing terpenes, which are lethal to mites. Sędzikowska et al. reported that sage oil killed the mites within 7 min, similar to TTO, while peppermint oil took a slightly longer time, killing the mites in 11 min [39]. Additionally, Chudzicka-Strugała et al. mentioned the potential use of castor oil, bergamot oil, and *Nigella sativa* L. seed oil in a synergistic manner [40]. This suggests that the highest efficacy may be achieved by combining these agents into a single formulation. It offers a natural therapy option for patients suffering from *Demodex* blepharitis.

3.5. Other Emerging Therapies

In the literature, there are also isolated cases of using Dilute Povidone-Iodine (PVP-I) at 0.25% in dimethyl sulfoxide (DMSO) as a topical gel [41], as well as selenium sulfide combined with carboxymethylcellulose (CMC) or petroleum jelly. In vitro studies by Heczko et al. demonstrated that a 4% concentration of selenium sulfide killed *D. folliculorum* similarly to 50–100% TTO [42]. Furthermore, Liu et al. compared the anti-*Demodex* effects of okra extract and TTO. The results showed that mites exposed to okra-derived substances survived significantly shorter. After three months of treatment, the number of mites and the OSDI index were markedly reduced. However, the overall eradication rate was slightly lower with okra (40.74% vs. 48%), but it caused fewer irritations [43]. These findings suggest that okra-based eyelid patches could be an alternative for patients with sensitive skin. Nevertheless, it is essential to note that while these methods provide alternatives, further in vivo research on a larger scale is necessary.

4. Conclusions

When comparing the old and new methods of combating DAB, based on the studies or articles we have cited, it can be stated that only the Lotilaner Ophthalmic Solution 0.25% can compete with standard therapies. Among the innovative options, it is the only one that has been clinically tested on a larger scale and has demonstrated high efficacy in studies, with only mild side effects in a few cases. Currently available options are limited to some countries, and we must wait for their dissemination. IPL therapy and blepharoexfoliation have only been tested on a small group of patients, and some alternative chemical substances have only been tested in vitro. Therefore, further research is necessary to determine which method is the best. They should focus on well-designed, multicenter clinical trials and long-term follow-up studies to validate the safety and sustained effectiveness of emerging therapies, as well as to define standardized treatment guidelines. On the other hand, the popularity of standard treatments depends on the medical center. If demodicosis is not severely advanced, ophthalmologists usually initiate therapy by recommending TTO-based wipes and eye hygiene, and consider pharmacological options only in later stages of treatment.

As was mentioned several times, it is not only ophthalmologists that play a crucial role. Due to nonspecific symptoms, pharmacists are typically the first healthcare professionals patients approach. Therefore, they should stay up to date with the latest anti-DAB products and their proper use to educate people effectively. A good initiative would be to display posters in pharmacies about adequate eyelid hygiene, as well as to distribute new, proven substances for eradicating *Demodex* spp. as soon as they become available on the market.

5. Future Directions

Demodex-associated blepharitis is a common and serious issue that needs more attention. It not only worsens cosmetic concerns but also leads to dangerous side effects.

Therefore, patients should not have to deal with it on their own, and better treatment options must be explored. However, the sensitivity of the eye area to chemicals and mechanical treatments presents specific challenges. According to medical ethics, the benefits of a therapy should outweigh its side effects. So, we face a significant question: "How to effectively and permanently help patients suffering from ocular demodicosis, improve their quality of life, and protect them from the negative effects of infestation, while ensuring comfortable and painless treatment?" Fortunately, in recent years, alongside established methods, new therapies have emerged, some with promising results. They represent a hopeful future in the treatment of DAB. Still, we should continue to develop and test these approaches rather than stopping with current studies. Perhaps one day, we will find a perfect solution.

Author Contributions: Conceptualization, A.C.-M.; methodology, M.M.K.; investigation, A.C.-M.; resources, A.C.-M. and B.R.-J.; data curation, A.C.-M.; writing—original draft preparation, A.C.-M.; writing—review and editing, M.M.K. and B.R.-J.; visualization, M.M.K. and A.C.-M.; supervision, B.R.-J. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: All data are contained within this article.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of this study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

DAB	Demodex-associated blepharitis
AIDS	Acquired Immunodeficiency Syndrome
MTZ	metronidazole
TTO	tea tree oil
T4O	terpinen-4-ol
FDA	U.S. Food and Drug Administration
IPL	Intense Pulsed Light
OSDI	ocular surface disease index
TBUT	tear break-up time
PVP-I	Povidone-Iodine
DMSO	dimethylsulfoxide
CMC	carboxymethylcellulose

References

1. Huang, C.; Chen, S.; Fu, S.; Li, Y.; Li, Z.; Li, S.; Liang, X.; Wang, Z.; Wang, Z.; Chen, Y.; et al. A Survey on How Ocular Surface Demodex Infestation Interactively Associates with Diabetes Mellitus and Dry Eye Disease. *Acta Parasitol.* **2021**, *66*, 1039–1047. [CrossRef]
2. Bitton, E.; Aumond, S. Demodex and eye disease: A review. *Clin. Exp. Optom.* **2021**, *104*, 285–294. [CrossRef]
3. Chatterjee, S.; Gupta, J.; Srinivas, S.P.; Rao, S.K. Demodex and the eye—A review. *Indian J. Ophthalmol.* **2025**, *73*, 10–18. [CrossRef] [PubMed]
4. Pyzia, J.; Mańkowska, K.; Czepita, M.; Kot, K.; Łanocha-Arendarczyk, N.; Czepita, D.; Kosik-Bogacka, D.I. Demodex Species and Culturable Microorganism Co-Infestations in Patients with Blepharitis. *Life* **2023**, *13*, 1827. [CrossRef] [PubMed]

5. Rhee, M.K.; Yeu, E.; Barnett, M.O.; Rapuano, C.J.; Dhaliwal, D.K.; Nichols, K.K.O.; Karpecki, P.O.; Mah, F.S.; Chan, A.; Mun, J.; et al. Demodex Blepharitis: A Comprehensive Review of the Disease, Current Management, and Emerging Therapies. *Eye Contact Lens* **2023**, *49*, 311–318. [CrossRef] [PubMed]
6. Bezecny, J.A.; Bolton, E.; Taylor, M.H.; Berry, E.G. A Rare Case of Demodicosis Following Treatment With Oral Fluconazole. *Cureus* **2023**, *15*, e33309, Erratum in: *Cureus* **2023**, *15*, c93. https://doi.org/10.7759/cureus.c93. [CrossRef]
7. Ye, Q.; Yan, W.; Wang, Y.; Chen, M. The prevalence of ocular Demodex folliculorum in 2253 young males. *Sci. Rep.* **2022**, *12*, 22346. [CrossRef]
8. O'dEll, L.; Dierker, D.S.; Devries, D.K.; Garlich, J.; O'Whitley, W.; Holdbrook, M.; Baba, S.N.; Yeu, E. Psychosocial Impact of Demodex Blepharitis. *Clin. Ophthalmol.* **2022**, *16*, 2979–2987. [CrossRef]
9. Barnett, M.O.; Simmons, B.O.; Vollmer, P.O.; Patel, A.; Whitson, W.E.; Berdy, G.J.; Karpecki, P.O.; Periman, L.M.; Holdbrook, M.B.; Baba, S.N.O.; et al. The impact of Demodex blepharitis on patient symptoms and daily life. *Optom. Vis. Sci.* **2024**, *101*, 151–156. [CrossRef]
10. Jaworska, K.; Sławińska, M.; Sobjanek, M.; Lipowski, P. Ophthalmic manifestations of *Demodex* spp. infection—What should a dermatologist know? *Dermatol. Rev.* **2021**, *108*, 485–503. [CrossRef]
11. Kurtul, B.E.; Kaya, O.M.; Kakac, A.; Cetinkaya, Y.F. Is there a relationship between keratoconus and ocular Demodex mites? *Oman J. Ophthalmol.* **2023**, *16*, 287–292. [CrossRef]
12. Page, M.R. Multidisciplinary perspectives in Demodex blepharitis: A new view of treatment from clinical, payer, and patient perspectives. *J. Manag. Care Spec. Pharm.* **2024**, *30*, S1–S8. [CrossRef]
13. Fromstein, S.R.; Harthan, J.S.; Patel, J.; Opitz, D.L. Demodex blepharitis: Clinical perspectives. *Clin. Optom.* **2018**, *10*, 57–63. [CrossRef] [PubMed]
14. Murphy, O.; O' Dwyer, V.; Lloyd-Mckernan, A. The Efficacy of Warm Compresses in the Treatment of Meibomian Gland Dysfunction and Demodex Folliculorum Blepharitis. *Curr. Eye Res.* **2020**, *45*, 563–575. [CrossRef] [PubMed]
15. Hernández Ceruelos, A.; Romero-Quezada, L.C.; Ruvalcaba Ledezma, J.C.; López Contreras, L. Therapeutic uses of metronidazole and its side effects: An update. *Eur. Rev. Med. Pharmacol. Sci.* **2019**, *23*, 397–401. [CrossRef] [PubMed]
16. Choi, Y.; Eom, Y.; Yoon, E.G.; Song, J.S.; Kim, I.-H.; Kim, H.M. Efficacy of Topical Ivermectin 1% in the Treatment of Demodex Blepharitis. *Cornea* **2022**, *4*, 427–434. [CrossRef]
17. Salem, D.A.-B.; El-Shazly, A.; Nabih, N.; El-Bayoumy, Y.; Saleh, S. Evaluation of the efficacy of oral ivermectin in comparison with ivermectin-metronidazole combined therapy in the treatment of ocular and skin lesions of Demodex folliculorum. *Int. J. Infect. Dis.* **2013**, *17*, e343–e347. [CrossRef]
18. Shah, P.P.; Stein, R.L.; Perry, H.D. Update on the Management of Demodex Blepharitis. *Cornea* **2022**, *41*, 934–939. [CrossRef]
19. Moris García, V.; Valenzuela Vargas, G.; Marín Cornuy, M.; Torres, P.A. Ocular demodicosis: A review. *Arch. Soc. Esp. Oftalmol.* **2019**, *94*, 316–322. [CrossRef]
20. Lam, N.S.; Long, X.; Griffin, R.C.; Doery, J.; Lu, F. Human demodicidosis and the current treatment options. *Hong Kong J. Dermatol. Venereol.* **2018**, *26*, 10–17.
21. Savla, K.; Le, J.T.; Pucker, A.D. Tea tree oil for Demodex blepharitis. *Cochrane Database Syst. Rev.* **2020**, *6*, CD013333. [CrossRef]
22. Messaoud, R.; El Fekih, L.; Mahmoud, A.; Ben Amor, H.; Bannour, R.; Doan, S.; Khairallah, M. Improvement in ocular symptoms and signs in patients with Demodex anterior blepharitis using a novel terpinen-4-ol (2.5%) and hyaluronic acid (0.2%) cleansing wipe. *Clin. Ophthalmol.* **2019**, *13*, 1043–1054. [CrossRef]
23. Navel, V.; Mulliez, A.; Benoist d'Azy, C.; Baker, J.S.; Malecaze, J.; Chiambaretta, F.; Dutheil, F. Efficacy of treatments for Demodex blepharitis: A systematic review and meta-analysis. *Ocul. Surf.* **2019**, *17*, 655–669. [CrossRef] [PubMed]
24. Junk, A.K.; Lukacs, A.; Kampik, A. Topical administration of metronidazole gel as an effective therapy alternative in chronic Demodex blepharitis—A case report. *Klin. Monbl. Augenheilkd.* **1998**, *213*, 48–50. [CrossRef] [PubMed]
25. Little, S.E. Lotilaner—A novel systemic tick and flea control product for dogs. *Parasites Vectors* **2017**, *10*, 539. [CrossRef] [PubMed]
26. Wright, I. Lotilaner—A novel formulation for cats provides systemic tick and flea control. *Parasites Vectors* **2018**, *11*, 407. [CrossRef]
27. Fuatos Gámez, B.A.; Sánchez Cisneros, J.S.; Villarreal Villarreal, J.P.; Contreras, L.M.; Núñez, C.R. Effectiveness of lotilaner against ticks of the genus *Amblyomma* spp. in three naturally infested cane toads (*Rhinella horribilis*). *Vet. Dermatol.* **2022**, *33*, 172-e49. [CrossRef]
28. Yeu, E.; Paauw, J.D.; Vollmer, P.; Berdy, G.J.; Whitson, W.E.; Meyer, J.; Simmons, B.; Peterson, J.D.; Periman, L.M.; Boehmer, B.E.; et al. Safety and Efficacy of Lotilaner Ophthalmic Solution (0.25%) in Treating Demodex Blepharitis: Pooled Analysis of Two Pivotal Trials. *Ophthalmol. Ther.* **2025**, *14*, 555–571. [CrossRef]
29. Gaddie, I.B.; Donnenfeld, E.D.; Karpecki, P.; Vollmer, P.; Berdy, G.J.; Peterson, J.D.; Simmons, B.; Edell, A.R.; Whitson, W.E.; Ciolino, J.B.; et al. Lotilaner Ophthalmic Solution 0.25% for Demodex Blepharitis: Randomized, Vehicle-Controlled, Multicenter, Phase 3 Trial (Saturn-2). *Ophthalmology* **2023**, *130*, 1015–1023. [CrossRef]

30. Talha, M.; Ali, M.H.; Fatima, E.; Nadeem, A.; Ahmed, A.; Nashwan, A.J. Efficacy and Safety of Lotilaner Ophthalmic Solution (0.25%) for the Treatment of Demodex Blepharitis: A GRADE Assessed Systematic Review and Meta-Analysis of Observational & Experimental Studies. *Am. J. Ophthalmol.* **2024**, *264*, 8–16. [CrossRef]
31. Tarsus Pharmaceuticals Inc. Tarsus Provides 2025 Update: Accelerating the Launch of XDEMVY and Advancing New Programs. Available online: https://ir.tarsusrx.com/news-releases/news-release-details/tarsus-provides-2025-update-accelerating-launch-xdemvyr-and/ (accessed on 29 May 2025).
32. Gade, A.; Vasile, G.F.; Hohman, M.H.; Rubenstein, R. Intense Pulsed Light (IPL) Therapy. In *StatPearls [Internet]*; StatPearls Publishing: Treasure Island, FL, USA, 2025. Available online: https://www.ncbi.nlm.nih.gov/books/NBK557574/ (accessed on 31 May 2025).
33. Chen, R.; Lu, J.; Dong, J.; Zhu, Y. Intense pulsed light therapy for ocular surface diseases. *Lasers Med. Sci.* **2024**, *39*, 111. [CrossRef]
34. Fishman, H.A.; Periman, L.M.; Shah, A.A. Real-Time Video Microscopy of In Vitro Demodex Death by Intense Pulsed Light. *Photobiomodul. Photomed. Laser Surg.* **2020**, *38*, 472–476. [CrossRef]
35. Huo, Y.; Mo, Y.; Wu, Y.; Fang, F.; Jin, X. Therapeutic effect of intense pulsed light with optimal pulse technology on meibomian gland dysfunction with and without ocular Demodex infestation. *Ann. Transl. Med.* **2021**, *9*, 238. [CrossRef]
36. Zhang, X.; Song, N.; Gong, L. Therapeutic Effect of Intense Pulsed Light on Ocular Demodicosis. *Curr. Eye Res.* **2019**, *44*, 250–256. [CrossRef]
37. Siegel, H.; Merz, A.; Gross, N.; Bründer, M.-C.; Böhringer, D.; Reinhard, T.; Maier, P. BlephEx-treatment for blepharitis: A prospective randomized placebo-controlled trial. *BMC Ophthalmol.* **2024**, *24*, 503. [CrossRef]
38. Mohammad-Rabei, H.; Arabi, A.; Shahraki, T.; Rezaee-Alam, Z.; Baradaran-Rafii, A. Role of Blepharoexfoliation in Demodex Blepharitis: A Randomized Comparative Study. *Cornea* **2023**, *42*, 44–51. [CrossRef]
39. Sędzikowska, A.; Osęka, M.; Grytner-Zięcina, B.; Roman, B.; Jaremko, E. Effect of Metronidazol, Mercury Oxide and Essentials Oils on the in vitro survivability of Demodex mites. *Okulistyka* **2014**, *4*, 64–66.
40. Chudzicka-Strugała, I.; Gołębiewska, I.; Brudecki, G.; Elamin, W.; Zwoździak, B. Demodicosis in Different Age Groups and Alternative Treatment Options—A Review. *J. Clin. Med.* **2023**, *12*, 1649. [CrossRef] [PubMed]
41. Pelletier, J.S.; Capriotti, K.; Stewart, K.S.; Capriotti, J.A. Demodex Blepharitis Treated with a Novel Dilute Povidone-Iodine and DMSO System: A Case Report. *Ophthalmol. Ther.* **2017**, *6*, 361–366. [CrossRef] [PubMed]
42. Heczko, J.; Schell, C.; Pansick, A.; Stein, R.; Perry, H.D. Evaluation of a novel treatment, selenium disulfide, in killing Demodex folliculorum in vitro. *Can. J. Ophthalmol.* **2023**, *58*, 408–412. [CrossRef]
43. Liu, W.; Gong, L. Anti-demodectic effects of okra eyelid patch in Demodex blepharitis compared with tea tree oil. *Exp. Ther. Med.* **2021**, *21*, 338. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.