

# Hypochlorous acid solution (Avenova®) is not demodicidal

Alan G Kabat

Pennsylvania College of Optometry,  
The Eye Institute, Salus University,  
Philadelphia, PA, USA

## Dear editor

I read with great interest the recent manuscript entitled “*Demodex* blepharitis: clinical perspectives” by Fromstein et al in *Clinical Optometry*.<sup>1</sup> I wish to commend the authors on a thorough and well-written review of the subject. However, I feel compelled to point out one very controversial point that I believe is erroneous and unfounded. In their discussion of management, the authors write, “In addition to branded Avenova® (NovaBay Pharmaceuticals, Emeryville, CA, USA), some mild generic lid cleansers contain detergents or hypochlorous acid, which are active against bacterial, fungal, and viral pathogens. Hypochlorous acid has been shown to be effective in controlling biofilms and in wound healing. Studies have shown a reduction in the number of *Demodex* mites with management of hypochlorous acid.”<sup>1</sup> It is the final sentence in this passage to which I take exception. In support of this claim, the authors cite two publications: “The efficacy of tea tree face wash, 1,2-octanediol and microblepharoexfoliation in treating *Demodex folliculorum* blepharitis”<sup>2</sup> and “Short-term comfort responses associated with the use of eyelid cleansing products to manage *Demodex folliculorum*”.<sup>3</sup> Having reviewed these original studies, I can find no mention whatsoever of hypochlorous acid in the former paper by Murphy et al.<sup>2</sup> Regarding the latter publication, while hypochlorous acid was one of the solutions evaluated by Ngo et al,<sup>3</sup> this particular study assessed subjective comfort primarily, with secondary measures including visual acuity, noninvasive tear breakup time, anterior segment biomicroscopy, central corneal sensitivity and corneal staining. Assessment of *Demodex* mites in terms of prevalence or survival was not a reported outcome. In fact, the subjects in this study were described as “non-contact lens wearers, asymptomatic (ocular surface disease index [OSDI] score  $\leq 22$ ) and were free from health conditions or ocular disease that could potentially affect an outcome variable”. In other words, these were healthy, young (mean age  $26 \pm 6$  years) subjects without demodicosis.

The myth that hypochlorous acid has any significant demodicidal activity has been intimated and perpetuated for several years, primarily in marketing materials and “advertorials” related to Avenova®. However, there is no clinical evidence to support this assertion. To the contrary, my laboratory has demonstrated that 0.1% hypochlorous acid solution has virtually no effect on live, adult *Demodex* mites in vitro. In compari-

Correspondence: Alan G Kabat  
Pennsylvania College of Optometry, Salus  
University, 8360 Old York Road, Elkins  
Park, PA 19027, USA  
Email akabat@salus.edu

son to 4% terpinen-4-ol (the active ingredient in Cliradex®) which eradicated 100% of tested mites in under 40 minutes, 79% of mites exposed to 0.1% hypochlorous acid solution survived the entire test duration of 90 minutes, with one sample surviving as long as 210 minutes.<sup>4</sup>

It is indeed unfortunate that the authors of “*Demodex* blepharitis: clinical perspectives” have, perhaps unwittingly, endorsed a dogmatic clinical misconception in this otherwise good and comprehensive review. While hypochlorous acid solution can be an effective therapy in anterior and posterior blepharitis associated with an excessive bacterial bioburden, it remains a poor therapeutic option in the management of demodicosis.

## Disclosure

Alan G Kabat is a consultant to Bio-Tissue, Inc. The author reports no other conflicts of interest in this communication.

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## Authors' reply

Stephanie R Fromstein

Jennifer S Harthan

Jaymeni Patel

Dominick L Opitz

Department of Clinical Education, Illinois College of Optometry,  
Chicago, IL, USA

Correspondence: Dominick L Opitz

Illinois College of Optometry, 3241 South Michigan Avenue, Chicago, IL  
60616, USA

Tel +1 312 949 7178

Fax +1 312 949 7556

Email dopitz@ico.edu

## Dear editor

The work by Dr Kabat is of particular interest to us as this is the first study comparing the kill time of commercially available Cliradex® (Bio-Tissue, Inc, Miami, FL, USA) containing 4% terpinen-4-ol to commercially available Avenova® (NovaBay Pharmaceuticals, Inc, Emeryville, CA, USA) containing 0.01% hypochlorous acid, and 100% mineral oil. His work demonstrated statistically significant kill time with Cliradex® compared to Avenova®, but we found it particularly interesting that 21% of *Demodex* mites treated with Avenova® were killed within 90 minutes of

exposure to Avenova® and that none of the mites exposed to mineral oil were killed. Although this study showed no statistically significant difference between the Avenova® group and mineral oil group, a larger scale study should be considered.

It is unfortunate that Dr Kabat's study was not available prior to our paper submission. We, the authors of "*Demodex* blepharitis: clinical perspectives",<sup>1</sup> thank Dr Kabat for his comments and for sharing his work with us. We look forward to learning more about the details of Dr Kabat's study and hope that the presentation of his work becomes a published manuscript.

## Disclosure

Jennifer S Harthan serves as a consultant and advisory board member for Allergan and Shire Pharmaceuticals, key opinion leader for SynergEyes, and consultant and lecturer for Metro Optics. Dominick L Opitz serves as a consultant for Shire Pharmaceuticals and as a speaker and consultant for Bausch + Lomb. Stephanie R Fromstein and Jaymeni Patel report no conflicts of interest in this communication.

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1. Fromstein SR, Harthan JS, Patel J, Opitz DL. *Demodex* blepharitis: clinical perspectives. *Clinical Optometry*. 2018;10:57–63.

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