Introduction

A variety of hydrogen peroxide (H2O2) care systems are available on the market. Each system is known to have unique sets of ingredients, catalysts, and case designs. Can one assume that all care systems are essentially equal?

Additionally, with a growing number of practitioners prescribing H2O2 care systems and a growing number of patients using private label solutions, it is important to understand the differences between each unique system and their implications on lens care and the patient experience.

The latest innovation in H2O2 care systems has been the addition of platinum modulation compounds (PMCs) in B+L’s newest care system, PeroxiClear. PMCs interact with the platinum catalyst disc to slow the neutralization process and increase H2O2 concentration over the course of the neutralization process. The benefit is quick and effective anti-microbial action.

To the author(s) knowledge, this is the first independent study comparing the H2O2 neutralization process of this unique set of one-step care systems.

Methods

Investigators identified three hydrogen peroxide care systems that are readily available in the United States: B+L PeroxiClear™, Alcon® Clear Care®, and Sauflon One Step (commonly marketed as a private label care system). After confirming known delays in neutralization within the first 20 minutes of use with new platinum catalyst disk investigators, chose to use cases that had previously undergone one full hour cycle of neutralization. 39 cases of each care system underwent the neutralization process for 8 hours with the corresponding hydrogen peroxide-based solutions. A total of 42 samples were taken for each care system over an 8-hour period: 3 unaltered samples of un-neutralized solution, 3 samples taken in 10-minute intervals over the first hour, and then 3 that were taken every 10 minutes thereafter. Altogether, a total of 126 samples were measured across three different cases. At each interval, an assay was prepared using a sample of contact lens solution. The assay was then heated with potassium permanganate. End points were determined by comparing against a pre-made distilled water blank. The concentration of peroxide was then calculated from the volume of permanganate solution used during the titration process.

Results

Alcon® Clear Care® and Sauflon One Step demonstrated similar H2O2 concentrations and neutralization rates (p > .05) over 8 hours, whereas B+L PeroxiClear™ exhibited significantly higher H2O2 concentration (p < .001) and a slower rate of neutralization, particularly over the course of the first hour. For both Alcon® Clear Care® and Sauflon One Step, there was a rapid decrease in H2O2 concentration over the first 30 minutes. They exhibited approximately a 79% (or a 24,000 ppm decrease) in hydrogen peroxide concentration within the first 10 minutes. There was another sharp decrease in concentration between the next two 10 minute intervals, 75% (7,000 ppm) and 50% (1,200 ppm) decreases respectively. In contrast, B+L PeroxiClear™ exhibited a 19 percent (6,300 ppm) decrease in the first 10 minutes, a 33 percent decrease between 10-20 minutes, then, a 20 percent decrease in concentration and Sauflon One Interval One (3,800ppm) decrease at 10 minute intervals between 20-60 minutes.

After four hours of neutralization, all care systems exhibited similar H2O2 concentrations (p > .05) and neutralization rates (p > .05). All care systems reached less than 100ppm by the 4th hour of neutralization. This is a level that is known to exhibit minimal damage to the ocular surface and is below the ocular awareness threshold.

Discussion & Conclusion

• Platinum Modulating Compounds, specifically carbamide, along with its catalyzed disinfection when properly used, can increase the rate of H2O2 neutralization and increasing overall peroxide exposure over the first 4 hours of H2O2 neutralization. Although the authors did not explicitly test anti-microbial efficacy of the three products, the addition of Platinum Modulating Compounds would lead to increased anti-microbial efficacy - a known concern for many eye care practitioners in 2014.

• For all three care systems, H2O2 concentration was at a “safe” and “comfortable” level (<100 ppm) for contact lens insertion at 4 hours. The additional level of hydrogen peroxide exposure between hours 4-8 was minimal (36-56ppm). Although B+L PeroxiClear™ has demonstrated disinfection efficacy, both Alcon® Clear Care® and Sauflon One Step clearly instructs users to undergo a 6 hour neutralization process. Therefore, the authors do not recommend a shortened neutralization with these products even though contact lens insertion would not be uncomfortable and the hydrogen peroxide concentration would not damage the ocular surface.

• Case design can affect the disinfection process if the patient is not informed of its use. Because the platinum catalyst disc of the Sauflon One Step care system is located on the bottom of the case, neutralization will begin to occur as soon as the case is filled with H2O2 solution as opposed to other systems in which the lens holder and platinum catalyst disc are submerged in the H2O2 solution at the same time. It is known that Sauflon One Step dramatically decreases in H2O2 concentration within the first 10 minutes. Therefore, if patients begin the neutralization process prematurely, their lenses may not be exposed to optimal levels of hydrogen peroxide.

References


An Analysis of the Neutralization Process of Hydrogen Peroxide Care Systems

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