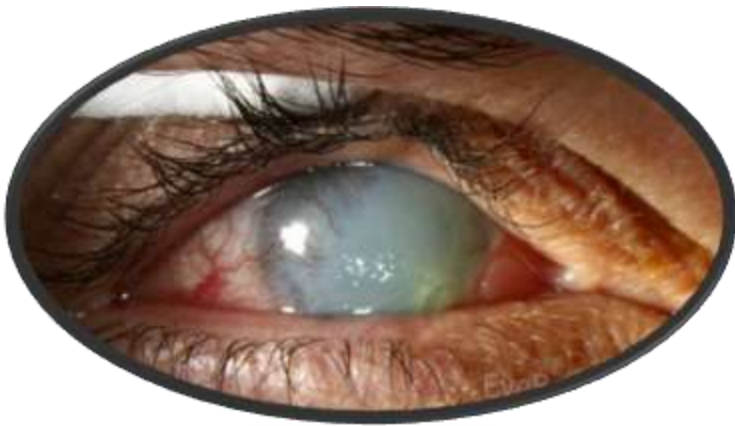


Molecular Hydrogen Effectively Heals Alkali-Injured Cornea



Alkali burns cause corneal damage by pH change, ulceration, proteolyzes and collagen synthesis defects. Alkali substances are lipophilic and penetrate the eye more rapidly than acids. The basic substance can quickly deposit within the tissues of the ocular surface causing saponification reaction within those cells.

Corneal alkali injury often causes extensive damage to the ocular surface and the whole anterior eye segment leading to partial or total vision loss. Immediately after corneal injury,

such as alkali burns or irradiation of the cornea with UVB rays, oxidative stress appears in the cornea. The activities as well as expressions of corneal antioxidant enzymes substantially decrease, whereas the activities of prooxidant enzymes (e.g., oxidases that generate reactive oxygen species, ROS) remain at physiological levels or even increase. The antioxidant/prooxidant imbalance appears leading to oxidative stress. ROS are insufficiently cleaved. With the effort to substitute the weakened functions of naturally occurring antioxidants, several synthetic antioxidants have been topically applied on the ocular surface with the aim of suppressing oxidative stress and enabling corneal healing. A study proposed that H₂ has potential as a novel effective antioxidant in preventive and therapeutic applications. According to these authors H₂ has a number of advantages as a mild but effective antioxidant: H₂ rapidly diffuses into



tissues and cells, and it is not mild enough either to disturb metabolic redox reactions or to affect ROS that function in cell signaling. H₂ is an inert gas and only the strong oxidants, for example, hydroxyl radicals and peroxy-nitrite,

are able to oxidize it. In other words H₂ reacts with strong oxidants such as hydroxyl radical and peroxynitrite in cells, and thus it is a potent agent for preventive and therapeutic antioxidant applications. H₂ can be consumed in the human body by various ways, including inhaling H₂, drinking hydrogen water (H₂-dissolved water), taking a hydrogen bath, injecting H₂-dissolved saline, dropping H₂ onto the eye, and increasing the production of intestinal H₂ by bacteria. Whereas, drinking hydrogen-rich water is the easiest and most effective way to consume hydrogen in the body.



A study proposed that if alkali-injured eyes irrigated with H₂ solution of 0.5–0.6 ppm for 30 min. The concentration of H₂ effectively suppressed oxidative stress in the cornea and reduced corneal neovascularization. The injured eyes were irrigated with H₂ solution (H₂ in PBS) or PBS free of H₂ immediately after the injury and then repeatedly for five days. Results showed that after H₂ treatment corneal transparency that was lost after the

injury quickly renewed and central corneal thickness that increased after the injury reached physiological levels. On day 20 after the injury in H₂ treated corneas the intracorneal inflammation was suppressed, the retrocorneal membrane was not developed, and corneal neovascularization was reduced. This was in contrast to PBS treated alkali-injured corneas, where the intracorneal inflammation was highly developed together with the retrocorneal membrane and corneas were largely vascularized.

Call Now: 1800-102-0908

Website: <http://www.kykindia.com>

Source:

<https://www.nature.com/articles/nm157>

[7](#)

<http://iovs.arvojournals.org/article.aspx>