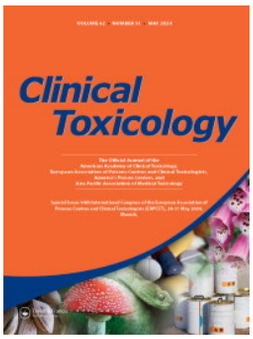

Journal of Toxicology: Clinical Toxicology

ISSN: 0731-3810 (Print) (Online) Journal homepage: informahealthcare.com/journals/ictx19

Topical Treatments for Hydrofluoric Acid Burns: A Blind Controlled Experimental Study

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To cite this article: Alan H. Hall, Joël Blomet & Laurence Mathieu (2003) Topical Treatments for Hydrofluoric Acid Burns: A Blind Controlled Experimental Study, Journal of Toxicology: Clinical Toxicology, 41:7, 1031-1032, DOI: 10.1081/CLT-120026531

To link to this article: https://doi.org/10.1081/CLT-120026531

Published online: 12 Mar 2003.

Journal of Toxicology
CLINICAL TOXICOLOGY
Vol. 41, No. 7, pp. 1031–1032, 2003

LETTER

Topical Treatments for Hydrofluoric Acid Burns: A Blind Controlled Experimental Study

To the Editor:

The publication of "Topical Treatments for Hydrofluoric Acid Burns: A Blind Controlled Experimental Study" by Höjer et al. (1) has raised the issue of whether the active, amphoteric, hypertonic, specific eye/skin hydrofluoric acid (HF) decontaminant, Hexafluorine®, is appropriate for use in emergent decontamination of HF eye/skin splashes.

As is not unexpected, there will be a number of studies, and sometimes one study may have negative results. A weight-of-the-evidence approach should be used by all those who must make decisions about proper decontamination and treatment of workers having eye/skin chemical splashes.

What have Höjer et al. actually studied? They have studied treatment of HF burns in a rat model rather than decontamination of HF splashes, and they did excellent work in a well-designed study. However, with a 3-min contact time of 50% HF and a 30-s delay to decontamination with water or Hexafluorine, and treatment with water only followed by a single inunction of 2.5% calcium gluconate, it would be highly unlikely that any decontamination measure would be efficacious, and all that was actually studied is treatment with topical calcium gluconate, which has been repeatedly demonstrated to be efficacious in workers with occupational HF exposure or in experimental animal studies (2–5).

The anesthetized domestic pig model has been shown to have good applicability for evaluating dermal lesions due to 38% HF exposure (6,7). In preliminary studies coordinated between Honeywell (the major producer of HF in North America and a producer of HF in Europe) and Laboratoire Prevor (manufacturer of Hexafluorine) in a reputable research laboratory using this pig model, exposure to 49% HF for as little as 5–10 s produces significant HF burns. In this same model, contact with 49% HF for 3 min produces immediate blanching apparent at the time the applicator is removed from the skin, followed by necrosis. The American National Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-1998) states in Appendix B, B5, Placement of Emergency Equipment: "Emergency eyewash and shower equipment should be available for immediate use, but in no instance should it take an individual longer than 10 s to reach the nearest facility" (8).

Emergent decontamination with Hexafluorine is recommended by Laboratoire Prevor within the first few seconds following HF exposure. Skin exposure to 50% HF produces pain nearly instantly; therefore, a skin-exposed worker is highly unlikely to wait 3 min before beginning decontamination, whether with water or Hexafluorine. The experimental protocol of Höjer et al. is thus unrealistic in regard to workplace HF skin splashes.

The experimental results in rats obtained with a 3-min 50% HF contact time followed by 30 s of delay to decontamination were not much different between water and Hexafluorine. It would have been interesting to test an experimental group of Hexafluorine decontamination plus topical calcium gluconate to compare this group with water decontamination plus calcium gluconate, but this was not done by Höjer et al.

In workers exposed to HF and decontaminated with Hexafluorine, the results have been universally positive. Hexafluorine is a solution that has been especially developed to decontaminate HF splashes and specifically binds both H^+ and F^- ions.

Reports published or presented at peer-reviewed scientific meetings in the United States and Europe have shown that Hexafluorine emergent decontamination is associated with no HF burns developing or with significantly less burns than have been associated with

DOI: 10.1081/CLT-120026531
0731-3810 (Print); 1097-9875 (Online)
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water decontamination followed by application of topical calcium salts (9,10). A study in rabbits found that following a 20 s exposure to 70% HF, water decontamination alone was ineffective, water decontamination with topical calcium gluconate delayed the onset and decreased the severity of 70% HF burns, whereas decontamination with Hexafluorine completely prevented 70% HF burns (11).

The experimental and statistical study of Höjer et al. has not been performed according to the protocol recommended by Laboratoire Prevor for the use of Hexafluorine and does not seem to justify their conclusions based on a weight-of-the-evidence evaluation of the available data. When used expeditiously and in the 5 L portable stand-alone shower (DAP) provided by the manufacturer, Hexafluorine might just be the best available emergent decontamination solution for HF skin/eye splashes.

Hexafluorine is an emergency first aid decontamination solution, but if decontamination has been delayed and HF burns or HF systemic poisoning have developed, appropriate treatment with topical or parenteral calcium gluconate or other calcium salts as well as all appropriate symptomatic and supportive measures should certainly be initiated.

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