



## Existing Evidence Does Not Support the Use of Hexafluorine

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LETTER

## Existing Evidence Does Not Support the Use of Hexafluorine

*To the Editor:*

We appreciate the interest by the Prevor Group (Hall, Blomet, Mathieu) (1) in our article on topical treatments for hydrofluoric acid (HF) burns (2), although we feel concerned with the commercial promotion of Hexafluorine<sup>®</sup>—after all, the authors represent the manufacturer (3–5).

They begin their letter by implying that if an issue is investigated repeatedly, one study may sooner or later report negative results. This comment is irrelevant, as proper scientific documentation of Hexafluorine was practically nonexistent prior to our study. A Medline search in May 2003 results in three hits only. One of these references is a compilation of uncontrolled cases conducted mainly by the manufacturer (4), another is a letter questioning that paper (6), and the third is our blind controlled experimental study (2).

Furthermore, we do not agree with the use of the word “negative” in this context. In the scientific vocabulary, a negative result generally represents a lack of statistical significance. The mentioned “weight-of-the-evidence approach” fails to demonstrate any superior efficacy of Hexafluorine in comparison with water. Moreover, since Hexafluorine is an expensive product and the only controlled and peer reviewed study so far shows that Hexafluorine is significantly less effective than decontamination with water rinsing plus topical calcium and at the most is equally effective to water rinsing (2), it does not seem justified to recommend it.

Hall and coauthors question our animal model, especially the 3-min contact duration of the 50% HF. The aim of our injury model was to create a reproducible burn, severe enough to be measurable despite early rinsing, but yet not too severe to be inaccessible to any treatment. After testing for different durations of exposure, a burn model well in accordance with methods used

in previously published experimental studies on HF (7–11) was established. A shorter duration of exposure than 3 min followed by water rinsing resulted in too mild on burns to be accurately measured. The same experience has been reported by several other independent investigators: Murao M, rat model, 20% and 50% HF, 5-min exposure (7); Yasuda et al., rat model, 23% and 46% HF, 3-min exposure (8); Bracken et al., rat model, 70% HF, 1-min exposure (9); Burkhart et al., rabbit model, 36% HF, 3-min exposure (10); and Dunn et al., pig model, 38% HF, 3-min exposure (11). In summary, a shorter exposure than 3 min of 50% HF is simply too short to get a reproducible burn if the HF is washed away with water after the exposure. On sound, scientific grounds it is not possible to rely on the preliminary, owner-performed and unpublished data which the Prevor Group is repeatedly referring to.

Moreover, the Prevor Group writes that it would be highly unlikely that any decontamination measure would be efficacious after a 3-min contact duration of 50% HF, and that what we actually studied was treatment with topical calcium gluconate. Again, this statement is incorrect. The rats in the control group in our study received the same HF exposure as the other animals, but did not receive any rinsing decontamination or topical calcium. This resulted in very severe burns rated as 5, i.e., maximum severity, on the scoring scale used. The animals that were treated with water rinsing had an average score well below 3 ( $p < 0.001$ ) (2). It is remarkable that the Prevor Group now focuses on the “3-minute issue,” since they recently have stated that: “In three cases of exposure to dilute HF reported here, even delayed decontamination with Hexafluorine<sup>®</sup> allowed prevention of chemical burns” (12) and “Hexafluorine<sup>®</sup> is hypertonic and can thus osmotically recover a portion of the HF which penetrated into the tissues” (4).



We fully agree with Hall and coauthors, as well as with the text in the American National Standard for Emergency Equipment, that emergency eyewash and shower equipment should be available for immediate use. The importance of this was also clearly emphasized in the discussion section in our article (2).

Finally, somewhat astonishingly, the Prevor Group point out that our experimental results did not show much difference between decontamination with water or Hexafluorine. This is correct, but in our opinion the consistent trend toward less benefit from Hexafluorine compared to water rinsing, although the difference was not significant, was a sensational finding (2), especially considering that Hexafluorine is claimed to specifically bind both hydrogen and fluoride ions (3).

The promotion campaign launched worldwide for Hexafluorine<sup>®</sup> during the last years has a lack of scientific basis that is particularly alarming considering its potential use in emergency health care.

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## REFERENCES

1. Hall AH, Blomet J, Mathieu L. Topical treatments for hydrofluoric acid burns: a blind controlled experimental study. Letter to the Editor. *J Toxicol Clin Toxicol* 2003;
2. Höjer J, Personne M, Hultén P, Ludwigs U. Topical treatments for hydrofluoric acid burns: a blind controlled experimental study. *J Toxicol Clin Toxicol* 2002; 40:861–866.
3. Josset P, Blomet J, Lym SK, Jahan D, Meyer MC. Theoretical and experimental evaluation of decontamination measures for burns with hydrofluoric acid. Proprietary data of Laboratoire PREVOR, Valmondois, France, 1992.
4. Mathieu L, Nehles J, Blomet J, Hall AH. Efficacy of hexafluorine for emergent decontamination of hydrofluoric acid eye and skin splashes. *Vet Human Toxicol* 2001; 43: 263–265.
5. Hall AH, Blomet J, Gross M, Nehles J. Hexafluorine for emergent decontamination of hydrofluoric acid eye/skin splashes. *Semiconductor Safety Assoc J* 2000; 14:30–33.
6. Mycyk MB, Onie RD. Efficacy of hexafluorine for emergent decontamination of hydrofluoric acid eye and skin splashes. Letter to the Editor. *Vet Human Toxicol* 2002; 44:52–53.
7. Murao M. Studies on the treatment of hydrofluoric acid burn. *Bull Osaka Med College* 1989; 35:39–48.
8. Yasuda H, Honda S, Yamamoto O, Asahi M. Therapeutic effect of topical calcium gluconate for hydrofluoric acid burn—time limit for the start of the treatment. *J Uoeh* 1999; 21:209–216.
9. Bracken WM, Cuppage F, McLaury RL, Kirwin C, Klaassen CD. Comparative effectiveness of topical treatments for hydrofluoric acid burns. *J Occup Med* 1985; 27:733–739.
10. Burkhart KK, Brent J, Kirk MA, Baker DC, Kulig KW. Comparison of topical magnesium and calcium treatment for dermal hydrofluoric acid burns. *Ann Emerg Med* 1994; 24:9–13.
11. Dunn BJ, MacKinnon MA, Knowlden NF, Billmaier DJ, Derelanko MJ, Rusch GM, Naas DJ, Dahlgren RR. Hydrofluoric acid dermal burns. An assessment of treatment efficacy using an experimental pig model. *J Occup Med* 1992; 34:902–909.
12. Mathieu L, Blomet J, Hall AH. Hexafluorine<sup>®</sup>: an improvement for emergent decontamination of ocular and dermal hydrofluoric acid splashes. Abstract presented at the XXXVIII European Congress of Toxicology (Eurotox 2000), London, UK, Sept 17–20, 2000.

