

## Glutaraldehyde and Formaldehyde: Allergic Contact Dermatitis (12/03)

Glutaraldehyde-induced and formaldehyde-induced allergic contact dermatitis among dental hygienists and assistants. Ravis SM, Shaffer MP, Shaffer CL, Dehkhaghani S, Belsito, DV. J Am Dent Assoc 2003;134:1072–1078.

Research indicates that health-care personnel, particularly dental health-care personnel (DHCP), are likely to have reactions to glutaraldehyde and formaldehyde. The authors conducted patch test evaluations on 101 dental hygienists and dental assistants and 51 non-dental professionals to determine the incidence of glutaraldehyde-induced and formaldehyde-induced allergic contact dermatitis (ACD); the potential for coreactivity between glutaraldehyde and formaldehyde; and the correlation between training methods in safe handling of sterilizing solutions and the sensitivity to glutaraldehyde and formaldehyde among dental hygienists and dental assistants. Among the DHCP, 79.2% had a known exposure to cold sterilizing solutions, while the remainder were unable to provide a known history of exposure. 10.9% had clear reactions to glutaraldehyde, 4.0% were questionably allergic to glutaraldehyde, and 2.0% were definitely allergic to formaldehyde. One control subject had a reaction to glutaraldehyde, and one other had a reaction to formaldehyde. Wearing nitrile gloves, training in the safe handling of glutaraldehyde-containing solutions or both measures significantly reduced the risk of developing glutaraldehyde-induced ACD. Despite awareness of glutaraldehyde-induced ACD and published guidelines outlining methods for its safe use, the rate of ACD to glutaraldehyde remains unacceptably high, especially among dental hygienists and dental assistants and other health-care workers. In this study, DHCP were eight-fold more likely to be allergic to glutaraldehyde than were control subjects. **The authors did not find any evidence of cross-reactivity between glutaraldehyde and formaldehyde in contrast to earlier studies. The preponderance of reactions among DCHP suggests that their present safety practices are largely ineffective in protecting against sensitization to glutaraldehyde in sterilizing solutions.**



**DIS Comment: Allergic contact dermatitis, also referred to as type IV or delayed hypersensitivity, may result from exposure to accelerators and other chemicals used in the manufacture of rubber gloves (e.g., natural rubber latex, nitrile, neoprene), as well as from other chemicals found in the dental practice setting (e.g., methacrylates, glutaraldehyde). Allergic contact dermatitis often manifests as a rash beginning several hours after contact and like irritant dermatitis, is usually confined to the area of contact. The condition can become chronic through repeated exposure.**

**As this article illustrates, high level disinfectants/chemical sterilants may present exposure risks to health-care personnel. These powerful, sporicidal chemicals (e.g., glutaraldehyde, peracetic acid, hydrogen peroxide) are highly toxic.<sup>1,2,3</sup> Fortunately, the practice of using liquid chemical germicides for high-level disinfection or “cold” sterilization of dental instruments is not common in USAF dental facilities. Most reusable instruments and devices used in dentistry can withstand heat sterilization. If certain devices cannot be sterilized, heat tolerant or single-use disposable alternatives should be used. If no other alternative exists, precautions (e.g., closed containers to limit vapor release, wearing chemically-resistant gloves and other personal protective equipment) must be followed when using chemical sterilants to ensure the safety of DHCP. Other precautions may also apply (e.g., room exhaust ventilation, 10 air exchanges per hour).<sup>4,5</sup> In addition to these precautions, manufacturer instructions for using chemical sterilants/high-level disinfectants must be followed precisely (e.g., dilution, immersion time, temperature).<sup>6,7</sup> Sterilizing instruments using chemical sterilants may require up to 12 hours of complete immersion, whereas high-level disinfection for semicritical instruments requires shorter immersion times (12 to 90 minutes). Also, the sterilization process with liquid chemical sterilants cannot be verified with biologic indicators (i.e., spore tests).<sup>8</sup> Special post-disinfection/sterilization instrument handling procedures are essential. Items need to be thoroughly rinsed to remove toxic or irritating**

residues, handled with gloves to prevent recontamination, delivered to the point of use in an aseptic manner, and if stored prior to use, the instrument should not be considered sterile. A common mistake is to use an intermediate level disinfectant for disinfection of heat-sensitive semicritical dental instruments (e.g., photographic retractors and mirrors) between patients because of the shorter contact time. Intermediate level disinfectants are intended for use on environmental surfaces (e.g., housekeeping surfaces, clinical contact surfaces) and are not to be used on any instruments or devices used intraorally; such use is counter to label instructions. Due to these limitations, use of heat-sensitive semicritical items that must be processed with liquid chemical germicides is strongly discouraged; heat tolerant or disposable alternatives are available for almost all such items.

## References

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