

Letter to the Editor

Allergic or irritant contact dermatitis after patch testing with alcohol – that is the point

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García-Gavín *et al.* recently described an allergic response to isopropanol among 44 patients (1). We are not convinced that the observed reactions were truly allergic reactions, for various reasons.

- (1) A dilution of 10% is recommended for patch testing with isopropanol (2), whereas in the study isopropanol was used 'as is', which is 100%. The use of 100% isopropanol in an occlusive patch test left for 2 days may cause a toxic skin reaction (which is shown in Fig. 2 in the paper of García-Gavín *et al.*), whereas the use of 10% isopropanol will have less potential to cause a toxic skin reaction, but may provide sufficient exposure to elicit an allergic skin reaction in the case of a true allergy.
- (2) Forty-four (3%) is a surprisingly large number of patients, with only 3 of them being healthcare professionals (HCPs). In central Europe, *n*-propanol-based and isopropanol-based hand rubs have been used regularly during work by HCPs for decades. In Germany, HCPs often suffer from occupational dermatitis (3, 4); this is mostly irritant dermatitis, but some allergens are well known, especially thiomersal, glutaraldehyde, formaldehyde, glyoxal, quaternium-15, benzalkonium chloride, thiurams, and fragrances (5, 6). However, although hand dermatitis in HCPs is well known and well investigated, isopropanol as a confirmed allergen is rare. Taking into account the broad use of isopropanol in hand rubs among HCPs, and assuming that the cases described by García-Gavín *et al.* are truly allergic, we would expect to see more HCPs in central Europe with a proven contact allergy to isopropanol, because sensitization on top of the common irritant hand dermatitis must be widespread. However, we do not see this. On the contrary, most HCPs with occupational dermatitis notice a clinical benefit within a few weeks when

changing hand hygiene behaviour from frequent hand washing to frequent hand disinfection, for example with propanol-based hand rubs.

Of course, some reactions to isopropanol have also been seen by our group. However, true allergic reactions are doubtful. We consider it possible that a defect in aldehyde dehydrogenase leads, after 2 days of occlusion, to the topical accumulation of toxic substances such as acetaldehyde. The presence of these enzymes in the skin is well known (7, 8, 9), and deficiency in these enzymes leads to non-immunological irritant skin reactions (10–13). With an occlusively applied 100% isopropanol solution, there might be sufficient substrate to provoke such an irritant reaction to acetaldehyde in predisposed individuals. This mechanism is supported by the finding that, after blocking of alcohol dehydrogenase experimentally, metabolism of the alcohol to acetaldehyde is stopped, and reactions in individuals with a known deficiency in aldehyde dehydrogenase are no longer induced (13). The discrimination of this mechanism from a genuine allergic reaction is of the highest importance, because a short duration of contact with isopropanol (e.g. during hand disinfection) may be rather harmless, even in persons with an enzyme deficiency, whereas, during occlusive patch test, this deficiency might lead to a strong irritant patch test reaction.

Overall, we see a number of good reasons to think that the skin reactions described during patch testing are much more likely to be toxic skin reactions (probably to acetaldehyde, especially in individuals with an aldehyde dehydrogenase deficiency) than allergic reactions. Further studies to prove this hypothesis are necessary.

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