

Cutaneous and systemic sequelae from exposure to 2-vinylpyridine

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We present the case of an employee of a chemical production factory who became sensitized to 2-vinylpyridine despite wearing full protective polyvinyl chloride clothing. He developed severe dermatitis at the site of contact, secondary eczematization over the flexures and periungual areas, as well as marked systemic upset. Pyridines are known sensitizers although this reaction pattern has not previously been described.

Key words: 2-vinylpyridine; allergic contact dermatitis; systemic contact dermatitis.

A 50-year-old maintenance fitter working at a chemical production factory developed severe dermatitis over the knees, and later over the flexures and periungual areas (Fig. 1), in association with nausea and light headedness, 48–72 hr after presumed cutaneous chemical exposure while kneeling at the chemical plant during the course of his duties. He was wearing full polyvinyl chloride (PVC) protective clothing at all times. The systemic disturbance settled over 48 hr, although the dermatitis took a week to abate. As he worked in several areas of the factory, he was patch tested to multiple representative substances. He had a '+' reaction to 2-vinylpyridine (2VP) in methyl ethyl ketone (MEK) at 48 hr, at

concentrations of 0.5% and 1% but not at 0.1%. Testing to 4-vinylpyridine (4VP), 2-methylpyridine, and 4-methylpyridine was negative. 3 of 30 controls reacted to 1% 2VP, but none of 30 other controls reacted to 0.5% 2VP.

Pyridines are widely used as solvents for both organic and inorganic chemicals. 2VP is also used in the synthesis of conjugated polymer systems, which have a multitude of uses in industry (1). Pyridines are known occupational sensitizers, and contact allergic dermatitis has been reported with pyridine (2), 4VP (3–5), and methyl-ter-pyridine (6). Interestingly, systemic upset was not reported in any of these cases. 2 cases (3, 4) with allergic contact dermatitis to 4VP did not cross-react with 2VP on patch testing, but another case did (5). In this report (5), a chemistry student suffered a severe bullous dermatitis to 4VP and had a positive patch test reaction to 0.1% 4VP and 0.5% 2VP. 2 of 5 controls also reacted to 0.1% 4VP and 1% 2VP but not to 0.5% 2VP. A high level of cross-reactivity between pyridine molecules was hypothesized on the basis of these findings.

To our knowledge, this is the first reported case of allergic contact dermatitis to 2VP with secondary eczematization of the flexures and periungual areas in association with systemic upset. The systemic upset may represent direct toxicity of 2VP from percutaneous absorption or systemic contact allergy. Although human data are unavailable, animal studies have confirmed

that systemic absorption of 2VP through both the enteral and the dermal routes takes place, and signs of toxicity include weakness, tremors, diarrhoea, hepatotoxicity, vasodilation, and death (7). The dermal lethal dose 50% for 99% 2VP solution in guinea pigs has been reported to be 0.16 ml/kg (7). It is of note that our patient wore full PVC protective clothing while in the production area, which appeared to be intact on subsequent examination. This would suggest that either there were microscopic holes in the material allowing direct penetration of 2VP, or permeation of the PVC occurred. The lack of cross-reactivity to 4VP in our patient does not support the previous suggestion that there is overlap in pyridine sensitivity. Our experience suggests that 0.5% is a suitable concentration for testing to 2VP as higher concentrations increase the risk of false-positive results.

References

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Fig. 1. Dermatitis over the knees (presumed site of initial contact) and secondary eczematization involving the periungual area.

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