

Letter to the Editor

Does cobalt spot testing of copper items result in false-positive test reactions?

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Clinicians are repeatedly challenged to correlate the outcome of patch testing with patient exposures. Past or current clinical relevance of a positive patch test reaction can only be determined when there is a concomitant history of skin exposure to the allergen in question. To verify current exposures, patch testers can, for some allergens, utilize spot tests, which are often easily performed and are therefore helpful in screening for the presence of allergens. Examples of spot tests routinely used to screen for metal ions include the dimethylglyoxime (DMG) test for nickel and the cobalt spot test for cobalt. The DMG test has been used for decades, and several attempts have been made to determine its sensitivity and specificity. As false-negative test reactions can occur, it is known that one cannot fully rely on negative DMG test reactions to rule out the release of nickel from a metallic item. Although the much more reliable positive DMG test reactions are typically pink, and therefore easily distinguishable from the clear-coloured negative test reactions, other colour variations can infrequently be observed, and make the interpretation difficult, leading to incorrect interpretations. Pertinently, there is much less experience with the recently developed cobalt spot test (1). The cobalt spot test solution is yellow when negative and changes to orange–red when positive (Fig. 1). As opposed to the DMG test, it can sometimes be difficult to distinguish the reactions, especially if the test item is dirty. There is a logical requirement to scientifically challenge this novel spot test and report potential inaccuracies if identified, as this is the only way to improve the test and learn from its use. It is clear that spot tests cannot stand alone in the assessment of allergen exposure, and should preferably be followed by more accurate chemical analyses.

It has previously been reported that copper can form coloured complexes with 2-nitroso-1-naphthol (2), but also that such complexes can be decomposed by the addition of inorganic acid without interfering with the more strongly bound cobalt complex (3). When we developed the cobalt spot test, we discovered a change of colour when testing metallic copper. However, the



Fig. 1. Cobalt spot testing. From left to right: control (negative), copper, and cobalt. The reaction observed with copper is not considered to be a false-positive reaction, but does show a brown/rust-colour that is different from the negative control.

addition of 0.1 wt.% oxalic acid removed most of the discoloration from the copper complexes but did not interfere with the colour of the cobalt complexes. In Fig. 1, we show the results of cobalt spot testing of a cobalt-containing surface, a piece of massive copper, and a negative control. It can be seen that, although there was a slight change in colour when the copper cylinder was tested, it did not mimic a positive test reaction, and it can therefore not be considered to be a false-positive result.

In a recent article in this journal, Bruze et al. reported a patient with facial dermatitis and positive patch test reactions to nickel and cobalt (4). They suspected transfer of cobalt ions from the hands to the forehead, owing to metal weaves being handled by the patient at work. The cobalt gel test, a variation of the cobalt spot test in which the cobalt test solution is mixed with a gel, was used by Bruze et al. to test the weave. They stated that 'a colour change was observed and interpreted as a positive spot test result'. However, according to the manufacturer of the weaves, they were made of tin-plated copper, and therefore contained no cobalt. Also, atomic absorption spectroscopy was performed, and showed no cobalt. Bruze et al. therefore concluded that they had observed a false-positive test reaction. As the dermatological community can learn from such important observations, we encourage Bruze et al. to also publish a photograph of

the 'false-positive' test reaction of the weave, preferably next to a photograph of a 'true-positive' test reaction from a cobalt-containing alloy showing the traditional orange–red discolouration. At present, there are very few published data evaluating cobalt spot test reactions of different alloys, and we could therefore all benefit from their new finding. We hope that future reports will also include photographs alongside the scientific findings.

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