

Evaluation of 10% Minimum Elicitation Threshold for Cr(VI)-Induced Allergic Contact Dermatitis Using Benchmark Dose Methods

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Historical patch test data have been used to propose health-based soil cleanup levels for Cr(VI) that are protective of eliciting allergic contact dermatitis (ACD) among previously sensitized individuals. Shortcomings regarding the use of these historical studies in the risk assessment of Cr(VI) have been identified and include the use of concentration as the dosimetric for ACD elicitation rather than the mass per surface area. Information on the surface areas of the patches used by the authors of three of the historical studies have been made available recently, and their dose levels have been converted from units of concentration to mass per surface area. For this study, benchmark dose methods were used to estimate the 10% minimum elicitation threshold (MET) based on the converted patch test data from these historical stud-

ies and from the data presented in a more recent patch test study by Nethercott et al. (1994). A truncated lognormal model was fitted to the historical data from each individual historical patch test study, and to the data from the Nethercott et al. (1994) study using maximum likelihood methods. The 10% MET from the Nethercott et al. (1994) study is seven times lower than those from the historical studies. There are two primary reasons for this result. First, Nethercott et al. used a 0.25% potassium dichromate patch to screen study participants, whereas the historical studies used patches with up to 0.5%. Hence, individuals who were less sensitive and those who had irritant, rather than allergic reactions at the high doses, were excluded. Second, Nethercott et al. used a TRUE-Test patch that is a more efficient and reliable allergen delivery device than those used in the historical studies. Assuming 100% bioavailability, the 10% MET from Nethercott et al. (1994) produces an ACD-based soil standard of 445 mg/kg compared with the ACD-based soil standards of 2,750 to 62,500 mg/kg calculated using the historical studies. The most recent patch study of Nethercott et al. (1994), which is based on modern patch testing methods and standardized diagnostic criteria, is the most scientifically appropriate for use in the risk assessment of Cr(VI) and produces the most conservative estimate of the 10% MET.