Validation of the EASE model in relation to dermal zinc exposures

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The EASE model is currently being used for a review of exposure to zinc compounds and there is concern about whether the predicted dermal exposures are reliable. The work reported here contains details of actual dermal zinc exposure measurements, collected from a wide range of exposure scenarios, and these are compared with the relevant EASE predictions.

Dermal exposure measurements were collected using a swab sampling method validated using human volunteers. Samples were also collected from a control group to determine natural background dermal zinc levels.

The assessments of dermal exposure to zinc were carried out in two phases. Preliminary assessments were carried out in a galvanising factory and a zinc oxide manufacturing plant. These were followed up with more detailed assessments in five other factories. These included a galvanising plant, a zinc metal refinery and three different factories producing zinc chemical products.

The different exposure scenarios were classified in terms of the EASE categories and then compared with the predicted exposures. The tasks fell into three different EASE exposure ranges or ‘endpoints’. It was apparent that EASE consistently over-estimated exposure, generally by about one order of magnitude. However, the EASE predictions increased in line with the measured exposures. It is clear that further work is necessary to refine the EASE model to improve its reliability in these circumstances.

With certain exceptions, the use of protective gloves in the workplaces investigated in this study was not considered an important factor in this exposure assessment. This was because the gloves themselves and the method of working were not designed to control dermal exposures. Hence, it is concluded that they provided only limited protection against dermal exposure to zinc.

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