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Dermal absorption of 2,4-D: a review of species differences

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Abstract

The human percutaneous absorption of 2,4-dichlorophenoxyacetic acid (2,4-D) is well characterized. Five studies using human subjects have been published and the results of those studies showed remarkable reproducibility across a span of three decades and multiple laboratories, formulations, and methods. These human data provide valuable perspective for characterizing the variability (CV = 60%) and central tendency (mean = 5.7%) associated with dermal absorption of 2,4-D from 34 individuals. Mouse, rat, and rabbit absorption measurements all tend to be higher, while Rhesus monkeys provide data in the same range as humans. Inter-laboratory reproducibility for a range of other pesticides shows $\leqslant$60% difference in central tendency estimates of human dermal absorption, providing reassurance that commonly used methods of measurement are reliable. For purposes of estimating potential human health risks associated with systemic absorbed doses, there is far less uncertainty in using carefully collected human data than in using dermal absorption estimates from small numbers of inbred laboratory animals.

Keywords: 2,4-D; Human dermal absorption; Species differences