This memorandum addresses the above oral and dermal absorption study of chlorpyrifos. The study was conducted by Griffin et al. (P. Griffin, H. Mason, K. Heywood, and J. Cocker) for Dow Agrosciences LLC to determine, among other things, oral and dermal absorption of chlorpyrifos in five human volunteers. There were four adult males and one female with the body weight ranging from 73-92 kg.

For an oral absorption study, each volunteer ingested 1-mg analytical grade chlorpyrifos (Promochem). Blood and urine samples were collected following administration of the dose. The urine samples were analyzed for anticipated dialkylphosphate metabolites. The mean percentage of the dose excreted in urine was 84 ± 23 % (55-115%).

Four weeks after the oral dose, 28.59 mg of chlorpyrifos was administered to an area of 78 cm² (366.5 µg/cm²) of the inner forearm of the same volunteers. The dosing solution was prepared by using a commercial preparation of chlorpyrifos (Dursban 4, Dow Elanco LTD), diluted in water to a total volume of 100 µl. The treated skin site was protected for a period of 8 hours with an occlusive cover made
with an impermeable plastic container. The treated skin was then washed with water and soap solution using three cotton swabs. Blood and urine samples were collected for analysis. The urine samples were analyzed for dialkylphosphate metabolites. Results showed that 1% of the administered dose was excreted as dialkylphosphate metabolites and 53% was recovered as chlorpyrifos from skin washings. This means that up to 46% of the dermal dose was not accounted for as dialkylphosphate metabolites in urine or as chlorpyrifos in skin washings.

The dose level used in the study done by Griffin et al. (DPN 342-773) was similar to the low dose employed by Nolan et al. (1982). In the Nolan study, the mean percentage of the dose excreted was 2.6% for the dose of 390 µg/cm² and 1.02% for the dose of 4,200 µg/cm². Because of the high doses used in the Nolan study, results from that and other studies were used to extrapolate the dermal absorption of chlorpyrifos (Thongsinthusak, 1991), which was 9.6%. Results obtained from the study accomplished by Griffin et al. do not warrant recalculation of this dermal absorption value.

Recommendations:
1. DPR will reevaluate the dermal absorption currently used in the exposure assessment, if a study is conducted using practical dose levels representative of field exposures, which are usually in the range of 1-50 µg/cm².

2. If a new study is to be conducted by the registrant, a study protocol should be submitted to DPR for review.

References:


cc: John Ross
David Haskell

(TCW/Dermal/Chlorpy1)