THE IMPACTS OF DERMAL EXPOSURE VARIABLES ON PERCUTANEOUS PENETRATION AND TISSUE DISPOSITION OF 3,3',4,4'-TETRACHLOROBIPHENYL IN AN EX VIVO SWINE MODEL

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3,3',4,4'-Tetrachlorobiphenyl (TCB), one of the dioxin-like PCBs, demands much research and regulatory attention. To evaluate the effects of exposure variables on dermal absorption and cutaneous disposition, occlusive or non-occlusive doses of ^{14}C-TCB were applied at 40 μg/cm^2 in various vehicles including acetone, methylene chloride, a water-acetone mixture, and a soil-based mixture using an ex vivo pig skin flap model (n=4-5/treatment). Significant exposure-dependent dermal absorption and tissue disposition profiles were observed. Ex vivo 8 h absorption varied from 0.11 to 0.80%, depending on exposure conditions. Acetone and methylene chloride vehicles showed different absorption profiles and skin tissue penetration patterns, but showed similar total absorption. Much more TCB was absorbed from soil-based mixture than from liquid (organic or aqueous-organic mixture) vehicles under non-occlusive exposure ($p<0.05$). Interestingly, occlusion of the TCB soil dose significantly ($p<0.05$) decreased both the total 8 h dermal absorption (0.80→0.29%) and total penetration (2.48→1.11%). This was similar to TCB absorption and disposition profiles in several other animal and human skin models tested. Adding water to the acetone vehicle did not change TCB dermal absorption. In conclusion, dermal absorption data from liquid TCB doses in organic or aqueous-organic mixture vehicles may underestimate the risk of TCB exposed in contaminated soil matrix. Dose occlusion and water addition to organic solvents showed little potential of enhancing TCB dermal uptake. Such observed exposure-dependent dermal absorption and tissue disposition profiles need to be considered when assessing TCB dermal risk under various occupational and environmental exposure conditions.

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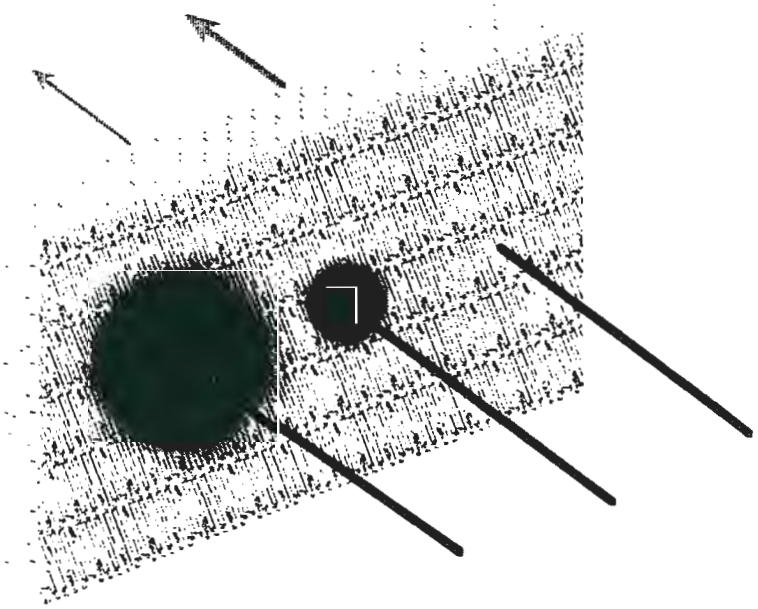

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