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Effect of exposure area on nerve agent absorption through skin *in vitro*

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Diffusion cells are used to determine the penetration of chemicals through skin *in vitro*. The cells have a limited surface area defined by the edge of the donor chamber. Should the penetrant spread rapidly to this containment limit the penetration rate can be accurately quantified. For the hazard assessment of small droplets of toxic chemicals, such as cholinesterase inhibitors, limiting skin surface spread *in vitro* could lead to underestimation of percutaneous penetration and hence underestimation of systemic toxicity *in vivo*. The current study investigated the dependency of the percutaneous penetration of undiluted radiolabelled nerve agents [VX and soman (GD), 10µl] on skin surface spread (pig and guinea pig) using Franz-type glass diffusion cells with an area available for diffusion of either 2.54 cm^2 or 14.87 cm^2. Both VX and GD spread to the edge of 2.54 cm^2 cells, but not to the 14.87 cm^2 cells over the study duration. Amounts of VX and GD penetrating pig and guinea pig skin in the 2.54 cm^2 cell were less than in the 14.87 cm^2 cell (except for GD under unoccluded conditions), however, penetration rates expressed per unit area were similar. Artificial limitation of skin surface spread *in vitro* does not impact percutaneous penetration *in vitro* as long as penetration is expressed in terms of mass per unit area.

Biography

Christopher Dalton is a Principal Scientist at Defence Science Technology Laboratory (Dstl) in UK. He completed his BSc (Chemistry), MSc (Toxicology) and PhD (Toxicology) at University of Birmingham, England, UK. His research interest includes "The percutaneous penetration of chemicals". He is a Chartered Biologist and European Registered Toxicologist.

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