
25 Chemical Warfare Agent VX Penetration through Military Uniform and Human Skin *Risk Assessment and Decontamination*

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25.1 INTRODUCTION

Most well-known warfare chemicals have similar molecular structures as the organophosphorus compounds. One of these, parathion, has been shown to exhibit body regional variation in human skin absorption (1). The exposed head and neck region ($\times 4$), trunk ($\times 3$), and genital area ($\times 12$) absorb more chemical than the arms and hands and legs and feet. In agricultural use, parathion has caused human death. Permeability constants (K_p) (potential chemical absorbed through human skin per unit area and time) indexed to regional variation give the mass of chemical absorbed through a region of the human body and the total body absorption when summed over all regions. The further overlap of toxicity data to absorption can be used to estimate potential lethality.

Percutaneous absorption and regional variation form the final barrier between the “outside” and the “inside” of the body where toxicity occurs. Percutaneous absorption is influenced by moisture, and certainly a soldier or civilian will sweat, and it does rain. Clothing also affects percutaneous absorption because material can act as both a barrier and a skin delivery system (2). Sweating, clothing, and skin absorption are thus interrelated.

Our objective of this study was to determine the percutaneous absorption of parathion when applied to naked human skin and uniformed skin with and without sweat and to predict potential human absorption and lethality of the structurally related chemical warfare agent (CWA) VX. A discussion as to skin decontamination of CWAs follows the absorption study.