MITIGATION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL HAZARD MITIGATION

Wound Decontamination Evaluation Pipeline (WDEP): Decontamination Of Wounds Contaminated With Chemical Warfare Agents

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Effective skin and wound decontamination are of significant military importance, as protective equipment designed to prevent exposure to chemical warfare agents may not be worn at the time of an attack or may become compromised during military activities. While normal, healthy skin may impede the ingress of many chemicals, it is not a perfect barrier. There is a time-critical window of opportunity to remove sufficient amounts of contaminant from the skin surface to prevent or limit local or systemic toxicity. Wounds afford chemical warfare agents a much more direct pathway into the blood stream. Concurrently, wounds also afford decontamination products a direct pathway into the blood stream. Accordingly, any decontamination product that will be used in wounds needs to be evaluated for potential systemic toxicity. The USA Medical Research Institute of Chemical Defense (USAMRICD) has many decades of experience testing decontamination products for intact skin and, more recently, in wounds. This project seeks to better define a standardized wound decontamination pipeline at the USAMRICD to evaluate new or existing products. This pipeline will use both in vitro and in vivo assays to evaluate candidate decontamination products. In the first tier, an NMR-based in vitro assay will be used to measure the half-life of the decontamination product while an in vitro skin assay will be used to measure the penetration of the compound across the punctured epidermal and exposed dermal layers, as well as potential impacts to wound healing. The combined scores from both assays will determine if a compound continues through the pipeline. Any decontamination product continuing to the next tier will be subjected to an in vivo small animal screen utilizing anesthetized, guinea pigs. Both the median lethal dose (MLD) of compounds in wounds and the effectiveness of a decontamination product will be evaluated, and the compound's score will determine if it continues to the large animal assay. Any decontamination product continuing through to the final tier will be subjected to an in vivo large animal screen utilizing anesthetized pigs. Any candidate that passes through all three tiers will be recommended as a possible wound decontamination product.

The views expressed in this abstract are those of the authors and do not reflect the official policy of the Department of Army, Department of Defense, or the U.S. Government.
The experimental protocols were approved by the Animal Care and Use Committee at the United States Army Medical Research Institute of Chemical Defense and all procedures were conducted in accordance with the principles stated in the Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act of 1966 (P.L. 89-544), as amended.
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