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Proceedings of the International Conference on Occupational & Environmental Exposures of Skin to Chemicals: Science & Policy

Hilton Crystal City September 8-11, 2002

NORA Dermal Exposure Research Program (DERP)

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Introduction

Some significant aspects of the US occupational skin exposure problem :

- Contact dermatitis is 10-15% of all occupational illnesses at an annual cost exceeding \$1,000,000,000.

- The toll of systemic effects has not been estimated.
- Dermal exposure assessment is not standardized and the results are difficult to interpret in terms of risk
- Engineering controls are emphasized too little.
- NIOSH policy focuses on Skin Notations and needs more comprehensive approaches

Part of the response by the National Institute for Occupational Safety and Health (NIOSH) is:

- After consulting with approximately 500 external partners, Allergic and Irritant Dermatitis was chosen as one of 21 priority research areas in the National Occupational Research Agenda (NORA).
- In 2000, the Dermal Exposure Research Program (DERP) was created to support and coordinate a program of NORA research and policy development in NIOSH

Overall goal

The overall goal of NORA DERP is to promote the development of NIOSH policies and recommendations for identifying and controlling skin exposures and dermatitis by:

- adding critical information to our current knowledge base through laboratory and field investigations and
- developing and applying a scientific decision-making process for policy development using that knowledge base.

Paradigm

The organizing concept of NORA DERP is the development of NIOSH policy from the existing scientific knowledge base to which the Program has

added critical information:



Specific aims

The specific aims of this program are to:

- Develop policy documents and guidelines that make scientifically-based recommendations for recognizing and controlling dermal hazards
- Apply accepted methods for classifying the potential of chemicals to cause dermatitis
- Improve mathematical models to predict skin permeation in laboratory studies and check for consistency with the results of field studies
- Demonstrate effective interventions against dermatitis and systemic effects in workplace case studies
- Organize forums to exchange information

Projects

Currently, there are eight research projects and two core activities in NORA DERP. The project leader is listed in parentheses.

Integrating project:

- Developing Policies and Decision-Making Procedures (Heinz Ahlers)

Methods development projects:

- Biomonitoring (Ken Cheever)
- Colorimetric Indicators (Evanly Vo)

Field case study projects:

- Field Studies: Exposure Assessment and Intervention Evaluation (Boris Lushniak)
- Engineering Controls (Leroy Mickelsen)

Hazard identification projects:

- Animal Studies of Decontamination and Chemical Penetration (Sid Soderholm)
- Predicting Penetration: Experiments and Mathematical Models (Fred Frasch)
- Quantitative Structure-Activity Relationship Modeling (Gene Demchuk)

Core projects:

- Hazard Identification – Local Lymph Node Assay (Jean Meade)
- Coordinating Core (Sid Soderholm)

Accomplishments

In its first 2 1/2 years, DERP can claim several accomplishments.

Integrating:

- Analyzed existing skin notations

Methods Development:

- Biomonitoring - two glycol ethers and 1-bromopropane
- Colorimetric detection - Aldehydes
- Analytical - Metabolites of Alachlor and caffeine

Field Case Studies:

- Developed protocol for field intervention study focusing on auto mechar and used engine oil

Hazard Identification:

- Developed a new type of mathematical model of skin permeation
- Determined that weanling pig and human skin-graft-on-rodent models were not suitable for our planned decontamination and permeation studies using radioactive chemicals
- Probed suitability of existing skin permeation data for establishing quantitative structure-activity relationships

Core Activities:

- Performed Local Lymph Node Assays in support of NIOSH Health Hazard Evaluations
- Funded four extramural pilot projects:
 - Field Glove Permeation Instrumental Methods Development (Shane Que Hee, UCLA)
 - Dermal Hazards in the Workplace: Assessment of Exposure and Protection (Tim Buckley, Johns Hopkins)
 - Workplace Surface Contamination & Dermal Exposure to Isocyanates (Roy Rando, Tulane)
 - Sunscreens, Agricultural Chemicals and Dermal Absorption (Rhonda Brand, Univ. Nebraska)
- Fostered better communication and collaboration internally and with OSHA, EPA and other partners in US and elsewhere
- Organized this international conference

In-progress

Additional work is in-progress.

- Continuing work noted in Accomplishments
- Improving concepts for NIOSH skin notations
- Building database to determine quantitative structure-activity relationships for skin sensitization
- Conducting in vitro studies of stratum corneum penetration, including time dependent effects
- Writing protocols for studies of skin decontamination using in vitro (human and hairless guinea pig) and in vivo (hairless guinea pig) experimental models
- Preparing state-of-the-art review chapters:
 - Introduction
 - Physiology and Anatomy
 - Immunology of the Skin
 - Skin Exposure Processes
 - Designing Lab-Based Permeation Studies
 - Assessing Exposure
 - Assessing Potential Health Effects
 - Controlling Skin Exposures

New future activities

- Conduct workplace studies focused on engineering controls
- Hold second international conference in Europe in 2004
- Draft policy documents

For additional information, visit the NIOSH skin topic webpage and look in the Research category

(<http://www.cdc.gov/niosh/topics/skin/skinresearch.html>).

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The International
Conference
on
Occupational & Environmental
Exposures of Skin
to Chemicals:
Science & Policy

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The National Institute for Occupational Safety and Health (NIOSH) co-sponsored this inaugural conference to bring together dermatologists, occupational hygienists, laboratory researchers, policy makers and other to focus on the science, knowledge gaps and policy opportunities related occupational and environmental exposures of the skin to chemicals.

The site was the Hilton Crystal City at Ronald Reagan National Airport hotel. The main conference was followed by a one-day workshop focusing on specific research and public health opportunities for decreasing the burden of skin exposures to chemicals in both workplaces and the general environment.

Approximately 135 individuals attended. A second conference is expected in 2004.

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