workers. The relationship was also quantified for general, physical, and mental health outcomes and for several measures of productivity (effectiveness, ability to work required hours, concentrate, handle workload, work without mistakes, and bend and twist). Self-reported data were compared to cost and incidence data in several databases to confirm validity. In addition, allergy treatment approaches (use of nonsedating antihistamines, sedating antihistamines, no treatment, and other treatment options) were compared to health and productivity outcomes.

101.

A NEW APPROACH TO SKIN HEALTH ASSESSMENT. H. Packham, Enviroderm Services, Evesham, United Kingdom.

Occupational skin disease carries a significant cost for industry in the form of workman's compensation, lost production, administrative costs, and lost skills. Faced with these mounting costs to industry and society as a whole, are there things we could be doing to reduce these costs? If we could detect problems at an early stage or better still when it is subclinical (invisible) we could reduce these costs. A skin health assessment program, if implemented correctly, could provide us with a very effective method for doing this.

Current methods are based around visual assessment. Unfortunately, this is a technique that looks solely at the surface of the skin and it will largely detect problems only when they are at a clinical and not subclinical stage. This allows action during the early clinical stages, but not normally for prevention of the problem by action at the subclinical stage.

Two techniques, which have been used in research for many years, provide a means of skin health assessment that can highlight subclinical damage for irritant contact dermatitis—the most common of the occupational skin diseases. The two techniques are (1) measurement of transepidermal water loss (moisture that passes through the skin and evaporates from the surface) and (2) hydration state of the stratum corneum (outermost layer of the skin). Transepidermal water loss measurement allows us to assess the state of the chemical barrier in the skin. Stratum corneum hydration is an indication of a general skin condition. These two measurements in combination with visual assessment give us the most powerful tool to date for the assessment of skin health, providing us with a program that not only allows for action at the earliest opportunity, but also at the subclinical stage.

102.

PERMEATION OF DIETHYL PHTHALATE THROUGH HAIRLESS GUINEA PIG SKIN. H. Frasch, A. Barbero, NIOSH, Morgantown, WV; J. McDougal, Wright State University, Dayton, OH.

Governmental agencies have expressed concern regarding the potential for dermal absorption of diethyl phthalate (DEP). DEP is on the priority testing list of the Interagency Testing Committee under the Toxic Substances Control Act. The present research measured skin permeation parameters for DEP using neat chemical and saturated aqueous solution.

Hypothesis: Steady state flux of DEP through skin from saturated aqueous solution and from neat liquid will be the same.

Methods: Dermatomed abdominal hairless guinea pig (HGP) skin was used. From each HGP (n = 4), six skin punches were mounted on Franz-type diffusion cells. Saturated aqueous (HEPES-buffered Hanks balanced salt solution (HBSS)) solution of DEP was placed in donor compartments of three cells; pure DEP was placed in three cells. Accumulation of DEP in receptor fluid (HBSS) was measured over 5 hr. Skin sections from the same animals were equilibrated in DEP-saturated HBSS and in neat DEP. Uptake of DEP was measured. For each n, data from three replicates were averaged. The following were determined: steady-state flux (Jss); lag time (tlag); permeation coefficient (kp); skin-HBSS partition coefficient (K); DEP solubility in HBSS; neat DEP solubility in skin.

Results: Data are mean +/- SD. Jss ($\mu g.hr^{-1}.cm^{-2}$) was greater (P = 0.015) from saturated HBSS (31.4 +/- 11.7) than from neat DEP (9.8 +/- 3.5). tlag (hr) did not differ (0.63 +/- 0.23 vs 0.59 +/- 0.45). kp ($cm.hr^{-1}$)from saturated HBSS: 3.4x10-2 +/- 9.7x10-3; from neat DEP: 8.7x10^{-6} +/- 3.2x10^{-6}. K: 3.9 +/- 0.8. DEP solubility (µg/ml) in HBSS: 921 +/- 126; in skin: 8925 +/- 3339.

Conclusions: Skin may be a significant route of uptake of DEP. Jss from saturated aqueous solution was ~3x greater than from pure chemical, even though the estimated chemical potential for neat DEP was greater than for saturated solution. Increased skin permeability caused by hydration may be the mechanism.

103.

MULTI-GENERATION REPRODUCTIVE TOXICITY STUDY OF IMPLANTED DEPLETED URANIUM IN RATS. D. Arfsten, A. Thitoff, E. Johnson, A. Jung, W. Jederberg, K. Still, Naval Health Research Center Toxicology Detachment, Wright-Patterson AFB, OH.

The risk for penetration injuries to battlefield personnel caused by depleted uranium (DU) projectiles has increased since the 1970s. Removal of DU projectiles from the body may not always be possible. Embedded DU solubilizes in the body over time and can translocate to various organs and tissues including the reproductive organs and developing fetus. Since DU is a toxic heavy metal and possibly mutagenic, fragments left inside the body could have a negative impact on reproductive organ function and/or reproductive success. To test this hypothesis, 8-week-old male and female Sprague-Dawley rats (P1 generation) were implanted with 0, 4, 8, 12, or 20 DU 1 x 2-mm pellets approximating 0.03, 0.06, 0.10, and 0.15% by weight of a 500-g rat, respectively. The animals were then cross-mated in various combinations at 30 days post-implantation. Parameters measured were reproductive success over a 7-day mating period, gestation weight gain, number of live-born pups, average pup weight at PND1, number of pups surviving to PND 4, and pup weight gain through PND20. Collection of urine and feces from P1 animals at 25 days post-implantation showed that DU was being excreted in the urine of DU-implanted animals. No evidence of toxicity was apparent for P1 DU-implanted animals at 30 days post-implantation. Our preliminary findings suggest no large differences between study groups for live birth indices, PND4 and PND20 viability indices, and average pup weight gain from PND4 to PND20. PND 4 F1 pups born to DU-implanted animals did not contain any detectable levels of uranium (limit of detection: 0.5 µg/mg tissue). Investigations are ongoing to determine the levels of DU detectable in PND4 pup tissues, specifically kidney, liver, GI tract, bone, brain, thymus, and ovaries/testes. Mating of DU-implanted animals at 120 days will also be carried out.

104.

ASSESSING RISK OF BLOODBORNE PATHOGEN INFECTION: A RESIDUAL BLOOD CONTAMINATION SURVEY. R. Hill, Clayton Group Services Inc., Lakewood, CO.

In response to a workers' compensation claim of Hepatitis C (HCV), an investigation was conducted to determine the risk of contracting HCV from electronic transmitters used to monitor home-bound prisoners. The initial investigation revealed a HCV infection prevalence rate of 64–85% among IV drug abusers, which suggested a potentially high prevalence in a prison population. However, this workplace occurrence appeared unusual because HCV is known as a bloodborne pathogen, and not as an enteric nor airborne pathogen. The ensuing, detailed investigation looked at the potential for residual blood contamination on transmitters and potential sensitivity of the HCV virion to environmental factors and disinfectants, particularly as compared to HBV and HIV. The residual blood contamination survey, using a technique utilized by crime scene investigators, did not reveal any residual blood residues on the transmitters. In conclusion, the lack of blood residues on incoming transmitters and the suspected environmental sensitivity of HCV cause it to be very unlikely that the HCV case at this work place resulted from this source.

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