256.

A LITERATURE REVIEW OF REPORTED SERUM/BLOOD LEVELS OF PERFLUOROALKYLATED SUBSTANCES (PFAS) PFOA (PERFLUOROOCTANOATE), PFOS (PERFLUOROOCTANATESULFONATE), AND RELATED COMPOUNDS TO ASSESS OCCUPATIONAL AND NONOCCUPATIONAL EXPOSURE. A. Ibrahim, JD Medical, Santa Monica, CA; J. Dahlgren, University of California at Los Angeles, Los Angeles, CA.

Purpose: To assess serum levels of PFOA, PFOS, OF (organic fluorine), IOF (inorganic fluorine), TF (total fluorine) in occupational and nonoccupational populations reported in the literatures.

Methods: We carried out a systematic retrospective review of biological monitoring articles and reports to the EPA of serum/blood levels of PFOA, PFOS, OF, and IOF. We classified studies by year of publication, year study was conducted, population understudy, country of origin, and job category. We calculated the weighted mean ((mean * n)/N) for each compound and compared the results.

Inclusion Criteria: Articles reporting serum levels of PFOA and related compounds in medical journals between 1979–2003.

Results: 17 studies were identified including case series. For PFOA, three studies were in an occupational setting (n = 859, weighted mean = 2718.735 bbp). For PFOS, two were from general population, from Japan (n = 36, weighted mean was 2.9662 ppb), and the USA (n = 106, range 81.5–6.7 ppb). For PFHS, one study was from Japan (n = 13, weighted mean = 0.769 ppb). For TF, two studies were in general population (n = 291, weighted mean = 7.130 ppb). For OF, two from occupational population(n = 65, weighted mean = 3.693 ppb) and three in general population (n = 349). IOF were in two occupational settings, n = 57, 12 in general population (n = 295, weighted mean = 2.905 ppb). There is a 50 to 100 folds increase in the PFOA and PFOS in plant workers. Using t-test, there are higher levels in the U.S. population vs. the Japanese population and higher levels in occupational setting vs, nonoccupational settings (p = .001)

Conclusions: PFAS compounds are widespread in the general population in detectable levels and extremely higher in occupational population. While the undesirable health effects are still understudied, workers and employers should be counseled and occupational health providers informed. Further studies are needed to investigate the underlying biological mechanisms.

257.

DERMAL DECONTAMINATION IN MAN. H. Maibach, University of California-San Francisco, San Francisco, CA.

A prominent dermatotoxicologic myth suggests that workers may readily remove skin surface applied chemicals (from routine exposure or accidental spills, or after chemical warfare or terrorist exposure).

This presentation will document the evidence-based data in this experimental field suggesting that, for practical purposes, this approach is currently myth and not fact.

Then, new techniques for ascertaining stratum corneum mass (a protein method) will be illustrated. This method, combined with *in vitro* stratum corneum assays, should permit screening of more efficient skin decontaminating systems.

258.

SURFACE AND SKIN DECONTAMINATION OF ALIPHATIC ISOCYANATES IN AN EXPERIMENTAL STUDY. D. Bello, S. Woskie, University of Masachusetts Lowell, Lowell, MA; R. Strecher, NIOSH, Cincinnati, OH; M. Stowe, J. Sparer, Y. Liu, Yale University School of Medicine, New Haven, CT.

Isocyanates may cause contact dermatitis and skin irritation or sensitization leading to asthma. Dermal exposure to aliphatic isocyanates in auto body shops is very common. However, little is known about the efficiency of available commercial products in decontaminating isocyanates. This experimental study evaluated decontamination efficiency of aliphatic isocyanates for six skin (ZEP®, GOJO®, STOKO® painters hand cleaners, STOKO® Culpran® barrier cream, CLI-DTAM™ safe solvent, and polypropylene glycol PPG) and seven surface (water, 10% soap/water, isopropanol, isopropanol/tergitol/water 5/20/75, CLI-ammonia, Pine-Sol® general purpose cleaner, generic ammonia-based cleaner) decontaminants used in or recommended for the auto body industry. The two major decontamination mechanisms were studied separately for each decontaminant: (1) destruction of free isocyanate groups via chemical reactions with active hydrogen components of decontaminant was studied via measuring reaction kinetics in a vial; (2) decontamination efficiency by physical and mechanical removal processes was evaluated from triplicate isocyanate spikes on 10-cm diameter aluminum foil. Two model isocyanates, butyl isocyanate and Bayer's N3300 isocyanurate each at 1×10^{-3} N, were used for the reaction kinetic study. N3300, spiked at 0.33 and 3.3 µg NCO/in^2, was used to study the efficiency of mechanical removal processes. Isocyanates were quantified using NIOSH method 5525 and high performance liquid chromatography. Considerable differences were observed among surface and skin decontaminants in their rate of isocyanate consumption, of which those containing free amine groups performed the best and PPG the worst. Overall, Pine-Sol® and CLI-ammonia solutions were the most efficient surface decontaminants, operating primarily via chemical reaction with the isocyanate group. All tested skin decontaminants performed similarly, accomplishing decontamination primarily via mechanical processes and removing up to 80% of isocyanates in one wiping. Limitations of these skin decontaminants are discussed and alternatives presented. *In vivo* testing and evaluation are needed to further assess the efficiency and identify related determinants.

259.

CLEANSER-INDUCED EFFECTS ON SKIN BARRIER FUNCTION. J. DeHaven, C. Beighley, M. Kashon, S. Soderholm, NIOSH, Morgantown, WV.

Dermal exposure to toxic chemicals is associated with health risks. Intuitively, health risks should be reduced by skin decontamination. As a preliminary step in studies of decontamination, we have looked at the modulation of skin barrier integrity by selected cleansers. Using the standard *in vitro* tritiated water barrier assay in a flow-through diffusion cell system, we evaluated five cleansers and two controls (water, no treatment). We chose cleansers (none containing abrasives) from the many readily-available or specifically marketed for decontamination. Cleansers were: 10% (v/v) Ivory Liquid®, 100% Safe Solvent®, 100% D-TAM®, 100% GoJo Smooth Orange®, 0.5% Clorox®. They were used with mild scrubbing (Q-tip) and according to the printed instructions of the manufacturer or, for Clorox®, per U.S. Army recommendations. Dorsal skin from three aged (29–36 mo) female hairless guinea pigs was stored, full-thickness, at -85°C for 130–260 days. Each dermatomed skin produced 14 skin disks. Disks were weighed, randomized to one of 14 cells, and tested for barrier integrity (tritiated water assay #1). Then intact disks (typical result 0.1% penetration) were exposed to acetone to simulate application of a contaminating chemical. Following 2 hours rest, 2 disks from each animal were randomized to each cleanser treatment (cleanser and 2 water rinses within 5 minutes). After 2 more hours, cells were re-tested for barrier integrity (tritiated water assay #2). Acetone alone did not perturb barrier function. None of the cleansers destroyed barrier integrity, i.e., all <0.35% penetration. Analysis of covariance using skin disk weight as the covariate indicated a significant effect of treatment ($p = 0.018$). Pair-wise comparisons of each cleanser vs. water using Dunnett's test showed evidence that the two most lipophilic cleansers significantly increased tritiated water penetration ($p<0.05$), suggesting that lipophilic cleansers might reduce barrier function in this test system.

260.

DERMAL EXPOSURE TO JP-8 JET FUEL FOR FUEL-CELL MAINTENANCE WORKERS AT AIR FORCE BASES. E. Chao, B. Serda, P. Egeghy, S. Rappaport, L. Nylander-French, University of North Carolina-Chapel Hill, Chapel Hill, NC.

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