Tu-Po-45 Viability of Cultured Primary Human Skin Cells Treated with HDI Monomer and HDI Isocyanurate

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The monomer and oligomer, 1,6 hexamethylene diisocyanate (HDI) and HDI isocyanurate, respectively, are components in sprayed polyurethane coatings. Exposure via the lungs and skin can lead to sensitization and chemically induced asthma. Much research has focused on effects of exposure on respiratory and immune cells. Using the luminescent ATP-viability assay (CellTiter-Glo, Promega, Madison, WI), we have studied the effect of a 4-h exposure to HDI monomer or HDI isocyanurate on the viability of three types of cultured primary human skins cells (fibroblasts, keratinocytes, and melanocytes) from several individuals to determine inter-individual variation and cell-type specific toxicity. Preliminary LD50s (50% lethal dose) of HDI- and isocyanurate-treated cells in unsupplemented culture medium range from 302000 M for the HDI monomer and 0.7 M for the oligomer. Similarly, published IC20 (20% inhibitory concentration) data using HDI-treated respiratory and immune cancer cells lines range 40500 M. Aerosolized paints typically contain 1% HDI monomer, which is the equivalent of 60 mM, The lethal

range 40500 M. Aerosolized paints typically contain 1% HDI monomer, which is the equivalent of 60 mM, The lethal doses in cultured cells are well below observed exposure concentrations in occupational settings and, thus, the in vitro data may predict dermatologic health issues with occupational exposures to the monomer. HDI isocyanurate, which can make up to 96% of sprayed polyurethane coatings, may be more toxic than the HDI monomer due to its extra reactive NCO group, and the much greater potential for exposure may make it a more significant health problem. HDI isocyanurate constitutes the largest inhalation and skin exposure and has been shown to possess a greater sensitizing capacity than HDI monomer. Further, HDI isocyanurate penetrates the skin faster than HDI monomer. Our dose/response data obtained with normal human cell cultures indicate that skin cell sensitivity to death by HDI varies among individuals but not between cell types from the same individual. We have also observed a hormesis effect at very low doses in some individuals. Our data will aid understanding of individual sensitivity to diisocyanate exposure as well as the relative risk associated with different diisocyanate forms.

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