Urine Biomonitoring For TDI Exposure

TDI Biomonitoring For TDI Exposure

Toluene diisocyanate (TDI) is a compound that reacts rapidly with polyols and amines to form polyurethane foam. Limited epidemiology studies suggest that workers with prolonged exposure to TDI at levels above established workplace exposure limits may experience a decline in lung function. Individuals exposed to very high levels of TDI may become sensitized and may experience asthma-like respiratory effects on re-exposure to TDI at levels below the exposure limits. Workplace exposure limits have been established to prevent the loss of lung function and respiratory sensitization in workers potentially exposed to TDI. Methods also are available to reliably monitor the concentrations of TDI in workplace air.

Urine testing methods have been used to determine if an individual worker was recently exposed to TDI. In the body, TDI reacts with proteins and other organic molecules before it is excreted. To determine total TDI exposure from all routes (inhalation, dermal, etc.) biomonitoring assays rely on sophisticated analytical techniques in which TDI and the various metabolic or breakdown products of TDI present in urine are converted in the laboratory to a derivative, toluene diamine (TDA). The total amount of converted TDA measured in the urine has been proposed as an estimate of exposure to TDI, assuming that an individual has not been exposed to another source of TDA.

Results of TDI biomonitoring analyses (measurements of converted TDA in urine) may be difficult to interpret and the following points must be considered:

• Studies of TDI exposures in the workplace have not consistently shown a good correlation between air exposure levels and biomonitoring results;
• Biomonitoring for TDI exposure by measuring converted TDA in urine does not identify peak exposures which may be more relevant to pulmonary sensitization;
• Urine monitoring results for TDI exposure have not been correlated to adverse human health effects and no biological monitoring limit has been established for TDI; and
• The detection of converted TDA in laboratory assays on processed urine samples does not necessarily reflect the presence of TDA in the body. Therefore, one should not normally expect TDA-related health effects just because converted TDA is detected in the biomonitoring assay for TDI.

The results of urine biomonitoring for TDI must be evaluated with caution and significant questions remain regarding the relevance of these studies for TDI exposure assessment.

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The Diisocyanates Panel of the American Chemistry Council and its member companies believe that this document is, as of the date of its publication, a technically accurate summary based on available scientific information. However, the Panel and its member companies do
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