



Understanding Work-related Asthma

Connecting glutathione with immune responses to occupational methylene diisocyanate exposure

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Overview

Work-related asthma may be triggered by large molecules (such as proteins from fish or from natural rubber latex) as well as by small, highly reactive molecules, such as diisocyanates (including TDI and MDI). MDI is commonly used to harden spray polyurethane foam (SPF) and is a major cause of work-related asthma, lung disease and dermatitis among SPF applicators. While prior information suggests that small molecules cause allergic responses by binding to large proteins in the body, the exact mechanism is not known. Researchers explored one potential mechanism for transporting MDI by testing chemical reactions in laboratory conditions simulating conditions in the human body. Chemical products were then reacted with antibodies obtained from blood samples from construction workers who had worked with MDI as well as from unexposed control subjects. The results suggest a chemical reaction that may help shuttle MDI into the bloodstream and distribute it throughout the body. Better understanding of this mechanism may help prevent or treat asthma.

Key Findings

- Researchers developed mixtures of MDI similar to what would be found following typical workplace exposures and placed them in various solutions, some of which mimic conditions in the human body.
- MDI was previously known to react with albumin, a human protein found in many parts of the body, including the bloodstream, as well as with glutathione (GSH), a substance also found throughout the body, including the lungs and the skin.
- In the test tube, MDI bound to GSH but was also able to transfer from the GSH to albumin.
- The MDI-albumin produced was then recognized by antibodies from MDI exposed workers, but not by controls.
- MDI also reacted with other proteins, but these were not recognized by antibodies from exposed workers.
- The researchers conclude that GSH may act as a shuttle to transport MDI from the site of contact with the body to the bloodstream and elsewhere.
- Further research is needed to better understand the process and to explore possible ways of reducing the effect of MDI exposure.

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See abstract:

<http://1.usa.gov/1mFxx05>

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