*Project S E.N.S.O.R. News

Volume 16, No. 2 Spring 2005

Development of Work-Related Asthma from Skin Exposure

The risk of developing of work-related asthma is a dose-related response. Figure I illustrates a well studied group of workers exposed to western red cedar dust in a sawmill from the Northwest United States. As the dust level in the sawmill increased, the diagnosis of asthma increased. However, on many occasions follow-up to the workplace of a patient with work-related asthma has not found elevated or even any measurable air levels of the suspected workplace allergen. In some cases, the history will reveal changes in production between the onset of asthma and the inspection. In other cases, a history of spills is elicited. As illustrated in Figure II studies have found a dose-response between the number of spills and disease. Air levels will be low or unmeasurable on the day of inspection since no spill is taking place that day. Proper spill clean up procedures, appropriate personal protective equipment and preventive maintenance can protect workers from exposure during spills.

In some situations where air levels are unmeasurable, there is also no history of spills or production changes. The literature on the development of respiratory sensitization after skin exposure without respiratory exposure may explain how the patient has had sufficient exposure to develop asthma. It is difficult in humans to isolate the source of exposure (i.e. someone with skin exposure typically also has respiratory exposure). Animal models have been used where the rodents' skin has been exposed via subcutaneous injection or an occluded patch without respiratory exposure. Respiratory sensitization has been demonstrated via skin exposure for latex, toluene diisocyanate (TDI) hexadimethyl isocyanate (HDI), diphenylmethane diisocyanate (MDI), trimellitic anhydride (TMA) and 3-amino-5-mercapto-1,2,4-triazol (AMT) (1-6). Further work with HDI has shown that HDI used in auto paints conjugates with keratins in the skin. These skin keratins are structurally related to keratin 18 which HDI binds in the airway epithelium (7).

Isolating skin exposure in studies of humans has not proven possible. A study was performed

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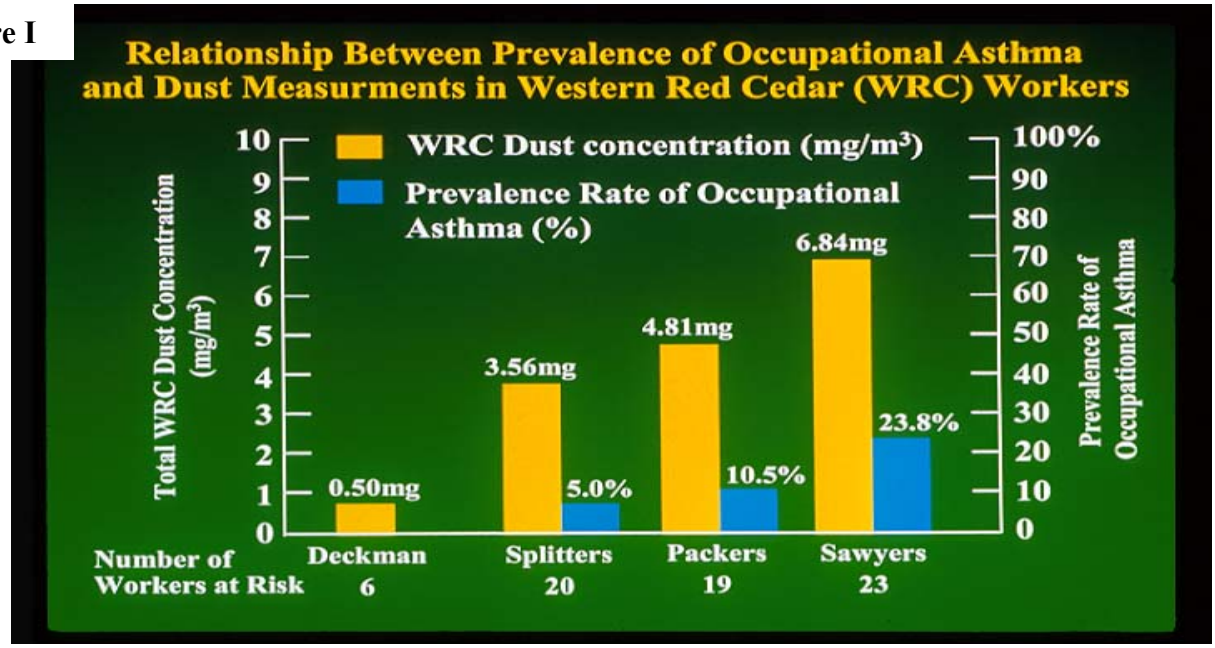
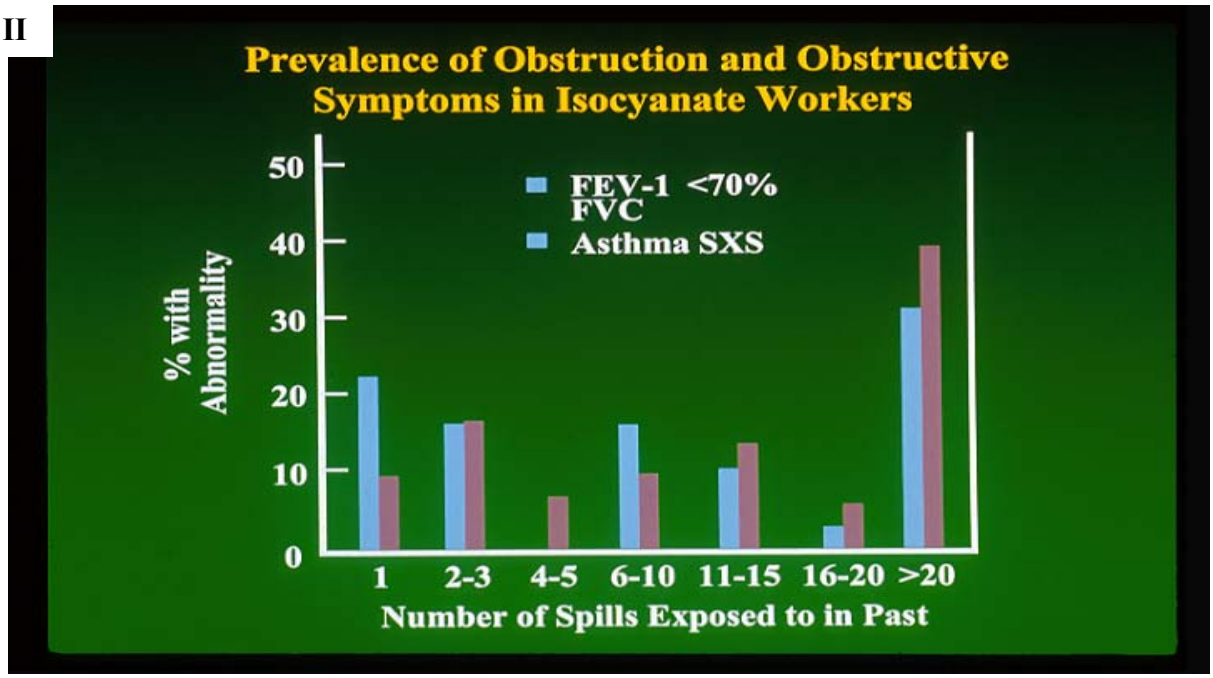
Figure I



among workers at a new wood product plant which used MDI. The facility had state of the art engineering controls including physical isolation and negative pressure ventilation as well as extensive personal protection equipment which included air-supplied respirators and protective clothing. Respiratory symptoms still developed. Both skin and clothing stains (skin more than clothing stains) from MDI were associated with respiratory symptoms. However, the authors could not rule out that there was increased inhalation exposure in workers with increased skin stains (8). A recent study of asthma in 11 workers with exposure to a chemical used to make the herbicide flumetsulam reported that dermal exposure to the chemical caused respiratory sensitization to mice and suggested a role for dermal absorption in the development of asthma in the workers (9).

The possibility of dermal exposure initiating or aggravating work-related asthma complicates both the prevention and management of work-related asthma. Dermal exposure should be considered as a possible route of exposure for the isocyanates, latex and possibly other exposures particularly when air levels are low or non-measurable.

Figure II



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In this issue:

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The Project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the National Institute for Occupational Safety and Health and is available at no cost. Suggestions and comments are welcome.

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