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Dear Health Care Provider,

In this issue, we provide a case study of an auto body shop worker exposed to isocyanates. The case study, previously presented by Dr. William Beckett and the American Thoracic Society¹, describes a classic case of occupational asthma (OA). Following the case description are questions posed to highlight some of the key issues related to diagnosis of work-related asthma. Since 1992, the Occupational Health Surveillance Program (OHSP) has received reports of 24 cases of asthma related to isocyanate exposure.

Remember to report suspected and confirmed cases of work-related asthma to OHSP by phone, fax or mail. To receive your Bulletin by e-mail, send a message, with the word "Bulletin" in the subject line to Occupational.Asthma@state.ma.us.

Sincerely,
 Elise Pechter MPH, CIH

Asthma in an Auto Body Shop Worker

A case study by William S. Beckett, MD., MPH
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A 24-year-old male auto body shop worker presents with a 4-year history of slowly progressive respiratory complaints which include chest tightness, wheeze, cough productive of minimal white phlegm, and dyspnea. Over the last 4 months, the patient has awakened from sleep twice weekly. His use of albuterol metered dose inhaler has gradually increased to a current level of 10-12 puffs daily. The past medical history is unremarkable, with no history of childhood asthma. He is a smoker with no history of substance abuse. He started working in the auto body shop roughly 4½ years ago, at which time he was symptom-free. Detailed occupational history, including review of Material Safety Data Sheets (MSDS), suggests the use of polyurethane (two-component, hexamethylene diisocyanate or HDI) spray paints. No seasonal symptoms or home precipitants are reported. The physical examination suggests a normal oropharynx and prolonged expiratory phase on chest auscultation. His prebronchodilator spirometry was within normal limits according to ATS criteria. His methacholine challenge test confirmed hyper-reactive airways. He was asked to

¹ The official journal publication, published by the American Thoracic Society, was accessed on January 11, 2004 at: <http://www.thoracic.org/assemblies/eoh/cases/ansmay03.asp>

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maintain a record of his peak expiratory flow rates at least four times daily for 2 weeks, both on and off work. The peak flow graph is shown in Figure 1.

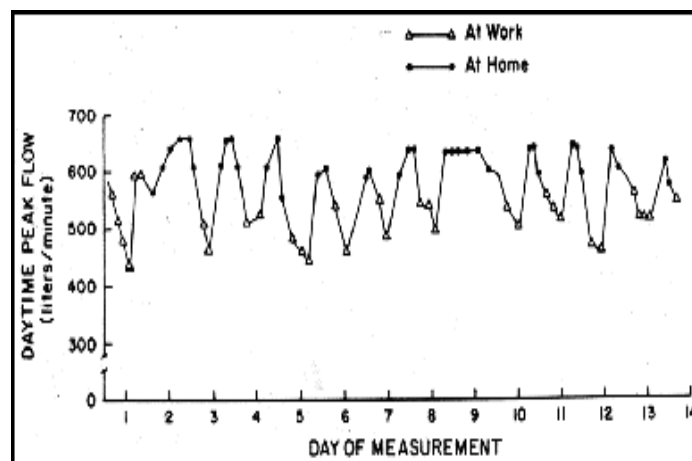


Figure 1. Auto body shop worker peak expiratory flow rates collected over a two-week period

QUESTIONS:

Question 1:

Of the following, which ONE is the most likely diagnosis for this case?

1. Non-occupational asthma
2. Occupational asthma (OA)
3. Industrial bronchitis
4. Airway irritation without asthma
5. Metal or polymer fume fever

Question 2:

Which ONE of the following is LEAST helpful in making a diagnosis of isocyanate-induced occupational asthma?

1. Occupational history
2. Material Safety Data Sheets
3. Nonspecific inhalation challenge by methacholine

continued on other side

4. Skin test for immediate hypersensitivity
5. Peak expiratory flow rate records both at home and at work

Question 3: (more than one answer may be correct)

Which of the following is/are NOT true regarding occupational asthma caused by isocyanates?

1. This is a common cause of reactive airways dysfunction syndrome (RADS) at the workplace.
2. Incidence of this disease may be declining in the United States.
3. Improvement of symptoms away from work occurs early in the course of this disease.
4. This affects only some of those exposed to isocyanates.
5. Smoking may increase the predisposition to this disease.

Question 4:

Which ONE of the following workplace corrective measures is LEAST helpful for occupational asthma caused by sensitizers?

1. Material substitution (e.g., change paints)
2. Engineering controls (e.g., local exhaust ventilation)
3. Personal protective equipment (e.g., respirator)
4. Transfer to non-exposed worksite

ANSWERS:

Question 1: The correct answer is 2.

A diagnosis of asthma is supported by history, physical examination, and methacholine challenge test. The occupational relationship is supported by occupational history, MSDS, and peak flows. Diurnal variability in peak expiratory flow rates >20% on days at work, but not on days away from work, is consistent with OA (see Figure 1).

Question 2: The correct answer is 4.

Skin testing has not proved useful for diagnosis of isocyanate-induced occupational asthma.

Question 3: The correct answers are 1 and 5.

Isocyanates are compounds that cause OA with latency. They usually do not cause RADS. RADS is asthma that occurs after a single exposure to high levels of an irritating vapor, fume, or smoke and persists after the initial episode. Tobacco smoking increases the risk of sensitization and asthma for several low-molecular-weight chemicals such as acid anhydrides², but not for isocyanates.

Question 4: The correct answer is 3.

Complete avoidance of exposure remains the most effective treatment of sensitizer-induced OA. Early removal is associated with a better medical outcome. Ventilation will reduce exposure. Personal protective equipment (respirator) often fails to provide adequate protection from sensitizers, and should only be used when other control measures are not practicable. Supplied air respirators would be the most effective personal protective equipment.

Isocyanate WRA Cases Reported to SENSOR March 1992 - December 2004 (n = 24)*

Manufacturing	14	Services	6
Sporting Goods	5	Automotive Repair	4
Plastic Products	2	Other	2
Adhesive and Sealant	2	Public Admin	3
Industrial Machinery	2	Other	1
Other	3		

*based on provisional data

Work-Related Asthma Cases Reported to Massachusetts SENSOR

September 2004	October 2004	November 2004	Total (03/92 - 11/04)
3	2	0	993



Figure 1. Specific occupational challenge at the patient's workplace using spray paints containing HDI. (This was done with informed consent as part of a research protocol for occupational asthma.)

² Chan-Yeung M, Malo JL, Occupational asthma. N Engl J Med 1995; 333(2):107-112.

Remember, work-related asthma cases may be reported to SENSOR by phone, fax, or mail!