



HARVARD SCHOOL OF PUBLIC HEALTH

Occupational Asthma and Contact Dermatitis in a Spray Painter after Introduction of an Aziridine Cross-Linker

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A 23-year-old spray painter developed contact dermatitis and respiratory difficulty characterized by small airways obstruction shortly after the polyfunctional aziridine cross-linker CX-100 began to be used in his workplace as a paint activator. The symptoms resolved after he was removed from the workplace and was treated with inhaled and topical steroids. Painters may have an increased risk of asthma due to exposure to a variety of agents, such as isocyanates, alkyd resins, and chromates. This case illustrates the importance of using appropriate work practices and personal protective equipment to minimize exposure. Occupational asthma is diagnosed by a history of work-related symptoms and exposure to known causative agents. The diagnosis is confirmed by serial pulmonary function testing or inhalational challenge testing. The risk of asthma attributable to occupational exposures is probably underappreciated due to underreporting and to inappropriate use of narrow definitions of exposure in epidemiologic studies of attributable risk. **Key words:** aziridine, contact dermatitis, occupational asthma, personal protective equipment, spray painting. *Environ Health Perspect* 107:599–601 (1999). [Online 16 June 1999] <http://ehpnet1.niehs.nih.gov/docs/1999/107p599-601leffler/abstract.html>

Case Presentation

A 23-year-old spray painter developed dermatitis and difficulty breathing after a new paint additive began to be used in his workplace in late December 1992. The rash began on his hands and progressed to his forearms, legs, and neck. The initial diagnosis was tinea corporis, and then asteototic dermatitis with nummular lesions. In January 1993, he was given nasal beclomethasone for congestion and an inhaler for breathing difficulties.

In February 1993, the patient was treated for bronchitis. By March, the rash was worse and he was given an albuterol inhaler for continued wheezing. He also had several episodes of eye irritation and redness and some periorbital and unilateral facial swelling.

During a 2-week vacation in July, the patient needed the bronchodilator less often. The rash on his hand appeared unchanged, but he noted improvement in the pruritis and in the back of his neck and legs.

In August 1993, the patient was referred to occupational medicine for the dermatitis. He brought material safety data sheets for water-based low-bake enamel paints. The new paint additive was a polyfunctional aziridine cross-linker, CX-100 (1). At this time, the patient was using diphenhydramine, inhaled albuterol, and topical triamcinolone. He had a scaly erythematous fissured rash on the dorsum of the hands, and palmar, forearm, and

facial erythema. An erythematous, scaly area extended over the posterior neck and upper back, and he had an intertriginous rash under the abdominal skin fold and an erythematous rash with circumscribed, raised edges on the scrotum and upper thighs. The patient's legs had erythematous papules and confluent areas of dermatitis. His nasal mucosa was boggy and pink, with a milky-colored discharge. There were bilateral expiratory wheezes throughout the lung fields, and his peak expiratory flow rate was 710 L/min. The diagnosis was a delayed hypersensitivity contact dermatitis, probably due to the aziridine cross-linker. Occupational asthma was considered because of the relation of symptoms to exposure onset and his reduced symptoms during a vacation, even if changes were not noted on weekends.

While working, the patient's forced vital capacity (FVC) was 4.7 L (97% of predicted). His forced expiratory volume in the first second (FEV₁) was 3.74 L (87% of predicted). The ratio of FEV₁ to FVC was 0.79. The patient's midexpiratory flow was 3.13 L/sec (62% of predicted). After the patient used bronchodilators, his FEV₁ was unchanged, but the midexpiratory flow rate increased by 19%. This pattern was consistent with mild small airways disease. The patient had a 5% cross-shift drop in the peak expiratory flow rate on workdays. After

he was removed from the workplace, the corresponding peak flow rates rose.

By September, the patient had been out of work for 1 week. His dermatitis had improved and his lungs were clear. He then left this job permanently.

In October, the patient was given a methacholine challenge test that showed a provocative concentration resulting in a 20% drop in the FEV₁ (PC₂₀) of 0.5 mg/mL (with < 8 mg/mL considered diagnostic of hyperreactive airways). The patient's dermatitis was resolved in all areas but the hands. He used a bronchodilator in the morning for chest tightness and cough and triamcinolone two puffs twice per day; he used fluocinonide cream for his hands.

In late October, the patient was prescribed triamcinolone cream and gloves at night for a vesicular eruption on his fingers. He discontinued inhaled steroids in late 1993 because of improvement. By April 1994, the rash on the right hand had resolved, but his left hand had a small lichenified, excoriated area. He used a bronchodilator three mornings per week and after exercise.

Past medical and occupational history. The patient denied childhood skin or respiratory problems and had never smoked. He noticed tears in his eyes when he was around cats. His identical twin got hives after bee stings.

The patient first worked in auto shops doing body work and painting. Then, as a technical student for 2 years, he spray-painted and refinished furniture. His most recent job (for 4 years) involved spray-painting furniture on an overhead conveyor belt, wearing a solvent respirator without eye protection. He stood between the furniture and the exhaust vent when spraying the back of each piece.

The painters added activator to the paint in a small room with a wall fan. They

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