



Building-Related Asthma

Case #1

A teacher in her 50s developed shortness of breath and chest tightness 5 years after beginning work for a new school district. Two years later she was started on albuterol and zafirlukast. Two years previous to the onset of her symptoms an adjoining garage was built. The patient described diesel fumes entering the school building. She had smoked less than 1/4 pack of cigarettes a day in her 20s for a couple of years. She had no family history of asthma. She had a history of allergies since childhood but had not had prior breathing problems.

Case #2

A woman in her 40s who worked for a state agency developed a cough, chest tightness, and shortness of breath 2 years after beginning to work for the state. Six years later she developed wheezing. She uses cromolyn and albuterol inhalers. She has received oral steroids. The building was 10 years old when she began working in it. She stated that in the office the temperature was uncomfortable, the air was very dry, the space was very dusty and dirty and there was mold growing on the carpet. She had a child with asthma. Fifteen years previously she had positive skin tests to mold, pollen, dust and grass after seeing an allergist for nasal stuffiness. She had never smoked cigarettes.

Case #3

A teacher in her 50s developed wheezing, cough, shortness of breath, and chest tightness 17 years after beginning to work in a school. She was begun on albuterol and triamcinolone inhalers. She described asbestos, water damaged ceilings, mold, deteriorating wood, pigeon droppings, tar and dust being present at her school. There was no family history of asthma and no personal history of allergies. She had quit smoking cigarettes in her early 40's after smoking 2 packs of cigarettes a day for 20 years.

Case #4

A man in his 60s who worked in a corporate office developed chest tightness 15 years and wheezing 18 years after moving to his current office. He was begun on albuterol and salmeterol. He described his office as being damp because one wall had dirt on the outside of the wall. He has siblings with asthma. He has no personal history of allergies. He stopped smoking in his 40's after smoking 2 packs of cigarettes a day for 25 years.

Case #5

A woman in her 50s developed asthma one year after beginning to work in a doctors office; her symptoms at that time were not related to work. Three years later she was hospitalized twice because of asthma attacks which she attributed to carpeting which had become wet from a leak in the office. She was taking albuterol and triamcinolone. She had smoked 2 packs of cigarettes a day for 7 years in her 30s. She had a son with asthma. She had positive skin tests to pollen.

Discussion

Asthma from exposures in offices is the 3rd most common reported cause of work-related asthma in Michigan. From 1988-1997, 70 cases or approximately 6% of all the confirmed occupational asthma reports have been on individuals with asthma from an office setting. Fifty-seven of the 70 (81.4%) reports have been new onset asthma although as in cases #1 and #2 a high percentage of individuals (77.3%) had a previous history of allergies. The remaining 13 (18.5%) reports were aggravation of preexisting asthma as in case #5 where the patient was hospitalized twice.

Sixty-four of the 70 (91.4%) individuals were women. Sixty of the 70 (85.7%) individuals were white. Only eleven of the 40 (27.5%) individuals where smoking status was known had smoked cigarettes. Thirty-nine of 63 (61.9%) individuals where history of family allergies was known had a family history of allergies. Fifty-one of 66 (77.3%) individuals where history of personal allergies was known had a personal history of allergies. Only thirteen of 65 (20%) where workers' compensation status was known had filed for workers compensation. Twenty-one of the 70 (30%) individuals had worked in schools, 18 (25.7%) worked in governmental offices, and 9 (12.9%) worked in health care settings, 9 (12.9%) worked for an auto company, and the remaining 13 (18.6%) worked in various private offices.

Although non-specific symptoms such as headache, fatigue, eye and throat irritation have been widely reported with poor ventilation in buildings(4), the occurrence of specific reports of asthma in association with office situations has been relatively infrequent(3,5). One study from Denver was unable to identify a specific etiologic agent(3). Another study of an office building in Toronto reported that the patient reacted on specific antigen challenge to tributyl tin oxide used as a fungicide in the carpet cleaner. Hypersensitivity pneumonitis has rarely been reported(4).

Not uncommonly, the patients complain of water damage and mold in their work areas. No studies could be identified in the literature where mold isolated from an office setting was then used in specific antigen challenge testing. Increased humidity in a building would also create favorable conditions for dust mites.

Because there are no OSHA standards on ventilation in the office setting, inspections are rarely

performed in offices by OSHA enforcement staff. Minimum ventilation of 10 liters per second of outdoor air per person has been recommended(4). The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) has guidelines on ventilation that, if followed, can help to alleviate health problems(2). Other recommendations regarding moisture, building materials and use of pesticides have been suggested to reduce indoor air problems(1). If air sampling is performed it almost always shows levels of chemicals to be low to non-detectable. However, sampling for carbon dioxide can be useful to document inadequate fresh air flow. The emphasis for relieving symptoms in an office setting should be on evaluating the ventilation system. A walk through of the office to eliminate any obvious chemical sources, leaks (i.e. sewer gas), malfunctions or poorly ventilated sources of combustion should be conducted. Then a review of the design and maintenance of the ventilation system needs to be performed. With the patient's permission, a letter from the treating physician to the building manager recommending a ventilation engineer be contacted to review the buildings ventilation can sometimes be effective in initiating an investigation.

As in other work settings when diagnosing work-related asthma, it is important to confirm that the patient has hyperreactive airways and that there is variability in peak flow or FEV₁ in relationship to work. This is particularly important in the office setting where the lack of evidence of specific exposure and the potential for the ubiquitous nature of the possible allergens (i.e. fungus) makes it important to document changes in pulmonary function so as to minimize the adverse economic consequences if a patient has to leave work.

On a research basis, we have 3 portable computerized spirometers that patients can use to evaluate pulmonary function in relationship to work. There is no charge for the use of this equipment, but the patient must be willing to pick up and return the spirometer to Lansing. The patient must have previous documentation of hyperreactive airways in a pulmonary function laboratory (FEV₁ :12% and 200 ml or greater improvement after a bronchodilator; or 20% or greater drop after methacholine).

If you have a patient who meets the above criteria who you wish to use the portable computerized spirometer, please call Ken Rosenman, M. D. at 1-800-446-7805.

References

1. American Thoracic Society. Achieving Healthy Indoor Air. American Journal Respiratory and Critical Care Medicine 1997; 156:s33-s64.
2. ASHRAE STANDARD. Ventilation for Acceptable Indoor Air Quality. ANSI/ASHRAE 62-1989. Atlanta, Georgia: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1990; 1-26.
3. Hoffman RE, Wood RC, Kreiss K. Building-Related Asthma in Denver Office Workers. American Journal of Public Health 1993; 83:89-93.
4. Menzies D, Bourbeau J. Building-Related Illnesses. New England J. of Medicine 1997; 21:1524-1531.
5. Shelton , Urch B, Tarlo SM. Occupational Asthma Induced by a Carpet Fungicide - Tributyl Tin Oxide. Journal Allergy and Clinical Immunology 1992; 90:274-275.

Project SENSOR Newsletters

We are happy to announce that the SENSOR Program has been funded for another 5 years. The program will be expanded to include a special emphasis on overexposure to lead. New regulations went into effect October 11, 1997 that require Michigan laboratories to report all blood lead levels. Accordingly, we expect most reports of lead toxicity to be sent directly from the laboratory but there may be instances where a report will come from your office or we may request additional medical information from you. We appreciate the ongoing cooperation of Michigan's practitioners. Please call us at 1-800-446-7805 if you have any questions.

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The Project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the Michigan Department of Industry Services and is available at no cost. Suggestions and comments are welcome.

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Michigan Law Requires the Reporting of Known or Suspected Occupational Diseases

Reporting can be done by:	
*FAX	(517) 432-3606
*Telephone	1-800-446-7805
*E-Mail	21770KDR@MSU.EDU
*Mail	Michigan Department of Consumer and Industry Services
	Division of Occupational Health
	P.O. Box 30649
	Lansing, MI 48909-8149
Reporting forms can be obtained by calling	(517) 335-8240
or	1-800-446-7805