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In this issue:
v18n2: Diagnosing Work-Related Asthma

*Project
S Remember to report all cases of occupational disease!

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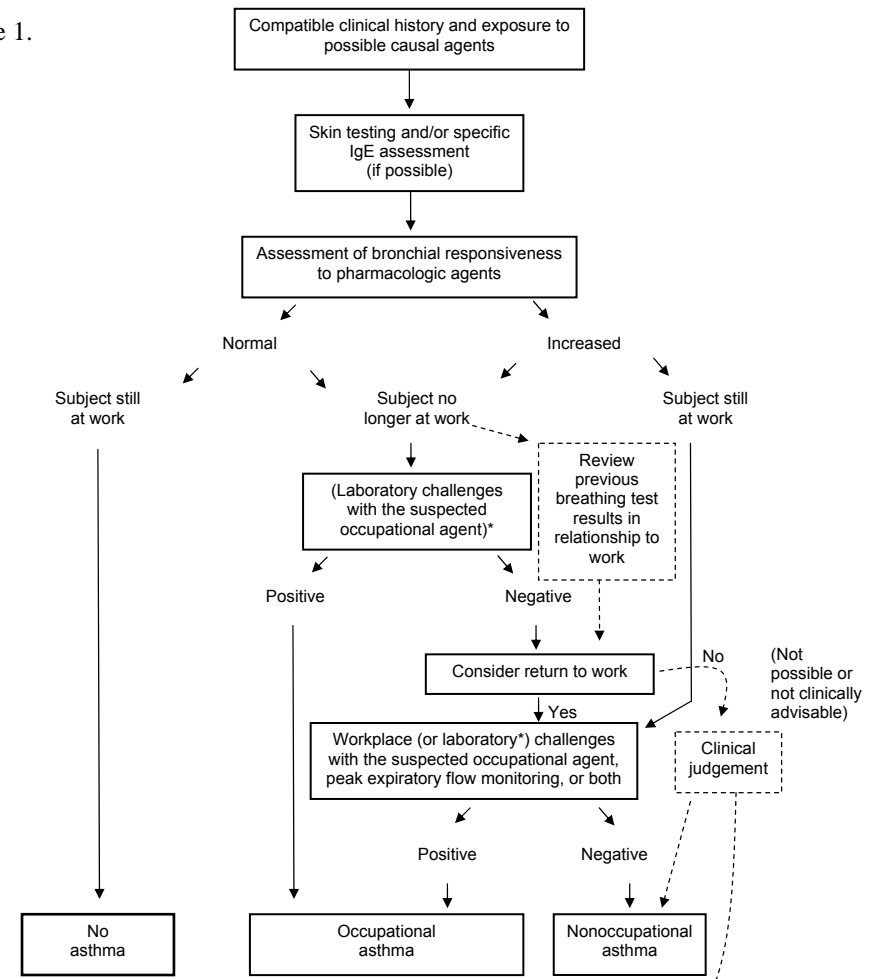
Spring 2007

Diagnosing Work-Related Asthma

The diagnosis of work-related asthma from sensitization to one of the 400 known workplace allergens (see <http://www.remcomp.com/asmanet/asmapro/asmawork.htm> for a listing of the 400 substances) or potentially a new allergen remains problematic. The gold standard for diagnosis, a

specific antigen bronchial challenge test, is unavailable on a non-research basis in Michigan as well as the rest of the United States. The flow diagram in Figure 1 summarizes a published approach to diagnosing work-related asthma from sensitization. The dashed boxes and lines have been

Figure 1.



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added to reflect the unavailability of specific antigen bronchial challenge testing, that patient may not be able to return to work and for either legal and/or medical reasons.

A recent article in Chest reviewed 77 studies that compared clinical diagnosis, methacholine challenge testing, serial pulmonary function tests (usually peak expiratory flow), specific skin prick test or serum specific antigen testing with specific antigen bronchial challenge testing.¹ The results were reported separately for high molecular weight allergens such as those in shellfish versus low molecular weight allergens, chemicals such as the isocyanates. Table 1, shown below, which is Table 4 from the paper summarizes the results.

Although a number of the tests had high sensitivity, such as clinical diagnosis, specificity was much lower. Serial pulmonary function tests, serial

methacholine tests and specific skin prick tests with low molecular weight compounds had the best combined sensitivity and specificity.

Additional sensitivities and specificities are shown in Table 2 for a combination of different tests .

It is important to remember that the data to calculate these sensitivities and specificities came from referral centers that do specific antigen challenge testing and the subjects would have had pre-screening and a strong level of suspicion of the work-relatedness of their condition. If the data had been derived from a sample of all asthmatics in a family practitioner's office then the calculated sensitivity and specificity would have been less.

The diagnosis of work-related asthma though not always straight forward and sometimes uncertain remains important to reduce both morbidity and

Table 1. Sensitivity and Specificity of Comparison Tests That Used SIC as a Reference Standard

Comparison Tests	No. of Studies	Pooled Sensitivity (95% CI)	Pooled Specificity (95% CI)
Single NSBP test			
HMW	10	79.3 (67.7–87.6)	51.3 (35.2–67.2)
LMW	24	66.7 (58.4–74.0)	63.9 (56.1–71.0)
Mixed	5	83.7 (66.8–92.9)	48.4 (25.9–71.6)
Specific SPT			
HMW	16	80.6 (69.8–88.1)	59.6 (41.7–75.3)
LMW	5	72.9 (59.7–83.0)	86.2 (77.4–91.9)
Mixed	5	63.0 (41.5–80.3)	59.2 (45.4–71.7)
Serum-specific IgE			
HMW	9	73.3 (63.9–81.0)	79.0 (50.5–93.3)
LMW	10	31.2 (22.9–40.8)	88.9 (84.7–92.1)
Mixed	2	85.1 (40.3–98.0)	61.2 (7.0–97.1)
Serial pulmonary function tests (usually PEF rate)			
HMW	0		
LMW	1	86.7 (59.5–96.6)	90.0 (53.3–98.6)
Mixed	5	63.6 (43.4–79.9)	77.2 (66.5–85.2)
Serial NSBP test			
HMW	1	100 (34.2–100)	100 (20.7–100)
LMW	2	67.5 (42.6–85.3)	65.6 (41.1–84.0)
Mixed	3	50.0 (35.5–64.5)	66.8 (53.3–78.0)
Clinical diagnosis			
HMW	2	93.7 (69.3–99.0)	32.3 (7.5–73.8)
LMW	5	93.6 (85.0–97.5)	68.9 (54.7–80.3)
Mixed	2	95.1 (86.8–98.3)	47.7 (26.7–69.7)
Eosinophil counts			
HMW	0		
LMW	0		
Mixed	3	54.9 (23.7–82.7)	72.3 (54.1–85.3)

SIC=specific inhalation challenge
NSBP=nonspecific bronchial provocation
SPT=skin prick test

CI=confidence interval
HMW=high molecular weight
LMW=low molecular weight
PEF=peak expiratory flow

Table 2. Sensitivity and Specificity of Comparison Tests That Used SIC as a Reference Standard

Comparison Tests	No. of Studies	Pooled Sensitivity (95% CI)	Pooled Specificity (95% CI)
Single NSBP tests and Specific SPT			
HMW	4	60.6 (21.0-89.9)	82.5 (54.0-95.0)
LMW	1	100 (94.1-100)	80.0 (49.0-94.3)
Single NSBP test, Specific SPT, Serum-specific IgE			
HMW	3	62.5 (6.7-98.0)	74.3 (45.0-91.0)

See Table 1 for definitions of abbreviations.

mortality from asthma. We have previously reported on a death in Michigan in 2003 from exposure to isocyanate.² A recent second death in Michigan from isocyanate induced asthma reemphasizes the importance of removing a sensitized individual from the workplace exposure

causing their asthma. We will provide more details on this second death in a subsequent newsletter.

Kenneth Rosenman, M.D. continues to be available at 1-800-446-7805 to assist you in evaluating individual patients.

References

1. Beach J, Russell K, Blitz S, Hooton N, Spooner C, Lemiere C, Tarlo SM, Rowe BH. A Systematic Review of the Diagnosis of Occupational Asthma. Chest 2007; 131:569-578.
2. Chester DA, Hanna EA, Pickelman BG, Rosenman KD. Asthma Death After Spraying Polyurethane Truck Bedliner. American Journal of Industrial Medicine 2005; 48:78-84.



The Occupational & Environmental Medicine Division at Michigan State University has a **FREE** Training Program for employers and employees who work with workplace allergens.

If you have seen multiple patients from a single facility, you might want to notify the plant manager or director of personnel of the availability of this free course.

An employer can sign up their employees for the training workshop by:

Calling MSU at 1-800-446-7805 or Emailing MSU at ODREPORT@ht.msu.edu

Here's what employers/employees will learn:

- ✓ What is asthma?
- ✓ What is the magnitude of adult asthma in Michigan?
- ✓ How asthma is related to the workplace.
- ✓ What asthma can cost the workplace.
- ✓ What employers/employees can do to help prevent and control asthma at work.
- ✓ How to develop a Health & Safety Program.
- ✓ Where to find more information.