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

Volume 27 No. 1 **Winter 2015 –2016**

Use of a Methacholine Challenge Test to Diagnose Work-Related Asthma

In the absence of the availability of a definitive antigen challenge test, the diagnosis of work-related asthma has remained challenging. A 2015 study from Quebec, where specific antigen challenge testing is routinely performed in the evaluation of patients with possible sensitization to a workplace exposure, provides new data on the value of methacholine challenge testing in diagnosing work-related asthma caused by sensitization to a substance at work (1).

Practitioners from the Hôpital du Sacré-Coeur in Montreal reviewed all 1,012 patients they evaluated from 1983 to 2011 who had completed a specific antigen challenge test and a methacholine challenge test for work-up of suspected work-related asthma. Individuals who had a positive specific antigen challenge test were considered to have work-related asthma. They divided the population into those who were still working when they were tested and those who were off work.

A summary of the specific antigen and methacholine challenge tests that were performed while the patient was still working is shown in Table I and a summary of the findings for those no longer at work is shown in Table II.

Sensitivity of a positive methacholine test was 95.4% when someone was still at work but the specificity was low at 40.1%. The positive predictive value of a positive methacholine performed while the patient was still at work was 41.1% while the

Table I. Sensitivity, Specificity & Predictive Value of Methacholine Challenge Tests in Those Still at Work*

	Occupational Asthma		
Methacholine Challenge Test	Yes	No	
Positive	125	179	Positive Predictive Value 41.1%
Negative	6	120	Negative Predictive Value 95.2%
Total	131	299	
Sensitivity 95.4%		Specificity 40.1%	
False Negative 4.6%		False Positive 59.9%	
*Adapted from reference #1			

Table II. Sensitivity, Specificity & Predictive Value of Methacholine Challenge Tests in Those No Longer at Work*

	Occupational Asthma		
Methacholine Challenge Test	Yes	No	
Positive	98	209	Positive Predictive Value 31.9%
Negative	49	226	Negative Predictive Value 82.2%
Total	147	435	
Sensitivity 66.7%		Specificity 52.0%	
False Negative 33.3%		False Positive 48.0%	
*Adapted from reference #1			

negative predictive value of a negative methacholine performed while the patient was still at work was 95.2%. The authors concluded that "a negative methacholine challenge in a patient still exposed to the causative agent at work makes the diagnosis of occupational asthma very unlikely". This reflects the 95.2% predictive value of a negative methacholine challenge performed while the patient was still exposed.

For those of us practicing in Michigan the other take home point is that while a positive methacholine test is highly sensitive at 95.4%, the predictive value of a positive methacholine challenge test is low at 41.1%. Therefore, performance of breathing tests such as peak flow over 2-4 weeks, both at work and away from work, or spirometry performed during work compared to spirometry performed after the patient has been away from work for a week or more, is needed to make the diagnosis of work-related asthma. With the inclusion of work-related breathing testing one can obtain sufficient confidence in diagnosing work-related asthma that can not be provided by history and a positive methacholine challenge test alone.

Without the specific breathing testing performed in relationship to work, there is insufficient certainty to determine if the patient has work-related asthma. As with many recommendations in medicine, this is not an absolute. Patients who are no longer working may have had severe, even life threatening, asthma attacks in relationship to work and yet never had breathing tests performed while they were still employed. Returning these patients to work to obtain breathing tests would be too risky. Others may have been fired and their employer will not allow them to return to work. However, individuals who are no longer working may have had breathing tests at the time of work; breathing tests can be performed at the time of their medical evaluation and compared to the previous breathing tests performed while they were still working.

Figure 1 shows an algorithm for working-up a patient with suspected work-related asthma. Although specific antigen challenge testing is included in the algorithm, alternative approaches not using specific antigen challenge testing are shown. You will note that assessment of bronchial responsiveness to pharmacologic agents is in the third box down from the beginning of the algorithm and a key part of the work-up.

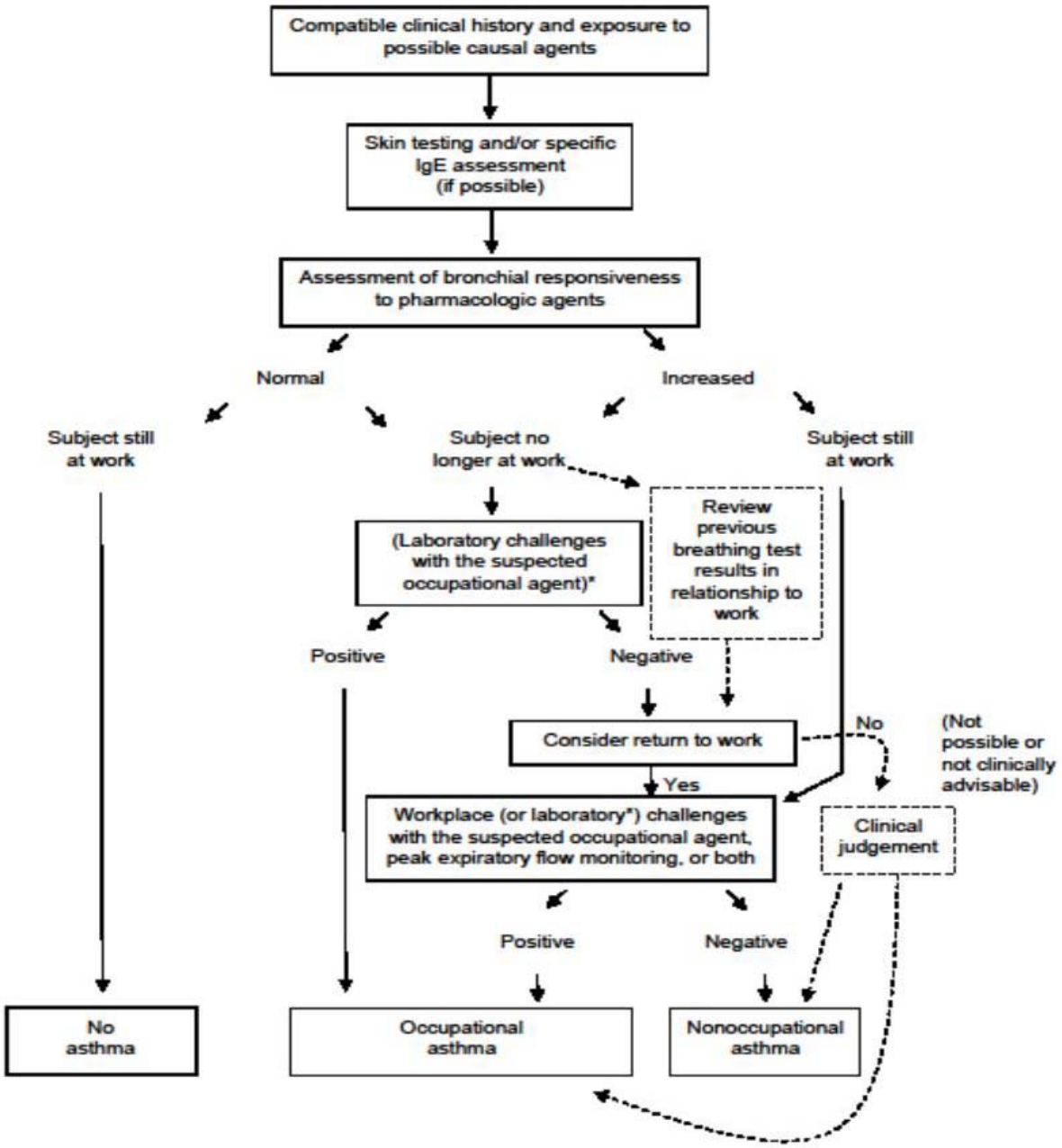
One final point — although a patient who is still working and has a negative methacholine challenge is unlikely to have sensitization to a substance at work, one could still perform breathing tests in relationship to work if you highly suspect work-related asthma despite the negative methacholine challenge. Five out of every 100 patients with a history consistent with work-related asthma who had a negative methacholine challenge test would be expected to have work-related asthma.

Reference

1) Pralong JA, Lemiere C, Rochat T, L'Archeveque JL, LaBrecque M, Cartier A. Predictive value of nonspecific bronchial responsiveness in occupational asthma. J Allergy and Clinical Immunology 2015; *Available online 26 July 2015* http://ac.els-cdn.com.proxy2.cl.msu.edu/S0091674915008799/1-s2.0-S0091674915008799-main.pdf?_tid=6e4c2e62-7049-11e5-95f6-00000aab0f01&acdnat=1444589819_2e8f3036760503d0b0c530cbe7325d8e

As always Kenneth Rosenman MD is available to assist in evaluating and managing patients with suspected work-related asthma,1-800-446-7805.

Figure 1. Algorithm for the Investigation of Occupational Asthma. A specific inhalation challenge is included in this algorithm; however, since this test is not clinically available, alternatives are provided. One can order breathing tests in relationship to work or, if such testing is not feasible because the patient is not working and cannot return to work, one can review previous breathing test results in relationship to work, using clinical judgement to diagnose whether a patient has work-related asthma (dashed boxes and arrows below).



*Not available.

Source: Cartier A, Boudreau N, Phenix P, Rosenman KD. Assessment of the Worker. Asthma in the Workplace, 4th Edition. Eds. Bernstein DI, Malo JL, Yeung MC, Bernstein L. Boca Raton, Florida: CRC Press 2013; 73-84. Originally adapted from Chan-Yeung M, Malo JL. Occupational asthma. N Engl J Med 1995; 333: 107–12.

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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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