

# Coughing Up the Facts on Work-Related Asthma

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An estimated 10% of asthma may have a work-related component.<sup>1</sup> Work-related asthma is classified as occupational asthma or work-aggravated asthma. Occupational asthma (OA) is further divided into sensitizer-induced or irritant-induced OA.

## Sensitizer-induced OA

This represents > 90% of OA cases and is caused by hypersensitivity to a specific substance at the workplace.<sup>2</sup>

### What substances act as sensitizers?

More than 400 substances have been implicated in causing sensitizer-induced OA. They are classically divided into high-molecular weight

**More than 400 substances are known to cause sensitizer-induced OA.**

agents and low-molecular weight agents (Table 1). High-molecular weight agents are thought to occur through an immunoglobulin E-related mechanism. Sensitivity to the low-molecular weight agents isn't completely understood.

### Is it asthma?

Diagnosing OA begins by confirming the presence of asthma. Spirometry is performed within 24

## Charlie's Coughing



Charlie, 29, is a welder. He comes to the office complaining of respiratory symptoms, including:

- shortness of breath,
- wheezing, and
- dry cough for the past six months.

He has no history of breathing problems and is a non-smoker with no history of asthma. For the past year, he has been welding stainless steel in a new job assignment. You wonder if he's been sensitized to the chromium in the stainless steel.

For more on Charlie, go to page 60.

hours of workplace exposure. If regular spirometry is negative, challenge testing (*e.g.* methacholine challenge) should be performed within 24 hours of workplace exposure. If this is also negative in a symptomatic patient, OA can be ruled out.

If pulmonary function testing is done while the patient has been away from work for long periods, false negative results may occur. Respiratory sensitizers may induce a short-term increase in respiratory hyper-responsiveness.

Primary-care providers can initiate investigations and help isolate potential sensitizers, and generally refer to a specialist for diagnostic confirmation.

### Is it occupation-related?

Serial peak expiratory measurements and symptom and medication diaries may indicate



## Charlie's followup

Spirometry shows a mild, reversible airway obstruction, which you treat with a  $\beta$ -agonist and inhaled corticosteroid.

For a few weeks, you ask Charlie to record:

- peak-expiratory flow,
- symptoms, and
- medication use.

This demonstrates worsening of the asthma during the work week, with significant improvement by the end of the weekend.

a pattern of work-relatedness. Flow limitations, increased symptom reporting, and greater medication use during working periods, with improvement away from work, lend evidence to a work-related component.

Serial methacholine challenge testing may provide further evidence of work-relatedness. Methacholine challenge testing is done at the end of a work week, then after a prolonged period away from work, such as holidays. Significant improvement in airway responsiveness away from work provides strong evidence of a work-related component.

### *Which exposures can act as sensitizers?*

Once potential work-relatedness is recognized, defer to available resources, including:

- the patient, who often has a good understanding of their workplace or access to materials safety data sheets,
- the employer, and
- electronic resources (e.g. Medline, Asmanet) to determine sensitizers by searching through occupation or substance.

### *How should the sensitized worker be managed?*

Symptoms are managed as per normal asthma management guidelines. Further to this, sensitized

Table 1

## Occupations and sensitizers associated with occupational asthma

Common Occupations	Common Sensitizers
<ul style="list-style-type: none"> <li>• Health-care workers</li> <li>• Bakers</li> <li>• Animal handlers</li> <li>• Spray painters</li> <li>• Woodworkers</li> <li>• Welders</li> </ul>	<ul style="list-style-type: none"> <li>• High-molecular weight               <ul style="list-style-type: none"> <li>• latex</li> <li>• animal allergens</li> <li>• flour</li> </ul> </li> <li>• Low-molecular weight               <ul style="list-style-type: none"> <li>• isocyanates</li> <li>• metal dusts</li> <li>• formaldehyde</li> <li>• amines</li> </ul> </li> </ul>

patients should *avoid further contact with the respiratory sensitizer*, often requiring removal from the specific work area or task. Personal protective measures (e.g. respirators), are of little benefit. Compensation issues should be addressed and if a sensitizer has been identified, co-workers should be taken into consideration.

### *What is the worker's prognosis?*

Early removal from exposure provides the best prognosis and is key to minimizing ongoing impairment. While some will have a complete remission from disease, the majority have persisting asthma symptoms.

### *Irritant-induced asthma*

Irritant-induced OA develops from a single large exposure to an irritant (as opposed to sensitizer) in < 10% of cases. Implicated substances have included:

- hypochlorite bleach,
- zinc chloride,
- ammonia, and
- many others.



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## Charlie's conclusion

Review of the literature indicates chromium may indeed act as a respiratory sensitizer. You submit a claim to the provincial workplace compensation board and advise Charlie not to do any more stainless steel welding and to use respiratory precautions, including local exhaust and personal protective equipment when welding.

At two years followup, Charlie's symptoms have improved considerably.

Diagnostic criteria include:

- Development of respiratory symptoms soon after a brief, high-intensity exposure to an irritant (sometimes requiring medical attention);
- Persistent respiratory symptoms, beyond 12 weeks;
- Objective evidence of airway hyper-responsiveness (spirometry, methacholine challenge).

Management of irritant-induced asthma differs from sensitizer-induced OA as complete avoidance of the initial irritant may not be necessary. Symptoms of asthma should be managed in the same manner as any airway hyper-responsiveness. Engineering controls, personal protective techniques, and avoidance of large exposures may be sufficient.

### *What's the prognosis?*

The prognosis for irritant-induced asthma is not clearly understood. However, for many patients, resolution has occurred over years.

### *Work-aggravated asthma*

Underlying asthma which worsens while at work may be due to a number of physical factors, including:

- chemical irritants,
- physical agents (*e.g.* heat), or
- exertion.

## Take-home message



- It is important to consider occupational factors in any patient with adult-onset respiratory problems or any patient with worsening of their asthma.
- Respiratory sensitization may occur from a variety of substances and in many different industries.
- While irritant-induced occupational asthma and work-aggravated asthma can often be managed by minimizing exposure, sensitizer-induced occupational asthma requires complete avoidance of the offending agent.

Peak-expiratory flow measurements and symptom and medication diaries may demonstrate worsening while at work. There is typically no difference in methacholine challenge testing whether the patient is at work or away from work. Methods to limit irritant exposures, such as engineering controls or personal protective equipment, are usually adequate in minimizing symptoms. CME

#### References

1. Blanc PD, Toren K: How much adult asthma can be attributed to occupational factors? *Am J Med* 1999; 107(6):580-7.
2. Tarlo SM, Boulet LP, et al: Canadian Thoracic Society guidelines for occupational asthma. *Can Respir J* 1998; 5(4):289-300.