



# HEALTH ALERT

CONNECTICUT DEPARTMENT OF  
PUBLIC HEALTH

Keeping Connecticut Healthy

## Bronchiolitis Obliterans in Workers Exposed to Food Flavorings

Recently, several investigations have identified clusters of workers diagnosed with bronchiolitis obliterans (commonly referred to as “popcorn workers’ lung” and “flavorings-related lung disease”), a form of fixed, irreversible airway obstruction, after exposure to mixtures of butter flavoring chemicals. Evaluations of these workers revealed high rates of both severe respiratory symptoms and significantly compromised lung function.<sup>1</sup> These investigations concluded that there is a risk for occupational lung disease in workers with inhalation exposure to butter flavoring chemicals.<sup>2</sup> Other investigations have also shown that workers that use or manufacture certain food flavoring additives have developed similar health problems.

### Diacetyl and Other Food Flavorings Used in Food and Flavoring Manufacturing

Food flavorings can be either natural or manmade. Some are comprised of only one ingredient, but others are complex mixtures of several substances. Diacetyl is a chemical used in the manufacture of butter flavoring and other food flavorings and is the suspected cause of several cases of bronchiolitis obliterans in workers. During the manufacturing process, workers may be exposed to food flavorings in the form of vapors, dusts, or sprays. There are many different types of food flavorings and most have not been tested for respiratory toxicity. However, recent animal studies of diacetyl exposure conducted by the National Institute for Occupational Safety and Health (NIOSH) have shown an association between diacetyl and fixed obstructive pulmonary disease.

### What are the health effects associated with flavorings-related lung disease?

Exposure to certain airborne food flavorings is associated with higher rates of respiratory symptoms such as coughing, shortness of breath, fatigue, and difficulty breathing with exertion or exercise. Other adverse health effects may include eye, nose, throat, and skin irritation. There is some evidence that asthma, in some instances, may be associated with workplace exposure to certain types of food flavorings.<sup>3</sup>

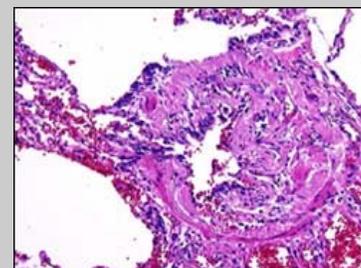
Individuals with flavorings-related lung disease typically have respiratory symptoms and/or abnormal spirometry findings of fixed airways obstruction that does not improve with asthma medication. These symptoms may vary from mild to severe. Usually symptoms progress gradually, but in some cases severe symptoms can occur suddenly. Unlike some work-related respiratory conditions, symptoms associated with flavorings-related lung disease usually do not get better when employees leave the workplace.

### How to determine if an individual has flavorings-related lung disease?

There are several tools available to diagnose flavorings-related lung disease.

Typical diagnostic testing for bronchiolitis obliterans includes:

- Diffusing capacity of the lung, which is generally normal, especially early in the disease
- Chest x-rays, which are often normal but may show hyperinflation
- Spirometry findings of fixed airway obstruction/restriction
- High resolution computerized tomography scans (CT or CAT scans) may show air trapping and thickening of the airway walls
- Biopsy of the lungs may show narrowing or complete obstruction of the small airways when the tissue is examined under a microscope<sup>3</sup>



Small airway with obstruction in bronchiolitis obliterans  
(Photo obtained from the European Respiratory Society Journals)

### How to determine if a patient is at risk for flavorings-related lung disease?

As with any individual presenting with respiratory symptoms, it is important to take a complete occupational history in order to determine what role, if any, the workplace may have in an individual’s specific respiratory condition. This includes not only asking patients where they currently work, but also where they worked in the past, what they did at each of their workplaces, and what chemical, dust, or other hazards they were exposed to at work.

Conditions may exist for significant exposures to food flavoring substances in facilities that manufacture or utilize food flavorings as part of their processes. Any individual working in one of these facilities may be at risk for flavorings-related lung disease, but it is expected that workers directly exposed to manufacturing processes involving food flavorings are most at risk.

**Connecticut Department of Public Health**  
**Environmental and Occupational Health Assessment Program**  
410 Capitol Avenue, MS # 11OSP  
P.O. Box 340308  
Hartford, CT 06134-0308  
(860) 509-7740  
<http://www.ct.gov/dph>

## What should physicians do if they identify an individual with flavorings-related lung disease?

Physicians in Connecticut who diagnose a case of flavorings-related lung disease should contact the State of Connecticut Department of Public Health, Occupational Health Unit at (860) 509-7740.

In addition, Connecticut State Law requires that physicians diagnosing any work-related illness complete a *Physician's Report of Occupational Disease* form, and submit that form to the Connecticut Departments of Labor and Public Health within forty-eight hours of recognition of that condition. Submission of this information is required by Connecticut General Statute (CGS) § 31-40a, confidential under CGS § 19a-25 and exempt from HIPAA restrictions according to 42 CFR § 164.512(a-b). A copy of the *Physician's Report of Occupational Disease* form can be found on the Connecticut Department of Public Health website at <http://www.ct.gov/dph>

### Additional Resources:

U.S. Department of Labor Occupational Safety & Health Administration (OSHA)  
[www.osha.gov/SLTC/flavoringlung/index.html](http://www.osha.gov/SLTC/flavoringlung/index.html)

National Institute for Occupational Safety and Health (NIOSH),  
[www.cdc.gov/niosh/topics/flavorings/](http://www.cdc.gov/niosh/topics/flavorings/)

The Flavor and Extract Manufacturers Association of the United States (FEMA)  
[www.femaflavor.org/html/public/RespiratoryRpt.pdf](http://www.femaflavor.org/html/public/RespiratoryRpt.pdf)

California Department of Health Services  
<http://www.dhs.ca.gov/ohb/flavorings>

Comprehensive Listing of Related Documents  
[http://defending-science.org/case\\_studies/Documents-for-Popcorn-Workers-Lung.cfm](http://defending-science.org/case_studies/Documents-for-Popcorn-Workers-Lung.cfm)

### References:

1. Kreiss K. et al. "Clinical bronchiolitis obliterans in workers at a microwave-popcorn plant". *New England Journal of Medicine* 347.5(2002): 330-330.
2. *National Institute for Occupational Safety and Health (NIOSH) Health Hazard Evaluation Report, HETA 2000-0401-299*, (2006, January).
3. *Preventing Lung Disease in Workers Who Use or Make Flavorings*. US Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 2004-110, (2003).