

## **Summary of Eight Known Cases of Confirmed or Suspected Fixed Obstructive Lung Disease in California Food Flavor Manufacturing Workers**

Prepared by Barbara Materna, PhD, CIH, Chief, Occupational Health Branch, California Department of Health Services, based on currently available information  
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### **Background**

In Fall 2004, the California Department of Health Services, Occupational Health Branch (CDHS-OHB), and California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), learned of the state's first case of a worker with *bronchiolitis obliterans* (BO). BO is a rare, life-threatening fixed obstructive lung disease previously identified in microwave popcorn manufacturing workers. The worker, employed in food flavoring manufacture as a flavor compounder (mixer), was exposed to diacetyl, a chemical used in artificial butter flavor and other food flavorings. The case was reported by a physician to Cal/OSHA, which conducted an enforcement investigation in this workplace. Citations were issued in January 2005, as well as a Special Order that requires the employer to provide ongoing medical screening of workers in this plant and take specific actions to control exposure to diacetyl and other hazards.

A second worker diagnosed with BO was reported to CDHS-OHB in April 2006. This worker was employed by a different flavor manufacturing company; she also was a flavor compounder who handled diacetyl. Cal/OSHA also conducted an enforcement investigation in this workplace and issued citations in October 2006. Cal/OSHA and CDHS-OHB requested technical assistance from the National Institute for Occupational Safety and Health (NIOSH) to conduct medical screening of all workers at this work site.

Cal/OSHA and CDHS-OHB have initiated an industry-wide investigation of lung disease in flavoring manufacture. Twenty-six currently operating companies have been identified in California in addition to the two companies described above. They have all agreed to conduct employee medical screening, have an industrial hygiene assessment, and implement recommended control measures. A few have discontinued use of diacetyl but are still required to conduct one-time medical screenings of employees.

Since April 2006, six additional workers have been identified who are confirmed with or suspected of having fixed obstructive lung disease. The process for identifying fixed obstructive lung disease and/or BO requires a series of medical tests, beginning with a screening that includes lung function testing (spirometry) and obtaining a medical and work history. If spirometry results are abnormal, the test is repeated following administration of a bronchodilation drug to determine whether the lung function abnormality is reversible with this medication. Depending on the results, further tests may be indicated. A definitive diagnosis of BO is based on the results of tests which

may include: high-resolution chest computerized tomography, complete pulmonary function tests, chest radiography, and, when necessary, open lung biopsy.

CDHS-OHB has been obtaining medical records and reviewing available information about these workers, who are at different stages in the diagnostic process. As such, specific types of information about some of the workers are not available at this time. A summary description of the eight flavoring workers who are either confirmed with or suspected of having fixed obstructive lung disease, based on information currently possessed by CDHS-OHB, follows below.

### **Description of Flavoring Workers with Confirmed or Suspected Lung Disease**

These eight workers are 29 to 49 years old. They all live in Southern California, where the majority of flavor manufacturing plants are located. Six are male, and two are female. All are Latino, and half are known to prefer to be interviewed in Spanish. Of the six for which smoking history is known, none have ever been smokers. Only one worker is known to have had asthma as a child; the majority did not have asthma or other breathing problems before working in this industry.

The workers were or are currently employed at five different flavor manufacturing companies in Southern California. Seven workers for whom a job history is available have all worked in jobs that involve mixing chemicals, including diacetyl, to make food flavorings (flavor compounding). Some of the workers only made powder flavorings, while others made both liquid and powder flavorings. Of the eight workers, only one is still working at the same company, but has been moved to a job that does not involve diacetyl exposure.

The time reported between beginning work in flavoring manufacture and first experiencing symptoms such as cough, wheezing, or shortness of breath varies between one month and several years for these workers (this information is available on six workers). Some of the workers were initially treated for asthma, bronchitis, or allergic rhinitis; however, their conditions continued to deteriorate. Early on in some of these cases, an association with workplace exposure does not seem to have been considered.

Spirometry testing results (available for seven of the workers) show a Forced Expiratory Volume in one second (FEV1) ranging from 18 to 44% of what is normally predicted based on age, race, gender, height, and weight. FEV1 shows the volume of air that can be forced out of the lungs on exhalation in one second. A reduced FEV1 is one indicator of obstruction in the lung that makes it more difficult to exhale. Further testing is indicated to determine the likely cause of the abnormality.

Most of these workers are severely impaired, cannot work, and suffer extreme shortness of breath on exertion (for example, they can only walk a very short distance). At least one is reported to be on a list for lung transplantation.

At this time, CDHS-OHB is aware of a total of three workers that have received a physician diagnosis of BO based on the results of the additional tests outlined above. The cases still described as *suspect* have not completed a definitive diagnostic work-up, or CDHS-OHB has yet to receive all pertinent medical records.

### **Identification of Cases by CDHS and Cal/OSHA**

Before the first case of a California worker with BO was identified in 2004, very few (if any) flavor manufacturers in the state were conducting routine medical screening for lung disease in workers. Since then, based on recommendations by CDHS-OHB and Cal/OSHA, NIOSH, or the industry trade association (Flavor and Extract Manufacturers Association), most of the companies have implemented screening for their current workers. Two have used NIOSH personnel to conduct screening, and others have selected medical providers including University of California occupational medicine clinics and National Jewish Medical and Research Center, an institution based in Denver, Colorado, that specializes in respiratory disease.

CDHS-OHB is in the process of ensuring that all companies provide routine medical screening of adequate quality and is compiling the results for analysis. The goal is to describe the risk of lung disease in this industry and make further prevention recommendations as appropriate. In addition, CDHS is following up with individual workers showing abnormal results on their spirometry or medical questionnaires to obtain further information about their status and ensure that their medical providers understand the additional testing needed to appropriately evaluate and diagnose these patients.

It is instructive to note that the cases to date have been identified to the state in various ways, indicating the possibility that additional cases may emerge. CDHS-OHB became aware of these eight cases after they were:

- reported to Cal/OSHA by a physician;
- reported to CDHS-OHB by a newspaper reporter;
- identified by Cal/OSHA's Medical Unit during the course of a compliance investigation that involved employer and employee interviews and review of medical records;
- detected by NIOSH in a screening conducted at the request of CDHS-OHB and Cal/OSHA;
- detected by NIOSH in a screening conducted at the request of an employer;
- detected by a private medical provider during a medical screening arranged by the employer;
- reported by a former flavoring worker who had been diagnosed with work-related asthma and contacted Cal/OSHA; and
- reported by a toxic tort attorney who was referred a worker with work-related asthma and recognized that this worker had been employed in flavoring manufacture.

The effort by Cal/OSHA and CDHS-OHB to ensure that all flavor manufacturing workers receive medical screenings of adequate quality is in progress. It is possible that

additional cases of lung disease may be identified through this process. As public awareness of the link between flavorings and lung disease increases, more former workers who were exposed to diacetyl or other flavoring chemicals may come forward for further evaluation. At this time, little is known about the extent of hazardous exposures or risk of lung disease in the many food manufacturing workplaces that use food flavorings that contain diacetyl as an ingredient, and it is not known whether these other industries typically provide routine medical screening to employees. In addition, there may be other types of industries that use pure diacetyl for purposes other than flavoring manufacture.

We are continuing to develop important information that is needed to better understand the problem of lung disease related to food flavoring ingredients. CDHS-OHB and Cal/OHSA are committed to acting on this information, as it becomes available, to ensure that workers are adequately protected.

More information is available about Flavorings-related Lung Disease, including medical case descriptions of the first two California workers identified with BO, on the CDHS-OHB Web site at: <http://www.dhs.ca.gov/ohb/flavorings.htm>.