



Bronchiolitis Obliterans and Coffee Processing: Guidance for Primary Care Physicians Treating Workers

BACKGROUND INFORMATION

Emerging evidence suggests employees exposed to a chemical called diacetyl in coffee processing facilities may develop a rare, serious and disabling respiratory illness called bronchiolitis obliterans. The recognized bronchiolitis obliterans cases have all occurred in workers who worked in both flavored and unflavored coffee processing areas at a single workplace in Texas.

Diacetyl is a food flavoring first linked to bronchiolitis obliterans in exposed microwave popcorn production workers. Diacetyl and 2,3-pentanedione, a similar food flavoring agent used as a substitute for diacetyl, can be man-made or develop naturally during coffee roasting. Flavorings added to flavored coffee often contain diacetyl and 2,3-pentanedione. Diacetyl and 2,3-pentanedione are both released during a number of food manufacturing processes including coffee roasting, grinding and packaging.

Bronchiolitis obliterans is difficult to diagnose, and has been mistaken for asthma, chronic obstructive pulmonary disease (such as chronic bronchitis and emphysema), pneumonia, and reactive airways disease. Bronchiolitis obliterans is also known as constrictive bronchiolitis, and sometimes as obliterative bronchiolitis.

To prevent disease in exposed workers, the National Institute of Occupational Safety and Health (NIOSH) has developed best practices for exposure reduction that include air monitoring for diacetyl and 2,3-pentanedione, ventilation to reduce employee exposures, the use of respirators when ventilation is insufficient, and medical surveillance for early detection of lung changes.

Workers with unexplained shortness of breath which worsens with exertion and dry cough should see their doctor as soon as is feasible.

A fact sheet for employers and workers is available at the UW Field Research and Consultation Group web page at <http://deohs.washington.edu/FRCG/EmpClinicianResources>.

Clinical Guidance

Key Symptoms – slowly progressive over weeks to months

- Exertional dyspnea
- Cough (sometimes productive)
- Less commonly, wheeze
- No improvement in symptoms away from workplace

Physical Exam

- Often normal
- May observe:
 - Tachypnea
 - Less commonly wheezing, hyperinflation, reduced breath sounds or crackles

Differential Diagnosis

- Asthma
- COPD
- Hypersensitivity pneumonitis
- Sarcoidosis
- Other bronchiolar disorders

Initial Diagnostic Studies

- Pulmonary Function Tests (PFTs)
 - Spirometry
 - May be normal
 - Otherwise, may show obstructive changes (i.e., low FEV1/FVC ratio)
 - Less commonly, mixed pattern (low ratio and low FVC) or restriction (normal ratio and low FVC) alone
 - Typically no response to bronchodilator (<12% or <200mL increase in FEV1)
 - Lung volumes
 - Often normal
 - Gas trapping (increased RV) with worsened disease
 - Diffusing capacity often normal
- Oxygen Saturation
 - Resting saturation most often normal
 - Exercise desaturation is more sensitive, especially as disease progresses



- Imaging:
 - Chest X-Ray
 - Often normal
 - May show:
 - bronchial wall thickening
 - hyperinflation
 - HRCT
 - More sensitive than chest x-ray
 - Comparison of inspiratory and expiratory images may show expiratory air trapping (mosaic perfusion)
 - Other less common findings may include centrilobular nodules
- Bronchoscopy and Bronchoalveolar lavage (BAL)
 - Findings non-specific
 - May rule out other causes of lung disease

Diagnosis

- Definitive – open lung biopsy or video-assisted thoracoscopic surgery (VATS) lung biopsy
- PFTs and HRCT may be sufficient if high degree of suspicion (e.g., previously healthy symptomatic coffee processing worker with known inhalational exposure)

Other points

- All diagnostic studies except lung biopsy may be normal in a symptomatic patient
- If the diagnosis is suspected, consider referral to a Pulmonary or Occupational and Environmental Medicine subspecialty clinic
- Synonyms: bronchiolitis obliterans, obliterative bronchiolitis, constrictive bronchiolitis

References

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