

# Occupational Risks: Interstitial Lung Disease

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# Conflict of Interest

I have affiliations with, special interests, or have conducted business with the following companies that in context with this presentation might possibly constitute a real or perceived conflict of interest:

- NIOSH Spirometry Course Provider

# Objectives

- Identify major interstitial diseases known to be related to specific exposures in the workplace and the related industry
- Discuss the role of PPE and engineering controls to limit exposures
- Describe pulmonary function tests to diagnose, evaluate, and follow the progression of the disease

# Pneumoconioses

- Primary group of interstitial lung diseases associated with work-place exposure
  - asbestosis
  - silicosis – new standards enforced as of September 23, 2017
  - coal workers' pneumoconiosis
- Other forms of pneumoconiosis caused by inhaling irritant dust, gases, fumes or vapors
  - aluminum, antimony, barium, graphite, iron, kaolin, mica, talc, among other dusts.

# OSHA Silica Standards

## ■ Requires employers to

- use engineering controls (such as water or ventilation) to limit worker exposure to the PEL (personal exposure limit)
- provide respirators when engineering controls cannot adequately limit exposure
- limit worker access to high exposure areas
- develop a written exposure control plan
- offer medical exams to highly exposed workers (above PEL)
- train workers on silica risks and how to limit exposures

# OSHA Silica Standards

- Spirometry required every 3 years performed by technologist with NIOSH spirometry training.

# Identification and Classification

- Diagnosed with radiological imaging
- International Labor Office (ILO) provides guidelines for systematic scientific classification of radiographs
- NIOSH operates the B Reader Program
  - physicians take an examination to document their proficiency in classifying radiographs for various dust-related abnormalities using the ILO guidelines.

# Michigan Experience – MSU Report 2015

- Based on capture - recapture analysis we estimate that although on average we receive 23 reports of silicosis a year, there are an additional 67-139 cases that are diagnosed each year but are not reported.
  - Occupational disease is typically under reported



# Michigan Experience

- 85% of MI silicosis patients worked in manufacturing, primarily foundries
- MIOSHA enforcement inspections at the workplaces of the silicosis patients reveal that over one-third of companies inspected had silica exposure measurements over the permissible limit
- Emerging industries
  - Engineered Stone Countertop Fabrication
  - Hydraulic Fracturing

# Hypersensitivity Pneumonitis

- Farmers' lung
- Bird hobbyists
- Popcorn workers' lung
  - Microwave popcorn flavoring (diacetyl)

# Hypersensitivity Pneumonitis

- Interstitial disease with inflammation and/or fibrosis
- Radiographic findings of fibrosis and unidentifiable antigen
  - Worse prognosis
- Misdiagnosis as IPF later found to be HP
  - May result in continued exposure to antigen
- 25% of HP may also present with pattern of usual interstitial pneumonia as the radiographic pattern
- Presence of air trapping

# Hypersensitivity Pneumonitis

- Difficult to diagnose, but causal agent must be identified
- Early identification allows removal from exposure
  - Reversal of process observed in PFTs and radiographic changes
- Michigan cohort of 18
  - Cluster of HP patients in southwest Michigan associated with machining (i.e. grinding, drilling) metal while using water based metal working fluids (coolants)
  - Pulmonary fibrosis
  - Difficult to identify the antigen

# Health Hazard Evaluations (HHE)

- Purpose is to evaluate workplace health concerns of an employee, union representative, or employer
- Interested party can write, fax, email, phone NIOSH to request a health evaluation
- Report of chief concern to NIOSH

# Health Hazard Evaluations (HHE)

- Contact information of three individuals
- NIOSH will reviews complaint and evaluates legitimacy and what type of evaluation may be needed
- Interdisciplinary: engineers, health scientists, epidemiologists, toxicologists, industrial engineers



# HHE (Health Hazard Evaluation) Request Form

## Request for a Health Hazard Evaluation

Form Approved  
OMB No. 0920-0260  
Exp. 11/30/2017

This form also is available at <http://www.cdc.gov/niosh/hhe/hheform.html>

Workplace Name

Workplace Address      
Street City State Zip Code

What type of work is done **at this location**?

How many people work **at this location**?

☐ 3 or less ☐ 4-9 ☐ 10-49 ☐ 50-99 ☐ 100-249 ☐ 250 or more

Who is responsible for employee health and safety in this workplace?

Name  Title  Phone number

What hazardous substances, agents, or work conditions are of concern? If known, please include chemical names, trade names, manufacturer name, or other identifying information.

How are employees exposed?

☐ Breathing ☐ Skin Contact ☐ Swallowing ☐ Other (Explain: )

In what work area, such as a building or department, is the hazard?

How many people work **in this area**? ☐ 3 or less ☐ 4-9 ☐ 10-49 ☐ 50-99 ☐ 100-249 ☐ 250 or more

Describe the work people do in this area.

What health concerns do people in this work area have?

### Information about you

Name (please print):

Address where we can send you information?      
Street City State Zip Code

Phone number where you would like to be called: (  )

Best time to call:  a.m. or  p.m.

Email address where you would like to be contacted:

Can NIOSH reveal your name to your employer? ☐ No ☐ Yes

Please check one:

- ☐ I am a current employee and 3 or fewer employees are exposed to the hazard.  
☐ I am a current employee and more than 3 employees are exposed to the hazard.

If you check this box, two other employees need to sign this form and provide their contact information.

Public reporting burden of this collection of information is estimated to average 12 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Information Collection Review Office, 1600 Clifton Road NE, MS D-74, Atlanta, Georgia 30333; ATTN: PRA (0920-0260).

### Second employee

Name (Please print):

Address where we can send you information?      
Street City State Zip Code

Phone number where you would like to be called: (  )

Best time to call:  a.m. or  p.m.

Email address where you would like to be contacted:

Can NIOSH reveal your name to your employer? ☐ No ☐ Yes

### Third Employee

Name (Please print):

Address where we can send you information?      
Street City State Zip Code

Phone number where you would like to be called: (  )

Best time to call:  a.m. or  p.m.

Email address where you would like to be contacted:

# Popcorn Workers Lung (Diacetyl Exposure)

- In 2000, the Missouri Department of Health requested that NIOSH perform and a HHE at a local popcorn manufacturing plant
- Nine employees had recently been diagnosed with a rare lung condition known as ‘bronchiolitis obliterans’
- Causative agent was not identified, but butter-flavoring salt mixtures were suspected



# Popcorn Worker's Lung

- NIOSH industrial hygienists divided the plant in 4 workspaces based on estimated exposure to butter-flavoring VOC and respirable dust concentrations
  - Butter-flavoring mixing
  - Microwave packaging area
  - Warehouse
  - Office workers/administration
- Diacetyl was determined to be the predominant respirable vapor in the flavoring operation
- Workers: exposure & respiratory questionnaire, CXR spirometry with DLCO

# HHE Results

- 117 workers participate (87%)
- 2.6 times higher risk for SOB and cough than general population
  - Age and smoking adjusted
- 10.8 times higher risk for obstructive pattern via spirometry
- Strong Diacetyl exposure: response association

# HHE Follow-back Activities

- Employer and Employee survey
- Employer conference call
- Return visits with health testing and to address successful implementation of recommended changes

# Chronic Beryllium Disease

- Beryllium - metal used in the manufacturing of cars, computers, golf clubs, and electrical equipment
  - Light, non-magnetic, and a good conductor of heat and electricity
- Chronic beryllium disease (CBD, berylliosis) is associated with inhaling beryllium powder or fumes
  - Exposed person usually is sensitized prior to progressing to CB
  - Sensitivity and CBD can develop soon after exposure or many (30-40) years later
  - About 10 percent get sensitized to it and about half of those progress to develop CBD

# Hard Metals Lung Disease

- A male in his 60s was diagnosed with hard metal pneumoconiosis from a lung biopsy. He was exposed to cobalt from grinding metal at a tool and die shop for 6 years with no respiratory protection. He had also worked for 28 years at an automotive manufacturing facility where he was exposed to coolant fumes. He had never smoked cigarettes.

# Who Reports Workers with Disease?

- Hospitals are the major source of reports
  - Not always reported, frequently under reported
  - Health records lack occupational exposures nationally
  - NIOSH goal to add to health records
  - RTs integral to helping with the occupational exposures
    - » Within hospital
    - » ED
    - » Clinics
    - » PF Lab
    - » Insurance – Chronic Disease Management
    - » Patient Education
- Healthcare providers

# Who Reports Workers with Disease in Michigan?

- Poison Control Center
- Reports from Co-Workers or MIOSHA Field Staff confirmed by a health care provider
- Death Certificates
- Michigan 3rd Judicial Court for asbestos-related disease
- Mine Safety and Health Administration
- Michigan Cancer Registry for mesothelioma
- Clinical Laboratories for specific IgE allergy testing



# Industries

- Manufacturing (silica, byssinosis, nylon flock)
- Construction (silica, asbestosis)
- Mining (silica, coal miners, beryllium mining, indium)
- Cleaning/Custodial
- Agriculture



# Engineering Controls/PPE

- Eliminate occupational exposure
  - engineering controls (industrial hygienist)
  - Removing dust
  - Ventilation
  - Behavioral
- PPE
  - N95 mask
  - Self contained breathing apparatus (fumes/vapors)

# PF Tests

- Spirometry
- Spirometry with bronchodilator
- DLCO
- Lung Volumes
- Exercise

The background of the slide features a blue gradient that transitions from a lighter blue at the top to a darker blue at the bottom. Overlaid on this gradient are several parallel diagonal stripes in a slightly darker shade of blue, running from the top-left towards the bottom-right.

Any Questions?