

Communicating the Risks of Beryllium Exposure

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BHSC Spring 2010 Meeting

Clinic Opportunities for Counseling and Education

- Medical Surveillance Clinic
 - Exposed workers
- Clinical Evaluation
 - Beryllium Sensitization (BeS)
 - Chronic Beryllium Disease (CBD)

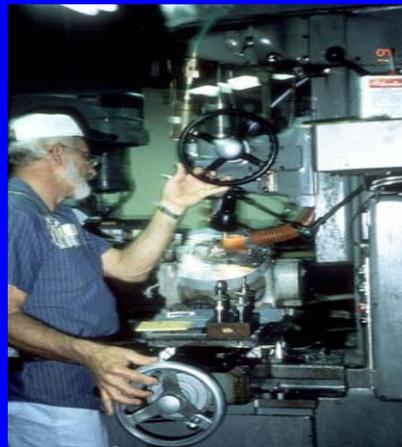
Counseling: Exposed Workers

The majority of workers will not experience adverse health effects

The dose does not necessarily make the poison



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Risk in Exposed Workers

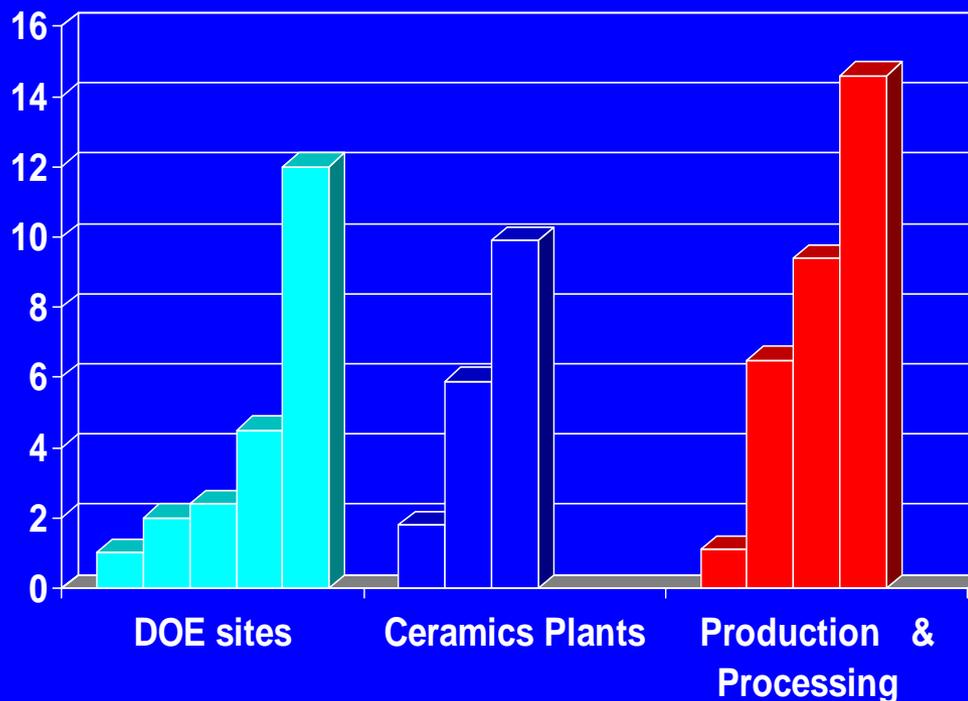
In those with genetic susceptibility, the dose makes the poison

Range: 1-15%

Prevalence increases
with serial surveillance

Highest in those with
greatest exposure

% of tested workers with BeS



Assessing Exposure in a Worker

- What did they do?
- Where did they work?
- When did they work?



Counseling: Normal BeLPT

- A normal BeLPT is reassuring
- Past BeLPT results
- Recommend serial testing
- Educate on signs/symptoms
 - Progressive shortness of breath
 - Sweats at night
 - Unexplained fatigue
 - Inform their physician that their workup should include beryllium testing



Counseling: Non-Normal BeLPT

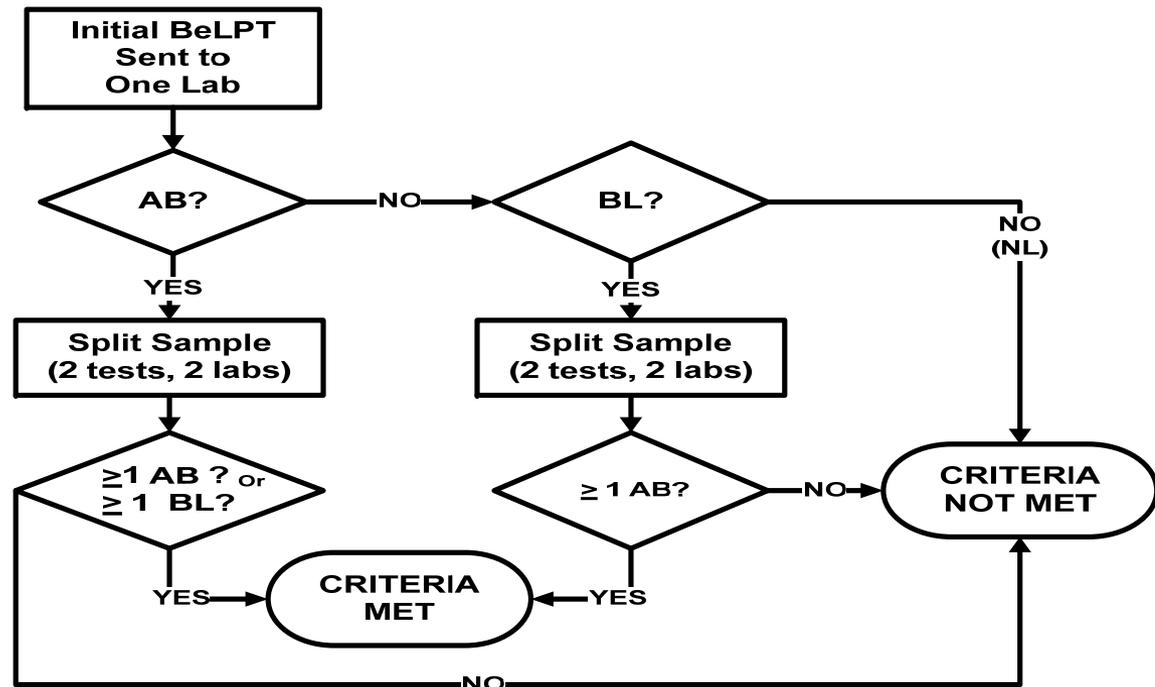
Abnormal:

- Repeat BeLPT
- DOL Claim (Parts B & E)

Borderline:

- Repeat BeLPT

Figure 1. One abnormal BeLPT and One Borderline BeLPT Meet Nominal Criteria for Diagnostic Evaluation



LEGEND

NL = NORMAL

AB = ABNORMAL

BL = BORDERLINE

CRITERIA MET = refer for medical evaluation.

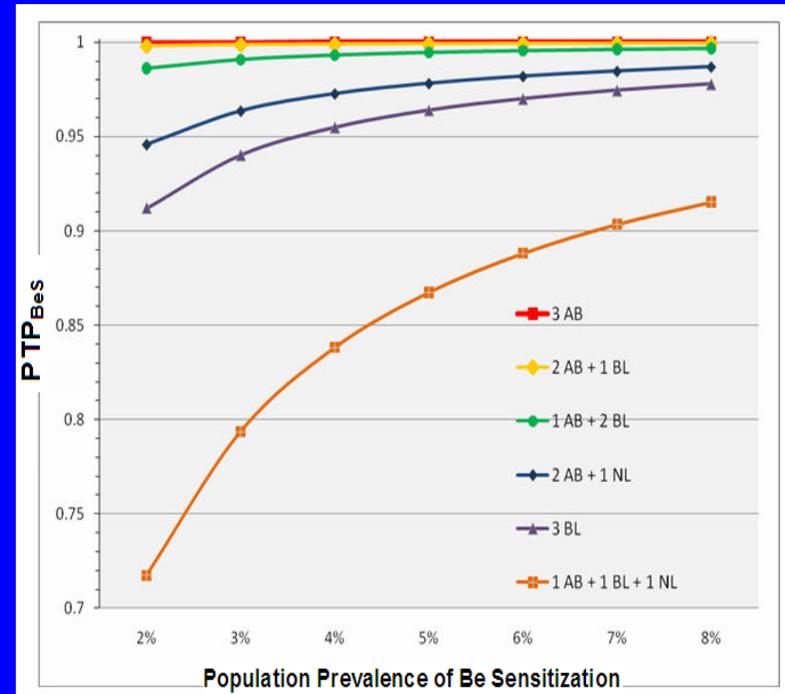
CRITERIA NOT MET = test results indicate probably not sensitized at time of testing.

Emotional and Psychological Support

- Beryllium Support Groups
- DOE Site Employee Assistance Programs
 - Current workers
 - Former workers (possible at certain sites)
- Clinical evaluation

Recommend: Follow up Testing to Determine Immunologic Status

- Confirmed BeS
 - ≥ 2 abnormal BeLPTs
- 1 AB + 1 Borderline
 - Predictive value approaches BeS
 - Prevalence ≥ 2 -3%



Recommend: Clinical Evaluation

- Confirmed BeS (2 Abnormal BeLPTs)
- Signs or symptoms consistent with CBD
- Chest x-ray abnormalities consistent with CBD
- Comparably exposed workers:
 - diagnosed with CBD
 - prevalence of BeS $\geq 2-3\%$
- 1 Abnormal + 1 Borderline BeLPT
- 3 Borderline BeLPTs

Clinical Evaluation

- Medical History
 - Symptoms
 - Past medical history
 - Review of systems
- Exposure history
 - Occupational history
 - Environmental history
 - Smoking history
- Physical Examination
- Physiologic Testing
- Radiographic Imaging

Physiologic Testing

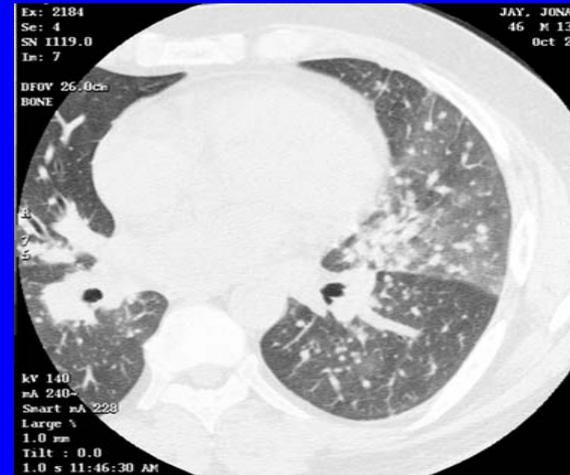


- **Pulmonary Function Testing**
 - Decreased Diffusion Capacity
 - Airflow obstruction
 - Restriction
- **Maximum MS Exercise Tolerance Testing**
 - Gas exchange abnormality
 - Cardiovascular abnormalities
 - Ventilatory abnormalities
 - Conditioning



Radiographic Imaging

- Often normal in early disease
- Abnormalities overlap with other diseases



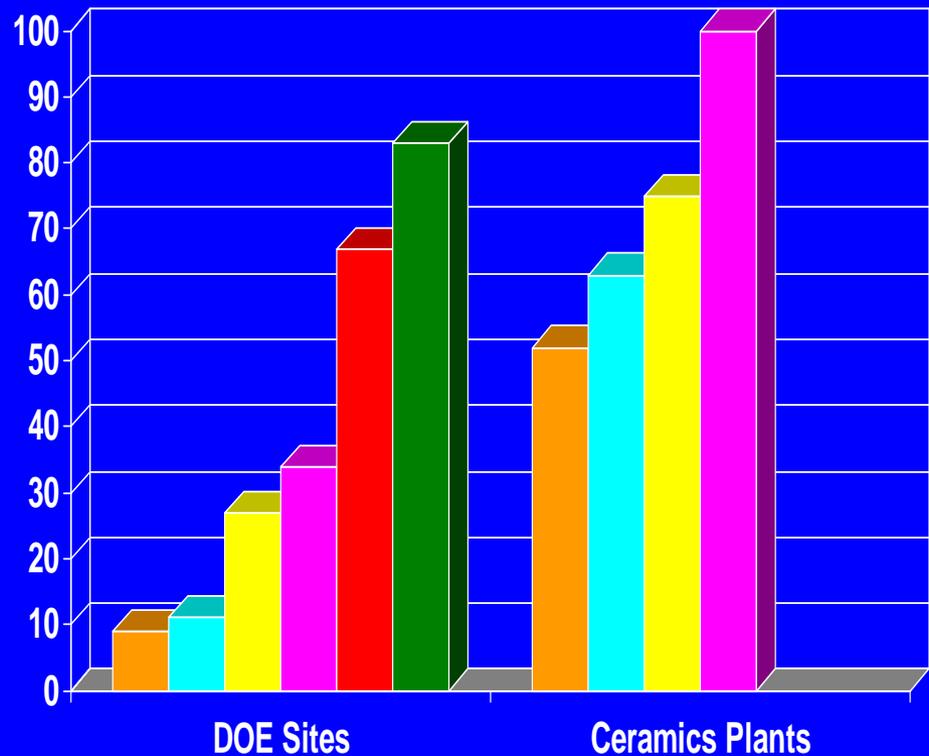
Counseling: Likelihood of CBD

- BeLPT history
- Be exposure

% BeS
with CBD

- Symptoms
- Physiology
- Radiographic imaging

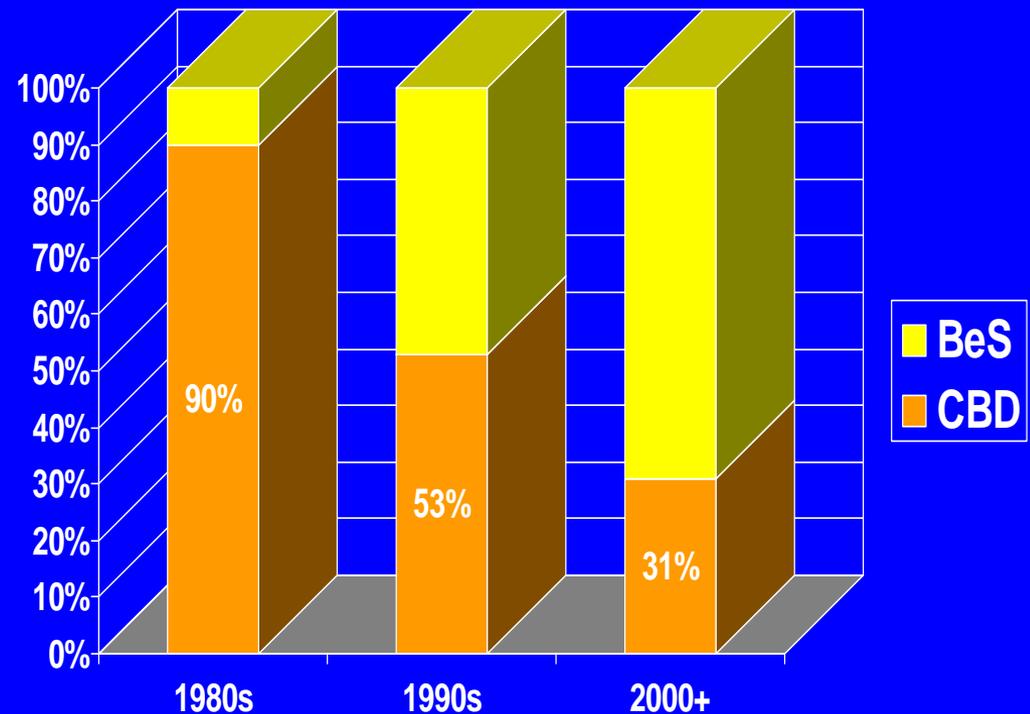
Percent of BeS Diagnosed with CBD



Counseling: We are diagnosing fewer patients with CBD

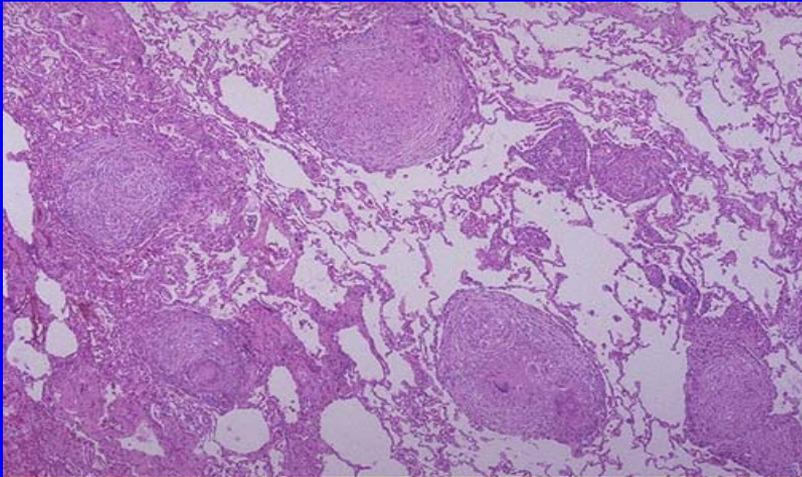
- More recent exposure tends to be lower
 - May be sufficient for BeS but not for CBD?
- Re-testing workers less likely to develop CBD?

Percent with CBD vs. BeS at clinical evaluation



Education: Diagnosis of CBD

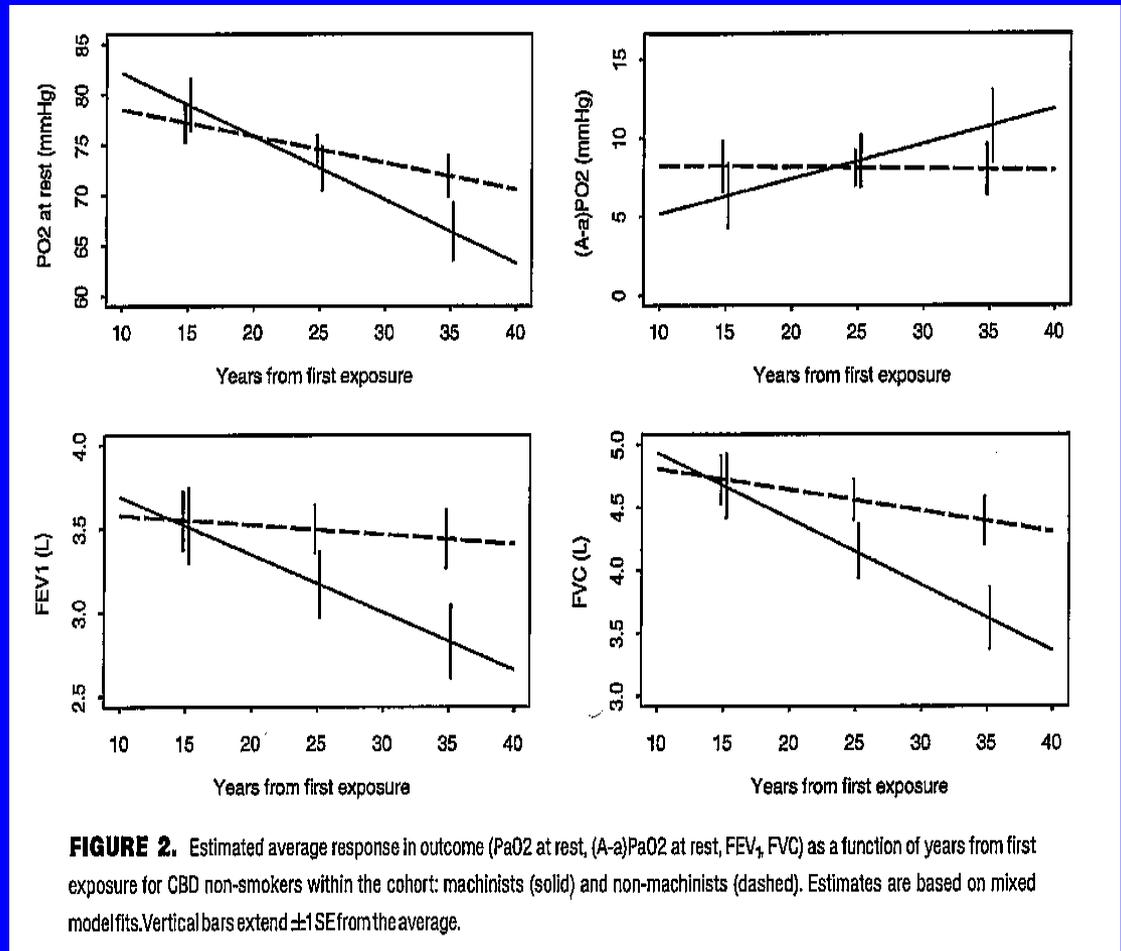
- Diagnostic bronchoscopy
 - Bronchoalveolar lavage (BAL)
 - BeLPT
 - Percentage of lymphocytes
 - Biopsy
- Confirmed BeS + granulomatous inflammation



- Abnormal BAL BeLPT + Lymphocytosis

Counseling: Diagnosis of CBD

- Reassurance
- Wide clinical spectrum
- Advanced disease
- ↓
- ↓
- Asymptomatic



Counseling: Treatment

- Weigh the potential risks and benefits
- Treatment options:
 - None
 - Inhaled corticosteroids, other medications
 - Oral corticosteroids
 - Other immunomodulatory agents
 - Oxygen



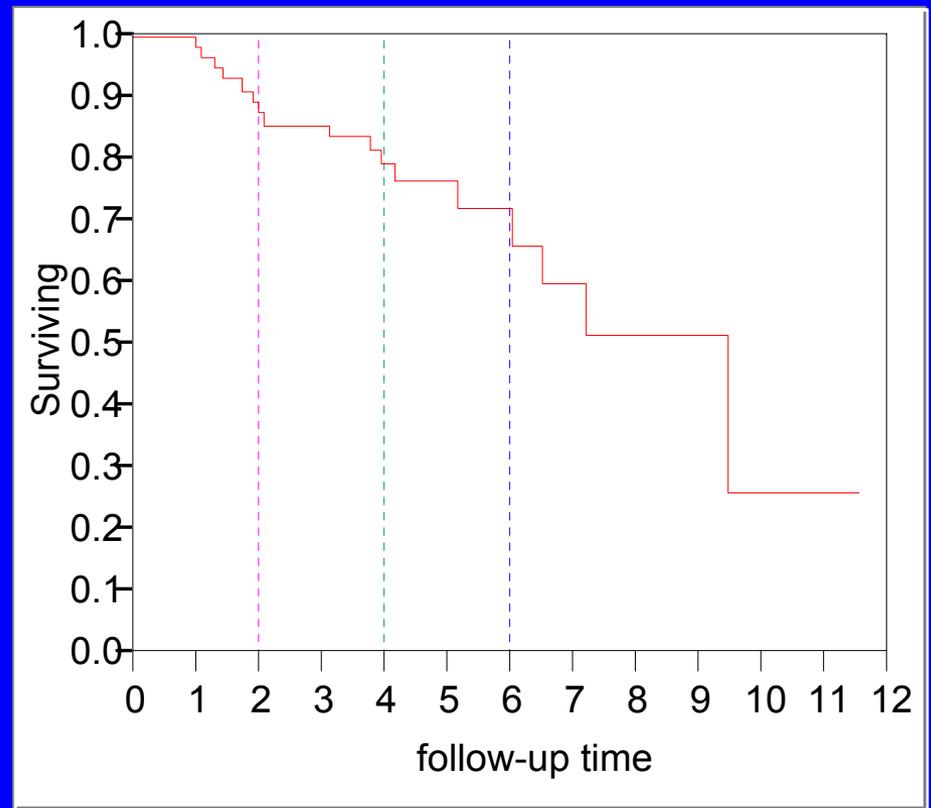
Counseling: File for Benefits

- DOL Energy Employees Occupational Illness Program Act (EEOICPA)
- Current & former DOE workers: Part B & E
- Certain vendors, sub/contractors: Part B
- Part B: Medical benefits + \$150,000
- Part E: Medical benefits, impairment, lost wage compensation

Counseling: No CBD

- Progression
 - 3-9% per year
 - First 6 years
- Exposure history
- 2 year follow up
 - Sooner if clinical change

Risk of Progression from BeS to CBD



Counseling: All Patients

- Minimize ongoing beryllium exposure
- Smoking cessation
- Treatment of concurrent medical conditions
 - Rhinosinusitis (Post-nasal drip)
 - Gastrointestinal Reflux Disease
 - Sleep apnea
- Optimize cardiovascular conditioning
- Maintain optimal weight

Workplace Education

- Link health outcome data to exposure data to identify higher risk tasks
 - Engineering controls and work practices changes to reduce exposure
 - Inform future LPT testing
- Important component of medical surveillance that may not always occur

Workplace Education

- Workers at separation
- Educate on signs/symptoms of CBD
- Recommend serial testing
- Former Worker Program information
- Testing can also be arranged through personal physician



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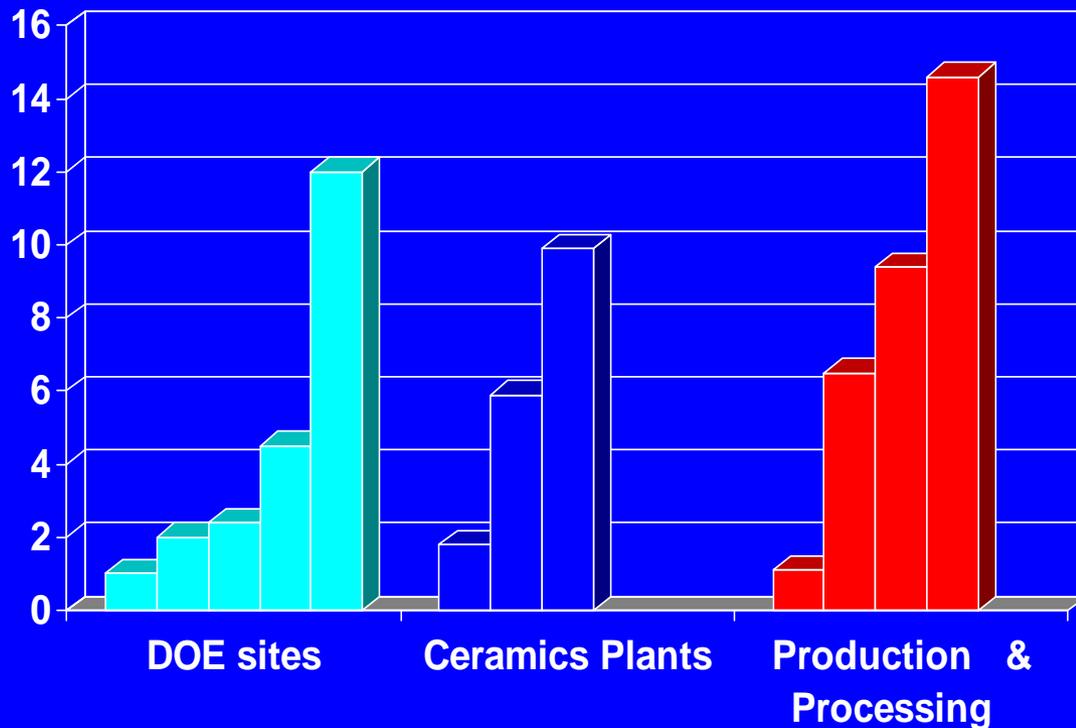
Questions?



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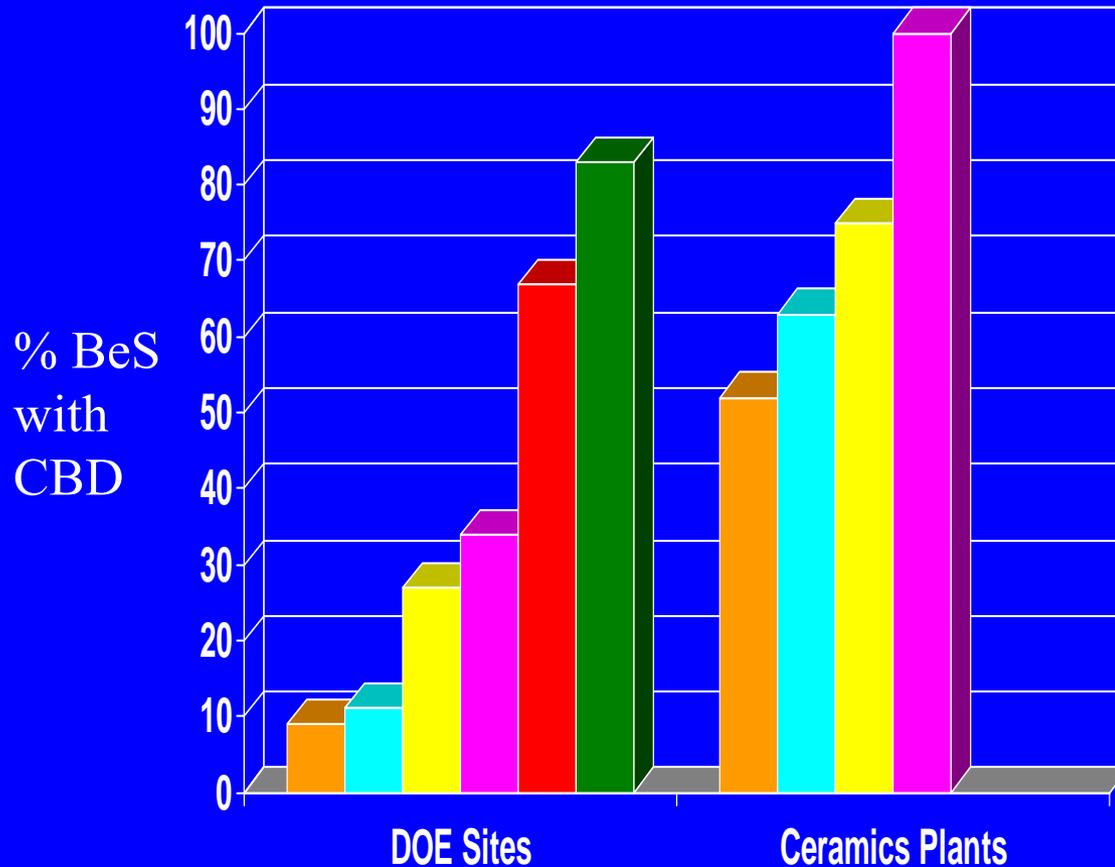
Prevalence of BeS

% of tested workers with BeS



- Sackett, 2004 (1%)
- Welch, 2004 (1%)
- Kreiss, 1993 (2%)
- Stange, 1996 (2.4%)
- Stange, 2001 (4.5%)
- Kreiss, 1989 (12%)
- Kreiss, 1993 (1.8%)
- Kreiss, 1996 (5.9%)
- Henneberger, 2001 (9.9%)
- Stanton, 2006 (1.1%)
- Schuler, 2005 (6.5%)
- Kreiss, 1997 (9.4%)
- Newman, 2001 (9.4%)
- Rosenman, 2005 (14.6%)

Percent of BeS Diagnosed with CBD



- Welch, 2004 (9%)
- Sacket, 2004 (11%)
- Stange, 1996 (27%)
- Stange, 2001 (34%)
- Kreiss, 1989 (67%)
- Kreiss, 1993 (83%)
- Rosenman, 2005 (52%)
- Henneberger, 2001 (63%)
- Kreiss, 1996 (75%)
- Kreiss, 1993 (100%)