

Medical Surveillance for Beryllium-Exposed Workers

Beryllium is a lightweight metal used primarily in alloys to add strength, thermal stability, and other properties valued in the aerospace and defense industries. Workers can develop adverse health effects from breathing beryllium in dust, mist, fumes, or in other forms, or through skin contact with beryllium particulate, fumes, or solutions. OSHA has finalized new beryllium standards for general industry, construction, and shipyards to better protect workers from this toxic metal.

What is Medical Surveillance?

Medical surveillance is a way to optimize worker health using health data. The purpose of medical surveillance is to detect and eliminate the underlying causes of observed health effects from hazards.

Medical surveillance programs can contribute to the success of workplace health and safety programs by identifying potential problem areas and verifying the effectiveness of existing control and prevention programs.

Health Effects Associated with Beryllium Exposure

- Sensitization
- Chronic Beryllium Disease (CBD)
- Acute Beryllium Disease
- Lung Cancer

Medical Surveillance Requirements for Beryllium Workplaces (paragraph (k))

OSHA requires employers to offer medical surveillance to workers who meet one of the following conditions: are or are reasonably expected to be exposed above the action level of $0.1 \mu\text{g}/\text{m}^3$ for 30 days in a year; show signs or symptoms of CBD; were exposed to beryllium during an emergency; or have received a recommendation for continued medical surveillance from a physician or other licensed health care professional (PLHCP) from the most recent exam. These are referred to as triggers for medical surveillance ((k)(2)(i)).

The medical surveillance program is voluntary for workers. However, once a worker meets any of the triggers described at left, the employer is required under the new beryllium standards to offer medical surveillance. The medical surveillance requirements within the beryllium standards include the following provisions:

- Employers must offer medical surveillance to a worker within 30 days of meeting the criteria set forth in paragraph (k)(2)(i), and then at least every two years thereafter for those who continue to meet the criteria in paragraph (k)(2)(ii).
- The medical examination must include:
 - Medical and work history with emphasis on past and present airborne exposure to or dermal contact with beryllium, smoking history, and any history of respiratory system dysfunction,
 - Physical examination with emphasis on the respiratory system,
 - Physical examination for skin rashes,
 - Pulmonary function tests,
 - Beryllium lymphocyte proliferation test (BeLPT)¹ or other equivalent test, and
 - Any other test deemed appropriate by the PLHCP² (including low-dose CT scan).³

OSHA requires that employers provide certain information to the PLHCP. This information includes:

- A copy of the standard,
- A description of the employee's former and current duties that relate to the employee's airborne exposure to and dermal contact with beryllium,
 - The employee's former and current levels of airborne exposure,

1. The BeLPT is a recognized diagnostic test for measuring the immune response to beryllium (see section on the BeLPT).

2. The low-dose CT scan is generally used for diagnosing lung cancer.

3. See section on other tests deemed appropriate by PLHCP.

- A description of any personal protective clothing and equipment (PPE), including respirators, used by the employee, including when and how long these were used, and
- Information from records of employment-related medical examinations previously provided to the employee, currently within the control of the employer, after obtaining written consent from the employee.

OSHA requires the employer to ensure that the employee receives a written medical report from the licensed physician within 30 days of the medical examination. The written report must include:

- The results of the medical examination (including whether the employee has any detected medical condition that may place the employee at increased risk from further airborne exposure, or any medical conditions related to airborne exposure that require further evaluation or treatment),
- Any recommendations on the employee’s use of PPE or respirators,
- Any limitations on the employee’s airborne beryllium exposure, and
- Any recommendation for referral to a CBD diagnostic center, continued medical surveillance, or medical removal

OSHA also requires that the employer receive a written medical opinion from the licensed physician. The written medical opinion must include:

- The date of the examination,
- Statements that the results of the examination were explained to the worker and that the examination met the requirements of the beryllium standard, and
- Any recommended limitations on the employee’s use of respirators, protective clothing, or equipment

If the worker is either confirmed positive for beryllium sensitization, diagnosed with CBD, or a licensed physician has determined it appropriate, and the worker provides written authorization, OSHA requires employers to provide:

- A referral to a CBD Diagnostic Center (see criteria set forth in paragraph (b) of the standard)⁴
- Continued medical surveillance
- Medical removal (upon request by worker)

Workers with potential exposure to beryllium are encouraged to participate in the medical surveillance

programs offered by their employer. Active participation by workers in the medical surveillance program helps increase the effectiveness of any health and safety prevention program by providing the employer with valuable information on potential sources of beryllium exposure that result in any type of health effect (e.g., sensitization, CBD). Providing this information to the employer ensures that corrective actions can be taken to eliminate or reduce the risk to fellow workers. See section on “Workers’ Rights” for more information.

Diagnosis of Chronic Beryllium Disease

Chronic Beryllium Disease (CBD) is a chronic granulomatous lung disease caused by inhalation of airborne beryllium by an individual who is beryllium-sensitized. In the early stages of CBD, an individual may not experience any symptoms. However, over time, the following symptoms may develop: shortness of breath with physical activity, dry cough that will not go away, fatigue, night sweats, chest and joint pain, or loss of appetite. A work and medical history of exposure to beryllium is an important step in diagnosing CBD. The first medical test for diagnosis of CBD is the beryllium lymphocyte proliferation test (BeLPT). The BeLPT is a test that determines if the immune system reacts to beryllium as a foreign substance — this reaction results in an abnormal BeLPT. In individuals who are not sensitized to beryllium and do not have CBD, the immune system does not respond to beryllium in any manner, and they have normal BeLPT results. Individuals must be sensitized to beryllium in order to develop CBD.

Individuals with either two abnormal BeLPT test results, an abnormal and a borderline test result, or three borderline test results are considered to be “confirmed positive” and should be encouraged to undergo further evaluation to determine if they have CBD.

The BeLPT

There are currently a few laboratories with sufficient expertise to perform the BeLPT. Due to procedural differences between laboratories performing the BeLPT, careful consideration of the test protocols and interpretation of BeLPT results should be considered prior to making a laboratory selection. Under the OSHA beryllium standard, a laboratory must be certified under the College of American Pathologists/Clinical Laboratory Improvement Amendments (CLIA) guidelines to perform the BeLPT. Physicians and employers may want to

4. As a general guide for referral to a CBD Diagnostic Center, an employee must be referred if confirmed positive or if the physician otherwise deems it appropriate (for example, because the employee is showing signs or symptoms consistent with CBD).

review information contained within the Department of Energy Specification (DOE-SPEC-1142-2001 April 2001) Beryllium Lymphocyte Proliferation Testing (BeLPT)) for background information to familiarize themselves with the BeLPT prior to selecting a laboratory (www.standards.doe.gov/standards-documents/3000/1142-dspec-2001/@_@images/file). Because the blood sample must arrive at the testing site within 24 to 30 hours of being drawn, a key selection consideration is the laboratory's ability to accommodate this timeframe.

Appropriate insulating material should be used to maintain satisfactory temperature control and to avoid extreme temperature fluctuation of the cells and maximize cell viability during shipping. The samples must be labeled with, at a minimum, the patient's name, date, and time blood is drawn, identification number, and name of person obtaining specimen. Biosafety packing should be utilized. Samples or the packing material should not be refrigerated, and shipping containers should be labeled: HUMAN BLOOD, DELIVER IMMEDIATELY, DO NOT FREEZE, PERISHABLE.

Other Tests Deemed Appropriate by PLHCP

Appropriate medical tests may include exercise tolerance testing, pulmonary function testing, a chest X-ray or CT scan, blood work, and diagnostic bronchoscopy with biopsy and lavage (lung washing), but the extent and applicability of these tests should be based on the patient's overall health and the physician's expert judgement. The diagnosis of CBD can be made on the basis of diagnosis of beryllium sensitization and the finding of granulomas, or by an abnormal beryllium test in the immune cells from the lungs and significantly elevated number of a particular type of an immune cell called a lymphocyte, in addition to the worker's medical and work history.

Further Information

There is no known cure for CBD. Treatment may include corticosteroids, oxygen, and other means to ease symptoms or slow the disease progression. For more information, see OSHA's Health Effects

section in the final beryllium rule; the National Institute for Occupational Safety and Health's [Workplace Safety and Topics – Beryllium](#) webpage; National Jewish Medical and Research Center's [Chronic Beryllium Disease Treatment](#) webpage; the Agency for Toxic Substance and Disease Registry's [ToxFAQs for Beryllium](#) webpage; and the Department of Energy's [Chronic Beryllium Disease Prevention Program](#) webpage.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For additional information, see OSHA's Workers page (www.osha.gov/workers).

How to Contact OSHA

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to help ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



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