Beryllium Lymphocyte Proliferation Test (Be-LPT)

Background Information

Beryllium compounds may be associated with hypersensitivity lung disorders in certain individuals. Beryllium is a lightweight metal that can cause a chronic granulomatous in individuals who develop beryllium-specific, cell-mediated immunity. Testing for an individual's sensitivity to beryllium is performed with an *in vitro* lymphocyte stimulation assay. This is used not only as a screening assay but also as a part of the diagnostic criteria for chronic beryllium disease.

The measurement of T-Cell activation is used clinically in the evaluation of immune competence, in the assessment of prior exposure to an antigen during hypersensitivity state, and in monitoring the relative activity of disease where T-cells play an important role. When an antigen-specific stimulus is employed, this assay can be used to demonstrate a sensitized state or to test current immunocompetence.

Clinical Indications

Beryllium is a lightweight metal with high melting point, high strength and good electrical conductivity. As a result, beryllium has become widely used in a variety of industrial applications, such as thermal coating, nuclear reactors, rocket heat shields, micro-circuits, brakes, X-ray tubes, golf clubs and dental plates. Frequently, it is formulated as an alloy or an oxide.

It is estimated that approximately 800,000 U.S. workers have been exposed to beryllium, with the potential to develop beryllium sensitization or chronic beryllium disease (CBD).[1] Correlation between the clinical status of CBD (chronic beryllium disease) and *in vitro* responses to beryllium in an LPT (lymphocyte proliferation test) was developed.[2] An elevated blood Be-LPT response may indicate asymptomatic beryllium hypersensitivity of CBD (overt or sub-clinical). As a follow-up step, individuals may undergo pulmonary evaluation, including bronchoscopy, trans-bronchial biopsy, BAL and BAL Be-LPT.

Methodology

The blood lymphocyte proliferation test for beryllium sensitization (Be-LPT) is measured by H3-thymidine uptake in a cell culture system. H3-thymidine incorporation reveals the levels of lymphocyte stimulation in the presence of Beryllium SO4.

Interpretation

The stimulation index (S.I.) for PHA should be ≥50.0 and the S.I. for Candida albicans should be ≥2.0 to indicate intact T-cell function.

If all six beryllium indices are less than 3.0 this signifies a normal BESO4 result.

Ratios of greater than 3.0 in two or more beryllium indices constitutes an abnormal response that is compatible with beryllium hypersensitivity.

References

1. McCanlies EC, Kreiss K, Andrew M, Weston A. 2003. HLA-DBP1 and chronic beryllium disease: a HuGE review. *Am. J Epidemiology*. 157:388-398.
2. Deodhar SD, Barna BP, Van Ordstrand HS. 1973. A study of the immunologic aspects of chronic berylliosis. *Chest.* 63:309-313.
3. Barna BP, Culver DA, Yen-Lieberman B, Dweik RA, Thomassen MJ. Clinical application of Beryllium Lymphocyte Proliferation Testing. *Clin and Diag Lab Immunol*. 2003;10:990-994.
4. U. S. Department of Labor, Occupational Safety and Health Administration. Directorate of Science, Technology and Medicine Office of Science and Technology Assessment, Safety and Health Information Bulletin, September 2, 1999.

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Test Overview

Test Name	LPT to Beryllium, Blood
Reference Range	PHA Stim Index: ≥50.0 SI Beryllium 1.0 uM D5: ≤ 3.0 SI Beryllium 1.0 uM D6: ≤ 3.0 SI Beryllium 10 uM D5: ≤ 3.0 SI Beryllium 10 uM D6: ≤ 3.0 SI Beryllium 100 uM D5: ≤ 3.0 SI Beryllium 100 uM D6: ≤ 3.0 SI Candida albicans: ≥ 2.0 SI
Methodology	H3-thymidine uptake in cell culture
Specimen Requirements	30 mL whole blood in three 10 mL heparized (sodium) green top tubes. Deliver specimen to laboratory within 48 hours of collection. Specimen must be received by 3 p.m. Monday - Thursday and by 12 p.m. Friday.
Ordering Mnemonic	BLDBE
Billing Code	43060
CPT Code	86353

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