

Respiratory ailments caused by the inhalation of dust from cobalt, tin, barium and graphite

Definition of causal agent

Respiratory ailments caused by the inhalation of dust from cobalt, tin, barium and graphite are characterized by a chronic lung diseases including in case of exposure to:

Cobalt – occupational asthma (See Annex I entry nr. 304.06 on **Allergic asthmas caused by the inhalation of substances consistently recognised as causing allergies and inherent to the type of work'**.) or/and interstitial lung disease (*hard metal disease*), resulting in interstitial fibrosis

Tin and barium – non-fibrosing benign pneumoconiosis, usually asymptomatic and without alteration of lung function (*stannosis, baritosis*).

Graphite – fibrosing pneumoconiosis (*graphitosis*), clinically similar to coal miners-pneumoconiosis (see above).

Local effects

The massive exposure to cobalt, barium and tin dusts and fumes may cause irritation to the eyes, skin and mucous membranes (including upper and lower respiratory tract).

Main occupational uses and sources of exposure:

Cobalt: production of metal-ceramic articles, tungsten carbide tools, diamond –edged carbide tools, grinding of metal tools, as well as working with cobalt steel, diamond polishing or decoration of ceramics.

Tin: mining, smelting, refining, production and use of tin alloys and solders.

Barium: Barium sulphate is used in the manufacture of radio-opaque materials and as a basis for the production of white pigments. Exposure can occur during extraction of the ore and during the subsequent phases of the industrial processing.

Soluble compounds: these are used in the manufacture of glass, vulcanization of synthetic rubber, pesticides, pigment production, in the foodstuffs industry and in the production of electronic components.

Graphite: graphite mining and milling, ceramics, steel, iron, lubricants, electrodes and car components manufacture. Occupational exposure can occur during the production of artificial graphite articles, ore extraction of the production of artificial graphite from coal or mineral oil.

Diagnostic criteria

History and analysis of working conditions providing evidence of repeated or prolonged exposure to dust or fumes containing these agents. Workplace air monitoring data.

Chest X-ray: diffuse radiological findings: characteristic for non-fibrosing (in *stannosis* and *baritosis*); or fibrosing (in *graphitosis*) pneumoconiosis; in *hard metal disease* – initially the pattern reticular, in more advanced cases – micronodular pattern.

Lung function tests: restrictive (hard metal disease, *graphitosis*) or obturative (cobalt-induced asthma) changes, or mixed changes; in *stannosis* and *baritosis* usually no alteration of lung function are observed. In *hard metal disease* and *graphitosis*, reduction of gas transfer factor may be found.

In some cases, additional evidence may be obtained from bronchoalveolar lavage fluid (*hard metal disease*), sputum test (presence of graphite particles in *graphitosis*) or lung biopsy.

Exposure criteria

Cobalt

Minimum intensity of exposure: Occupational exposure confirmed and, if possible assessed by:

History and study on the working conditions showing evidence of repeated or prolonged exposure to cobalt dust and fumes (>0.05mg/m³)

Minimum duration of exposure: A few months

Maximum latent period: None

Tin

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by:

- History and study of working conditions providing evidence of prolonged/repeated exposure to tin oxide dust or fumes;

and, if available:

- Workplace air monitoring

Guide values; Atmospheric concentration >2µg/m³ inorganic tin

Maximum duration of exposure: Five years

Maximum latent period: Five years

Barium

Minimum intensity of exposure:

Irritant effects:

Atmospheric pollution well above 0.5 mg/m³

See section on ***Occupationally caused irritation of the skin and mucous membranes*** in Annex I entry nr. 202.

Systemic effects:

Workplace air monitoring

Atmospheric concentration > 10mg/m³ [in the event of crystalline silica, the concentration producing effects would be much lower (see document on silicosis)]

Minimum duration of exposure: five years

Maximum latent period: five years

Graphite

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by:

- History and study of working conditions providing evidence of exposure to graphite dust,

Workplace air monitoring;

Guide values: atmospheric concentration well above 10mg/m³ for artificial graphite, 2.5mg/m³ for the respirable fraction of natural graphite.

Minimum duration of exposure: five years

Maximum latent period: five years