



נוהג טוב בביצוע תהליכי עבודה

## Talc

Updated: December 2015

.....

This is hydrated magnesium silicate,  $Mg_3Si_4O_{10}(OH)_2$ . A crystalline structure of magnesium ions sandwiched in between sheets of silica accounts for the smoothness that is commonly associated with talcum powder. Calcium, aluminum and iron are always present in variable amounts.

Some minerals are almost invariably present in association with talc. These include serpentines, quartz, magnesite, calcite and others. A wide variety of mineral assembles of talc depend on the geographic area of origin. Talc exists in sheet-like crystalline forms or as fibers.

Commercial talc ranges from high grades of purity, containing over 95% talc proper, down to industrial grades that contain 50% or more impurities.

Five to six million tons of talc are mined yearly throughout the world.

Talc is processed by being passed through mesh to eliminate the larger talc particles. Accordingly, the mesh size sets the upper limit for the size of the talc particles in the final preparation [1,2].

## Usage

- High-grade talc is used in paints as a filler and inert extender. "Fibrous talc" increases mechanical strength of the paint films.
- In the roof industry and shingle industry talc is distributed on the felt surfaces to prevent adhesion, and may also be used as a filler in the asphaltting industry.
- High grade talc is used for cosmetic, toilet and pharmaceutical talcum powder and antiperspirant sticks.
- Pharmaceutical tablet production.
- Talc is used in preparing the mix for electric ceramics and tiles. Talc mixed with clay and alumina is used for different types of refractory kiln equipment.
- Rubber industry – talc is used as a dusting agent to prevent adhesion of the rubber in the moulds and provide smooth extrusion. It is used as filler in hard

rubber goods, in cable manufacture, and as inert filler in some plastic polypropylene compounds.

- Talc is also used in the moldings of accumulator plates.
- Leather finishing.
- Fertilizer industry – low-grade talc is used as an anti-caking agent in the manufacture of fertilizers.
- Low-grade talc is used as refractory filler for moulds and cores in ferrous and non-ferrous castings.
- Paper industry – talc is used as a coater and filler of paper.
- Textile industry- talc is used for bleaching.
- Talc is the agent for pleurodesis [Light].

### **Routs of exposure**

Exposure to talc occurs through inhalation of the dust containing talc.

**Target organs:** The lungs are the target organs in exposure to talc.

### **Health effects**

Talc exposure has been associated with symptoms of cough, dyspnoea and phlegm production, and with evidence of airflow obstruction in pulmonary function studies. ARDS (Acute Respiratory Distress Syndrome) can develop after its intrapleural administration [Light].

Talc pneumoconiosis was first described by Thorel in 1896 [Parkes].

The composition of inhaled talc is the major determinant of the appearance and biological behavior of the pneumoconiosis. The recognized causes of pulmonary talcosis, each of which results in a different form of disease, are the following: inhalation of pure talc; inhalation of talc in association with silica (talcosilicosis); inhalation of talc in association with asbestos (talcoasbestosis); and intravenous injection of talc, which occurs most often during recreational drug use [3]. Pure talcosis is associated with cosmetic use of talcum powder [4]. There is one case report of inadvertent talc inhalation leading to diffuse interstitial fibrosis, causing rapidly progressive disease and pulmonary hypertension [5]. Some studies report increased risks for idiopathic pulmonary fibrosis associated with a consistent set of occupational and environmental dust exposure, including talc [6].

Lung pathology has revealed various forms of pulmonary fibrosis: granulomatous changes and ferruginous bodies have been reported, and dust-laden macrophages

collected around the respiratory bronchioles intermingled with bundles of collagen [7]. Mineralogical examination of lung tissue from talc workers is also variable and may show silica, mica or mixed silicates [8].

Diffuse rounded and irregular parenchymal lung opacities and pleural abnormalities are seen on the chest radiographs of talc workers. The radiographic shadows may be ascribed to talc itself or to contaminants in the talc. CT findings in talcosis include small centrilobular and subpleural nodules or heterogeneous conglomerate masses that contain foci of high attenuation indicating talc deposition [Chong]. There are also focal ground glass opacities [9].

### **Carcinogenicity**

Talc deposits may be associated with asbestos and other fibers that increase risk of bronchogenic carcinoma. Recent investigations of workers exposed to talc without associated asbestos fibers revealed trends for higher mortality from non-malignant respiratory disease (silicosis, silico-tuberculosis, emphysema and pneumonia), but the risk for bronchogenic cancer was not found to be elevated [10]. The study of mortality among workers at a talc mine concluded that exposure to talc ore dust may not have been responsible for the lung cancer excess among these workers but probably contributed to the elevated rate of non-malignant respiratory disease, particularly pulmonary fibrosis [11].

Talc not containing asbestiform fibers is not classifiable as to its carcinogenicity to humans (Group 3). Talc containing asbestiform fibers is carcinogenic to humans (Group 1) [12,13,14,15].

It has been suggested that talcum powder may be carcinogenic to the covering layer of the ovaries by its migration through the vagina, uterus, and fallopian tubes to the ovary. The risk from talc use increased among women who had not had a tubal ligation. Findings are mixed, some studies report a slightly increased risk and others report no association [16,17,18,19].

The last reevaluation of carcinogenicity of talc was fulfilled at 2010. The IARC Working Group found little or inconsistent evidence of an increased risk for cancer in the studies of workers occupationally exposed to talc. The studies of talc miners and millers were considered to provide the best source of evidence, but no consistent pattern was seen. Other studies also found no increased cancer risk or no higher risk with increasing cumulative exposure. Overall, these results led the Working Group to conclude that there was inadequate evidence from epidemiological studies to assess whether inhaled talc not containing asbestos or asbestiform fibers causes cancer in humans.

For perineal use of talc-based body powder, many case–control studies of ovarian cancer found a modest, but unusually consistent, excess in risk, although the impact of bias and potential confounding could not be ruled out. The Working Group concluded that the epidemiological studies taken together provide limited evidence of an association between perineal use of talc-based body powder and an increased risk for ovarian cancer.

There is inadequate evidence in humans for the carcinogenicity of inhaled talc not containing asbestos or asbestiform fibres.

There is limited evidence in humans for the carcinogenicity of perineal use of talc-based body powder.

Perineal use of talc-based body powder is possibly carcinogenic to humans (Group 2B).

Inhaled talc not containing asbestos or asbestiform fibres is not classifiable as to its carcinogenicity (Group 3) [20].

## References:

1. Parkes W.R.: Occupational Lung Disease. 3d edn. pp.536-540, 1994
2. Light R.W.: Talc for Pleurodesis? Chest 122: 1506-1508, 2002.
3. Sullivan J.B., Krieger G.R., eds.: Hazardous Materials Toxicology : Clinical Principles of Environmental Health. Williams & Wilkins, 1992.
4. Dekel Y., Rath-Wolfson L., Rudniki C., Koren R.: Talc inhalation is a life-threatening condition. PatholOncol Res 10(4):231-3, 2004.
5. Baumgartner K.B., Samet J.M., Coultas D.B., et al.: Occupational and Environmental Risk Factors for Idiopathic Pulmonary Fibrosis: A Multicenter Case-Control Study. Collaborating Centers. Am. J. Epidemiol. 152: 307-315, 2000.
6. Woywodt A., Schneider W., Goebel U., Luft F.C.: Hypercalcemia Due to Talc Granulomatosis. Chest 117: 1195-1196, 2000.
7. Petsonk E.L., Shor S.R.: Respiratory System: The Variety of Pneumoconioses. ILO.SafeWork.Bookshelf.<[http://www.ilo.org/safework\\_bookshelf/english](http://www.ilo.org/safework_bookshelf/english)>
8. Chong S., Lee K.S., Chung M.J., Han J.: Pneumoconiosis: Comparison of Imaging and Pathologic Findings. Radiographics 26:59-7, 2006.
9. Edson M., Soares S.A.: Inhalational Pulmonary Talcosis: High resolution CT Findings in 3 Patients. J Thoracic Imaging 19(1):41-44, 2004.

10. Scancarello G, Romeo R, Sartorelli E: Respiratory disease as a result of talc inhalation. *J Occup Environ Med* 38(6):610-614, 1996.
11. Honda Y., Beall C., Delzell E., Oestenstad K.: Mortality among workers at a talc mining and milling facility. *Ann Occup Hyg* 46: 575-585, 2002.
12. IARC. Supplement 7: 1987, p.349.
13. Wild P., Leodolter K., Refregier M., et al.: A cohort mortality and nested case-control study of French and Austrian talc workers. *Occup Environ Med* 59: 98-105, 2002.
14. Moshhammer H., Neuberger M.: Lung cancer and dust exposure: results of a prospective cohort study following 3260 workers for 50 years. *Occup Environ Med* 61: 157-162, 2004.
15. Wild P.: Lung cancer risk and talc not containing asbestiform fibres: a review of the epidemiological evidence. *Occup Environ Med* 63: 4-9, 2006.
16. Barnes M.N., Grizzle W.E., Grubbs C.J., Partridge E.E.: Paradigms for primary prevention of ovarian carcinoma. *CA Cancer J Clin* 52: 216-225, 2002.
17. Mills P.K., Riordan D.G., Cress R.D., Young H.A.: Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California. *Int J Cancer* 112:458-464, 2004.
18. Langseth H., Kjærheim K.: Ovarian cancer and occupational exposure among pulp and paper employees in Norway. *Scand J Work Environ Health* 30(5):356-361, 2004.
19. La Vecchia C.: Epidemiology of ovarian cancer: a summary review. *Eur J Cancer Prev* 10(2):125-129, 2001.
20. IARC. Volume 93 (2010). pp: 277-413.