International Chrysotile Association

For environmental
occupational health
safe and responsible use

Science-Based Facts

Revelant Health Issues – 2015

SCIENCE-BASED FACTS AND RELEVANT HEALTH ISSUES 2015

ON THE DIFFERENT ASBESTOS FIBER TYPES:
AMPHIBOLES VS CHRYSOTILE

ON PROTOCOLS FOR SAFE WORK PRACTICES

ON THE CORRECT INTERPRETATION OF IARC
(WHO) CLASSIFICATION

ON STUDIES IN VARIOUS SETTINGS
SHOWING NO DETECTABLE RISK

EXAMPLES OF SAFE USES OF
CHRYSOTILE CEMENT APPLICATIONS.

DIFFERENCES IN ASBESTOS FIBER TYPES

THERE ARE SIX DIFFERENT ASBESTOS FIBER TYPES

- chrysotile
- amosite
- crocidolite

- tremolite
- actinolite
- anthophyllite

The first three are those used commercially, and are thus subject to scrutiny.

MODERN SCIENCE TEACHES THAT:

- not all asbestos fiber types are equally potent;
- this difference in potency is several orders of magnitude, especially for mesothelioma.

Crocidolite: (**500**)
Amosite: (**100**)
Chrysotile: (**1**)

DIFFERENCE IN RISK BETWEEN AMOHIBOLES AND CHRYSOTILE

Fiber specific risks:	Chrysotile	Amosite	Crocidolite
For lung cancer:	1	10	50
For mesothelioma:	1	100	500

Hodgson J.T. and Darnton A. (2000).
The Quantitative Risks of Mesothelioma and Lung Cancer in Relation to Asbestos.
Ann. Occup. Hyg. 44(8): 565-601

WHO OFFICIAL STAND ON MANAGEMENT OF ASBESTOS

CHRYSOTILE IS SIGNIFICANTLY LESS HAZARDOUS THAN THE AMPHIBOLES.

Properly controlled, and in absence of amphiboles, chrysotile does not present health risk of any significance to the workers and the general public.

Some individual anti-asbestos activists, working inside WHO, call for a ban of all asbestos fiber types including chrysotile.

They claim that their personal call for a total ban reflects the official WHO stand on asbestos. That claim is wrong.

Real science will indicate clearly that regulations regarding asbestos must take into account the existing differences between fibres types.

WHO OFFICIAL STAND ON MANAGEMENT OF ASBESTOS.

This is the present official stance of the WHO, which has been adopted in 2007 by the highest decision body: the World Health Assembly (WHA)

WORLD HEALTH ORGANIZATION
WORLD HEALTH ASSEMBLY
Final resolutions - page 86, item 10 2007

"WHO will work with Members States to strengthen the capacities of the ministries of health to provide leadership for activities to workers' health, to formulate and implement policies and action plans, and to stimulate intersectoral collaboration. Its activities will include global campaigns for elimination of asbestos-related diseases; bearing in mind a differentiated approach to regulating its various forms; in line with relevant international legal instruments and the latest evidence for effective interventions."

Note: « …bearing in mind a differentiated approch to regulating its various forms. ».

The same remarks apply also to a « resolution » passed at a ILO « conference » in 2010, where it was proposed that the exploitation of all asbestos fiber types, including chrysotile should be banned.

Comment:

The ILO Convention 162 on Safety in the Use of Asbestos was adopted in 1986, and has been ratified by some 36 countries.

This Convention does not call for a ban of chrysotile. This international Convention binds all 36 countries to abide by the objectives of the Convention.

A “resolution” from a “conference” cannot overrule the Convention 162, which is adopted by the highest decision body of the ILO.

The very concept of safe use is reflected in Convention 162 of the ILO. This Convention recommends a strict framework for the use of chrysotile...

...but it does not include prohibitions other than for amphiboles and for the use of loose, friable asbestos in fireproofing applications.

Convention 162 remains the only international legal instrument for the controlled use of chrysotile asbestos.

PROTOCOLS FOR THE SAFE USE OF CHRYSOTILE

Controlled-use is based on scientific evidence. It involves:

A | Exclusion of all amphiboles

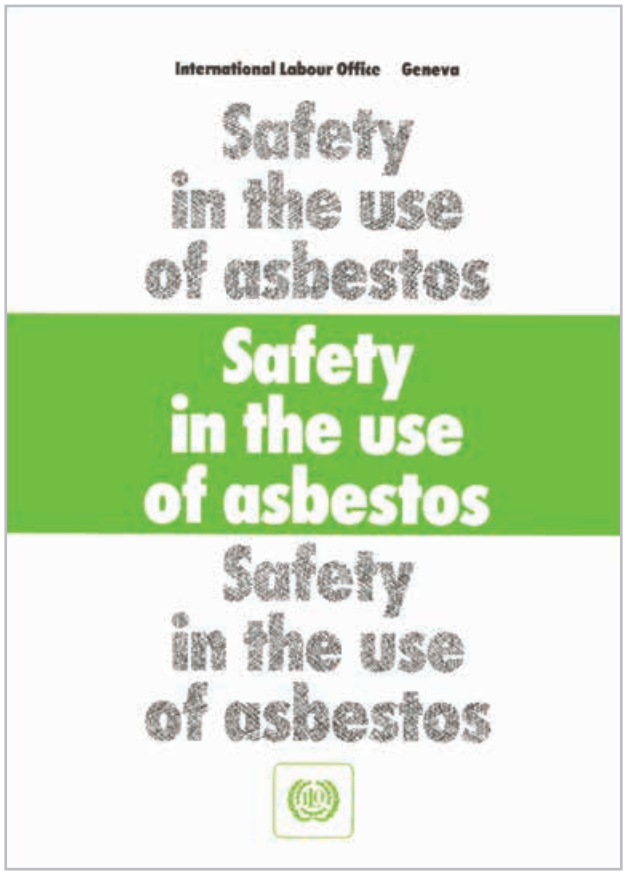
B | Regulations and Enforcement

C | Implementation:

1. Monitoring
2. Engineering dust controls
3. Medical surveillance
4. Training and Information

The essential elements are detailed in the ILO brochure:

ILO CODES OF PRACTICE
« SAFETY IN THE USE OF ASBESTOS »



THE CORRECT MEANING OF IARC CLASSIFICATIONN OF HUMAN CARCINOGENS

In the « GROUP 1 » (CARCINOGENIC TO HUMANS), ARE LISTED THE FOLLOWING (from the 111 identified so far)

Agents and groups of agents:

- Asbestos
- Benzine
- Cadmium
- Oestrogen, post-menauposal therapy
- Oestrogens, both steroidal and non-steroidal
- Oral contraceptives, sequential
- Silica (crystalline, inhaled in the form of cristobalite)
- Vinyl chloride
- X-radiation and gamma radiation

Mixtures:

- Alcoholic beverages
- Analgesic mixtures containing phenacetin
- Salted fish (Chinese-style)
- Tobacco smoke;
- Wood dust

(Very recently):

- Diesel exhaust emissions
- Outdoor air pollution

Exposure circumstances :

- Aluminium production
- Boot and shoe manufacture
- Furniture and cabinet making
- Iron and steel foundry
- Painter (occupational exposure)
- Rubber industry
- Solar irradiation

QUESTION

Does the presence on the IARC list of « Group 1 » of substances, mixtures and industrial activities imply that these must be banned?

IF THE ANSWER IS YES

Would Society be prepared to ban…

- Diesel motors ?
- X-rays for clinical investigation ?
- Contraceptive pills ?
- Oestrogen therapy ?
- Boot and shoe manufacture ?
- Iron and steel foundry ?
- Aluminum production ?
- Etc…

… just because these and others are listed by the IARC in the Group 1 category of human carcinogens ?

THE CORRECT ANSWER IS NO

Because the IARC classification covers only the identification and characterization (**hazard**) of these substances, mixtures and activities.

It does not include the assessment of risk, i.e.: the probability of toxic manifestation under actual conditions of use.

IMPORTANT DISTINCTION

« HAZARD » is not « RISK »

The IARC classification is about HAZARD, not RISK

Characterizing a hazardous substance is not equal to assessing the true risk.

HAZARD characterization is an essential, but insufficient component of risk assessment, which also comprises exposure data over time and estimation of the likely RISK under actual conditions of use.

Because the IARC classification refers only to "hazard identification", and does not refer to "risk assessment", because the components of dose under actual conditions are absent.

The IARC classification is not meant and should not be used as the only "risk management" instrument for eventual regulatory action.

STUDIES IN VARIOUS SETTINGS SHOWING NO DETECTABLE RISK

CONTROLLED USE OF CHRYSOTILE:

IS IT REALLY WORKING ?

HERE ARE A FEW EXAMPLES OF PUBLISHED STUDIES SHOWING NO DETECTABLE HEALTH RISKS

WHEN

CHRYSOTILE ONLY IS USED

IN COMPLIANCE WITH LOW EXPOSURE LIMITS (≤ 1 f/cc)

EVIDENCE FROM CHRYSOTILE-CEMENT MANUFACTURING IN USA

Weill H., Hughes J. and Waggenspack C. (1979). Influence of dose and fibre type on respiratory malignancy risk in asbestos cement manufacturing.

American Review of Respiratory Disease 120(2):345-354.

An investigation on 5,645 asbestos-cement manufacturing workers, showing no raised mortality resulting from exposure for 20 years to chrysotile asbestos at exposure levels equal to or less than 100 MPPCF. Years (corresponding to approximately 15 fibres/ml x years). The authors state: *"...However, the demonstration that low cumulative and short-term exposures did not produce a detectable excess risk for respiratory malignancy may be of assistance in the development of regulatory policy, because a scientifically defensible position based on these data is that there are low degrees of exposure not associated with a demonstrable excess risk".*

EVIDENCE FROM CHRYSOTILE-CEMENT MANUFACTURING IN UNITED KINGDOM

Thomas HF, Benjamin IT, Elwood PC and Sweetnam PM (1982). Further follow-up study of workers from an asbestos cement factory.

British Journal of Industrial Medicine 39(3):273-276

In an asbestos-cement factory using chrysotile only, 1,970 workers were traced, and their mortality experience was examined. There was no appreciably raised standardized mortality ratio (SMR) for the causes of death investigated, including all causes, all neoplasms, cancer of the lung and pleura, and cancers of the gastrointestinal tract. The authors indicate: *"Thus the general results of this mortality survey suggest that the population of the chrysotile asbestos-cement factory studied are not at any excess risk in terms of total mortality, all cancer mortality, cancers of the lung and bronchus, or gastrointestinal cancers".*

MORE EVIDENCE FROM ASBESTOS-CEMENT MANUFACTURING IN UNITED KINGDOM

Gardner MJ, Winter PD, Pannett B and Powell CA (1986). Follow up study of workers manufacturing chrysotile asbestos cement products.

British Journal of Industrial Medicine 43:726-732

A cohort study carried out on 2,167 subjects employed between 1941 and 1983. **No excess of lung cancers or other asbestos-related excess death is reported, at mean fibre concentrations below 1 f/ml**, although higher levels had probably occurred in certain areas of the asbestos-cement factory.

EVIDENCE FROM FRICTION MATERIALS MANUFACTURING IN UNITED KINGDOM

Berry G and Newhouse ML (1983). Mortality of workers manufacturing friction materials using asbestos.

British Journal of Industrial Medicine 40(1):1-7.

A mortality (1942-1980) study carried out in a factory producing friction materials, using almost exclusively chrysotile. Compared with national death rates, there were no detectable excess of deaths due to lung cancer, gastrointestinal cancer, or other cancers. The exposure levels were low, with only 5% of men accumulating 100 fibre-ml x years. The authors state: *"The experience at this factory over a 40-year period showed that chrysotile asbestos was processed with no detectable excess mortality".*

MORE EVIDENCE FROM FRICTION MATERIALS MANUFACTURING IN UNITED KINGDOM

Newhouse, M.L. and Sullivan, K.R. (1989). A mortality study of workers manufacturing friction materials: 1941-86.

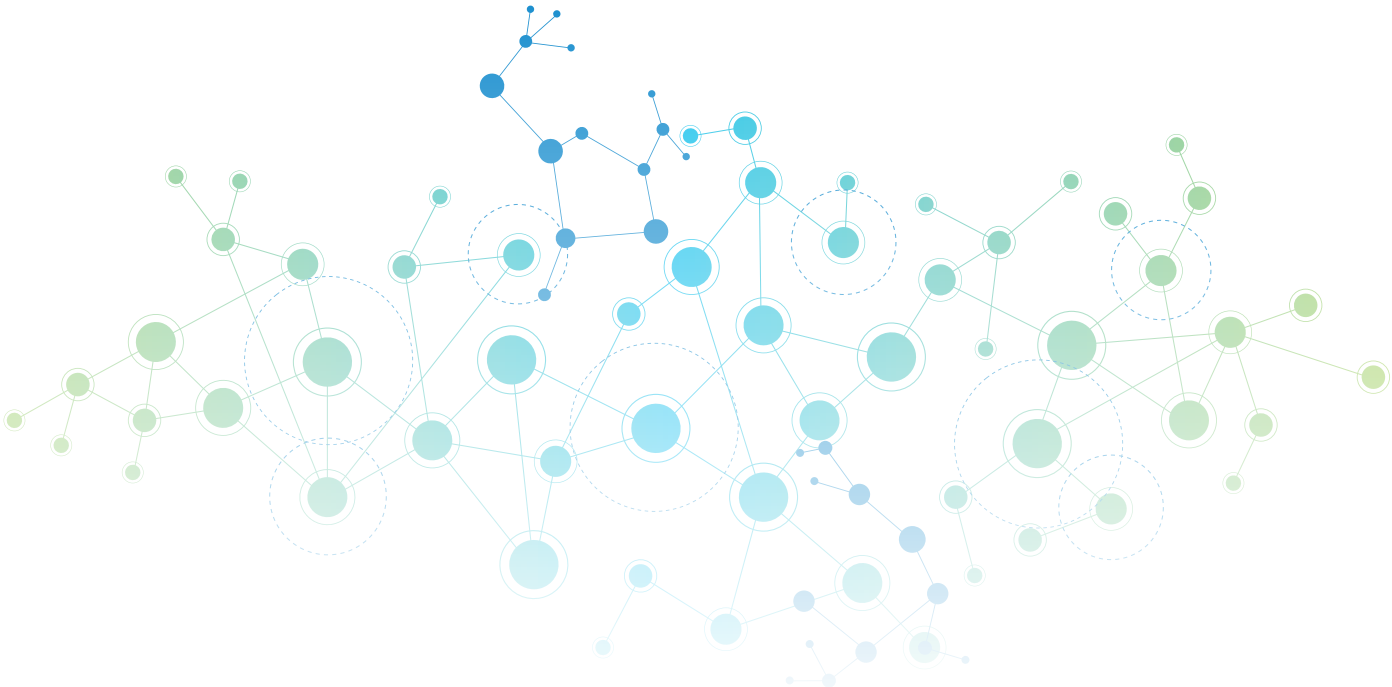
British Journal of Industrial Medicine 46(3):176-179.

The study referred to in the preceding slide has been extended by seven years. The authors confirm that there was no excess of deaths from lung cancer or other asbestos related cancers, or from chronic respiratory disease. After 1950, hygienic control was progressively improved at this factory, and from 1970, levels of asbestos have not exceeded 0.5-1.0 f/ml. The authors conclude: *"It is concluded that with good environmental control, chrysotile asbestos may be used in manufacture without causing excess mortality".*

It is the professionnel duty of scientists to make sure that regulatory authorities and governments make their risk management decisions based on science, not on myths.

Today, risk management of chrysotile must be based on current scientific assessment

- which recognizes and differentiates between chrysotile and the amphiboles;
- which demonstrates that low (1 f/ml) levels of exposure to chrysotile is feasible, and is not associated with any measurable risk.



DIFFERENCES IN PATHGENIC POTENTIAL ACCORDING TO ASBESTOS FIBER TYPES

a/ Morbidity and mortality studies in persons exposed to chrysotile only.

•**Wagner, J.C., Newhouse, M.L., Corrin, B., Rossiter, C.E.and Griffiths, D.M. (1988).** Correlation between fibre content of the lung and disease in East London asbestos factory workers.
British Journal of Industrial Medicine 45(5):305-308.
"We believe therefore that chrysotile is the least harmful form of asbestos in every respect and that more emphasis should be laid on the different biological effects of amphibole and serpentine asbestos fibre".

•**Kleinerman, J. (1988).** The pathology of asbestos related lung disease.
Proceedings, The Fleischner Society, Eighteenth Annual Symposium on Chest Disease, Montréal, Canada, 16-18 May, pp. 33-46.
"Most asbestos workers who develop mesothelioma are exposed to amphibole asbestos. Few mesotheliomas are found in workers exposed to chrysotile... The tremolite exposure is considered to play a major role in the development of the mesotheliomas in these cases".

•**Dunnigan, J. (1988).** Commentary: Linking chrysotile asbestos with mesothelioma.
American Journal of Industrial Medicine 14:205-209.
Overview of evidence showing unlikeliness of link of mesothelioma with chrysotile exposure. Epidemiological studies from USA (Weiss, McDonald and Fry, Dement), from Britain (Newhouse, Thomas, Acheson) are analysed, and lung burden studies (Pooley, Wagner, Jones, A.D. McDonald) are also pointed to.

•**Hughes, J.M., Weill, H. and Hammad, Y.Y. (1987).** Mortality of workers employed in two asbestos cement manufacturing plants.
British Journal of Industrial Medicine 44(3):161-174.
Mortality of 6,931 employees of two asbestos cement factories was studied. In one of them (plant 2), crocidolite was used along with chrysotile. There were 10 cases of mesothelioma in this study, 8 of whom from the plant 2. The case-control analysis found a significant relation between risk of mesothelioma and proportion of time spent in the area of making a/c pipes where crocidolite was used.

•**Gardner, M.J. and Powell, C.A. (1986).** Mortality of asbestos cement workers using almost exclusively chrysotile fibre.
Journal of the Society of Occupational Medicine 36(4):124-126.
Three studies are reviewed of asbestos-cement workers using almost exclusively chrysotile in Great Britain and in Sweden. No asbestos-related mortality in meaningful excess of expected

was found. The authors state: "This is in contrast with most studies of workers making similar products from mixed fibres containing mainly chrysotile but also amphiboles, crocidolite and amosite".

•**Berry, G. and Newhouse, M.L. (1983).** Mortality of workers manufacturing friction materials using asbestos.
British Journal of Industrial Medicine 40(1):1-7.
Study of 13,400 workers (friction materials) showing no mesothelioma when chrysotile only was used, but 10 mesotheliomas when crocidolite was also used.

•**Thomas, H.F., Benjamin, I.T., Elwood, P.C. and Sweetnam, P.M. (1982).** Further follow-up study of workers from an asbestos cement factory.
British Journal of Industrial Medicine 39(3):273-276.
Study of 1,970 a/c workers, showing no case of mesothelioma over a 40-year period when chrysotile only was used, but 2 mesotheliomas when crocidolite was used during a 2-year period.

•**McDonald, A.D. and Fry, J. (1982).** Mesothelioma and fibre type in three American asbestos factories - Preliminary report.
Scandinavian Journal of Work, Environment and Health 8 (Supplement 1):53-58.
Study of yarns, cloth and packings, and also gaskets manufacturing, showing only 1 case of mesothelioma / 2,341 workers when almost exclusively chrysotile was used, and 18 cases / 1,429 workers when mixed fibre types were used.

• **Acheson, E.D., Gardner, M.J., Pippard, E.C. and Grime, L.P. (1982).** Mortality of two groups of women who manufactured gas masks from chrysotile and crocidolite asbestos: a 40-year follow-up.
British Journal of Industrial Medicine 39(4):344-348.
Study of gas mask workers showing no case of mesothelioma when chrysotile only was used, and 5 cases / 757 workers using crocidolite.

•**McDonald, A.D. and McDonald, J.C. (1978).** Mesothelioma after crocidolite exposure during gas mask manufacture.
Environmental Research 17(3):340-346.
Exposure to crocidolite in making war-time military gas-masks in Québec led to accumulation of 9 cases of mesothelioma out of 56 deaths (16%). High amounts of crocidolite (and some chrysotile) were found in their lungs. This compares with incidence of mesothelioma, 0.26% of deaths in the Québec (chrysotile) mines.

•**Weiss, W. (1977).** Mortality of a cohort exposed to chrysotile asbestos.
Journal of Occupational Medicine 19(11):737-740.
Study showing no case of mesothelioma in millboard and paper manufacturing when chrysotile only is used.

b/ Mineral analysis of lung content in man.

•Wagner, J.C., Newhouse, M.L., Corrin, B., Rossiter, C.E.R. and Griffiths, D.M. (1988).
Correlation between fibre content of the lung and disease in East London asbestos factory workers.
British Journal of Industrial Medicine 45(5):305-308.
The lungs from 36 past workers of an asbestos factory using chrysotile, crocidolite, and amosite were examined. Crocidolite and amosite lung contents were strongly associated with asbestosis, and with mesothelioma, whereas no such correlation was evident with chrysotile and mullite.

•Wagner, J.C., Moncrieff, C.B., Coles, R., Griffiths, D.M. and Munday, D.E. (1986).
Correlation between fibre content of the lungs and disease in naval dockyard workers.
British Journal of Industrial Medicine 43(6):391-395.
Study showing increasing amounts of amphiboles in lung tissue with increasing severity of asbestosis, but no increase of chrysotile.

•Churg, A. (1985). Malignant mesothelioma in British Columbia in 1982.
Cancer 55(3):672-674.
Study showing a 300-fold increase of amphiboles in lung tissue of mesothelioma cases, but no difference with general population with regard to chrysotile lung content.

•Churg, A. (1988). Chrysotile, tremolite, and malignant mesothelioma in man.
Chest 93(3):621-628.
Churg maintains that of 53 cases of mesothelioma ever reported as caused by chrysotile, in fact 51 may be attributed to contamination by tremolite, crocidolite and/or amosite.

•Jones, J.S.P., Roberts, G.H., Pooley, F.D., Clark, N.J., Smith, P.G., Owen, W.G., Wagner, J.C., Berry, G. and Pollock, D.J. (1980). The pathology and mineral content of lungs in cases of mesothelioma in the United Kingdom in 1976.
In Biological Effects of Mineral Fibres, J.C. Wagner Editor, Vol. 1, International Agency for Research on Cancer, IARC Scientific Publications No. 30, Lyon:187-199.
Study in U.K. showing that patients with mesothelioma have a far greater number of amphiboles in their lungs, but same amount of chrysotile when compared to controls.

•McDonald, A.D. (1980). Mineral fibre content of lung in mesothelial tumours: - Preliminary report.
Biological Effects of Mineral Fibres, J.C. Wagner Editor, Vol. 2, International Agency for Research on Cancer, IARC Scientific Publications No. 30, Lyon:681-685.
Same observation as above for patients with mesothelioma in North America.

•Churg, A. (1982). Asbestos fibres and pleural plaques in a general autopsy population.
American Journal of Pathology 109(1):88-96.
Study showing that patients with pleural plaques have a 50-fold increase of amphiboles compared to chrysotile.

•**Wagner, J.C., Berry, G. and Pooley, F.D. (1982).** Mesothelioma and asbestos type in asbestos textile workers: a study of lung contents.
British Medical Journal 285:603-606.
In an asbestos textile factory that utilized mainly chrysotile with some crocidolite, less chrysotile and more crocidolite fibre were found in the lungs of 12 persons who had died of mesothelioma than in the lungs of controls without mesothelioma.

•**Wagner, J.C., Pooley, F.D., Berry, G., Seal, R.M.E., Munday, D.E., Morgan, J. and Clark, N.J. (1982).** A pathological and mineralogical study of asbestos-related deaths in the United Kingdom in 1977.
The Annals of Occupational Hygiene, Inhaled Particles V, 26(1-4):423-431.
Study showing a 100 fold increase of amphiboles in lung tissue, but similar amounts of chrysotile in referred pneumoconiosis patients.

•**Gylseth, B., Mowe, G. and Wannag, A. (1983).** Fibre type and concentration in the lungs of workers in an asbestos cement factory.
British Journal of Industrial Medicine 40(4):375-379.
The predominant asbestos type used in a Norwegian asbestos-cement factory (1942-1980) has been chrysotile (91.7%), with small admixture of amosite (3.1%), crocidolite (4.1%) and anthophyllite (1.1%). In the lungs of workers who had died of mesothelioma (4) or of lung cancer (3), the percentage of chrysotile fibres was 0%-9% whereas the corresponding proportion for the amphiboles was 76% and 99%.

•**Rowlands, N., Gibbs, G.W. and McDonald, A.D. (1982).** Asbestos fibres in the lungs of chrysotile miners and millers - A preliminary report.
The Annals of Occupational Hygiene, Inhaled Particles V, 26(1-4):411-415.
Lung samples from 47 workers of chrysotile mines in Québec who had died of various causes not related to asbestos were studied. Similar quantities of chrysotile and tremolite were found although tremolite admixture to chrysotile ore is extremely small. It indicates that tremolite persisted in the lungs while chrysotile was dissolved.

•**McDonald, A.D., McDonald, J.C. and Pooley, F.D. (1982).** Mineral fibre content of lung in mesothelial tumours in North America.
The Annals of Occupational Hygiene, Inhaled Particles V, 26(1-4):417-422.
99 case-control pairs of lung tissue specimens were examined from persons who had died of mesothelioma in North America. High content of amosite was found in 26 cases and 8 controls, and high content of crocidolite in 15 cases and 5 controls, while content of chrysotile was equal in cases and controls.

•**Gibbs, A.R., Jones, J.S.P., Pooley, F.D., Griffiths, D.M. and Wagner, J.C. (1989).** Non-occupational malignant mesotheliomas.
In Non-Occupational Exposure to Mineral Fibres, Eds. J. Bignon, J. Peto and R. Saracci.
WHO/IARC Scientific Publications No. 90, Lyon:219-228.
The mineral content of the lungs from 84 cases of malignant pleural mesothelioma was estimated by electron microscopy and energy-dispersive X-ray analysis. These cases were chosen because the history of asbestos exposure was absent, indirect or ill-defined. The chrysotile counts in the lungs from these mesothelioma cases were similar to those in controls an in a previous series of

mesotheliomas in which the majority had had direct exposure to asbestos. These findings confirm those of previous studies indicating that amphiboles are more important than chrysotile in the causation of malignant mesothelioma. The results confirm that some mesotheliomas develop in the absence of asbestos exposure. "It is possible that chrysotile might potentiate the effects of amphiboles, but we believe that it has either no potential (or a very low one) for mesothelioma induction on its own".

•Albin A, Pooley FD, Strömberg U, Attewell R, Mitha R and Welinder H (1994)
Retention patterns of asbestos fibres in lung tissue among asbestos cement workers.
A study which showing different kinetics for amphibole and chrysotile fibres in human lung tissue. Amphibole fibre concentrations increase with duration of exposure, whereas chrysotile concentrations do not. The authors indicate that their study supports a former finding of a possible adaptive clearance of chrysotile, and conclude that their findings "support the hypothesis that adverse effects are associated rather whit the fibres that are retained (amphiboles), than with the ones being cleared (largely chrysotile)."

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healthcare

REVIEW ARTICLE

Health risk of chrysotile revisited

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Abstract

This review provides a basis for substantiating both kinetically and pathologically the differences between chrysotile and amphibole asbestos. Chrysotile, which is rapidly attacked by the acid environment of the macrophage, falls apart in the lung into short fibers and particles, while the amphibole asbestos persist creating a response to the fibrous structure of this mineral. Inhalation toxicity studies of chrysotile at non-lung overload conditions demonstrate that the long (>20 μm) fibers are rapidly cleared from the lung, are not translocated to the pleural cavity and do not initiate fibrogenic response. In contrast, long amphibole asbestos fibers persist, are quickly (within 7 d) translocated to the pleural cavity and result in interstitial fibrosis and pleural inflammation. Quantitative reviews of epidemiological studies of mineral fibers have determined the potency of chrysotile and amphibole asbestos for causing lung cancer and mesothelioma in relation to fiber type and have also differentiated between these two minerals. These studies have been reviewed in light of the frequent use of amphibole asbestos. As with other respirable particulates, there is evidence that heavy and prolonged exposure to chrysotile can produce lung cancer. The importance of the present and other similar reviews is that the studies they report show that low exposures to chrysotile do not present a detectable risk to health. Since total dose over time decides the likelihood of disease occurrence and progression, they also suggest that the risk of an adverse outcome may be low with even high exposures experienced over a short duration.

Keywords

Amphibole asbestos, cement products, chrysotile, epidemiology, health risk, inhalation toxicology, mining

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Lung cancer and mesothelioma risk assessment for a population environmentally exposed to asbestos

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ABSTRACT

Asbestos-related cancer risk is usually a concern restricted to occupational settings. However, recent published data on asbestos environmental concentrations in Thetford Mines, a mining city in Quebec, Canada, provided an opportunity to undertake a prospective cancer risk assessment in the general population exposed to these concentrations. Using an updated Berman and Crump dose–response model for asbestos exposure, we selected population-specific potency factors for lung cancer and mesothelioma. These factors were evaluated on the basis of population-specific cancer data attributed to the studied area's past environmental levels of asbestos. We also used more recent population-specific mortality data along with the validated potency factors to generate corresponding inhalation unit risks. These unit risks were then combined with recent environmental measurements made in the mining town to calculate estimated lifetime risk of asbestos-induced lung cancer and mesothelioma. Depending on the chosen potency factors, the lifetime mortality risks varied between 0.7 and 2.6 per 100,000 for lung cancer and between 0.7 and 2.3 per 100,000 for mesothelioma. In conclusion, the estimated lifetime cancer risk for both cancers combined is close to Health Canada's threshold for "negligible" lifetime cancer risks. However, the risks estimated are subject to several uncertainties and should be confirmed by future mortality rates attributed to present day asbestos exposure.

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Evaluation of the deposition, translocation and pathological response of brake dust with and without added chrysotile in comparison to crocidolite asbestos following short-term inhalation: Interim results☆

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ABSTRACT

Chrysotile has been frequently used in the past in manufacturing brakes and continues to be used in brakes in many countries. This study was designed to provide an understanding of the biokinetics and potential toxicology following inhalation of brake dust following short term exposure in rats. The deposition, translocation and pathological response of brake dust derived from brake pads manufactured with chrysotile were evaluated in comparison to the amphibole, crocidolite asbestos. Rats were exposed by inhalation 6 h/day for 5 days to either brake dust obtained by sanding of brake-drums manufactured with chrysotile, a mixture of chrysotile and the brake dust or crocidolite asbestos. No significant pathological response was observed at any time point in either the brake dust or chrysotile/brake dust exposure groups. The long chrysotile fibers (>20 μm) cleared quickly with $T_{1/2}$ estimated as 22 and 33 days, respectively in the brake dust and the chrysotile/brake dust exposure groups. In contrast, the long crocidolite fibers had a $T_{1/2}$ > 1000 days and initiated a rapid inflammatory response in the lung following exposure resulting in a 5-fold increase in fibrotic response within 91 days. These results provide support that brake dust derived from chrysotile containing brake drums would not initiate a pathological response in the lung following short term inhalation.

NOTES

International Chrysotile Association

For environmental
occupational health
safe and responsible use