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Mr Matthew Boyley
First Assistant Secretary
Office of Health Protection
Department of Health

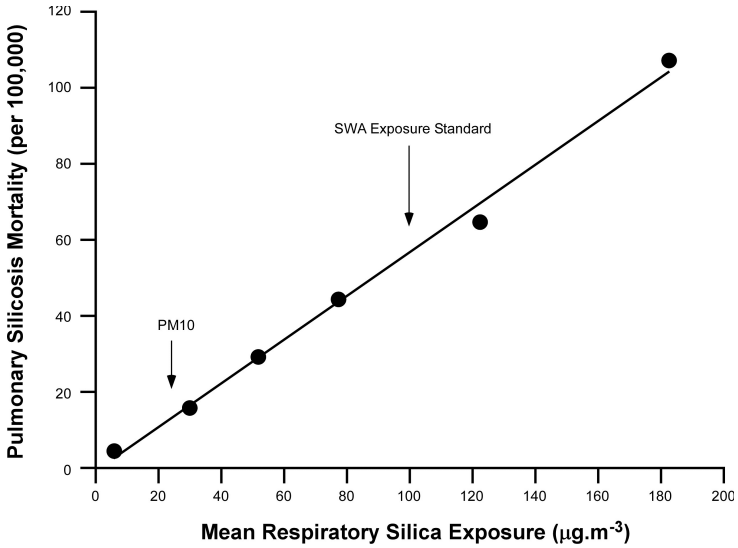
For the attention of the National Dust Diseases Taskforce

Dear Professor Brendan Murphy,

Thank you for the opportunity to raise concerns regarding the health risks of environmental silica silica-related diseases from non-occupational exposure.

It seems absurd that we are still having this discussion about a condition that has been well-known for centuries [1]. My own great- and great-great-grandfathers' death certificates cite stone-cutters phthisis as the causes of death. Exposure to crystalline silica contributes to: pulmonary silicosis, COPD, lung carcinoma, chronic renal disease and renal failure, asthma, autoimmune diseases (SLE, RA, SSc, vasculitis) [2, 3].

It can be seen from many data sets that the cumulative exposure risk predicts silicosis morbidity and mortality. For example, plotted from the data of 't Mannetje *et al* [4], the graph below shows a linear increase in mortality at moderate to low levels of RCS exposure. The key feature, however, is that the plot extrapolates to the origin. Thus, there is no safe threshold level of exposure to this toxin. These mortality figures understate the effects as mortality represents only 4-8% of silicosis morbidity, pneumoconioses are under-diagnosed, and this pneumoconiosis is just one of many diseases that have silica aetiology.



Silicosis mortality rates with different levels of occupational cumulative exposure plotted from 't Mannetje et al [4] who pooled data from six occupational cohorts and 170 deaths with retrospective exposure.

As there is no safe exposure level, it becomes a value judgement by regulators as to how many people can be sacrificed to procure these economic resources. It is, however, clear that a Australian community poll would show that the mortality associated with the current SWA exposure standard for crystalline silica (100 μg/m^3) is unacceptable and not sufficiently protective.

Rock crushing for sand

A specific new concern is exposure to RCS though sandstone mining and rock-crushing. Alluvial sand for building has run out in Sydney, in Australia, and worldwide. Sandstone mining and crushing is the new replacement industry. Unlike alluvial sand that has lost electrochemical activity through the millennia, crushing newly exposed sandstone creates active crystalline silica. Workers in the building and transport industries particularly are using this new form of sand but treating it as they previously managed alluvial sand. The same applies down to the handyman as the product is now being packaged for retail.

Crushed sand used for construction and other purposes is not as benign as the alluvial sand it replaces. Regardless of its origin, whether mined sandstone or the current excavations from road and rail tunnelling, new standards are required for the use of this new material.

Non-occupational environmental exposure through mining and rock crushing

Since Bernardino Ramazzini's 1705 treatise [1], the Pneumoconioses have been described in the Occupational Diseases chapter of medical texts. Silicosis is considered an occupational disease that affects miners, construction workers and engineers. Almost all of the pathological and epidemiological information about the health effects of Respirable Crystalline Silica (RCS) exposure and reported cases of silicosis has come from studies of workers who were exposed to high concentration levels. However, as we know from experience with smoking and asbestos, one does not have to create the exposure to suffer the consequences. Passive exposure to those nearby must be considered.

Only recently has the effects of chronic non-occupational or ambient exposure to RCS and cases of silicosis nearby mining and industry are estimated or measured. Concern regarding non-occupational or ambient exposure to RCS has emerged internationally, making it important to gather information available on these exposures and relevant cases of silicosis. Studies on non-occupational and ambient exposures have found high levels of RCS within the vicinity of uncontrolled rock cutting and grinding operations in manufacturing facilities. Other studies have implicated chronic exposure to windblown dust in the aetiology of non-occupational lung disease.

Sand is expensive to transport so being the closest mine to an urban area is financially lucrative. Thus, these mines target the urban hinterland where there are significant rural-residential populations. These new massive mines are approved as "quarries" under the historical and less stringent *Extractive Industries* framework of the Environmental Planning & Assessment Act. Under the current legislation they can be located over the fence from a residential property. This industry relies on open-air rock crushers, stackers, and truck loaders that create vast quantities of dust. Typical mitigation operations, if complied with, specify wetting roads in dry weather to prevent "visible dust".

People living near these polluting industries are exposed to active crystalline silica 24/7 through air and water. At less than one-third of the occupational exposure standards, these people will receive the same cumulative dose of the toxin. Unlike sand mine workers, who give some level of consent to exposure, the neighbours do not consent to being exposed to this risk.

Dust dispersion simulations are applied using deterministic parameters for pollutant release and meteorological conditions. However, as these quantities are inadequately known or predictable, there are major uncertainties in predicted flow, concentrations and dispersion patterns [5]. To this we must now add the unpredictability that long-term climatic effects will have on exposure to this toxin. The proposed lifetimes of these mines is typically 30-40 years, bringing us into the latter half of the century. CSIRO projections [6] for this period are for: (i) temperatures to increase (>2C by 2050) with more frequent hot days (very high confidence), (ii) rainfall to decrease (high confidence), (iii) time in drought to increase over southern Australia (high confidence), evapotranspiration to increase (high confidence), soil moisture to decrease (high confidence). All of these confidently projected changes will exacerbate the silica dust exposure created by this industry over the life of these mines.

A case study

In the NSW Southern Highlands, two large sandstone mines with on-site rock crushing to produce sand for construction have been proposed within a few kilometres of each other in rural residential areas with nearby small-acreage agricultural operations and upwind of rural townships. These mines have been

described as posing a “substantial and unquantified risk to the state” and an “unparalleled risk to the state” for a variety of reasons that include air and water pollution. One has been approved and is currently dormant (just enough to keep the licence) while the other (under consideration) is a 67-hectare operation mining to 60m deep complete with open-air rock crushing, stackers and 24-hour trucking. The only proposed mitigation is that required for a quarry of hosing the access rode in dry weather.

There is an additional operating mine that was originally approved for small clay extraction but has changed to sandstone mining and crushing, operating outside of the approval. This issue has been raised with the local and state authorities without resolution, showing the difficulty in controlling these out-of town industries. A neighbouring resident, recently diagnosed with silicosis, has no identifiable cause other than long-term exposure to the silica dust from this mine. His treating physician has advised that he move from the area and expressed concern regarding the health of his family. This has caused significant concern in the community regarding the wellbeing of the patient, his family, and that of the wider community.

Conclusions

The histories of research and understanding of tobacco and then asbestos exposure first showed the risk of immediate exposure before the risk of environmental exposure with the ultimate conclusion that there is no safe level of exposure to these toxins. It is no stretch of the imagination to see that the same story will be retold with the silica toxin – the data are conclusive with immediate exposure and the work on the environmental exposure is commencing.

We urgently need new regulatory mechanisms to deal with this new mining industry and the use of the crushed sandstone product in construction. They must specify where rock crushing plant can be situated and new lower permissible levels of silica pollution rather than overall particulate matter levels. The cumulative risk of exposure to RCS within the vicinity of these sandstone mines has not been considered or reviewed. We ask that the National Dust Diseases Taskforce review the cumulative risk of these mines and prioritise further research on non-occupational or ambient RCS exposure and cases of silicosis within the vicinity of mining and industrial sites. We ask that the Taskforce support a national dust diseases registry that will provide accurate epidemiological data to identify the health risks of dust exposure. We also ask for the consideration of a separate standard for community or non-occupational exposure to RCS nearby mining and industrial sites. We ask that any disease attributable to silica exposure – not just respiratory silicosis –be made a notifiable disease and a compensable disease. We ask that these changes be stringently considered prior to any review, approval, construction or continued operation of these mines.

We look forward to the outcomes of the Taskforces deliberations.

Sincerely,

Dr Richard Fitzpatrick

References

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3. Miller, F.W., et al., *Epidemiology of environmental exposures and human autoimmune diseases: findings from a National Institute of Environmental Health Sciences Expert Panel Workshop.* J Autoimmun, 2012. **39**(4): p. 259-71.
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