

Safety In Mines Research Advisory Committee

Project Summary : SIM 030803

Project Title:	MARKERS FOR PREDICTION AND EARLY DETECTION OF PNEUMOCONIOSIS (59 pages)
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Category:	Occupational Health	Applied Research	Occupational Medicine
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Summary

The debate regarding the risk of developing silicosis at various exposure levels continues. The assessment of the efficacy of these dust-allaying measures will depend on an assessment of the incidence of adverse health outcomes due to silica dust exposure, rather than the prevalence of silicosis.

Silicosis is the currently used health outcome for silica dust dose-response assessments and clinical detection is dependent on radiology. Early evaluation of the health outcomes of dust allaying interventions is not currently performed. The use of biomarkers can greatly enhance the process of risk assessment. In the past few years, many aspects of the previously unknown pathological mechanisms in the pathway from silica exposure to the development of silicosis have been elucidated.

If scientifically acceptable existing biomarkers for silica dust exposure can be identified, industry could utilise these for the early detection of adverse health effects, rapid evaluation of dust-allaying projects that may be introduced in the near future, and timely implementation of intervention strategies.

The objectives of the project were to:

1. Undertake a comprehensive literature survey to identify biomarkers for the early detection and / or prediction of silicosis
2. Develop a systematic framework for the evaluation of studies on biomarkers
3. Conduct a meta-analysis of data, if appropriate
4. Hold a workshop of international experts, primarily to evaluate the potential for conducting a Phase II study.
5. Develop an outline of a proposal for a Phase II

evaluation of any promising markers(s) identified.

The relevant literature was identified, and each study was scrutinised, using a systematic review form. A total of 171 papers and articles related to biomarkers for silicosis were identified, and reviewed by international experts.

Although the literature on silicosis-specific biomarkers is fairly extensive, no definitive conclusions have been reached. Previous studies have been cross sectional rather than prospective in design, and many of the studies have used animals or cell systems. Furthermore, often only one or two biomarkers have been evaluated in any one study, precluding a comparative assessment. By analysing several biomarkers from a single individual at a single point in time, more information may be obtained about the nature of the exposure than from use of a single biomarker.

Recommendations

Based on these factors, an outline for a Phase II proposal has been developed for further evaluation of 10 of these markers.

In selecting markers for the Phase II proposal, attention was paid to biological relevance, temporal relevance towards effect, background variability, confounders, reproducibility and predictive value, and practicability

The primary objective of the Phase II proposal is to determine which of the 10 biomarkers has/have the highest sensitivity and/or specificity in detecting changes in response to silica exposure, or susceptibility to silicosis? A prospective cohort study

is necessary to answer this question, with annual follow up for at least five years. The biomarkers chosen can be measured in serum or whole blood.