

PULMONARY DISEASE IN THE VCM/PVC INDUSTRIES

INTRODUCTION

1. Three potential hazard areas can be defined based on the materials to which workers are exposed, namely 1) the polymerization process, 2) the mixing processes, 3) the fabrication processes.
2. In the polymerization processes there is the potential for a worker to be exposed to monomer and/or polymer, depending on the type of process and the stage of the process to which he is exposed. To this may be added exposure to other materials involved in the reaction and to other products of the reaction.
3. A wide range of materials may be met with in the mixing processes where PVC is compounded to produce the material for the particular application that the resin is required for. Among them may be substances that in their own right are known to be associated with respiratory disease.
4. In the fabrication stage, apart from moulding, there may be turning, polishing, welding, bonding, thread-tapping and milling. In these processes a hazard may result if there is thermal degradation or there is production of fine air-borne particles.

Respiratory morbidity in polymerization workers

5. Miller et al (1975) studied pulmonary function in workers exposed to vinyl chloride and polyvinyl chloride and demonstrated high prevalence of air-flow impairment which increased with age or years of exposure.

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They commented on other possible factors and stated that further study would be required to elucidate the effect of general environmental pollution. To date further studies have not been reported by them.

In a further analysis, Miller (1975) separated the effect of occupational exposure and found it to predominate over the effects of smoking.

6. Lilis et al (1976), studying a larger group, observed chest x-ray change and pulmonary function abnormalities that did not always correspond with each other. Respiratory symptoms were also stated to be more common.
7. Wegman (1975) in a conference discussion referred to a small population said to have a pure PVC exposure. Among abnormalities noted three had chest x-rays with fine nodular changes and four had abnormal FEVs and three abnormal FVCs. A scientific publication has not yet been received.
8. Suciu et al (1975) described bronchitic symptoms and emphysema in workers exposed to VCM as well as adverse effects on lung volumes and ventilation and radiographic abnormalities. They concluded that the pulmonary effects were not as intense as other effects and might be caused by other factors such as dust, acids or bases.

9. Gamble J et al (1976) studied vinyl chloride polymerizers and rubber workers but were unable to repeat the observation of Miller et al. They raised the points of the possible differential migration of susceptible workers from their populations and the shortcomings of the internal comparisons they had made between various work groups that were both exposed to agents that could reduce lung function to account for the disparity with Miller et al (1975) and with Lilis et al (1976).

Respiratory morbidity in PVC mixers

10. No specific studies of workers engaged on the compounding of PVC have been found, other than perhaps that by Szende, B et al (1970) who published a case report of a granulomatous lung condition in a worker engaged in shovelling PVC dust.

Respiratory morbidity and mortality in fabricators

11. Vertkin and Mamontov (1970) studying a group of 96 workers employed on PVC fabrication reported bronchitis and emphysema and impaired ventilation. X-rays also were said to show unusual changes in an unusual number of workers. They concluded that in all probability these changes were due to the action of adverse workshop environmental factors and more especially to prolonged exposure to PVC dust in high concentrations.
12. A study of mortality among PVC fabricators (Chiazze L et al, 1977) does not refer to mortality from non-malignant respiratory disease, concentrating mainly on ^{excess} neoplasms which were very likely gastrointestinal in males and females and possibly breast and urinary organs in females. Being a proportionate mortality study the conclusions are subject to careful interpretation.

CONCLUSIONS

13. As with many studies, it is possible to pick holes in all the reports cited above. Nevertheless, the human evidence on respiratory effects alone is sufficient to counsel prudence in exposing workers to chronic inhalation of PVC dust, even if the animal evidence (Popow, 1969; Frongia et al, 1974; Richards et al, 1975; Cylwick et al, 1972; etc.) of respiratory and systemic effects is discounted.

M GREENBERG

EMAS (E)

An additional well documented case of lung disease in a man who had worked in the bagging area of a VCM polymerization plant has been reported (Arnaud et al, 1978). X-ray changes, lung function and lung tissue changes resembled those in previous reports cited.