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SYSTEMIC EFFECTS FROM EXPOSURE TO CERTAIN CHLORINATED HYDROCARBONS *

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These three cases show the occurrence of similar pathological changes in the liver in three young adults known to have been working with chlorinated naphthalenes and diphenyls—all were exposed directly or indirectly to the higher chlorinated hydrocarbons. In all three cases, a most careful investigation failed to reveal any other predisposing cause for the condition. In the first case in particular, that of a healthy young girl on her first job, the absence of any conditions predisposing to liver damage either preceding or following her exposure to the substances in question is especially clear.

It is of interest to note that two of the cases apparently had suffered from at least one previous attack of hepatitis followed by a certain degree of improvement before the onset of the fatal attack.

In view of the fact that Drinker, Warren and Bennett found no lesions in organs other than the liver in their experimental animals, it is noteworthy that such lesions were conspicuous in all three of the cases here reported. Such lesions, are, indeed, usual findings in cases of acute yellow atrophy of the liver in humans regardless of etiology. On the basis of present knowledge, it would be impossible to say whether they are the result of primary intoxication or are merely secondary to liver damage. In the light of the animal experiments, however, one would incline to the latter view and speculate as to the part played by length of exposure, in the final pathological picture.

It has been mentioned that, in Drinker's [4] experiments, cats with no evidence of clinical disease while being exposed to the chlorinated naphthalenes, promptly died from acute yellow atrophy of the liver when given doses of carbon tetrachloride so small as to be harmless to control animals. This prompts speculation as to whether death from acute yellow atrophy of the liver in workers similarly exposed occurs only in those having some pre-existing substratum of liver damage—such as might follow an attack of catarrhal jaundice, for example—and that this might account, in part at least, for the fact that only a very occasional worker out of a large group will suffer from systemic effects of exposure to these substances. In the three cases reported, however, no history was given suggesting that any hepatic disorder prior to exposure had occurred.

The presence of a papulo-pustular eruption in two cases is of interest. In one it antedated the systemic symptoms. This type of eruption is characteristic of the dermatitis caused by chlorinated naphthalenes, and until recently was the only disturbance attributed to them.

The presence of "aggregations of comedones" such as were found in Case 1 is also characteristic of the skin eruptions produced by these substances. The question as to whether or not the skin eruption in such a case is in any way connected with the onset of systemic effects cannot be answered, since thus far no correlation has been established between skin lesions and systemic disease [5].

It is interesting, therefore, that in Case 1 the skin eruption apparently antedated all evidences of systemic disease. Had the girl been promptly removed from further exposure when it was first observed it is possible that her life would have been saved; or had the physicians first called upon to treat the jaundice (of whatever origin) in her case, or in the second case here reported, recognized the danger of continuing exposure to the chlorinated naphthalenes, these deaths might possibly have been averted.

Recommendations For Medical Control

1—The authors wish to stress the need for the conscientious reporting by physicians of all illnesses occurring among workers exposed to the chlorinated naphthalenes and diphenyls, particularly cases which have been carefully worked up, so that the clinical disease entities resulting from such exposure can become further clarified and thus more readily recognized in the future. Fewer errors in the diagnosis and management of these cases would occur, and workers' lives could undoubtedly be saved in this way.

2—Persons suffering from the typical acneform eruptions should be removed from further exposure.

3—Persons who have, at any time in the past, had any liver disease—even a mild catarrhal jaundice—should not work with these substances; nor should workers with a history of typhoid fever, malaria, gall-stones or other diseases known to affect the liver adversely.

4—Persons receiving arsphenamine treatment for syphilis, or those who are taking drugs believed to be injurious to the liver in susceptible persons, should not be allowed exposed in their work to potential liver poisons.

5—Persons working with the chlorinated naphthalenes or diphenyls, if requiring a general anesthetic for an operation, should not be given chloroform or avertin, and vice versa, individuals who have recently received such anesthetics should not immediately thereafter go back to their former work or to work with other substances believed to be potentially toxic to the liver.

6—Pregnant women should not be exposed because the liver, in pregnancy, appears to be peculiarly susceptible to injury.

7—Experience seems to indicate that by proper attention to ventilation and medical supervision of workers the chlorinated naphthalenes and diphenyls can be used in industry with safety.

Summary

The systemic effects resulting from exposure to certain chlorinated naphthalenes are discussed, and the literature of the subject briefly summarized. Three liver deaths in workers handling these substances are presented in some detail, with autopsy findings. Recommendations for prevention are given.

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HEALTH CONSERVATION IN TUNNEL CONSTRUCTION

Dust is generated in tunnel construction by the rock drills, in blasting and during the shovelling and removal of broken rock (mucking). Smoke and toxic gases are formed during blasting and fog frequently forms at the heading when the drills are in operation. The contamination of the tunnel atmosphere by these several substances creates health and accident hazards which must be controlled in order to maintain good working conditions. This is the object of Industrial Code 33 on rock drilling and of the various regulations issued by the Industrial Commissioner.

The control of these contaminants involves new procedures in tunnel ventilation never before attempted in New York on the scale required by the Delaware Aqueduct. Indeed, in certain respect, the regulations are wholly new and without precedent.

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