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MEDICINE

Dangerous Plastic

A new and deadly occupational disease has been discovered by Medical Specialists in Bonn: workers engaged in the production of PVC risk incurable diseases of the liver.

Pipes and venetian blinds, curtains and films and whole host of articles in common use are made from PVC, a hard, durable plastic which can be moulded into almost any product. German producers alone have distributed almost a million tonnes of polyvinyl chloride over the country in the last year.

PVC has so far been responsible for the death of as yet unknown numbers of chemical workers. For the production of this much desired material, which can be combined in so many different ways with plasticisers, fillers and pigments that it has become one of the leading products of the plastics age within the last twenty years, is apparently very much more dangerous than had been previously been assumed.

Medical specialists of the Bonn University Clinics have this year diagnosed a "vinyl chloride disease" in at least 40 of the 120 PVC workers in a labouring chemical factory. However, the number of cases is probably considerably higher than this. According to preliminary comments made by the doctors this newly discovered "occupational illness" is characterised by a "serious prognosis and a relatively high mortality rate in men of predominantly younger age groups". According to Prof. Günther Veltman writing in the "Deutsche Medizinische Wochenschrift": "Certainly more than 10% as revealed by our enquiries".

This occupational disease first came to the notice of dermatologist Veltman and his team in the form of characteristic changes to the skin, particularly in the fingers. However, they were soon forced to the conclusion that still worse was to be revealed by this already well-known PVC symptom: vinyl chloride harms blood and blood vessels, bones, nerves, liver and lungs. As summed up by Veltman: "A disease of the system".

This plastics material apparently places at risk only those individuals actually present when the colourless vinyl chloride gas, obtained from mineral oils, is liquefied under pressure and compressed to form powder in the large reactors known as "autoclaves". This "polymerisation process" is necessary to produce the PVC which is then sold as "Hostalit" (Farbwerke Hoechst) or "Vinoflex" (BASF): Products which are not toxic as far as the end consumer is concerned, unless, in the words of plastics experts, "Plasticisers migrate from them". Those cases in which these toxic substances have been liberated from such materials have indeed been reported for a considerable period of time.

On the other hand, the "closed system" of the autoclaves gives rise to dangerous leakages. The Bonn Medical Specialists have been investigating "possibilities of gas leakages and associated inhalation risks" at numerous points in the production process. VC-gas escapes when the reactors are discharged and opened as well as through "leaks in the autoclaves". For many years doctors have been aware of the toxic nature of the gas and its narcotic effect. Almost without exception personnel engaged on the cleaning of autoclaves complain of feeling "dopey", giddiness and headaches. For this reason the "maximum allowable concentration" ("MAK") of the VC gas has been repeatedly reduced. According to Veltman, however, "we have so far not been aware of regular gas concentration measurements being carried out on production sites."

Personnel responsible for cleaning the autoclaves - such as the majority of the diseased chemical workers - apparently inhale many times the quantity of the acceptable tolerable dose of the toxic substances. Industrial doctors in America have repeatedly measured gas concentrations of 1,000 ppm * in the neighbourhood of PVC autoclave walls, which is ten times the MAK value.

The symptoms suffered by the diseased Bonn workers show that the air in German chemical factories is not very much better. The following changes in bodily organs has frequently been observed after only 18 months employment :

Enlargement of liver and spleen with lasting destruction to the structure and function of their cells - collective tissues proliferate in the organs.

Reduced circulation in the hands due to diseased narrowing of the arterial vessels.

Finger bones gradually deteriorate, and were almost completely destroyed in cases of advanced disease.

Blood formation and coagulation were affected and breathing was found to become increasingly difficult.

The majority of these illness-induced changes are considered non-curable by reason of the fact that the increase in connective tissues in all vital organs is "irreversible". Specialists in internal diseases accordingly hope at the most for a "defective healing" in diseased livers. The chemical workers are left with a thick-skinned and deformed organ such as that found in chronic alcoholics after many years over-indulgence in alcohol.

According to Prof. Veltman, the necessary "consequence" is "compensation for all diseased workers" and the recognition of the illness as an occupational disease. Neither he nor his colleagues have so far ventured to estimate the numbers of the victims of the PVC disease.

Basic research into the medical problems of VC is also badly lagging. In the 100 year after the ability of vinyl chloride to polymerise was first discovered - in 1878 - the doctors in Bonn are now demanding "experimental investigations in animals on the effects of the vinyl chloride with particular reference to skin, bone, lungs, liver and spleen".

* PPM : abbreviation for parts per million = parts (by volume) per million : a measurement unit used to indicate the quantity of trace substances eg in a gas mixture.

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