

Liver Cancer Alert Declared to Protect Plastics Workers

By JANE E. BRODY

As physician for the B.F. Goodrich chemical plant in Louisville, Ky., Dr. John L. Creech Jr. examines all employees returning to work after illness. He was struck recently by the large number of serious liver ailments among the workers, compared to patients he saw in his private medical practice.

Dr. Creech searched his medical and worker records and discovered that in the last five years four employees had died of angiosarcoma of the liver, an extremely rare cancer. All the affected workers, he found, were directly involved in the production of polyvinyl chloride from vinyl chloride, a toxic organic chemical known to damage the liver at high concentrations.

The doctor suspected a relationship between this chemical and the illnesses he was seeing in the workers. His suspicions were led the Government to declare an emergency and seek ways to protect workers. They also spurred extensive studies by Federal, industry

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Alert Is Declared for Plastics Workers

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and other scientists to define the cause of the problem and how extensive it may be.

Vinyl chloride, a simple molecule of carbon, hydrogen and chlorine, is the foundation for much of the modern plastics industry. Large numbers of vinyl chloride molecules can be joined to form a polymer, a chemical chain resembling a beaded necklace.

Production Forces

Some 6,500 workers in 51 American plants and many more thousands of European workers are involved in the production of vinyl chloride or polyvinyl chloride, a white powdery chemical resembling sugar.

In addition, tens of thousands of American workers participate in the conversion of these raw materials, vinyl chloride and polyvinyl chloride, into countless products, including paints, construction pipes, furniture, upholstery, draperies, wall coverings, floor tiles, tablecloths, toys, clothing, footwear, food packages, garden hoses, photographic records, dentures, bottles and pharmaceutical products. In turn, hundreds of millions of consumers in every industrialized society are exposed to these products.

Thus, when Goodrich officials conveyed Dr. Creech's observations to the National Institute for Occupational Safety and Health three weeks ago, the situation was regarded as "a serious emergency to be immediately and fully investigated," Dr. Marcus M. Key, director of the institute, told a

meeting of labor and management in Cleveland this week.

Accordingly, the institute, as well as Goodrich and the Vinyl Chloride Chemical Association, has begun intensive studies of thousands of workers — past and present, dead and alive — and a variety of laboratory animals to determine the nature, extent and cause of illness among vinyl chloride workers.

Emergency Action

Although these studies will take many months, and in some cases years, to complete, at a hearing today in Washington the institute will recommend emergency corrective action to the Occupational Safety and Health Administration, which is considering new regulations to protect workers exposed to vinyl chloride.

The current Federal standard allows workers to breathe as much as 500 parts of vinyl chloride per million parts of air, a level that readily causes liver damage in animals, according to a study published 13 years ago by a Dow Chemical Company scientist. The Government did not act upon this finding. Several companies, however, including Goodrich, softened their plant standard to 50 parts per million, one-tenth the permitted level.

However, one study showed that at certain points of the polyvinyl chloride operation workers may be temporarily exposed to vinyl chloride levels of up to 1,500 parts per million. In Europe, where 75 per cent of the world's supply of vinyl chloride is produced, signs of liver disease have been found in a large percentage of exposed workers, according to foreign language reports dating to the early 1960s.

Impact of Italian Report
But it took a report in 1970 of an Italian laboratory experiment to shake up the vinyl chloride industry. Rats exposed to very high levels of the chemical developed cancers of the skin and lungs.

This prompted the European Community to begin its own studies, one of which has reportedly resulted in angiosarcoma of the liver in rats exposed to low levels of vinyl chloride — lower than the United States standard of 500 parts per million.

Prof. Cesare Maltoni of the University of Bologna, who did the experiment, is expected to describe his results to the hearing in Washington today.

"With this finding, we have come full circle," Dr. Irving J. Selikoff remarked at the Cleveland meeting. "We have cancer in the vinyl chloride workers and apparently the identical tumor has been reproduced in animals exposed to the chemical," said Dr. Selikoff, who is director of environmental medicine at Mount Sinai School of Medicine here.

Nonetheless, Dr. Selikoff and Cleveland meeting. The institute scientists said they were keeping an open mind, but it shouldn't only be doing first-aid. Some 50 or 60 different chemicals besides vinyl chloride are anticarcinogens and need to be used in these plants, and any

one of them could turn out to be the culprit, they warned.

It is also possible that something peculiar to the Louisville workers — either born or in the past — accounts for their susceptibility to this rare tumor.

Doctor's Prediction

However, Dr. Creech, for one, does not think so. "I think when we look we'll find angiosarcoma of the liver all over the world wherever vinyl chloride is used," he said in a telephone interview. He based his prediction on a previous experience.

A decade ago, he said, he discovered that some of the Louisville workers had a peculiar condition in their fingers called acroosteolysis — slow destruction of the bone at the fingertips. Industrial hygienists disclosed that this was a fairly common worldwide problem, typically occurring in the workers who cleaned the huge reactor tanks where the conversion of vinyl chloride to polyvinyl chloride takes place.

Subsequent changes in cleaning practices have virtually eliminated this problem, Dr. Creech said.

The 31-year-old Kentucky-born surgeon added that the liver cancer probably showed up in Louisville first "because we are one of the oldest plants — 1940 — and the workers have been exposed longer to vinyl chloride." He said recognition of the problem was aided by the fact that the same physician saw all the cases.

"But had the cancer been a more common one, such as lung cancer, I probably would not have realized there was any problem in the first place," Dr. Creech said.

Dr. Selikoff noted that the plastic era — now about 35 years old — is just coming of age in terms of "latent period" for the onset of disease among exposed persons. He said his interest in the problem stemmed beyond the workers to the general public, who may be exposed to vinyl chloride that seeps out of plastic products.

"The workers are the 'canaries,'" he remarked. "They give us hints of what we might find in the population at large."

Accordingly, Dr. Edward Ferrand of the New York City Environmental Protection Administration has begun to analyze hundreds of consumer products for vinyl and polyvinyl chloride.

"We don't know if these findings will have any relevance to the public," Dr. Ferrand commented, "but we don't want to be caught without information if something turns up."

It is this sort of prophylactic approach that Dr. Selikoff would like the institute to adopt. "The N.I.O.S.H. budget, medical medicine or Mount Sinai School of Medicine here, they should be," he told the institute scientists. "The institute has been doing first-aid, we're keeping an open mind, but it shouldn't only be doing first-aid. Some 50 or 60 different chemicals besides vinyl chloride are anticarcinogens and need to be used in these plants, and any

INTER-OFFICE MEMO **TENNECO CHEMICALS, INC.**

TO Darwin Rhoads AT DATE February 26, 1974

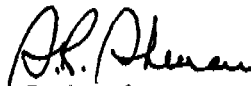
FROM S. R. Sheeran AT COPY TO F. X. Dwyer - w/o atts.
J. P. Lamb - " "

SUBJECT VINYL CHLORIDE MONOMER ASSOCIATED CANCER - ARSENIC

Please find attached an excellent search on the above subject from Miss Carnahan. I have not made any copies so this is being passed on to you intact. I have read all of the references that Miss Carnahan provided and have noted that arsenic poisoning does not appear for long periods of time, i.e. 10-25 years after exposure. Miss Carnahan's memo and attached literature speaks for itself.

As you told me, the Louisville plant of B. F. Goodrich scrubbed the acetylene supplied by Carbide with sulfuric acid to remove the impurities such as arsine, phosphine, etc. before use as a monomer. I refer you specifically to the ACS monograph reference wherein it is indicated that most of the impurities from commercial cylinder gas had been reduced to a level which is negligible if the gas is to be used for raw material synthesis. As I mentioned to you, in my Ph.D. dissertation Dr. Vogt was a co-advisor and insisted on further purification of the cylinder of acetylene to remove arsine and phosphine since these were not completely removed from the acetylene in the Prestolite cylinders. Basically, the extent of purification of the acetylene used at Notre Dame at that time varied from no treatment to extensive treatment depending on the chemistry being studied. In many cases the acetylene was used as is until peculiarities in the chemistry appeared, then further purification trains would be added. In other words, the acetylene was purified only to the extent necessary to remove interfering impurities. As an extension of this, I wonder whether this was the case at the Goodrich plant where the acetylene was scrubbed with sulfuric acid only to the extent required to avoid interference with the addition of HCl to make VCM. It is my recollection that the addition of HCl to make VCM is not sensitive and wonder what conclusions could be drawn if all of the arsine was not removed in the Goodrich sulfuric acid scrubbers. You will note from the attached references provided by Miss Carnahan that the quantities that are deleterious are at extremely low levels. I do not want to persist unnecessarily long and hard in this possibility but do feel that it should not be stricken from the possible sources of the incidents at Louisville and at Charlestown. I say this in face of the Business Week article of February 23, 1974, Page 101 where in the right hand column the statement is made that "only two other carcinogens, arsenic and thorium-232 are proven causes of angiosarcoma, and medical records of the four Goodrich workers show no exposure to either." Again, referring to other references from Miss Carnahan, the question could be raised as to the accuracy of this statement and the accuracy of the tests used to determine arsenic content; or a question could be raised on what basis is the statement made that the four Goodrich workers showed no exposure to arsenic.

I will be very happy to discuss my concerns and the attached references at your convenience, if you so desire.


S. R. Sheeran

SRS:pr
atts.

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Tenneco Chemicals
A Tenneco Company

Park 80 Plaza West-1
Saddle Brook, N. J. 07662
(201) 646-3800



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R. N. WHEELER, JR.

March 29, 1974

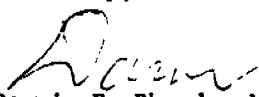
Mr. R. N. Wheeler
Union Carbide Corporation
Chemicals and Plastics Division
P. O. Box 8004
South Charleston, West Virginia 25303

Dear Nick:

I appreciated your very timely call with the information on arsine. I was in the office of Dr. Stanley Sheeran, one of our vice presidents, who has been very much interested in the possibility of the angiosarcoma problem being caused by contaminants. I am enclosing a copy of the literature search which he mentioned during our conversation. This came from our library and is not very complete, but may be interesting to you. Incidentally, he was discussing this with Ben Zwicker who also received a copy of the attached. I am sure he did not realize the close working relationship we have developed during this crisis and, therefore, was reluctant to mention other names.

Your idea of keeping the union president informed, especially in preparation for the forthcoming IUD meeting, struck a very receptive cord with my boss, Joe Lamb. Thanks for the idea. I think it was an excellent one.

Sincerely,


Darwin E. Rhoads, Manager
Safety and Loss Prevention

DER:ms
Attachment

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