

Firestone 

INTER.OFFICE

DATE MAY 17, 1974

TO MR. T. C. WALKER

FROM R. S. BROCKMAN

REFERRING TO LETTER OF

SUBJECT

NEW YORK ACADEMY OF SCIENCES MEETING
HOTEL DELMONIO, NEW YORK CITY - MAY 10-11, 1974

I attended subject meeting accompanied by Dr. L. H. Ballou and Mr. G. L. Wilson. A copy of the meeting program is attached and I will report only on those papers and comments that I believe to be significant to our situation. The paragraph numbering system follows that given in the attached program.

1a and 1b - Veltman & Lange - University of Bonn, Germany

These men reported on the so-called "Vinyl Chloride Disease" based upon a study of the Dynamit Nobel operation in Troisdorf, West Germany. A detailed report by these men was made available to us by MCA about a month ago and is available from my files.

In essence, this disease which is quite apparent in 50 workers in this plant is characterized by an acroosteolysis (AOL) type bone deterioration, skin changes, enlarged spleen and various types of liver disease.

Similar types of symptoms were also found in a study of one PVC fabricating plant, but no angiosarcoma (AGS) was noted in the fabricating operation.

Two cases of AGS were found in the Dynamit-Nobel operation:

1. 38 years old - 12 years in PVC polymerization.
2. 39 years old - 12 years in PVC polymerization.

Many other employees in this same plant show symptoms of the VC disease described above but do not have AGS.

2 - L. Suciv - University of Cluj, Romania

This man was extremely difficult to understand but his data may be of value to us and it would be helpful if we could get a copy of his paper.

He also described similar VC disease symptoms as reported in the previous paper but had not found any AGS.

His study indicated average plant concentration of VCM in the air as 2298 mg./m³ in 1962 and 146 mg./m³ in 1966. He further indicated a 2/3 decrease in the VC disease incidence between 1962 and 1966 indicating a close response relationship. He also indicated that symptoms increase in reactor cleaners where exposure levels are high putting further credence on a close response relationship.

3 - Dr. J. L. Creech - B. F. Goodrich plant physician, Louisville, Ky.

Indicated that VCM, VDC and VAc are all used in the B. F. Goodrich Louisville, Ky. plant. In addition, ACN, Bd and Styrene are used within the Louisville complex. He suggested that exposure levels decrease in the following order among workman.

- | | |
|-------------------------------|---|
| Decreasing
VCM
Exposure | 1. Regular employees in PVC polymerization plant. |
| | 2. Regular workers in other Louisville (non-PVC) chemical operations. |
| | 3. Maintenance men in the PVC plant. |
| | 4. Maintenance men in other chemical plant. |

He has run SMA-12 blood studies on 1183 Louisville workers. 26.6% had one abnormal blood test and 3.5% had two or more. On retesting only 6.3% continued to show abnormalities.

10% of the original abnormal group would be subjected to a battery of clinical and medical procedures of this group.

67% were found to be normal

7% were found to be highly abnormal

26% were found to be slightly abnormal

17 cases of the abnormal above showed spleen disorders and 16 were biopsied. Two of these were found to have angiosarcoma.

Due to these test results, 59 employees were transferred from their PVC plant. Of the 7 AOL cases B. F. Goodrich had in 1970-1971, only one showed abnormal liver test, which disappeared when the man reduced his alcohol intake.

In general, Creech concluded there was a greater percentage incidence of abnormal SMA-12 in non-PVC workers than in PVC workers.

4 - Dr. H. Sakabe - Japan

He described the ACL incidence in Japan which is quite low. Of 1599 people examined -

2 had AOL

10 showed major finger defects

38 showed minor defects

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No AGS has been found in Japan.

5 - Dr. R. Lilis - Mount Sinai

This speaker discussed Dr. Selikoff's study at the Goodyear-Niagara plant. 267 current workers and 87 former workers were included. No historical records of VCM exposures were available, but indications are that high levels were experienced in the past.

- a. Reynauds phenomena was found and with greater frequency in workers with more than 10 years service.
- b. 6.4% showed skin changes.
- c. 8% indicated pain in fingers.
- d. Hypertension was not noted with unusual frequency.
- e. Urine analysis showed no abnormal patterns.
- f. 15% showed enlarged livers with incidence more frequent in workers with longer service.
- g. 3.4% showed spleen disorders not associated with service time.
- h. Abnormal alkaline phosphatase was noted in a large percentage and was related to long service. This was found not to be related to alcohol intake but rather to VCM exposure.
- i. No relationship was found between abnormal liver functions and abnormal chest x-rays. However, a relationship was noted on abnormal chest x-rays and the finding of Reynauds phenomena.

This speaker summarized the talk by concluding that all abnormalities are related to time of exposure - another dose-time relationship hint.

Dr. P. Berk commented from the floor that he had studied a BFG reactor cleaner beginning 8 years ago. Initially a liver biopsy indicated fibrosis similar to that found in other VC workers. When re-examined 2½ years later, after having been transferred from PVC service, blood tests returned to normal, liver scan was normal, but the liver fibrosis was now more severe.

Dr. Miller of Mt. Sinai commented further on the Goodyear study indicating that pulmonary function (PF) testing showed airway obstructions in 58% of PVC workers that correlated directly with age and smoking.

Dr. Michels of the University of Louisville commented on his study of the BFG Louisville plant. Studied 413 PVC workers and 469 non-PVC workers.

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In summary -

- a. SMA-12 tests showed no differences between groups.
- b. The PVC group had albumin levels that others did not.

Dr. Snyder of Hoffman-LaRoche discussed his carcinembryonic antigen assay in the Goodyear study. This assay was higher than normal in PVC workers and goes up with exposure time.

7 - Dr. H. Popper - Fogarty Center, Bethesda, Md. and Dr. P. Gedigk - University of Bonn, Germany

Dr. Popper gave what appeared to be a very scholarly paper on the pathology of AGS. It was beyond the ken of this writer.

Dr. Gedigk again discussed the study at Dynamit-Nobel and concluded that the so-called VC disease appears to be reversible when the subjects are removed from the exposure.

Fairchild of NIOSH commented that the human and animal lesions in AGS are histologically identical.

8 - Dr. P. Gehring - Dow Chemical Company

Dr. Gehring discussed a proposed metabolic explanation of VC and its relationship to AGS. He suggests that sulfhydryl content changes in the liver reduces cystine production which renders animals more susceptible to carcinogenesis.

Monochloro acetic acid and betachloro ethanol cystine (products of alkylation of VCM) were found in the urine of animals at 5000 ppm VCM exposure.

A material balance of VCM was attempted in the presence of exposed animals.

6-8% of VCM was found to be retained by the animal and 2% of it was in the liver.

Gehring concluded that betachloro ethanol cystine is the major metabolite of VCM.

This study is ongoing and is the one being sponsored by MCA.

Oster of Mt. Sinai indicated some experimental data showing that VCM binds serum albumin.

Jaeger of Harvard described some interesting experiments where he has shown that the toxicity of vinylidene chloride (VDC) is reduced when VDC is mixed with VCM.

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A gentlemen from the state of Mass. OSHA revealed that SMA-12 run on 37 workers in a Mass. calendering plant showed a high incidence of liver abnormalities.

9 - Heath - CDC - documented the reported AGS cases

B. F. Goodrich	7
Goodyear	3
UCC	2 (one recently found)
Firestone	1

The mean age is 47.9.

He indicated 0.0014 cases of AGS per 100,000 population or 25-30 cases per year and a 400-1 chance of the BFG incidence level.

He went further to deal only with BFG cases. All showed abnormalities in SGOT, bilirubin, LDH and alkaline phosphatase.

The mean exposure for BFG cases is 17.9 years with a range of 12-28 years. Two of the cases were abnormally high users of alcohol and one had possible exposure to arsenic (another cause of liver cancer), none had AOL, and none had ever had thorotrast administered.

On open biopsy all showed portal fibrosis.

Heath concluded with the suggestion, based on his study, that low levels of exposure may not be harmful.

10 - W. Gaffey - Tabershaw-Cooper

Gaffey reported on the final outcome of the MCA sponsored epidemiological study. This report in total is available from my files. Gaffey's presentation was done poorly.

11 - J. K. Wagoner - NIOSH

Dr. Wagoner indicated that 6 walk through surveys were made in PVC operations (Pottstown included). He had little other data of value to report. Chances are NIOSH has published the results of these surveys that we might obtain.

12 - W. J. Nicholson - Mt. Sinai

Dr. Nicholson reported further on the Goodyear study. Of the 255 people interviewed with 10 years or more PVC service, 50% indicated they had at least once experienced dizziness or unconsciousness indicating exposure levels of 1000 to 10,000 ppm.

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From this group 3.9 cancer deaths should be expected and 9 were observed. The 3 cases of AGS found had 14, 17, and 23 years service time.

Holmberg of Sweden's equivalent of OSHA revealed that 2 likely cases of AGS have been located in the only PVC plant in that country.

Case 1 - 18 years as PVC worker showed high alkaline phosphatase.

Case 2 - age 61, 23 years service had a normal alkaline phosphatase.

No AOL was found in this plant.

14 - G. Volkheimer, M.D. - Berlin, Germany

Dr. Volkheimer reported that when PVC (not VCM) was fed to animals, it was retained by various organs. He described the process as "persorption."

15 - C. Maltoni, M.D. - Bologna, Italy

Maltoni again repeated his earlier work and added that after long exposure times his continuing study in rats at 50 ppm had turned up one AGS of the liver and one AGS at another site. He suggested that his other experiments indicate shortening exposure at any level reduces tumor incidence.

Under questioning Maltoni felt that the exposure time of the rats in the 50 ppm until they developed AGS might be extrapolated to 70-80 years in man.

16 - Dr. T. Torkelson - Dow Chemical Co.

Torkelson reported for IBT on the MCA exposure study. The results were known to us and are available in my files.

17 - Dr. V. K. Rowe - Dow Chemical Co.

Rowe reviewed VCM monitoring methods. Nothing new was presented here except his comments that expired breath analysis of men exposed to VCM might be a good method for monitoring individual exposure.

Dow has monitored since 1959 and have posted results for employees to see. In their polymerization plants they had a goal of 50 ppm VCM and 25 ppm VDC.

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Levinson, an International Union Executive, requested joint studies and actions by unions and management. His remarks were aimed at criticism of the MCA studies done without labor sanctions.

18 - Dr. G. Schweitzer - EPA and Dr. Corn - University of Pittsburgh

Dr. Schweitzer spoke. He passed out copies of his comments which are attached. Of significance he did indicate that when setting standards one must make judgments on the risk level vs. the benefits derived and suggested that controlling VCM to zero levels involves formidable costs with only incremental improvement in risk to human life.

Dr. Corn is an expert on ventilation and may be of some future value to us. He indicated that central monitoring will be unsatisfactory and that only personnel monitoring is accurate.

In summary he claimed that the engineering expertise to ventilate to very low VCM levels is available but only at a cost of tens of millions of dollars for a small plant.

20 - A. Mazzocchi - OCAW

Mazzocchi indicated that this problem will be solved economically and politically rather than scientifically. He suggested that PVC fabricators be studied medically as well as PVC producing workers.

21 - E. C. Hammond - American Cancer Society

Hammond of the American Cancer Society said consideration of zero risk is not appropriate to consider and suggested low exposure groups (fabricators) be studied for mortality patterns.

22 - Dr. M. A. Schneiderman - National Cancer Institute

Mr. Scheiderman of NCI was critical of the new proposed MCA mice study indicating that the number to be exposed has no statistical significance.

Sir Richard Doll of the Oxford University, Oxford, England, indicated that the medical profession probably caused more angiosarcoma in man than VCM will by the administration of thorotrast several years ago.

He does not believe there is an acceptable threshold limit in humans for a chemical carcinogen, but suggested that regulations be written based on human experience not animal experience.

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He concluded by stating that in his opinion VCM does not pose a risk to the general public.

R. S. Brookman

R. S. BROOKMAN

RSB:djs

Attachments

cc: Mr. C. J. Kleinert
Mr. G. D. Lloyd
Dr. L. H. Ballou
Mr. G. L. Wilson
Mr. W. B. Connolly, Jr.
Mr. N. E. Schmidt
Dr. F. T. Diaz

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