



DOW CHEMICAL U.S.A.

MIDLAND DIVISION
MIDLAND, MICHIGAN 48640

May 21, 1975

H. B. Lovejoy, M.D.
PPG Industries Inc.
P.O. Box 1000
Lake Charles, La 70601

Dear Doctor Lovejoy:

On behalf of Dr. Johnson and myself, it was a pleasure meeting with you this past week in Cleveland and discussing the medical aspects of vinyl chloride exposure. Enclosed find a list of attendees for the May 13th conference.

Very truly yours,

Ralph R. Cook, M.D.
Medical Department

Enclosures

cc: M. N. Johnson, M.D., B. F. Goodrich

RRC:ad



Cleveland Meeting
May 13, 1975
ATTENDEES

M. N. Johnson, M.D.	B. F. Goodrich
W. N. Blalock, M.D.	Air Products
T. R. Robinson, M.D.	Ethyl Corporation
R. Henningster	Diamond Shamrock
F. Kennedy	Conoco
H. B. Lovejoy, M.D.	P.P.G. Industries
J. M. Silver	Great American Chemical Company
Tracy E. Barber, M.D.	Stauffer Chemical
J. D. Forbes, M.D.	Uniroyal
R. N. Johnson, CSP	General Tire & Rubber Company
C. A. Johnson, M.D.	Goodyear Tire & Rubber Company
L. H. Ballan, M.D.	Firestone Tire & Rubber Company
R. B. O'Connor, M.D.	Borden, Inc.
H. L. Schmidt, Jr.	Borden Chemical
T. Mekani	Borden Chemical
R. L. Gibson	Gulf Oil Corporation
H. B. Wallis, M.D.	Dow Chemical of Canada
J. L. Fowler	Imperial Oil Ltd. (Exxon)
T. R. Torkelson	Dow Chemical Company
M. O. Alcorn, M.D.	General Tire & Rubber Company
R. J. Abramowitz	Hooker Chemical
H. Tauber, M.D.	Pantasote
W. Holland, Jr., M.D.	Union Carbide
D. H. Glenn, M.D.	Union Carbide
S. G. Harrison	Tenneco Chemicals
W. Mayo Smith, Ph.D.	Air Products
R. W. Laundrie, J.D.	General Tire & Rubber Company
J. Creech, M.D.	B. F. Goodrich
Carlo H. Tamburro, M.D.	University of Louisville
R. R. Cook, M.D.	Dow Chemical, U.S.A.
R. W. McBurney, M.D.	Diamond Shamrock

VCM PRODUCERS PHYSICIAN'S MEETING
SHERATON HOPKINS
CLEVELAND, OHIO

May 13, 1975

ATTENDED BY A. S. LOVEJOY M.D.

The meeting was chaired by Dr. Maurice Johnson, Medical Director of B. F. Goodrich.

The first speaker was Dr. Ralph Cook of Dow, Midland, Michigan Plant. The effects of Vinyl Chloride he mentioned include the explosion at the proper concentration which is a hazard, narcosis which occurs somewhere in the area of 5,000 to 8,000 per million concentration, hepatitis which may occur somewhere between 200 and 300 ppm, and acroosteolysis. He mentioned the angiosarcomas which are found and these were confirmed by Dr. Maltoni, but also they were noted by Maltoni in sites other than the liver in control animals. In time he mentioned that 5 ppm of Vinyl Chloride was the maximum allowable concentration for any period of time; that 0.5 ppm was the action level where the Vinyl Chloride Standard had then to be applied. Medical aspects of the Standard were then discussed, and at the Midland, Michigan Plant they made what they call a health inventory on each patient. This included the employee's identification with age, etc., his work history, his family doctor, his smoking history, family history, then the physical examination which included height, weight, blood pressure, hearing, vision, intraocular tension, pulmonary function, and laboratory data which included an EKG, urine analysis and blood chemistries which were the SMA 12 including fasting blood sugar, BUN, uric acid, creatinine, total serum bilirubin, total serum proteins, serum albumin, SGOT, alkaline phosphatase, LDH, and cholesterol. These were drawn in a non-fasting state along with the GGTP and SGTP some seven to ten days prior to the battery of history and physical examinations. The reports were available at the time of the physical examination. The people were then separated into those with liver problems and those

with non-liver problems and those that were normal. Those that were normal were seen again in either six to twelve months depending upon their previous exposure time in Vinyl Chloride. The non-liver problems were advised as to what appropriate action should be taken with their problem and the liver problems underwent further evaluations which included fasting liver function studies. If these were normal there was no further problem and the patient again returned in six to twelve months. If these were abnormal, their problem was discussed with the individual and the possible other hepato toxins mentioned, such as alcohol, other medications, etc., and they were retested in three weeks at which time a comprehensive liver profile was done and their consultant might be seen. A consultant would be a specialist in either gastroenterology or some other internist properly educated in the field of Vinyl Chloride toxicity. Comprehensive liver profile included the various LDH isoenzymes, the phosphatase fractionation, both total and direct serum bilirubin, SGOT and SGPT and GGTP, total count, CBC, and possibly alpha fetoprotein and a mucopolysaccharide spot test on the urine. If liver function studies were indicative of further disease, the patient was then advised to undergo hospitalization where Pan-angiography liver scanning, along with spleen scanning, and multiple biopsies were done. At the time these patients were being checked, they were removed from the Vinyl Chloride area.

When asked about the billing or charging for the consultants, Dr. Cook mentioned that some of these were covered under regular insurance, some were covered under compensation insurance and this was decided when the etiology of the abnormality was determined. There was also what he called an internal medical "slush fund" which would pay for the necessary lab work and consultants until such time as the regular insurance or compensation insurance could be decided upon.

The discussion then went to what is normal so far as laboratory work was concerned. Dr. Cook mentioned that there were many differences of opinion, that the Midland, Michigan Plant had been using the Bio-Science Laboratory and they thought

that these were accurate and what they would depend on, recognizing that only 95% of the people would fall within the normal limits. Dr. Hans Popper, Pathologist, was quoted as stating that the upper limit of the test plus 50% increase should be the cut-off. He also mentioned that in the studies at Louisville, by Dr. Creech and Dr. Johnson, some 56 out of 1153 employees checked by liver scans had an enlarged spleen. They also found a number of other problems including fibrosis of the liver, esophageal varices, and they felt that all of these might be work-related. Since this was present in the people who had a history of work exposures less than 200 ppm. It was recommended that everyone set their own normals but they recommended no more than two standard deviations. It was mentioned that there was much variation on many of the automatic chemistry machines.

Dr. Johnson mentioned Dr. Popper's viewing, "Liver function tests do not measure liver function." Creech stated that in their opinion the SGOT was 50% accurate, the SGPT was 87% accurate and the GGTP was 90% accurate so far as abnormalities were concerned. Creech from Goodrich in Louisville stated that any abnormality equaled removal from the area and he also stated that a liver scan was now a routine procedure in Louisville. One patient was found to have a 6 cm angiosarcoma with no liver function blood abnormalities. They were using both biochemical tests for other abnormalities particularly the periportal fibrosis. They felt in Louisville that possibly the periportal fibrosis would cause a liver abnormality and that this condition may precede and be responsible for the development of angioscarcomas. The angioscarcomas do not necessarily give abnormal liver function on the blood test. They also saw on the scan large spleens and varices. The scan was done at a cost of \$75 per person, was now done yearly but they would probably go to every six months. When asked about the radiation given by the amount of radio-active material, he stated that it was one-tenth the X-radiation that was received in a normal chest X-ray. They included every single person in the Vinyl area. They received no

objection from any of the employees when they understood what the problem was. They used a particular type of scan which was called a "rectolinear scan." They did use some camera scans but felt that the rectolinear scan was more important in that the pictures could then be reevaluated by other radiologists provided that the technician used the same Kili Volt readings and the same point readings.

For biopsy they felt that it did not matter which route was used. They do this rather simply and routinely there through the transjugular route which threads a Cook type needle through the jugular vein down through the vena cava past the heart and into the hepatic vein and they take five specimens. They felt that the specimen must be at least 10 mm long by 2 mm in diameter and include two portal triads and one central vein or one portal triad and two central veins. By this route you do not get as many portal areas as you do with the percutaneous biopsy, but if you have a bleeding problem with a low prothrombin time, the bleeding would be back into the vein and thereby cause no particular problem. You also could measure wedge pressures and estimate the portal pressures through the transjugular route. They did not do venograms because of the risk of liver infarction. They were finding many patients who had an increase in the vena caval pressures. They do not know why; they thought it might be due to cardiac or pulmonary fibrosis problems but many of these conditions did not exist and they thought possibly vinyl exposure might be responsible for the increase in the vena caval pressures. The periportal fibrosis, as I mentioned above, was found in all the angiosarcoma cases and it may be that we as physicians should be looking for this rather than the angiosarcoma in that none of the angiosarcomas were resectable and this particular pathological condition may precede the angiosarcomas in its development. He said that there was no evidence that osteolysis was due to vinyl. He said that at least in animals. He stated that possibly vinyl acetate might be responsible in that it took two and one-half years of a polycleaner working vinyl for them to develop the problem, but it was only in those who had been working since they had changed from

one process to another and have a Vinyl acetate problem exposure. The question of when to start scanning - they had found that they had had no tumors in any of the people except in their polycleaners who had the highest Vinyl exposure.

The next speaker was a Dr. Tamburo who is, I think, a Pathologist, and possibly heads up the Gastroenterology Service at the University of Louisville and has been working closely with Dr. Johnson and Dr. Creech on the evaluation of their liver problems. He stated that there were big spleens found in people working with butadiene, starting in other conditions as well. It is not known what causes this and it may be that the previously described normal sizes of spleen on a scan are not accurate; that the spleens may vary much more widely in size normally.

They talked of various types of stains that were used on the staining of tissues obtained at biopsy. Mentioned a positive Schicatta? stain being equivalent to a diagnosis of viral hepatitis. He stated that biopsies were exceedingly safe if done by a properly trained individual. The technique did not seem to make much difference. He thought that whatever the individual's training was is the type of biopsy that should be used. They were using a thin Vin-Silverman needle with a Franklin modification and bite-off. He insists that the biopsies be done in the morning so you will have your complete surgical staff available in the afternoon if there is any complication that might occur. They had some three out of a possible 20,000 liver biopsies that had difficulty which he called morbidity but no mortality. He also mentioned that he felt that the SGPT was some 83% accurate, GGTP was some 85% accurate, but there were some false positives. He felt that the ICG clearance was a valuable test utilizing 5 mm per kilogram of body weight and measuring the clearance which would be drawn at 2, 4, 6, 8 and 10 minutes. He stated that this could all be done very simply by putting a needle in the vein,

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giving the radio-active material for the scan, then giving the ICG dye, then drawing blood for your complete liver function studies; then drawing your blood for your ICG clearance at 2, 4, 6, 8 and 10 minutes. This could be accomplished with one stick in the vein and the patient would be much more satisfied and more cooperative. He also felt that scans were mandatory in that the liver function studies were unreliable in detecting tumors of the liver. He asked about high bilirubin levels only. He felt that this should warrant a complete liver profile but felt that many times the problem of liver disease was present and these people would be permitted to continue working in the Vinyl area. The ICG test would have to be normal as well as would the ~~Coombs~~^{Coomb's}. He stated that if there was any problem, ^{*} he felt that sending of tissue biopsies to Dr. Ishook?, Armed Forces Institute of Pathology in Washington, would be the choice of consultants for evaluation. He felt that not only H & E stains be done on the tissues but that they be done with Masson's stains as well. Creech then mentioned that they had had excellent cooperation from the employees in that their nurses at the plant were able to get all types of medical data from the individual's family physician. Some of the patients were referred or went to their own family physician for problems that might be related to Vinyl exposure. He then mentioned that the Vinyl Chloride Standard issued by the government was in error in that people who had been taken out of Vinyl Chloride were not required to be followed. They felt at Goodrich that all of these people should be followed for ten to twenty years after they were removed from the Vinyl area. They also felt that no specific medical criteria should be laid down by the Vinyl Standard because there had been no formula found that would insure that a physician practice properly and that there was no form or formula that could prevent a physician from practicing improperly.

Dr. Ballou of Firestone spoke on their experience with their 250 vinyl workers as compared with 2500 others in the rubber industry in their Potstown Plant and

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liver scans on all of their people find more liver enlargement in vinyl workers than others but not as many large spleens. They found no difference in liver function abnormalities. They did some 127 scans. They found 23 probably abnormal spleens. He mentioned that Dr. Selikoff mentioned finding chromosome abnormalities in vinyl-exposed people where the rubber workers were no worse off in their experience and that this work had apparently been confirmed by Dr. Killian who is at the Dow Plant in Freeport, Texas. The did find, however, more diastolic hypertension in vinyl workers. In measuring their liver size they utilized a specific method of measuring, giving the mid-clavicular line and the mid-sternal line. They also utilized their scan in evaluating the size of the liver and in the spleen. They found that in this case there was nothing subjective utilized that the radiologist could read the same way every time from the raw data. The University of North Carolina is involved in their study here and also feels vinyl chloride causes no chronic pulmonary diseases, although it does cause a temporary decrease in their vital capacity which is decreased during the day but is back to normal the following morning.

Dr. McBurney from Diamond-Shamrock then stated that it was essential that we as physicians attempt to get management to agree to spend more money to implement data procurement. He also went on to state that if a union upholds an employee's refusal to undergo physical examinations and testing personnel, then the physician at the plant should talk to him and attempt to persuade him to have these tests. If he still refuses, they attempt to have the employee sign a waiver and then forget it. At some plants they discharged for this. Firestone allows men to go to their own panel of internists at their own expense, and then they have the internist sign that he is O.K. to work in vinyl. They have found that none of the private physicians are willing to sign this vinyl release so it winds up going back to the plant

physician. This concluded the morning part of the session and in the afternoon more questions were discussed.

What constitutes an exposure? It was the final conclusion of most of the people there that any single exposure had to be considered as an exposure. It was again mentioned that after an abnormality was found what is done with personnel. Every plant there advised, recommended and proceeded with the condition that the man was restricted from the area. This caused the Tenneco representative to be very much concerned in that they had a union which was causing problems. Dr. Cook from Dow at Midland stated that he had what they called "medical bumping rights." This permitted the Medical Department to place people in another plant or another place due to his medical condition and this could be a promotion, but the man was then "fixed" to this area and could not utilize this "medical bumping" procedure to climb the promotional list.

The problem of contractors' employees was then discussed and it was Dr. McBurney's feeling that the primary company have the responsibility for advising and seeing about the contractors' employees. Cook at Dow stated that there was no way this could be accomplished at their plant because of the rapid change-over in contractors' employees. He stated that people regularly working for contractors in the area, the contractors paid for the work but the company did the work and the employee was given a note. The contractor maintained the records.

Whose responsibility the vinyl exposure was in tank cars and ships was then discussed. It was felt that both had to assume this responsibility. Heavy exposure as a result of an "emergency" condition. The handling of exposed personnel was discussed. They felt that the person should be hospitalized if narcosis occurred, if not, the employee was then to be given liver function studies, EKG, etc., immediate!

or as soon as possible and then followed as indicated.

The remainder of the afternoon involved the EPA Standard which many of the Industrial Hygienists and Physicians were more concerned about than the medical OSHA Standards. It was mentioned that in 1974 the EPA estimated some 90 million kilograms of vinyl being released into the air by the manufacturers. There has been work suggesting that possibly angiosarcomas in the general population might be caused by exposure to Vinyl Chloride. In Connecticut as the sufferers of the angiosarcomas lived in an area close to a vinyl manufacturing plant. It was mentioned that the EPA are in a power struggle. Dr. Infante's report on the possible increase in chromosomal abnormalities, birth defects, increased abortions, etc., was mentioned and it was also mentioned that Section 112 of the Clean Air Act will be the law under which the EPA will act. Under this statute they do not have to make an economic evaluation but can dictate immediately to industry what they shall do. Once a compound is placed upon this list by the Clean Air Act and the EPA, it can be removed only if it is proved to be non-hazardous. Dr. Mayo Smith of the Air Products Company felt that this was a much more serious threat than the OSHA regulations. He felt that if we could strip the PVC to less than 400 ppm that there would be no problem; that the copolymer was more difficult to strip even at 180° than the dispersion resins.

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