

July 15, 1974

Anthony J. DiMarino, M. D.
735 Delaware
Paulsboro, New Jersey 08066

Dear Dr. DiMarino:

We appreciated the opportunity of meeting with you the other day in Paulsboro. Enclosed you will find those things which I agreed to send to you (i.e., the CDC Report on liver angiosarcoma, NIOSH recommendations for medical surveillance of persons working with VCM and the PPG medical history and physical examination record). Please contact me if you have any further questions concerning the periodic medical examination program of the employees at the Paulsboro Terminal.

Sincerely yours,

Lee B. Grant, M. D.
Medical Director

LCG:pc

Enclosures

cc: G. Barton
F. DeBloody ✓

CENTER FOR DISEASE CONTROL

Morbidity and Mortality



Vol. 23, No. 6

REPORT

For
Week Ending
February 9, 1974

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE PUBLIC HEALTH SERVICE
DATE OF RELEASE: FEBRUARY 15, 1974 - ATLANTA, GEORGIA 30333

EPIDEMIOLOGIC NOTES AND REPORTS ANGIOSARCOMA OF THE LIVER AMONG POLYVINYL CHLORIDE WORKERS - Kentucky

Between September 1967 and December 1973, 4 cases of angiosarcoma of the liver were diagnosed among men employed in the polyvinyl chloride polymerization section of a B.F. Goodrich plant near Louisville, Kentucky. This section of the plant began operations in 1938. It employs about 270 persons and produces polyvinyl chloride as well as a variety of copolymers by polymerization of vinyl chloride monomer. All 4 men had worked continuously in the section for at least 14 years prior to onset of illness (Table 1); all 4 had worked directly in various phases of the polymerization process.

Case 1 presented in August 1967 with an epigastric mass and thrombocytopenia. An exploratory laparotomy was per-

CONTENTS

Epidemiologic Notes and Reports	
Angiosarcoma of the Liver Among Polyvinyl Chloride Workers - Kentucky	49
Wild Mushroom Poisoning - Pennsylvania	50
Current Trends	
Influenza - United States	55

formed in September 1967; liver biopsy revealed angiosarcoma. Case 2 presented in January 1970 with gastrointestinal (GI) bleeding. Recurrent bleeding in May 1970 led to an exploratory laparotomy at which time a diagnosis of angiosarcoma was made on liver biopsy. Case 3 presented in January 1964 with GI bleeding which recurred in May 1965 with

TABLE 1. CASES OF SPECIFIED NOTIFIABLE DISEASES, UNITED STATES
(Cumulative totals include revised and delayed reports through previous weeks)

DISEASE	6th WEEK ENDING		MEDIAN 1969-1973	CUMULATIVE, FIRST 6 WEEKS		
	February 9, 1974	February 10, 1973		1974	1973	MEDIAN 1969-1973
Aseptic meningitis	34	29	35	213	238	218
Brucellosis	1	3	1	9	11	11
Chickenpox	3,609	5,305	-	18,811	27,061	-
Diphtheria	1	2	2	7	12	17
Encephalitis:						
Primary, Arthropod borne and unspecified	19	21	18	86	95	120
Post-Infectious	12	4	5	27	20	26
Hepatitis, Viral						
Type B	135	120	128	934	805	805
Type A	871	1,027	1,067	4,914	5,775	6,407
Type unspecified	153	-	-	812	-	-
Malaria	6	6	39	18	17	243
Measles (rubeola)	521	704	704	2,414	3,461	3,663
Meningococcal infections, total	34	34	50	156	174	331
Civilian	34	34	49	156	166	307
Military	-	2	2	-	8	15
Mumps	1,762	2,145	2,502	9,148	10,400	12,594
Pertussis	72	-	-	182	-	-
Rubella (German measles)	258	441	823	1,098	2,269	2,964
Tetanus	2	1	1	6	6	6
Tuberculosis, new active	529	562	-	3,040	3,027	-
Tuberculosis	2	2	2	10	10	10
Typhoid fever	6	4	4	35	22	26
Typhus, tick borne (Rky. M., spotted fever)	-	1	-	12	6	3
Veneral Diseases						
Gonorrhea	16,810	14,259	-	97,831	85,951	-
Syphilis, primary and secondary	462	516	-	2,661	2,917	-
Rabies in animals	43	69	67	267	327	347

TABLE 2. NOTIFIABLE DISEASES OF LOW FREQUENCY

	Cum		Cum
Anthrax	1	Poliomyelitis, total	
Botulism, Wash 2	2	Paralytic	
Congenital rubella syndrome, Ida 1, Tex 1	7	Posttoxic, Tex 1	2
Leprosy, Hawaii 1	4	Rabies in man	
Leptospirosis, Hawaii 1, Ida 1	6	Trichinosis, N.Y.C. 1, Okla. 1	13
Plague		Typhus, murine, Calif. 1, Va. 1	2

SL 093013

ANGIOSARCOMA - Continued

signs of portal hypertension. A portacaval shunt was performed, and liver biopsy yielded a diagnosis of cirrhosis. Repeat biopsies in October 1970 and September 1972 confirmed this diagnosis. Autopsy in March 1973 revealed angiosarcoma. Case 4 presented in July 1973 with hepatosplenomegaly, weight loss, and jaundice. Two liver biopsies were interpreted as showing severe cirrhosis. Autopsy in December 1973 revealed angiosarcoma.

In each case, pathologic material revealed the presence of extensive cirrhosis of a non-alcoholic type in addition to angiosarcoma. In 2 cases, the diagnosis of angiosarcoma was made only at autopsy, cirrhosis having been diagnosed 7 years before in Case 3 and 5 months before in Case 4. None of the patients gave histories of prolonged alcohol use or exposure to hepatotoxins outside their work place. In particular, none had ever had exposure to thorium dioxide or to arsenic, 2 materials known specifically to induce hepatic angiosarcoma in man (1,2).

(Reported by John Creech, M.D., Plant Physician, B.F. Goodrich Chemical Company, Louisville, Kentucky; Maurice N. Johnson, M.D., Director of Environmental Health, B.F. Goodrich Chemical Company, Akron, Ohio; Bradford Block, M.D., Medical Consultant, Kentucky Occupational Safety and Health Administration, Kentucky State Department of Labor, National Institute for Occupational Safety and Health, and the Cancer and Birth Defects Division, Bureau of Epidemiology, CDC.)

Editorial Note

Angiosarcoma of the liver is an exceedingly rare tumor. It is estimated that only about 25 such cases occur each year in the United States. Four cases, therefore, among a small number of workers at a single plant is a most unusual event, and one which raises the possibility of some work-related carcinogen, conceivably vinyl chloride itself. Although no data are yet available concerning the occurrence of angiosarcoma among workers at other vinyl chloride plants in the United States, it seems distinctly possible that the problem may be industry-wide. Epidemiologic studies have started to

Table 1
Cases of Angiosarcoma of the Liver
among Polyvinyl Chloride Workers
B. F. Goodrich Plant
Louisville, Kentucky

Case	Age at illness onset	Date of			Years worked with PVC before illness
		Illness onset	Diagnosis	Death	
1	41	Aug. 1967	Sept. 1967	Jan. 7, 1968	17
2	36	Jan. 1970	May 1970	Sept. 27, 1971	14
3	41	Jan. 1964	Mar. 1973	Mar. 3, 1973	14
4	58	July 1973	Dec. 1973	Dec. 19, 1973	27

determine the extent of the problem in the United States, with respect both to angiosarcoma of the liver and to its possible relationship to post-toxic cirrhosis.

Published data concerning the potential hepato-toxicity and oncogenicity of vinyl chloride are limited. Studies in Germany have suggested a link between hepatic damage and occupational exposure to vinyl chloride (3), while Italian workers have suggested that vinyl chloride may cause a wide variety of tumors in animals (4). The chemical concentrations used in these latter experiments, however, far exceed levels likely to be encountered in industrial environments. Efforts to confirm such observations and to measure effects at lower dose levels are now in progress.

References

1. da Silva Horta J, Abbatt JD, Cayolla da Motta L, Rottz ML. Malignancy and other late effects following administration of thorotrast. *Lancet* 2:201-205, 1965.
2. Regelson W, Kim U, Ospina J, Holland JF: Hemangioendothelial sarcoma of liver from chronic arsenic intoxication by Fowler's solution. *Cancer* 21:514-522, 1968.
3. Marsteller HJ, Lelbach WK, Muller R, et al. Chronisch toxische Leberschaden bei Arbeitern in der PVC-Produktion. *Dtsch Med Wochenschr* 98:2311-2314, 1973.
4. Viola PL, Bigotti A, Caputo A: Oncogenic response of rat skin, lungs, and bone to vinyl chloride. *Cancer Research* 31:516-522, 1971.

WILD MUSHROOM POISONING - Pennsylvania

On October 9, 1973, 57 nuns ate their evening meal at a convent in Berks County, Pennsylvania. Between 3 and 4 1/2 hours later (median - approximately 2 hours), 17 nuns developed an illness characterized by profuse sweating (76%), watery diarrhea (76%), chills (58%), and abdominal pain (42%) (Table 2). Six of the nuns were hospitalized; none died.

Food-specific attack rates for foods ingested in the 24 hours before illness strongly implicated mushrooms as the intoxicating food (Table 3). Stool specimens from 4 of the ill nuns and bacteriologic cultures of the remaining mushrooms yielded no enteric pathogens. Remnants of the mushrooms were identified as *Clitocybe* sp. and *Lepiota* sp. Some species of the former genus are known to contain muscarine, which produces parasympathomimetic effects.

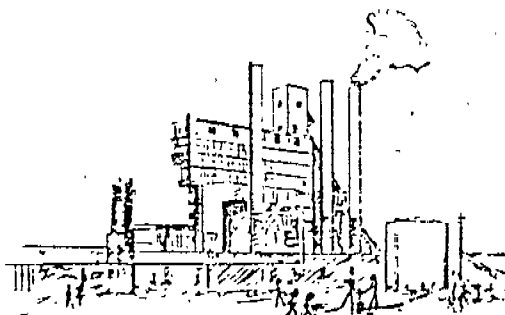
The mushrooms had been picked on the grounds of the convent on the afternoon of the outbreak. For several years, the nuns had eaten these mushrooms at meals, and no apparent illness had occurred. On October 9, however, the nun who

Table 2
Symptoms in 17 Ill Nuns
Berks County Convent - October 9, 1973

Symptom	Percent with Symptom
Diarrhea	76
Sweating	76
Chills	58
Abdominal pain	42
Nausea	35
Vomiting	23
Excessive salivation	23
Feverish feeling	18
Dry mouth	12
Blurred vision	12
Headache	6
Weakness	6
Faint feeling	6

(Continued on page 55)

4/18/74
11C.111



NATIONAL INSTITUTE FOR
OCCUPATIONAL SAFETY AND HEALTH

Attached are the vinyl chloride
medical surveillance recommendations
which were transmitted to DOL on
March 21.

RECEIVED

MAR 25 1974

MFG. DFDT

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

ENC #4

145

h. Medical Surveillance

The following recommendations are directed primarily at medical screening to detect liver disease and/or hepatic tumor. They should be considered in the context of routine health screening for any general employee health problems, including non-hepatic health conditions potentially related to vinyl chloride monomer exposure. Routine health screening should include at time of initial employment the recording of past medical history and the performance both of a general physical examination and certain basic laboratory procedures (e.g., complete blood count, urinalysis, chest x-ray); provisions should also be made for routine periodic health followup examinations.

Employees covered by the following specific recommendations shall encompass all persons engaged in vinyl chloride monomer production and polymerization, including personnel peripherally involved such as in clerical and management assignments. The recommendations shall be applied both as a pre-employment requirement and as part of periodic health followup. Screening priority should be given to current employees with prolonged and close potential exposure to vinyl chloride monomer, whether in present or past work settings.

(i) At time of initial employment, or upon institution of screening, a physical examination shall be performed with specific attention to detecting enlargement of liver or spleen by abdominal palpation.

(ii) At time of initial employment, or upon institution of screening and annually thereafter, a medical history check-list shall be completed by the employee. This list shall include questions concerning:

- (a) alcohol intake;
- (b) past history of hepatitis;
- (c) past exposure to potential hepatotoxic agents, including drugs and chemicals;
- (d) past history of blood transfusions; and
- (e) past history of hospitalizations.

Completed medical check-lists shall be reviewed by a physician and should be acted upon as medically indicated for each individual employee.

(iii) At time of initial employment, or upon institution of screening, a serum specimen shall be obtained for screening with respect to the following five bio-chemical determinations of liver function:

- (a) total bilirubin;
- (b) alkaline phosphatase;
- (c) serum glutamic oxalacetic transaminase (SGOT);
- (d) serum glutamic pyruvic transaminase (SGPT); and
- (e) gamma glutamyl transpeptidase (GGTP).

Additional tests that may optionally be considered for use in screening include lactic dehydrogenase (LDH), serum protein determinations, serum protein electrophoresis, and platelet count. Laboratory analyses shall be performed in laboratories accredited by the College of American Pathologists or licensed in accordance with the provisions of the Clinical Laboratories Improvement Act of 1967.

(iv) If results of laboratory screening are normal, screening shall be repeated on an annual basis. If the person being screened has been employed directly in vinyl chloride monomer production or polymerization for 10 years or longer, screening shall be repeated every six (6) months.

(v) If one or more liver function tests are abnormal, serum testing shall be repeated as soon as possible, preferably within two (2) to four (4) weeks. If no abnormalities are present upon rescreening, testing should be repeated in three (3) months.

(vi) If abnormalities persist on rescreening, the employee shall be removed from contact with vinyl chloride monomer operations and an individualized medical workup shall be instituted. Suggested as initial steps in medical workup are a complete physical examination and various special procedures such as hepatitis B antigen determination and liver scanning.

If liver function abnormalities are determined to be unrelated to liver disease (e.g., elevated alkaline phosphatase in a young, physically active man or elevated bilirubin in Gilbert's syndrome) or to be transient (e.g., due to recent hepatitis or recent alcohol intake), the employee may be permitted to return to vinyl chloride-related employment, subject to individual medical evaluation.

(vii) In view of the preliminary results of animal toxicology studies, it is recommended that no woman who is pregnant or who expects to become pregnant should be employed directly in vinyl chloride monomer operations.