Current Intelligence

Angiosarcoma of the Liver in Vinyl Chloride/Polyvinyl Chloride Workers

In the December, 1974, issue of the JOM (16 809) 26 cases of angiosarcoma of the liver were reported. As of January 22, 1975, 38 cases have been collected. The new data are given in this report.

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On January 22, 1974, the National Institute for Occupational Safety and Health was advised of three deaths from angiosarcoma of the liver at a single vinyl chloride polymerization plant. Since that time, 29 additional cases among polymerization workers in the United States and nine other nations have been reported. Details are given in Table 1.

Review of these cases according to date of diagnosis shows that all but three were diagnosed within the last seven years. Although the cases have clustered since that time, it is probable that the high risk of this disease for polymerization workers might have gone unnoticed except for the observation of a case in 1973 by a plant physician who reviewed earlier records and identified four cases during the prior ten-year period. The difficulty of making an early determination of an association of such a rare disease with an occupational exposure, even when the exposed worker is at very high risk, is also pointed up by the distribution of cases over time. Of the first eight cases diagnosed between 1961 and the end of 1968, six were from four plants in the United States, one was from France, and one was from West Germany.

While an exact estimate of the incidence of liver angiosarcoma among polymerization workers cannot be determined until exposed-to-risk figures become available, it is already apparent that these workers are at very high risk of

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Table 1. — Reported Cases of Angiosarcoma of the Liver Among Vinyl Chloride Polymerization Workers.

Country	Case No.	Birth Date	1st VC or PVC Exposure	DX Angio-Sarcoma	Age At DX	Yrs 1st Exp To DX	Tot Yrs Exp	Date of Death
Canada	01	AWAITING DETAILS						
Canada	02	AWAITING DETAILS						
Canada	03	AWAITING DETAILS						
Canada	04	AWAITING DETAILS						
Czechoslovakia	01	AWAITING DETAILS						
Czechoslovakia	02	AWAITING DETAILS						
France	01*	00 00 00	00 00 00	00-00-00	43	19	[illegible]	09 [illegible]
Great Britain	01*	00-00-01	00-00-46	12-00-72	71	26	[illegible]	12 [illegible]
Great Britain	03	06-00 37	02-00-66	00 00-74	38	8	[illegible]	12 24 [illegible]
Italy	02*	11 13 29	00-00 57	12 13 72	43	15	[illegible]	12 [illegible]
Norway	01*	12 23 15	03-00 50	12 20-71	56	22	[illegible]	01 [illegible]
Rumania	01	AWAITING DETAILS						
Sweden	01*	06 23 27	08 14 51	02 00-70	43	19	[illegible]	10 [illegible]
United States	01*	10 17-23	12-09 48	03-03-73	49	22	[illegible]	03 [illegible]
United States	02*	08-19 33	11 15 55	05 00 70	36	14	[illegible]	09 [illegible]
United States	03*	05 25-15	11 28-45	12/19-73	58	28	[illegible]	12 [illegible]
United States	04*	01 15-24	07-06 52	08 19-67	43	15	[illegible]	01 [illegible]
United States	05*	01 25-12	06-19-44	04 09-64	52	20	[illegible]	04-09 64
United States	06*	00-00-29	01 17-62	02-00 74	45	12	[illegible]	ALIVE
United States	07*	05-03-22	08-00-44	00-00 68	45	24	[illegible]	03 [illegible]
United States	08*	05-06 20	10-07-46	08-00-61	41	15	[illegible]	08 [illegible]
United States	09*	11-08-31	09-09 54	03-01-74	43	17	[illegible]	ALIVE
United States	10*	08-16-13	06 12 51	05-00-68	55	17	[illegible]	05 [illegible]
United States	11*	05-27-09	10 14-46	03-00-70	61	23	[illegible]	03 [illegible]
United States	12*	11-17-18	09 13-49	05-02-69	50	20	[illegible]	05 [illegible]
United States	13*	12-01 21	08 19-44	05-00-74	53	30	[illegible]	07-04 74
United States	16*	11-04 27	05-08-50	00-00-69	41	17	4	03 27 69
United States	17	05-06 31	06-23-55	10-11-74	43	19	19	ALIVE
W. Germany	01*	07 26-31	10 14 57	09 25-70	40	13	[illegible]	12 [illegible]
W. Germany	02*	06-24 30	10-01-57	09 19-68	38	13	[illegible]	01 [illegible]
W. Germany	04*	00-00-00	00-00-00	00-00-00	44	17	[illegible]	00 [illegible]
W. Germany	05*	00 00-00	00-00-00	00-00-00	49	11	[illegible]	ALIVE
Total Reported Cases = 32								
Median Values:								
15 U.S. Cases					45.0	19.0	[illegible]	
10 Non-U.S. Cases					43.0	16.0	[illegible]	
25 Total Cases					44.0	17.0	[illegible]	

* Indicates microscopically confirmed angiosarcoma of the liver.
"00" Indicates unknown data

Table 2. — Reported Cases of Angiosarcoma of the Liver Among Non-Polymerization Workers Exposed to Vinyl Chloride.

Country	Case No.	Birth Date	1st VC or PVC Exposure	DX Angio-Sarcoma	Age At DX	Yrs 1st Exp To DX	Tot Yrs Exp	Date of Death	
Great Britain	02*	09 08 14	00 00-46	02-00 70	55	24	11	12-00 70	Note 1
Italy	01	06 15-34	00-00-65	04 19-71	36	6	3	04 16 71	Note 2 & 7
Sweden	02*	11 27 11	00-00-45	05 15 72	61	27	23	08 16 72	Note 3
United States	14	00-00-13	08 18-38	06-00 73	60	36	00	07-03 73	Note 4 & 8
United States	15*	00-00 25	00 00 00	07 00 72	47	00	00	02 15 73	Note 5
W Germany	03*	07 16 30	00 00-00	02-00-68	43	14	14	10 10 73	Note 6

Note 1 Pouring PVC Oil mixture onto fabric bases
Note 2 Production of PVC sacks
Note 3 Production of Vinyl Chloride
Note 4 Machine Operator covering electrical wire with PVC plastic insulation
Note 5 Accountant at plant making PVC fabric
Note 6 Loading pesticide cans with VC propellant
Note 7 Angiosarcoma involving liver, lung, and pericardium. Although difficult to determine, primary site seems to be pericardium.
Note 8 Diagnosis Sarcoma (possibly "angiosarcoma"), liver. Possibility of generalized neoplasm of the reticuloendothelial cell system cannot be ruled out.

* Indicates microscopically confirmed angiosarcoma of the liver
"00" Indicates unknown data

this disease. Approximately 5,600 men are currently employed at 36 facilities in the United States. To date, 15 cases of angiosarcoma of the liver have been reported from four of these facilities, all of which have been in operation for more than 25 years. Nine cases have been reported from a single facility which employs less than 300 workers. A further indication that the earliest cases are coming from the older plants is seen in the distribution by date of initial exposure. All but one case was initially employed prior to 1958 and more than 70% of the cases were initially employed 20 or more years ago. Since the average latent period from first exposure to diagnosis is about 19 years, we would not expect to see many cases at this time from the newer plants.

Preliminary findings from continuing epidemiological investigations of U.S. polymerization workers indicate that these men also may be at high risk for other malignant neoplasms, particularly of the brain where a significant excess has been noted.

Details of reported cases of angiosarcoma of the liver among other workers with exposure to vinyl chloride are shown in Table 2. It should be noted that in two of these cases primary angiosarcoma of the liver cannot be definitely confirmed. While too few cases have been reported to draw any definitive conclusions regarding a cause and effect relationship, the age of diagnosis for these cases, which like that for the polymerization workers is considerably lower than that observed for cancer of the liver in the general population, suggests the possibility of a common etiology. It also should be pointed out that with such a rare disease it may be some time before we can determine whether workers exposed to lower levels of vinyl chloride are at excess risk for angiosarcoma of the liver or other malignancies. It is, therefore, imperative that the non-polymerization workers be kept under continued surveillance.