Exhibit 250

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Mortality of Aircraft Manufacturing Workers in Southern California

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A retrospective cohort mortality study was conducted among men and women employed for four or more years, between 1958 and 1982, at an aircraft manufacturing company in San Diego County. Specific causes of death under investigation included cancer of the brain and nervous system, malignant melanoma, and cancer of the testicle, which previous reports have suggested to be associated with work in aircraft manufacturing. Follow-up of the cohort of 14,067 subjects for a mean duration of 15.8 yr from the date of first employment resulted in successful tracing of 95% of the cohort and found 1,804 deaths through 1982. Standardized mortality ratios (SMRs) were calculated based on U.S. national mortality rates and separately based on San Diego County mortality rates. Mortality due to all causes was significantly low (SMR = 75), as was mortality due to all cancer (SMR = 84). There was no significant excess of cancer of the brain, malignant melanoma, cancer of the testicle, any other cancer site, or any other category of death. Additional analyses of cancer sites for which at least ten deaths were found and for which the SMR was at least 110 showed no increase in risk with increasing duration of work or in any specific calendar period. Although this study found no significant excesses in cause-specific mortality, excess risks cannot be ruled out for those diseases that have latency periods in excess of 20 to 30 yr, or for exposures that might be restricted to a small proportion of the cohort.

Key words: cancer, occupational diseases, aircraft, mortality

INTRODUCTION

A number of reports have suggested increased risk of malignant brain tumors [Dubrow and Wegman, 1984; Guralnick, 1963; Milham, 1983; Preston-Martin et al., 1982] and malignant melanoma [Costa et al., 1986] in the aircraft manufacturing industry. Work in this industry involves various aspects of metal machining, forming, and processing; these activities have been reported to be associated with brain tumors [Sweeney and Ahrenholtz, 1984; Thomas et al., 1986]. Germ cell tumors of the testicle have been associated with aircraft repair work in which there was exposure to

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dimethylformamide [Ducatman et al., 1986]. Although aircraft manufacturing is a large industry, there have been no reported studies that have systematically examined mortality in this industry.

We conducted a retrospective cohort mortality study and standardized mortality (SMR) analysis of employees in a large aircraft manufacturing company. Our objectives were to evaluate the overall mortality among the workers and to test the hypotheses that brain tumors, malignant melanoma, and testicular neoplasms are associated with work in this industry.

MATERIALS AND METHODS

Sources of Data

The cohort consisted of all individuals who had completed at least 4 yr of work at the company by December 31, 1982 and who had worked for at least one day at the company facility in San Diego County between January 1958 and December 31, 1982. The criterion of 4 yr of work was chosen to achieve a cohort size that would provide adequate statistical power in the SMR analyses; 1958 was chosen as the first year of observation because this was the first year in which company records were available to identify cohort members. The cohort was defined using employment records, termination reports, and benefits records obtained from the company.

From these records, the following information was collected for each subject: name, social security number, sex, race, date of birth, date of hire, and date of termination. Death certificates were available from the company for several hundred employees who had died while employed or after retiring.

Determination of Vital Status

It was necessary to establish the vital status of all cohort members as of December 31, 1982, the closing date of the study. Subjects who were employed by the company on or after this date were classified as alive. A vital status search was conducted for all employees who had terminated prior to this date. The sources used in the vital status follow-up of former employees included: 1) Social Security Administration national and regional records, 2) the California Department of Motor Vehicles (DMV), and 3) TRW Information Services which maintains credit records of individuals throughout the United States.

Determination of Cause of Death

The cause of death was determined either from the death certificate or from the California Death Tapes (which list all deaths in California and which are maintained by the State). The cause of death was defined as the underlying cause coded by a trained nosologist according to the International Classification of Diseases (ICD) revision in effect at the date of death. Specific causes of death were grouped into broad and specific categories to facilitate comparison across ICD revisions.

Analysis

SMR methods were used to determine whether the risk of death in the study population differed from that in a reference population. Person-years accrued from the anniversary date of an individual's fourth year of service with the company or January 1, 1958 (whichever was later) to the end of the study period (December 31,

TABLE I. Distribution by Sex and Year of Hire of all Cohort Members

	Men		Women		Total	
Year of hire	Number	%	Number	%	Number	%
1940–4	276	2.3	19	.9	295	2.1
1945–9	748	6.3	116	5.4	864	6.1
1950–4	1,872	15.7	616	28.4	2,488	17.7
1955–9	3,423	28.8	564	26.0	3,987	28.3
1960–4	1,156	9.7	97	4.5	1,253	8.9
1965–9	2,867	24.1	388	17.9	3,255	23.1
1970–4	931	7.8	207	9.5	1,138	8.1
1975–8	625	5.3	162	7.5	787	5.6
Total	11,898	100.0	2,169	100.0	14,067	100.0

1982) or the date of death (whichever was earlier). For subjects who were lost to follow-up, the person-years of observation were counted up to the last date on which the subject was known to be alive. This was either the date of termination from the company, the date of last credit activity recorded by TRW, or the last driving record activity from the DMV. Each person-year contributed by a subject was classified by sex, race, age and calendar year. For both the cohort and the reference population, age and calendar year were grouped into five-year periods. Race was categorized as white (including white, hispanic and race-unknown) or non-white.

The United States national race–, sex–, age–, calendar year–, and cause-specific mortality rates were applied to these person-years to obtain the number of deaths from each cause that would be expected to occur given a similar distribution of person-years of observation in the United States population. This procedure was repeated using the San Diego County mortality rates.

Computations of expected deaths and SMRs were performed using the life table analysis system developed by NIOSH (Waxweiler et al., 1983). p-values and confidence limits were based on the Byar approximations to the exact test and confidence limits for a Poisson variable [Rothman and Boice, 1979] when there were six or more deaths. When there were fewer than six deaths, exact p-values for the Poisson distribution were used and exact confidence limits were calculated [Bailar, 1964]. Tests for trend in the SMRs were calculated using Poisson regression techniques [Baker and Nelder, 1978].

RESULTS

Altogether 14,067 individuals were accepted into the cohort. Eighty-five percent of the cohort were males and 15 percent were females. Table I gives the distribution of males and females by year of hire. Eight percent of the subjects were hired before 1950, 46 percent were hired between 1950 and 1960, and 32 percent were hired between 1960 and 1970. The distribution by hire date was not appreciably different for women than for men.

Table II shows the distribution of person-years of follow-up of the cohort by duration of work and by duration since the date of hire. There were 222,100 person-years of follow-up. Over 47 percent of the person-years were contributed by subjects who worked for ten years or more, while only 13 percent were contributed by subjects who worked less than 5 years. The distribution by duration of follow-up

TABLE II. Distribution of Person-Years of Followup by Duration of Employment and Duration of Follow-up Since Date of Hire

	Duration of employment							
Duration of follow-up	48 mos–5 yr	5 yr–10 yr	10 yr–15 yr	15 yr–20 yr	20 yr–25 yr	25 yr–30 yr	30 yr–& over	Total
< 5 yr	10,186	0	0	0	0	0	0	10,186
5–10 yr	6,384	50,698	0	0	0	0	0	57,082
10–15 yr	5,677	15,396	34,678	0	0	0	0	55,752
15–20 yr	3,948	10,666	6,885	22,213	0	0	0	43,713
20–25 yr	2,885	7,106	4,911	4,167	13,569	0	0	32,638
25–30 yr	421	2,911	2,250	2,107	2,184	6,350	0	16,222
30 & over	0	225	632	690	873	1,055	3,033	6,508
Total	29,501	87,003	49,357	29,177	16,626	7,404	3,033	222,100

TABLE III. Distribution by Vital Status (on December 31, 1982) of All Cohort Members

			Death Certificates	
Vital status	Number	%	Obtained	Outstanding
Alive	11,607	82.5		
Dead	1,804	12.8	1,720(95.3%)	84(4.7%)
Unknown	656	4.7		
Total	14,067	100.0		

since first employment indicates that 70 percent of the person-years were contributed by subjects who had ten or more years of follow-up, and that 45 percent were contributed by subjects who had 15 or more years of follow-up.

Table III shows the vital status of the cohort on December 31, 1982. At the end of the study period, 11,607 (82.5%) were still alive. A total of 1,804 individuals had died during the study period and death certificates were obtained for all except 84 (4.7% of all deaths). At the end of the study, the vital status of 656 individuals (4.7% of the total cohort) remained unknown.

Table IV shows for the entire cohort (males and females), the observed number of deaths, the expected number of deaths, the SMR, and the 95% confidence interval (95% C.I.) on the SMR for each specific cause of death based on U.S. national mortality rates. The total mortality was significantly low (SMR = 75) by comparison with the US national mortality experience. Mortality from cancer of all types was also significantly low (SMR = 85). There were statistically significant deficits for malignancies of the following sites: cancer of the stomach (SMR = 40), cancer of the larynx (SMR = [illegible]), and cancer of the trachea, bronchus, and lung (SMR = 80). There were no statistically significant increases in cancer mortality, although there were non-significant excesses of esophagus cancer (SMR = 114), pancreas cancer (SMR = 119), and bladder cancer (SMR = 126).

The SMR for malignant neoplasms of the brain and nervous system was 78 (not significant). The SMR for malignant neoplasm of the skin was 71 (not significant), based on 7 deaths. Five of these deaths were due to malignant melanoma. (The SMR for malignant melanoma alone was not calculated based on U.S. mortality rates, as melanoma was combined with other skin cancers in the mortality rates we used. However, the SMR for malignant melanoma alone, based on San Diego County

ABLE IV. Observed Deaths and SMRs by Cause for Total Cohort, Based on U.S. National ortality

use of death category oad Specific	Observed deaths	Expected deaths	SMR	95% C.I. Lower limit	95% C.I. Upper limit
ll causes	1,804	2,399.58	75[a]	72	79
ll cancers	453	533.42	84[a]	77	93
berculosis	6	8.32	72	26	157
alignant neoplasm					
N of buccal cavity and pharynx	10	16.32	61	29	113
MN of lip	0	0.32	0	0	1,157
MN of tongue	2	3.80	52	6	190
MN of buccal cavity	4	4.47	89	24	229
MN of pharynx	4	7.73	51	14	132
N of digestive organs and peritoneum	130	140.51	92	77	110
MN of esophagus	14	12.27	114	62	192
MN of stomach	9	22.39	40[a]	18	76
MN of intestine except rectum	47	48.85	96	71	128
MN of rectum	15	14.32	104	59	173
MN of biliary passages and liver	8	8.49	94	40	186
MN of pancreas	34	28.45	119	83	167
MN of peritoneum and unspecified	1	1.97	50	1	282
N of respiratory system	141	180.48	78[a]	66	92
MN of larynx	0	7.41	0[a]	0	50
MN of trachea, bronchus and lung	138	171.25	80[a]	68	95
N of breast	16	17.50	91	52	148
N of female genital organs	7	11.42	61	25	126
N of male genital organs	26	29.23	88	58	130
MN of prostate	25	26.86	93	60	137
MN of other male genital organs	1	2.36	42	1	235
N of urinary organs	29	26.22	110	74	159
MN of kidney	12	12.78	93	48	164
MN of bladder and other urinary organs	17	13.44	126	74	203
N of other and unspecified sites	56	63.44	88	67	115
MN of skin	7	9.76	71	29	148
MN of brain and nervous system	13	16.60	78	42	134
MN of other unspecified sites (minor)	32	30.98	103	71	146
eoplasms of lymphatic, hematopoetic origin	38	48.28	78	56	108
Lymphosarcoma and reticulosarcoma	13	15.82	82	44	141
Hodgkin's disease	4	5.44	73	20	188
Leukemia and aleukemia	16	19.35	82	47	134
Other neoplasms of lymphatic and hematopoetic tissue	5	7.68	65	21	152
enign and unspecified neoplasms of brain	5	4.53	110	36	258
Benign neoplasms of brain	1	1.24	80	2	448
Unspecified neoplasms of brain	4	3.29	121	33	311
iabetes mellitus	12	36.34	33[a]	17	58
Diseases of blood and blood forming organs	3	7.22	41	9	121
Iental and psychoneurotic disorders	7	14.65	47[a]	19	98
Alcoholism	3	10.95	27[a]	6	80
Other mental disorders	4	3.69	108	30	277
Diseases of the nervous system	109	153.49	71[a]	58	86
Vascular lesions affecting the central nervous system	109	150.67	72[a]	59	87
Multiple sclerosis	0	2.82	0	0	131

(continued)

TABLE IV. Observed Deaths and SMRs By Cause for Total Cohort, Based on U.S. National Mortality (Continued)

Cause of death category Broad Specific	Observed deaths	Expected deaths	SMR	95% C.I. Lower limit	Upper limit
Diseases of the circulatory system	710	1,039.56	68[a]	63	74
Chronic rheumatic heart disease	14	19.04	73	40	123
Arteriosclerotic heart disease	607	860.84	70[a]	65	76
Other myocardial degeneration	7	9.39	74	30	154
Other diseases of the heart	23	53.08	43[a]	27	65
Diseases of the arteries and veins	45	66.90	67[a]	49	90
Diseases of the respiratory system	107	136.07	78[a]	64	95
Influenza	2	3.19	62	8	227
Pneumonia	37	48.56	76	54	105
Bronchitis	8	8.22	97	42	191
Other respiratory disorders	59	75.86	77	59	100
Diseases of the digestive organs	78	95.00	82	65	102
Diseases of the stomach and duodenum	10	13.88	72	34	132
Cirrhosis of the liver	63	72.66	86	67	111
Diseases of the genitourinary system	8	19.83	40[a]	17	80
Diseases of skin	2	2.51	79	10	287
Unknown causes	6	30.63	20[a]	7	43
Accidents	91	144.93	62[a]	51	77
Transportation accidents	55	77.07	71[a]	54	93
Violence	54	76.84	70[a]	53	92
Suicide	48	54.40	88	65	117
Other causes	69	93.85	73[a]	57	93

[a]Two-sided $p < 0.05$

mortality rates was 54, and was not statistically significant). There was one death due to a testicular neoplasm.

Mortality due to causes other than cancer showed statistically significant deficits of diabetes mellitus (SMR = 33), alcoholism (SMR = 27), diseases of the nervous system (SMR = 71), diseases of the circulatory system (SMR = 68), diseases of the respiratory system (SMR = 78), diseases of the genitourinary system (SMR = 40), accidental deaths (SMR = 62), and violent deaths (SMR = 70). There were six deaths due to unknown causes, which was a statistically significant deficit (SMR = 20).

Mortality was also examined separately for males and females. Since males made up 85% of the study population, their results were quite similar to the results presented for both sexes combined. Among males, there were no statistically significant excesses of death due to any cause. Statistically significant deficits were observed for the following sites: cancer of the stomach (SMR = 39), cancer of the larynx (SMR = 0), and cancer of the trachea, bronchus, and lung (SMR = 76), diabetes mellitus (SMR = 35), alcoholism (SMR = 28), diseases of the nervous system (SMR = 70), diseases of the circulatory system (SMR = 67), diseases of the respiratory system (SMR = 78), diseases of the genitourinary tract (SMR = 45), accidental deaths (SMR = 62), and violent deaths (SMR = 67). The size of the female cohort was small and there were no important findings that differed from those of the males.

The results of the SMR analyses for the total cohort based on San Diego County mortality rates showed results similar to those based on U.S. mortality rates, with the exception of diseases of the circulatory system. The total mortality, based on 1959 expected deaths, was significantly low (SMR = 92, 95% C.I., 84–99). Mortality from cancer of all types, based on 512 expected deaths, was also significantly low (SMR = 89, 95% C.I., 83–97). There were statistically significant deficits for cancer of the following sites: cancer of the stomach (SMR = 42, 95% C.I., 20–85), cancer of the larynx (SMR = 0, 95% C.I., 0–68), and cancer of the trachea, bronchus and lung (SMR = 80, 95% C.I., 65–99). The SMR for malignant neoplasms of the brain and nervous system was 77 (95% C.I., 41–133). There were no statistically significant increases in cancer mortality.

There were statistically significant deficits of diseases of the digestive system (SMR = 76, 95% C.I., 63–93), cirrhosis of the liver (SMR = 77, 95% C.I., 51–93), and external causes of death (SMR = 73, 95% C.I., 63–81). The only important difference between the results based on U.S. mortality rates and San Diego County mortality rates was for diseases of the circulatory system. Using San Diego County mortality rates, the SMR was 94 based on 715 expected deaths, while using U.S. mortality rates the SMR was 68 based on 1040 expected deaths.

We further analysed the mortality pattern of cancer of the esophagus, cancer of the pancreas, and cancer of the bladder to determine if mortality increased with the duration of work or was increased in any specific calendar period. These sites were chosen for further study because they were the only causes of death for which the SMR was above 110 and for which there were at least ten deaths.

Table V presents the SMR results for these three cancer sites according to five-year categories of duration of employment, and for five-year categories of calendar year from 1958 through 1982. For esophagus cancer, there was no instance in which the SMR was statistically significantly elevated in either a category of duration of employment or a category of calendar year of death and there was no significant trend in the SMRs. The results for pancreas and bladder cancer were similar to those for esophagus cancer, in that there was no statistically significant SMR in any category of duration of work or category of calendar year, and there was no significant trend in the SMRs.

DISCUSSION

The total cohort was relatively large and was followed for a mean of 15.8 yr after entering the aircraft company work force. In addition, the cohort was limited to workers who had worked at least 4 yr for this company. Thus, the cohort was of adequate size for examining mortality for many individual causes, and was restricted to relatively long-term workers in an effort to study those most likely to have long-term exposures.

Because the SMR study did not find statistically significant increased risks for any specific cancer site (or other causes of death), we calculated the statistical power of the study to detect significant excess risks greater than two-fold at the 5% significance level for several causes of death of interest. For cancer of the brain and central nervous system, the size was sufficient to detect any significant excess risk

TABLE V. Cancer Mortality by Duration of Work and by Year of Death, for Selected Causes for Total Cohort Based on U.S. National Mortality

	Duration of employment (years)							
Cause of death	4–5	5–9	10–14	15–19	20–24	25–29	30+	Total
Esophagus cancer								
Obs	0	6	3	2	2	1	0	14
Exp	0.86	3.51	2.96	2.24	1.51	0.76	0.42	12.27
SMR	0	170	101	89	132	131	0	114
Pancreas cancer								
Obs	0	9	10	4	8	2	1	34
Exp	1.90	8.23	7.05	5.25	3.47	1.67	0.87	28.45
SMR	0	109	141	76	230	119	114	119
Bladder cancer								
Obs	0	4	5	5	0	2	1	17
Exp	0.74	3.79	3.51	2.62	1.63	0.76	0.41	13.44
SMR	0	105	142	191	0	266	245	126

	Year of Death						
	1958–1959	1960–1964	1965–1969	1970–1974	1975–1979	1980–1982	Total
Esophagus cancer							
Obs	0	0	3	3	4	4	14
Exp	0.22	0.91	1.57	2.66	3.96	2.94	12.27
SMR	0	0	191	112	101	135	114
Pancreas cancer							
Obs	1	1	4	7	13	8	34
Exp	0.52	2.27	3.93	6.33	8.75	6.64	28.45
SMR	192	43	101	110	148	120	119
Bladder cancer							
Obs	0	1	2	3	7	4	17
Exp	0.25	1.00	1.73	2.86	4.20	3.41	13.44
SMR	0	100	115	104	166	117	126

greater than two-fold with 93% power. For malignant melanoma, the study had 70% power to detect any significant risk greater than two-fold. It is unlikely that this study would have failed to detect a significant risk of these diseases had one truly existed in the entire cohort. For testicular neoplasms, which are quite uncommon, the study had low power (28%) to detect a risk greater than two-fold. It is possible, however, that for cancers with very long latency, this study would not have been adequate to detect excess risks that would not have been detectable with less than 20–30 yr of follow-up.

This study did not provide evidence that brain tumors, malignant melanoma, or malignancies of the testicle are associated with work in the aircraft industry, as has been reported in other studies. It is possible that risks for these diseases may exist for sub-cohorts within this industry and might not be apparent in an overall mortality study such as ours. Case-control studies of these tumor sites are needed to determine if there are such occupational risk factors.

Because there were elevated SMRs for cancers of the esophagus, pancreas, and bladder, we conducted additional analyses of mortality for these causes of death. These analyses did not indicate a pattern of increasing risk with increasing duration work and did not point to any calendar period during which risk was substantially evated. In light of these findings and the large number of SMRs that were lculated, it is likely that these excesses were due to chance. In addition, adjustment these SMRs for the overall low mortality experience of the cohort did not result in eir achieving statistical significance.

The all causes SMR for the whole cohort was significantly low regardless of hether the comparison was based on United States or San Diego County mortality tes. It is likely that this low overall mortality was due to the combination of lection of healthy people for employment and the effects of continued employment ith its accompanying benefits of desirable lifestyle and health care (the healthy orker effect). However, although there were important differences between the San iego County and United States mortality rates for diseases of the cardiovascular stem, the cancer mortality rates were quite similar. As a result, the pattern of cancer sk was quite similar in both sets of analyses.

The comparison population for a cohort of workers should theoretically be hosen to include subjects who are at the same risk of death as the study group, but or the risks of the workplace. In practice, such an external population can rarely be ssembled because of logistical problems and lack of a priori knowledge of the ifferential selection factors that act on both the study cohort and the comparison opulation. Alternatively, the use of an internal comparison population is theoreti-ally advantageous in that the subjects are likely to have been subjected to the same election criteria as the study population. However, an internal comparison popula-on is only useful if it is not exposed to workplace hazards that alter its underlying isks of disease. This implies that exposure information must be available for all nembers of the cohort in order to define the study and comparison populations, but is is often either unavailable or prohibitively expensive to reconstruct.

Since neither an external comparison population of workers nor exposure nformation was available in this study, the only practical alternatives available to us vere to use the U.S. national population and the San Diego County population for omparison. We chose to use both. The only clear difference in SMRs between the wo analyses, which was that seen for cardiovascular disease, was due primarily to ne lower risk of cardiovascular disease in San Diego County than in the U.S. national opulation.

The ethnic composition of San Diego County differs from that of the U.S. opulation largely because of the presence of a large number of Hispanics. However, n the past the ethnic profile of industry in San Diego County has not reflected that of the general population of the County. This is particularly true in the aircraft nanufacturing industry, which has been dominated by non-Hispanic white males. Because of this, it may be more appropriate to compare our study population with the U.S. national population than with the San Diego County population. Regarding cancer mortality, however, for which the two sets of results were essentially identical, he choice of one comparison population over the other does not materially affect the nterpretation of our results.

Aircraft manufacturing includes a wide range of technologies, at the core of which are metal machining and forming, and the assembly of metal structures. The manufacturing processes in the company we studied can be grouped into ten categories, listed below, with the percentage of the employees who ever held a job in each category, and the major processes in the category:

Process category	% of subjects ever employed	Major tasks in process category
Assembly	25	Assembly of structures & electrical equipment, assembly of metal-plastic composites, riveting and fitting of metal parts.
Fabrication	5	Fabrication of sheet metal parts: routing, sawing, filing, burring, and drilling.
Forming	5	Bending and forming of sheet metal parts by cold forging, hydraulic pressing, stretching, planishing, and hot sizing.
Inspection	13	Inspection and non-destructive testing of parts.
Machine shop	7	Metal machining: drilling, grinding, milling, boring, honing, lathing; tool cutting and grinding; layout work.
Maintenance	11	Maintenance and repair of heating, air conditioning, plumbing, electrical equipment, small tools, heavy equipment, electronics equipment.
Processing	11	Chemical etching, heat treating, plating, painting, and sealing of metal parts.
Production control	18	Tool crib attendants, operators of cranes, trucks, forklift trucks, salvage work, materials handlers.
Tooling	17	Tool and die making, layout work, mock-up making, jig and fixture building.
Wage jobs, n.e.c.	15	Helpers, parts identifiers, welders.

The materials that are most commonly used include aluminum alloys, metal cutting fluids, and degreasing and painting solvents. Although it was not possible to reconstruct the lifetime work exposures of all subjects in this study, we have reconstructed the exposures of a subset of the cohort for use in a case-control study of esophagus cancer, which includes 14 cases and 56 matched controls. The exposures of these 70 subjects were ascertained by abstracting their lifetime work records at the company, then interviewing co-workers who had held the jobs that were held by the subjects to identify the manufacturing processes, the materials used, and the exposures in each job. Based on these interviews regarding 362 jobs held by subjects of this study, we have estimated the prevalence of exposure to a variety of materials, some of which are presented below.

Material	Percent of jobs exposed
Aluminum alloy dusts	44
Stainless steel dusts	24
Welding fumes	36
Methylene chloride	30
1,1,1-trichloroethane	10
Trichloroethylene	37
Methyl ethyl ketone	47
Toluene	16
Lubricating oils and greases	50
Metal cutting fluids	54
Paints	30

Thus, this cohort provides indirect information regarding the mortality risks of males exposed to these materials, since exposures in this cohort are very likely to be much higher than in the populations to which their mortality experience was compared. Additional case-control studies are essential to define the risks of specific substances.

In conclusion, this study provides the first comprehensive look at mortality in the aircraft manufacturing industry. This is a large sector of industry in the United States and western Europe and is growing rapidly in developing nations. Thus, there is a need for assessing the hazards in this industry. Insofar as this industry is one of the few in which large numbers of workers are engaged in machining and forming lightweight metal alloys, this study also provides interesting information regarding the mortality risks of these operations. It is also possible that there are health risks in this industry that are not well reflected by altered mortality or that have very long latency periods. The limitations of our study design made their detection unlikely.

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