

Cancer mortality in IBM Endicott plant workers, 1969-2001

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Abstract:

We analyzed the mortality experience of workers who were employed at the IBM plant in Endicott, New York and died between 1969-2001 in response to concerns expressed by workers at a public meeting. An epidemiologic feasibility assessment indicated potential worker exposure to several known and suspected carcinogens at this plant. We used the mortality and work history files produced under a court order and used in a previous mortality analysis. The results showed significantly increased mortality due to melanoma (PCMR=367; 95% CI, 119-856) and lymphoma (PCMR=220; 95% CI, 101-419) and modestly increased mortality due to kidney cancer (PCMR=165; 95% CI, 45-421) and brain cancer (PCMR=190; 95% CI, 52-485) in males. The results also showed modestly increased mortality due to breast cancer (PCMR=126; 95% CI, 34-321) in females. These results are similar to results from a previous IBM mortality study and support the need for a full cohort mortality analysis such as being planned by the National Institute for Occupational Safety and Health.

Introduction:

We conducted a supplementary analysis of data from a previous publication on mortality among the U.S. employees of the IBM company (Clapp, 2006) in response to concerns expressed by employees at another plant in Endicott, NY. One of us (RWC) attended a meeting in the community near the plant and heard the concerns about cancer in workers, in particular. This former IBM facility had produced a variety of products since it began operations in 1911, including calculating machines, typewriters, guns, printers, automated machines for banks, printed circuit boards and chip packaging. The purpose of the supplementary analysis of mortality data for this plant was to see if there were patterns of cancer mortality similar to those seen in other IBM manufacturing workers during the years 1969-2001. IBM sold the Endicott microelectronics facility in 2002.

Discussion:

According to a NIOSH feasibility study (Pinkerton, 2007) completed over a year ago, there were 28,000 workers employed at the Endicott plant for at least a year after 1965. A large percentage (44%) were potentially exposed to one or more carcinogens, including asbestos, benzene, cadmium, nickel compounds, vinyl chloride or probable carcinogens such as tetrachloroethylene, trichloroethylene, PCBs, ortho-toluidine and ultraviolet light. A variety of other solvents were used, and chlorinated solvents were eventually phased out beginning in the 1980s. NIOSH has concluded that a cohort study of the Endicott employees is feasible and has developed a cost proposal which is being discussed.

The present supplementary analysis was carried out in response to workers' desires for information. It is based on the IBM Corporate Mortality File (CMF) which was produced after a court order during litigation and used in a previous analysis, but which did not look at the Endicott plant workers separately. The CMF contained records for deceased individuals who had been employed for five years or more, who were actively employed or receiving retirement or disability benefits at time of death, and whose families had filed a claim for death benefits in their Corporate Mortality File (CMF). Within the CMF, underlying causes of death were coded to the Ninth Revision of the International Classification of Disease (ICD 9). Data from the CMF were joined to work history data from the IBM Corporate Employee Resource Information System (CERIS) which included a location code for place of employment. Death records of individuals who had worked at Endicott between 1969 and 2001 were selected using seven location codes (CPM, EEC, END, ENL, ENP, GDL and PLE) and included 360 individuals, of whom 115 had died of cancer. The number of cancer deaths by age group and sex is presented in Table 1; the number of deaths by cancer type and sex is presented in Table 2.

Proportional cancer mortality (PCMR) analysis (Monson, 1990) was conducted using publicly available data for the state of New York as a standard of comparison. (1) Unfortunately, state cancer mortality data could not be located for the entire study period; however, comparison data for the years 1979 to 1998 were used in the PCMR analyses. Proportional cancer mortality ratios were calculated from the ratio of the observed number of deaths due to a particular cancer type among the workers to the expected

number of deaths of that type in each sex. For each PCMR, 95% Poisson confidence intervals were also calculated.

The PCMR results for those cancer types with at least four deaths in one sex are presented in Table 3. The full analysis is provided as an appendix.

(1) Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File 1979-1998. CDC WONDER On-line Database, compiled from Compressed Mortality File CMF 1968-1988, Series 20, No. 2A, 2000 and CMF 1989-1998, Series 20, No. 2E, 2003. Accessed at <http://wonder.cdc.gov/cmfi-icd9.html>

Table 1: Endicott cancer deaths by age and sex.

Age Group	Females	Males
35-44 years	1	1
45-54 years	1	15
55-64 years	6	28
65-74 years	6	55
75-84 years	1	1

Table 2: Endicott cancer deaths by type and sex.

	Females	Males
All Cancers	15	100
Bladder	0	1
Brain	0	4
Breast	4	1
Colon	0	7
Endocrine Glands	0	1
Esophagus	1	4
Gallbladder	1	2
Kidney	0	4
Larynx	1	0
Liver	0	1
Lung	3	35
Lymphoma	0	9
Melanoma	0	5
Multiple Myeloma	0	3
Nasal cavities, middle ear, and accessory sinuses	0	1
Nasopharynx	1	0
Oropharynx	0	1
Ovary	1	0
Pancreas	1	4
Rectum	1	3
Stomach	0	4
Without Specific Site	1	10

Conclusions:

This mortality analysis updates previous results presented for all IBM employees and for sub-groups of manufacturing workers and workers at other specific plants. In the present analysis, several types of cancer were elevated as a cause of death in Endicott workers, compared to deaths in New York State during the same time period. The PCMR results in Table 3 show significantly elevated mortality due to melanoma and lymphoma, and elevated but not significant mortality due to breast cancer, kidney cancer and brain cancer. These results are similar to the results seen in IBM manufacturing workers as a whole and at specific plants such as the San Jose, CA plant in previous analyses.

These results are based on small numbers of deaths, and they do not include deaths in workers who were not eligible to be in the Corporate Mortality File. The similarity in the pattern of mortality and the similarity in some of the chemical exposures in the Endicott plant suggest that there may be more information to be learned from a full cohort study such as being proposed by NIOSH.

List of Abbreviations:

CERIS, IBM Corporate Employee Resource Information System

PCMR, Proportional cancer mortality ratio

CI, Confidence Interval

IBM, International Business Machines

CMF, Corporate Mortality File

ICD 9, International Classification of Diseases, 9th revision

Competing interests:

The first author (RWC) was previously paid a consultancy by the plaintiffs' law firm; the law firm did not design or conduct the study, nor review or approve the manuscript. The author received no remuneration for the preparation of this manuscript.

Authors' contributions:

RWC was responsible for the overall conception and presentation of the work. KH calculated the PCMRs and wrote the methods description.

Acknowledgements:

The authors would like to acknowledge the major contribution by Dr. Rebecca Johnson in the preparation of the file for these analyses. This work was supported in part by a previous paid consultancy to Drs. Clapp and Johnson by the law firm of Alexander, Hawes & Audet, LLP in San Jose, CA. The funders obtained the raw data from the company but played no role in the design or conduct of the study nor in the management, analysis or interpretation of the results. The funders did not prepare, review or approve the manuscript.

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Table 3: Endicott cancer PCMRs by type and sex.

	Males					Females				
	Observed	Expected	PCMR	Lower C.I.	Upper C.I.	Observed	Expected	PCMR	Lower C.I.	Upper C.I.
All Cancers	100	100.0	-	-	-	15	15.0	-	-	-
Esophagus	4	3.6	111.6	30.3	285.6	1	0.2	524.0	13.3	2918
Stomach	4	3.9	102.8	33.3	239.5	0	-	-	-	-
Colon	7	9.6	72.6	29.1	149.6	0	-	-	-	-
Pancreas	4	5.3	76.0	20.7	194.6	1	0.8	132.7	3.4	739.1
Lung	35	34.2	102.5	71.4	142.4	3	3.2	94.7	19.5	276.6
Melanoma	5	1.4	367.3	119.0	855.7	0	-	-	-	-
Breast	1	0.1	728.0	18.4	4054	4	3.2	125.5	34.1	321.3
Kidney	4	2.4	164.5	44.7	421.1	0	-	-	-	-
Brain	4	2.1	189.5	51.6	485.2	0	-	-	-	-
All Lymphoma	9	4.1	220.4	101.0	418.8	0	-	-	-	-

Additional files provided with this submission:

Additional file 1: endicott pcmrs.xls, 35K

<http://www.ehjournal.net/imedia/1109418208181667/supp1.xls>