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CENTER FOR HUMAN RADIOBIOLOGY

Fact Sheet on

Mortality of Female Radium Dial Workers First Employed Before 1930
and on Employment Lists

This study involves part of a larger group of female radium dial workers first employed before 1930. Included are persons identified from sources largely unbiased with regard to outcome (mortality). Epidemiologic studies on this group should be particularly useful in assessing long-term health effects of radium and internal radiation, and in examining dose-response relationships.

Study group: A total of approximately 1260 female radium dial workers first employed before 1930 have been identified from various sources and located. Of these, 713 have been identified from employment lists and similar sources. These sources include: (1) city directories from two Illinois cities, indicating workers at a radium dial company; (2) photographs of workers at the same Illinois company; (3) company lists of persons who worked with radium in Waterbury and Bristol, Connecticut; and (4) payroll records of a company in Crange, New Jersey. Of these 713 persons, 617 (86.5%) have been located; thus far, a body burden measurement is available for 390.

Findings: Death certificates have been obtained for almost all dial workers who have died. The age-time-specific person-years of the study cohort have been calculated, using year of first exposure for the beginning of follow-up in some analyses. Expected deaths are calculated by multiplying age-time-cause-specific U. S. standard rates for white females (Monson, 1974, Computers Biomed. Res. 7, 325) by age-time-specific person-years of follow-up. Observed numbers of deaths are divided by expected numbers in each cause category to obtain a mortality ratio.

Table 1 shows selected results for the group of 617 located female dial workers. An excess of deaths from malignant neoplasms, especially cancer of bone, is evident. Other cancer categories (large intestine, brain, and leukemia) show increases over expectation, but numbers are small. Other cause categories (e.g., cardiovascular diseases and CNS lesions) show no increase over expectation. Similar analyses have also been made by year of first exposure, year of death, age at first exposure, and dose category (for measured persons).

The results of this study will be compared with those of the larger study of all dial workers first employed before 1930.

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Table 1. Female Dial Workers First Employed Before 1930 and on Employment Lists (N = 617): Partial Listing of Underlying Causes of Death

Cause of Death	Observed No.	Expected No. ^a	Mortality ratio
All causes	232	190.0	1.22
All infective and parasitic	7	11.0	.64
All cancers	83	43.3	1.99
Cancer of digestive organs	15	12.7	1.18
Cancer of large intestine	10	5.0	2.00
Cancer of lung	3	2.1	1.43
Cancer of breast	9	9.3	.97
Cancer of brain and C.N.S.	3	1.0	3.00
Cancer of thyroid (1950—)	0	0.2	—
Cancer of bone ^b	22	0.3	70.00
Cancer of other and unspecified sites	16	2.5	6.40
Leukemia and aleukemia	3	1.4	2.14
Disease of blood and blood-forming organs	4	1.0	4.00
Diseases of circulatory system	58	63.4	.91
Arteriosclerotic heart disease	38	38.1	1.00
Diseases of respiratory system	6	7.2	.83
Accidents, excluding motor vehicle ^c	28	3.9	7.18
All causes except cancer and external causes	118	136.8	.86

^a Based on U. S. white female age- and time-specific rates (Monson, 1974). Follow-up begins with year of first employment in the radium dial industry.

^b Includes 4 cancers of the mastoid cavity.

^c Includes deaths coded to "radiation accidents" and their sequelae.