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INCIDENCE OF CANCER IN THE VILLAGE OF MIDDLEPORT (NIAGARA COUNTY) NEW YORK

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510(3) Middleport

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Background

A resident of the Village of Middleport wrote to Dr. Holly L. Howe, Director of the Cancer Surveillance Program of the New York State Department of Health on September 26, 1986 about the incidence of cancer in the Village of Middleport. The community is concerned about the proximity of the FMC Corporation inactive toxic waste site to two schools in the Village. The FMC site contains pesticides and pesticide residues. Arsenic and lead have been detected on the playgrounds of these two schools. Mrs. Lois Youngblood, Associate Director of the Cancer Surveillance Program, spoke to the resident and sent a letter on October 13, 1986 confirming the request for a cancer incidence investigation. Dr. Howe initiated the investigation on October 3, 1986.

Methods

The study area was defined as the Village of Middleport in Niagara County. The first step was to identify all cases of cancer diagnosed among residents of the Village during the study period. The source for these data was the New York State Cancer Registry.

The Registry contains information on all cases of cancer reported to the New York State Department of Health, as mandated by law. The period studied for this investigation was 1976 through 1984, the most recent year for which reporting was considered complete for small area analysis.

Variation in cancer incidence among different geographic areas reflects not only true differences in cancer incidence, but also the practices of diagnosing, treating, and recording cancers in various areas in the State.

The completeness and accuracy of the Registry depend upon reporting from hospitals. It is estimated that over 95 percent of all cancer cases are reported (1).

The computerized Registry files are continuously updated to reflect multiple reports on the same cancer; to eliminate metastatic cancers which spread from a primary site; to identify true multiple primary cancers; and to determine correct dates of diagnosis. Data presented in this report represent the status of the Cancer Registry as of November 1986.

A listing of cases by street name was obtained for the Village of Middleport and surrounding areas. The address for each case was examined to determine whether the person lived in the study area at the time of diagnosis. All cases with a street address located within the area were grouped by tumor site, sex, and age. These are referred to as the "observed" cases.

The next step was to determine whether the observed number of cancer cases exceeded the number that would be expected in an area of Middleport's population size and age and sex composition. The value for the expected number also took the population density (the number of residents per square mile) into consideration since cancer incidence may vary between urban and rural areas. This was done by using standard cancer rates which are based on population density to generate expected numbers of cancer cases to compare with the number of observed cases in the study area.

All the minor civil divisions of New York State, excluding New York City, have been assigned to one of five different groups according to the number of residents per square mile in 1980. Group I contains the areas with the highest population density and Group V, the areas with the lowest population density. The Village of Middleport is in Group V.

According to the 1980 U.S. Census, the population of the Village of Middleport was 1,995, with 959 males and 1,036 females. Age- and sex-specific incidence rates for areas of similar population density for 1978-1982 were used to estimate the expected number of cases for the most common cancer sites and for all sites combined among the residents of the study area. Thus, the expected numbers of cancer cases were adjusted for sex, age, and population density.

Seventeen of the most common cancer sites were examined among the men. These included lung, colon, rectum, prostate, lymphoma, leukemia, and bladder, among others. Nineteen of the most common sites were examined among the women. In addition to the aforementioned sites (except prostate), cancers of the breast and female reproductive organs were also included. The sites were grouped in the table to protect the privacy of individuals.

The Poisson model was used to assess the probability that chance alone could explain a given increase or decrease in the observed number of cancer cases relative to the expected number (2). If the probability was 0.025 or less for any cancer site, it was considered to be a statistically significant excess or deficit.

Results

For all cancer sites combined, the incidence of cancer for both sexes together in the study area was 64 cases observed with 57 cases expected. In men, 29 cases were observed and 28 cases were expected. In women, 35 cases were observed and 29 cases were expected. None of these observed numbers of cases were significantly different from the expected numbers. These results and those reported below are summarized in the Table.

None of the specific anatomic cancer sites had numbers of observed cases that were significantly different from the expected numbers. The site of cancer most commonly diagnosed was cancer of the colon and rectum. Specifically, 12 cases of colo-rectal cancer were observed and 9 cases were expected. The other most common sites of cancer observed in the study area were lung cancer with 7 cases observed and 9 cases expected, female breast cancer with 7 cases observed and 7 cases expected, and female reproductive cancers (including ovary, cervix and uterus) with 7 cases observed and 5 cases expected. Also 7 cases of urinary tract cancers (including bladder and kidney) were observed while 4 cases were expected.

Discussion and Conclusions

In drawing conclusions from these data, two aspects of the statistical method need to be addressed. First, since there were at least 38 tests of significance, it was anticipated that one or two results might appear statistically significant even though the differences between observed and expected numbers were due entirely to random fluctuations in the data. None of the observed number of cases was significantly different from the expected numbers in this study.

The second aspect is the power of the statistical test, that is, the probability that a true departure from the expected number can be detected by significance testing. The power of a test varies with the number of cases expected. For example, using the statistical test described above, the probability of detecting a true doubling in cancer incidence over the expected value will be 90 percent or higher when the expected number is at least 16. In the study area, the power of detecting a doubling was high for the total number of cancer cases and the total number for each sex.

And finally, the latency between the time of exposure and the onset of clinically-recognizable disease for most adult cancers is generally between 10 and 20 years. Specific cancers may vary somewhat in the length of the latent period, but generally speaking, recent exposures, that is exposures in the last 10 years, cannot be expected to be associated with current cancer incidence. Furthermore, it appears that for some cancers the development of the disease may depend upon two kinds of exposures, first to a cancer initiating agent, which transforms a previously normal cell into a cancerous cell, and subsequently to a cancer promoting agent, which allows the uncontrolled growth of this cell. Thus, exposures of any type can only be expected to affect cancer incidence following a reasonably long latency.

The cancer incidence in the Village of Middleport during 1976-1984 was similar to the incidence expected. None of the specific cancer sites in either males or females had numbers of observed cases that were significantly different from the expected numbers. The small deviations seen between the observed numbers of cases and the numbers expected based on the population standard rates were within the range which occurs by chance when comparing a single community with a large population.

The requestor was concerned about the presence of arsenic and lead in the playgrounds of two school yards. Arsenic has been associated with lung (and other respiratory) cancers and skin cancer in occupational settings. Lead has been associated with lung cancer (3). The number of lung cancer cases observed in the Village was similar to the expected number of cases. It was not possible to evaluate skin cancer incidence since most skin cancers are not reportable health events, and thus are not included in the Cancer Registry.

The primary human health risk from exposure to arsenic and lead (especially for children) is not cancer. Arsenic exposure is associated with nerve damage in the arms and legs, several skin conditions, anemia and heart disease. Lead exposure, especially in children, has been linked to behavioral and emotional problems due to lead poisoning.

Environmental exposure to carcinogens very rarely produces tumors in children. Even though these exposures may occur in young people, the malignant tumors do not manifest themselves until adulthood. Childhood cancers are most commonly related to hereditary factors, genetic diseases, or radiation exposure (4). The cancer rates for children under age 15 and then ages 16-24 were also examined for the Village of Middleport. The observed number of cases was similar to the expected number. No cases of specific cancers were identified in body sites that are known to be related to arsenic or lead exposure.

General Cancer Information

Cancer is a common disease, sometimes more common than many people believe. One of every three persons will develop it during their lifetime, and it eventually affects three out of every four families (5). The number of people with cancer is increasing in most communities because more people are living to the ages of greatest cancer occurrence.

Much more research is necessary before the causes of cancer are well understood. Current knowledge, however, suggests that the leading preventable cause is cigarette smoking. The best current estimates attribute only 5 percent of the causes of cancer mortality to the physical environment, in other words geophysical factors and pollution. Thirty percent of cancer mortality can be attributed to smoking, 35 percent to diet, 3 percent to alcohol, 7 percent to sexual and reproductive factors, about 4 percent to occupational

exposures and the remaining 21 percent to all other causes (6). It is important to note therefore, that any possible risk associated with the environment would most likely only have a small effect on cancer mortality relative to that of tobacco.

Many cancers can be effectively treated if they are diagnosed in their early stages. Screening for cancers of the breast, cervix, rectum, colon, and prostate, for example, helps to identify these diseases before the onset of symptoms and at a time when they are usually most curable. Many persons could reduce their chances of developing or dying from cancer by adopting a healthier lifestyle (avoiding agents of cancer initiation and promotion) and by visiting their physician regularly for a cancer-related checkup.

References

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NEW YORK STATE DEPARTMENT OF HEALTH

Observed and Expected Numbers of Cancer Cases
By Site in Middleport Village
1976-1984

Site (ICD-9)	Observed[b]	Expected[c]
All Sites (140-208)	64	57
Oral (140-149)	2	2
Colon and Rectum (153-154)	12	9
Other Digestive Organs (stomach,liver,pancreas) (151,155,157)	4	3
Lung (162)	7	9
Female Breast (174)	7	7
Female Reproductive (uterus,cervix,ovary) (179,180,182,183)	7	5
Male Reproductive (Prostate, testis) (185,186)	3	5
Urinary Tract (bladder, kidney) (188,189)	7	4
Leukemia and Lymphoma (200-202,204-208)	6	4
Other (including, among others, melanoma (172), brain (191), thyroid (193))	9	9

[a] Classification of site was done using the International Classification of Diseases 9th edition.

[b] The data source was the New York State Cancer Registry. The table includes reports as of November 1986.

[c] Expected number derived by applying age-sex-population density-specific rates for New York State, excluding New York City, to the 1980 population of Middleport Village in Niagara County.