Massachusetts
Department
Of
Public Health

Evaluation of Cancer Incidence in Freetown, MA

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Center for Environmental Health,
Community Assessment Program

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I. Introduction

In June of 2002 the honorable George Rogers, State representative for the 12th Bristol District, requested that the Massachusetts Department of Public Health (MDPH) investigate the incidence of cancer in an area of East Freetown. Specific concerns from Representative Rogers focused on a suspected increase in cancer incidence among individuals who resided near the Fall Brook/Long Pond area in East Freetown, and whether this may represent an atypical pattern or possibly be related to a common environmental factor.

At the time of Representative Roger's request, the most recent and complete cancer incidence data available from the Massachusetts Cancer Registry (MCR) was for the time period of 1994 – 1998. Review of town-wide data from the MCR's regularly published report *Cancer Incidence in Massachusetts, City and Town Supplement* for Freetown indicated that the number of observed diagnoses for the majority of cancer types listed in the MCR report was either at or below what would be expected during 1994 – 1998 (MCR, 2001). However, to determine whether an atypical cancer pattern in the area of East Freetown around Long Pond (see Figures 1 and 2) may exist, the MDPH Center for Environmental Health's (CEH) Community Assessment Program (CAP) reviewed the MCR data files for residents of this area of Freetown who had been diagnosed with cancer (all types).

II. Methods

A. Town-Wide Cancer Incidence, 1996 – 2000

As part of this evaluation, the CAP reviewed the most recent available cancer data from the Massachusetts Cancer Registry (MCR) for Freetown published in the MCR report *Cancer Incidence in Massachusetts, City and Town Supplement* (MCR, 2004). The 5-year period 1996-2000 constitutes the time period for which the most recent and complete cancer incidence data are available. The MCR is part of the MDPH Center for Health Information, Statistics, Research, and Evaluation. It is a population based surveillance system that has been monitoring cancer incidence in the Commonwealth since 1982. All new diagnoses of cancer among

Massachusetts residents are required by law to be reported to the MCR within six months of the date of diagnosis (M.G.L. c.111. s 111b). This information is kept in a confidential database.
In order to determine whether cancer incidence in a community is occurring at a higher or lower rate than expected, a statistic called the standardized incidence ratio (SIR) is calculated using data from the MCR. More specifically, the SIR is the number of observed cancer cases in a town divided by the number of expected cases based upon the population of the town and the state's cancer rates. An SIR greater than 100 indicates that more cancer cases occurred than expected; an SIR less than 100 means that fewer cases occurred than expected. For example, an SIR of 150 is interpreted as 50 percent more cases than expected; an SIR of 90 indicates 10 percent fewer cases than expected. When an SIR is statistically significant, there is less than a 5% chance that the observed number of cases is due to chance alone. SIRs and 95% confidence intervals (CIs) are not calculated when the observed number of cases is less than five. A more detailed explanation of SIRs and 95% CIs is provided in Appendix A.

B. Cancer Incidence in a Neighborhood of East Freetown

To address Representative Rogers's concerns about a suspected increase in cancer incidence in a neighborhood of East Freetown surrounding Long Pond, CAP staff reviewed MCR data files for residents of this area who had been diagnosed with any cancer type to determine whether an atypical pattern of cancer may be occurring in this area of Freetown. [Coding for cancer types in this report follows the International Classification of Diseases for Oncology (ICD-O) system. See Appendix B for the incidence coding definitions used in this report.] MCR data is currently complete through the year 2000. However, because the MCR is a continual surveillance system for cancer, it is possible to review case reports for more recent years (i.e., 2001 – present). Therefore, MCR data files from 1982 to the present were reviewed qualitatively for residents of this area of Freetown.

Although specific address information of Freetown residents diagnosed with cancer was not provided in Representative Rogers's request to the MDPH, the areas of East Freetown mentioned in his letter included neighborhoods near Fall Brook, Cleveland Park and around the Long Pond. Therefore, the CAP reviewed the residential information of residents diagnosed with cancer in the area that is bordered to the north by the Lakeville town line, to the east by Beach Bluff Road

and Mohawk Avenue, to the south by Chace and Mason Roads and to the west by Christopher Road (see Figures 1 and 2).

To determine whether any specific cancer type appeared to be concentrated within this area of East Freetown, place of residence at the time of diagnosis was mapped for all individuals diagnosed with cancer. As a result it was possible to assess the geographic concentrations of cases and determine the likelihood that environmental factors may have played a role. For confidentiality reasons, maps of the location of individuals diagnosed with cancer cannot be provided in this report.

III. Results

A. Town-Wide Cancer Incidence in Freetown, 1996 - 2000

Table 1 and Table 2 summarize cancer incidence data in Freetown for the 5-year time period 1996-2000. With respect to the town of Freetown as a whole, a review of data from the MCR report *Cancer Incidence in Massachusetts, City and Town Supplement* showed that for the majority of cancer types, the number of individuals diagnosed (observed) was either near or below the expected number (MCR, 2004). For example 38 females were diagnosed with breast cancer while approximately 36 were expected (SIR = 104) (See Tables 1 and 2).

The incidence of several cancers was actually lower than expected. The overall (among males and females combined) incidence of lung cancer was statistically significantly lower than expected. Twenty individuals were diagnosed with lung and bronchus cancer when approximately 31 were expected (SIR = 64, 95% CI, 39 – 99). The incidence of colo-rectal cancer among males and females combined was also statistically significantly lower than expected. Eleven individuals were diagnosed with colorectal cancer in the town when approximately 25 cases would have been expected (SIR = 45, 95% CI, 22 – 80).

B. Cancer in an East Freetown Neighborhood, 1982 – 2003

A review of the pattern of cancer among individuals in East Freetown who had been diagnosed with any cancer type between 1982-present was also conducted. Because this neighborhood is a relatively small geographic area (see Figure 1), and to maintain the confidentiality of individuals reported to the MCR, specific details regarding individual diagnoses are not discussed in this report. However, review of information reported to the MCR at the time of this report showed that in this area of East Freetown, there were a total of 18 different cancer types diagnosed among individuals during the 22-year period 1982-2003. The most commonly reported diagnoses included cancers of the breast, lung and bronchus, prostate, and colon and rectum. These are the four most common types of cancer diagnosed among males and females in Massachusetts and, therefore the incidence in this neighborhood of East Freetown is consistent with statewide trends. Together, these four cancer types represented more than half (approximately 62%) of the cancer diagnoses in this area of East Freetown. There were also a number of other cancer types diagnosed among residents of this area over the 22-year time period reviewed. However, the types of cancer that occurred varied in nature and there was no specific pattern or geographic concentration of any one cancer type within this neighborhood. Also, the years of diagnosis for these individuals varied throughout the 22 years reviewed, indicating no apparent trend or pattern in the time of diagnosis.

The majority of cancer types diagnosed among residents of this area of Freetown are predominantly associated with non-environmental factors such as family history, tobacco use, diet, and other lifestyle/behavioral risks. Because the MCR collects some information related to risk factors (e.g., history of smoking and other tobacco products) for individuals diagnosed with cancer, this data was reviewed to better characterize the incidence patterns of cancer in this area of Freetown. This included a review of age at diagnosis, gender, and smoking history.

Age is an important risk factor for many cancers. Different cancers occur with different frequencies among the various age-groups, and most cancer types occur more frequently in older populations (i.e., those over 50 years of age). The average age at diagnosis among individuals in this neighborhood with any type of cancer was 63. The majority of individuals (approximately 79%) were over 50 at the time of diagnosis. Review of the age and gender pattern among these individuals indicates that the incidence of cancer in this area is consistent with established prevalence patterns of disease in the general population. A current or past history of using

tobacco products is also an important risk factor for the development of several cancer types, including cancers of the lung and bronchus, bladder, pancreas, oral cavity, and stomach. Of the 24 individuals diagnosed with a smoking-related cancer, information on whether or not they smoked or used tobacco was available for 17 individuals. Of these 17 individuals, 16 reported being current or former smokers at the time of diagnosis and 1 was a non-smoker. Smoking history was unknown for 7 individuals. Finally, based on our review of the geographic distribution and the years of diagnosis covering a 22-year time period, there were no unusual concentrations of cancer diagnoses in this area of Freetown.

IV. Summary and Conclusions

When reviewing the information presented in this report, it is important to keep in mind that cancer is a common disease. The American Cancer Society estimates that one out of every three Americans will develop some type of cancer during his or her lifetime. Over the past forty years, the rise in the number of cancer cases generally reflects the increase in the population, particularly in the older age groups. The most commonly diagnosed cancers for adults include cancers of the lung and bronchus, colon and rectum, prostate (males) and breast (female) (ACS, 2004).

In the town of Freetown as a whole for the majority of the 23 cancer types, the number of individuals diagnosed (observed) was either near or below the number of expected cases for the time period 1996-2000. Although some residents in the neighborhood of concern in East Freetown were diagnosed with cancer since 1982, a number of different cancer types were diagnosed over the last 22 years. Because cancer is not one disease but a group of many different types of diseases caused by many different factors, this information does not indicate an atypical pattern of any one cancer type in this area. In addition, no specific pattern with respect to place of residence or diagnoses over time emerged that would suggest a cluster or common factor (either environmental or non-environmental) in this area of Freetown. Review of individual risk factors suggests that smoking likely played an important role in the overall pattern of cancer evaluated among residents of this area.

Understanding that cancer is not one disease, but a group of diseases is very important. Research has shown that there are more than 100 different types of cancer, each with different causative (or risk) factors. In addition, cancers of a certain tissue type in one organ may have a number of causes. Cancer may also be caused by several factors acting over time. For example, tobacco use has been linked to lung, bladder, oral and pancreatic cancers. Other factors related to cancer may include lack of crude fiber in the diet, high fat consumption, alcohol abuse, and reproductive history. Family history (or genetics) is an important risk factor for several cancers. To a lesser extent, some occupational exposures, such as jobs involving contact with asbestos, have been shown to increase the risk of developing cancer. Environmental contaminants have also been associated with certain types of cancers (Bang, 1996; Frumkin, 1995).

According to American Cancer Society statistics, cancer is the second leading cause of death in Massachusetts and the United States. Not only will one out of three people develop cancer in their lifetime, but this tragedy will affect three out of every four families. For this reason, cancers often appear to occur in "clusters," and it is understandable that someone may perceive that there are an unusually high number of cancer cases in their surrounding neighborhoods or towns. Upon close examination, many of these "clusters" are not unusual increases, as first thought, but are related to such factors as local population density, variations in reporting or chance fluctuations in occurrence. In other instances, the "cluster" in question includes a high concentration of individuals who possess related behaviors or risk factors for cancer. Some, however, are unusual; that is, they represent a true excess of cancer in a workplace, a community, or among a subgroup of people. A suspected cluster is more likely to be a true cancer cluster if it involves a large number of cases of one type of cancer diagnosed in a relatively short time period rather than several different types diagnosed over a long period of time (i.e., 20 years), a rare type of cancer rather than common types, and/or a large number of cases diagnosed among individuals in age groups not usually affected by that cancer. These types of clusters may warrant further public health investigation.

Based upon this information the MDPH recommends no further investigation of cancer incidence in Freetown at this time but will continue to monitor cancer incidence in the town through reports from the Massachusetts Cancer Registry.

V. References

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TABLE 1
Cancer Incidence in Freetown, MA: 1996 - 2000

Cancer Type	Total					Males					Females				
	Obs	Exp	SIR		95% CI	Obs	Exp	SIR		95% CI	Obs	Exp	SIR		95% CI
Bladder	4	6.9	NC		NC -- NC	3	5.1	NC		NC -- NC	1	1.8	NC		NC -- NC
Brain & CNS	1	3.4	NC		NC -- NC	1	2.0	NC		NC -- NC	0	1.5	NC		NC -- NC
Breast	38	36.7	104		73 -- 142	0	0.3	NC		NC -- NC	38	36.4	104		74 -- 143
Cervix/Uteri	2	2.0	NC		NC -- NC	0	0.0	NC		NC -- NC	2	2.0	NC		NC -- NC
Colon/Rectum	11	24.5	45	*	22 -- 80.3	9	13.1	69		31 -- 130	2	11.4	NC		NC -- NC
Esophagus	1	2.7	NC		NC -- NC	1	2.1	NC		NC -- NC	0	0.5	NC		NC -- NC
Hodgkin's Disease	2	1.6	NC		NC -- NC	0	0.9	NC		NC -- NC	2	0.7	NC		NC -- NC
Kidney	3	5.6	NC		NC -- NC	2	3.6	NC		NC -- NC	1	2.0	NC		NC -- NC
Larynx	3	2.5	NC		NC -- NC	3	2.0	NC		NC -- NC	0	0.5	NC		NC -- NC
Leukemia	5	4.9	NC		NC -- NC	2	2.8	NC		NC -- NC	3	2.1	NC		NC -- NC
Liver	0	2.1	NC		NC -- NC	0	1.6	NC		NC -- NC	0	0.5	NC		NC -- NC
Lung and Bronchus	20	31.2	64	*	39 -- 99	16	17.3	92		53 -- 150	4	13.9	NC		NC -- NC

SIRs and 95% CI are not calculated when observed number of cases < 5.

Obs = Observed number of cases
Exp = Expected number of cases
SIR = Standardized Incidence Ratio
CNS = Central Nervous System
95% CI = 95% Confidence Interval
NC = Not calculated
* = Statistical significance

Data Source: Massachusetts Cancer Registry. Cancer Incidence in Massachusetts 1996-2000: City/Town Supplement. Massachusetts Department of Public Health, Center of Health Statistics, Research & Evaluation. April 2004

TABLE 2
Cancer Incidence in Freetown, MA: 1996 - 2000

Cancer Type	Total				Males				Females			
	Obs	Exp	SIR	95% CI	Obs	Exp	SIR	95% CI	Obs	Exp	SIR	95% CI
Melanoma of Skin	6	7.5	81	29 -- 175	3	4.3	NC	NC -- NC	3	3.2	NC	NC -- NC
Multiple Myeloma	3	2.1	NC	NC -- NC	1	1.1	NC	NC -- NC	2	0.9	NC	NC -- NC
NHL	8	8.4	95	41 -- 188	4	4.7	NC	NC -- NC	4	3.7	NC	NC -- NC
Oral Cavity	5	5.6	89	29 -- 207	2	3.9	NC	NC -- NC	3	1.7	NC	NC -- NC
Ovary	4	4.1	NC	NC -- NC	0	0.0	NC	NC -- NC	4	4.1	NC	NC -- NC
Pancreas	5	4.6	108	35 -- 252	1	2.4	NC	NC -- NC	4	2.2	NC	NC -- NC
Prostate	28	36.4	77	51 -- 111	28	36.4	77	51 -- 111	0	0.0	NC	NC -- NC
Stomach	1	3.5	NC	NC -- NC	0	2.3	NC	NC -- NC	1	1.2	NC	NC -- NC
Testis	3	1.4	NC	NC -- NC	3	1.4	NC	NC -- NC	0	0.0	NC	NC -- NC
Thyroid	3	3.3	NC	NC -- NC	0	0.9	NC	NC -- NC	3	2.4	NC	NC -- NC
Uterus	5	7.0	71	23 -- 167	0	0.0	NC	NC -- NC	5	7.0	71	23 -- 167

SIRs and 95% CI are not calculated when observed number of cases < 5.

Obs = Observed number of cases
Exp = Expected number of cases
SIR = Standardized Incidence Ratio
NHL = Non-Hodgkin's Lymphoma
95% CI = 95% Confidence Interval
NC = Not calculated
* = Statistical significance

Data Source: Massachusetts Cancer Registry. Cancer Incidence in Massachusetts 1996-2000: City/Town Supplement. Massachusetts Department of Public Health, Center of Health Statistics, Research & Evaluation. April 2004