



Community Cancer Assessment

Cancer Incidence Among Residents of Avon Lake, Ohio, 1996-2002. Progress Report – August 12, 2005

Initiation of Action

In early 2004, the Lorain City Health Department, which provides public health services to Avon Lake, requested assistance from the Ohio Department of Health (ODH) to examine and address the community concerns of perceived high rates of cancer among residents of Avon Lake in Lorain County, particularly among residents less than 25 years of age. The ODH Chronic Disease and Behavioral Epidemiology Section worked with the Lorain City Health Department to establish three objectives for this community cancer assessment:

- (1) To determine the burden of cancer among residents of Avon Lake, by cancer site/type for the years 1996-2002;
- (2) To compare this burden of cancer to the national background experience of cancer for persons of all ages and persons less than 25 years of age by cancer site/type; and,
- (3) To conduct a case review of persons less than 25 years of age with cancer to determine factors that may have played a role in the disease.

Note: This is not an environmental assessment of Avon Lake.

Background

A community cancer assessment attempts to identify the number of cancer cases in a community by site/type (breast, colon, lung, brain, leukemia, etc.) and compare this to the number of cancer cases expected to be found in the community.

What do we mean by “expected” number of cancer cases? The American Cancer Society estimates that one out of two males and one out of three females, about 40 percent of the population, will develop some type of cancer in their lifetime. Thus, every community in Ohio and across the nation is “expected” to have a burden of cancer. Expected cancer cases in a community are estimated using cancer incidence data for the nation.

Based on Ohio data from 1996 through 2002, it is estimated that about 54,600 new cases of cancer will be diagnosed among Ohio residents during 2005. About 1,350 Lorain County residents are expected to be diagnosed with cancer during 2005 and about 91 Avon Lake residents are expected to be diagnosed with cancer during 2005.

The number of new cancer cases and average annual age-adjusted incidence rates per 100,000 persons by cancer site/type for 1996-2002 for Lorain County is presented in Table 1. Ohio and national background rates from the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute are presented for comparison purposes. These data indicate that the Lorain County cancer rates are very similar to Ohio and U.S. rates.

Methods

- Cases of cancer among Avon Lake residents were identified through the Ohio Cancer Incidence Surveillance System (OCISS) for diagnosis years 1996-2002. All persons diagnosing or treating cancer are required by Ohio law to report those cases to the OCISS. The years 1996-2002 were selected for analysis as these represent the most complete and recent cancer incidence data available. Cancer cases were grouped by site/type of cancer in the manner used by the SEER Program, e.g. lung and bronchus, leukemia, etc. These cases are referred to as “observed” cases.
- The number of “expected” cases was calculated by applying the age-specific incidence rates from the SEER Program to the age-specific 2000 Census of Population counts for Avon Lake for each cancer site/type grouping.
- A comparison of “observed” to “expected” cases was done through the calculation of Standardized Incidence Ratios (SIR) where:

$$\text{SIR} = \frac{\text{observed cases}}{\text{expected cases}}$$

A ratio greater than 1.00 indicates more cases are observed than expected and a ratio less than 1.00 indicates fewer cases are observed than expected. Since the number of cases “observed” can frequently differ from the number “expected” by chance alone, 95 percent confidence intervals were calculated for each SIR. If the 95 percent confidence interval includes 1.00 then the ratio could have occurred by chance alone more than five times out of 100. If the 95 percent confidence interval does not include 1.00 then the ratio could have occurred by chance alone less than five times out of 100. This is often referred to as “statistical significance” at a probability (p) of 0.05 and allows researchers to critically evaluate findings.

Results

A total of 634 new cases of cancer were “observed” among Avon Lake residents for the years 1996-2002, or about 91 new cases each year. The “observed” and “expected” cases, the SIRs and 95 percent Confidence Intervals (CI) are presented in Table 2. These analyses indicate:

- The number of total cancer cases observed, i.e. all sites/types of cancer combined, is higher than the number of cases expected (634 cases observed, 608.75 expected); however, this excess is not statistically significant (SIR = 1.04, 95% CI = 0.96-1.13).
- The number of cases of melanoma of the skin observed is statistically significantly higher than the number expected (43 observed, 27.64 expected, SIR = 1.56, 95% CI = 1.13-2.10).

- The number of cancer cases observed for all other sites/types of cancer is not statistically significantly different from the number of cases expected, including leukemia (20 observed, 15.86 expected, SIR = 1.26, 95% CI = 0.77-1.95).
- A total of 11 cases of cancer were observed among Avon Lake residents less than 25 years of age. These consisted of one case of brain and other central nervous system cancer, one case of Hodgkin's Lymphoma, two cases of leukemia, three cases of melanoma of the skin, one case of non-Hodgkin's Lymphoma, two cases of thyroid cancer, and one case of cancer of the placenta. A total of 8.13 cases would be expected. The resulting SIR is 1.35 and the 95% CI is 0.68-2.42. Thus the number of cancer cases observed is not statistically significantly different from that expected among Avon Lake residents less than 25 years of age.

Discussion

The ODH Chronic Disease and Behavioral Epidemiology Section's role of determining a community's cancer burden is a complex task. Cancer is not just one disease, but as many as 120 very different diseases. Each type of cancer has unique causes and risk factors. A case of cancer may be attributed to a person's age, genetics, occupation (work), lifestyle choices, personal behaviors, environmental exposures, or a combination of these factors. There is a tremendous gap, however, between the public's perception of the causes of cancer and the current scientific view of cancer causes. A large proportion of the public may believe chemicals in the environment are the primary cause of cancer. The current scientific view is that less than 5 percent of cancers are believed to be due to factors in the environment such as environmental pollution (2 percent), industrial products (1 percent) or food additives (1 percent). The scientific view is that the vast majority of cancers are attributed to lifestyle factors such as poor dietary habits (about 35 percent of all cancers) and tobacco use (about 30 percent of all cancers).

The most common types of cancer in Avon Lake were breast (female), colon and rectum, prostate, and lung and bronchus. These cancers account for 53 percent of the cases in the Avon Lake population and 57 percent of the cases in Lorain County. The good news is that these types of cancer can be prevented by making changes in personal lifestyles and behaviors. These changes include smoking cessation, regular exercise and participating in good dietary/nutritional practices. Also, early detection of cancers followed by prompt, appropriate treatment can reduce the number of persons that will die from these tragic diseases.

Next Step

- Completion of a case review of all cancer cases less than 25 years of age to attempt to identify factors that may have a role in the disease process.

Table 1

Number of Newly Diagnosed Cancer Cases and Average Annual Age-Adjusted Incidence Rates per 100,000, by Site/Type, for Lorain County With Comparison to Ohio (1996-2002) and the U.S. (SEER, 1997-2001)^{1, 2, 3}

	Lorain County 1996-2002		Ohio 1996-2002		U.S. (SEER) 1997-2001	
	Cases	Rate	Cases	Rate	Cases	Rate
All Cancer Sites/Types	9,469	475.6	382,307	466.5	---	470.3
Bladder	480	24.2	18,346	22.3	---	20.4
Brain and Other CNS	113	5.7	5,220	6.5	---	6.0
Breast (Female)	1,420	130.5	57,772	129.0	---	135.2
Cervix	90	8.8	3,696	8.8	---	9.3
Colon and Rectum	1,119	56.8	46,627	56.7	---	53.6
Corpus Uterus	296	27.2	11,971	26.6	---	24.5
Esophagus	110	5.5	4,347	5.3	---	4.5
Hodgkin's Lymphoma	46	2.3	2,251	2.8	---	2.7
Kidney and Renal Pelvis	226	11.2	9,746	11.9	---	11.3
Larynx	105	5.2	3,887	4.7	---	3.8
Leukemias	228	11.5	8,606	10.6	---	12.2
Liver and Intrahepatic Bile Duct	79	3.9	3,127	3.8	---	6.0
Lung and Bronchus	1,521	76.0	62,337	75.5	---	61.6
Melanoma of the Skin	288	14.4	11,627	14.4	---	17.0
Multiple Myeloma	99	5.0	4,261	5.2	---	5.6
Non-Hodgkin's Lymphoma	352	17.7	15,450	18.9	---	19.1
Oral Cavity and Pharynx	189	9.4	7,677	9.4	---	10.6
Ovary	151	14.0	5,900	13.1	---	13.9
Pancreas	200	10.1	8,396	10.2	---	11.0
Prostate	1,378	161.0	52,376	148.8	---	172.5
Stomach	167	8.5	5,337	6.5	---	8.9
Testis	36	3.7	2,062	5.3	---	5.2
Thyroid	100	5.0	4,647	5.8	---	7.2
Other Sites/Types/Unknown Origin	676	---	26,641	---	---	---

¹Source: Ohio Cancer Incidence Surveillance System/Chronic Disease and Behavioral Epidemiology Section, Ohio Department of Health, August 2005.

²The 1996-2002 rates were calculated using the following populations: re-calculated intercensal estimates for July 1, 1996-1999; Census 2000 bridged estimates for April 1, 2000; and post-censal estimates for July 1, 2001-2002 (U.S. Census Bureau, 2004). Rates are direct age adjusted to the U.S. 2000 standard population.

³U.S. rates are from the Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence – SEER 11 Regs + AK Public Use – April 2004.

Table 2

Observed and Expected Numbers of Incident Cancer Cases, Standardized Incidence Ratios (SIR) and 95% Confidence Intervals (CI), by Cancer Site/Type, Among Residents of Avon Lake, Ohio, 1996-2002^{1,2}

	Observed 1996-2002 Cases	Expected 1996-2002 Cases	SIR (Observed/ Expected)	95% CI³
All Cancer Sites/Types	634	608.75	1.04	0.96-1.13
Bladder	36	28.14	1.28	0.90-1.77
Brain and Other CNS	14	9.34	1.50	0.82-2.51
Breast (Female)	102	102.55	0.99	0.81-1.21
Cervix	2	5.42	0.37	0.04-1.33
Colon and Rectum	70	64.98	1.08	0.84-1.36
Corpus Uterus	21	18.88	1.11	0.69-1.70
Esophagus	7	5.80	1.21	0.49-2.49
Hodgkin's Lymphoma	3	3.52	0.85	0.18-2.49
Kidney and Renal Pelvis	16	15.08	1.06	0.61-1.72
Larynx	7	4.99	1.40	0.56-2.89
Leukemias	20	15.86	1.26	0.77-1.95
Liver and Intrahepatic Bile Duct	4	5.47	0.73	0.20-1.87
Lung and Bronchus	79	81.11	0.97	0.77-1.21
Melanoma of the Skin	43	27.64	1.56	1.13-2.10
Multiple Myeloma	4	6.44	0.62	0.17-1.59
Non-Hodgkin's Lymphoma	27	25.33	1.07	0.70-1.55
Oral Cavity and Pharynx	13	13.80	0.94	0.50-1.61
Ovary	10	10.58	0.95	0.45-1.74
Pancreas	8	13.00	0.62	0.27-1.21
Prostate	87	89.86	0.97	0.78-1.19
Stomach	5	8.28	0.60	0.20-1.41
Testis	2	3.65	0.55	0.07-1.98
Thyroid	9	9.79	0.92	0.42-1.75
Other Sites/Types	45	N/A	N/A	N/A

¹Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, August 2005.

²Expected numbers of cases were calculated using the Surveillance, Epidemiology, and End Results (SEER) Program U.S. age-specific cancer incidence rates for the white population, 1997-2001, *SEER Cancer Statistics Review 1975-2001*, National Cancer Institute.

³Significance was determined based on 95% confidence intervals for the Poisson distribution using Fisher's Exact test.

N/A: Not Applicable.