

Bureau of Health Statistics, Research and Evaluation  
Occupational Health Surveillance Program

**Cancer Incidence and Mortality in Massachusetts  
1982 - 1992: STATEWIDE REPORT**

November 1995

*Bureau of Health Statistics, Research and Evaluation*  
Daniel J. Friedman, Ph.D.,  
*Assistant Commissioner*

*Massachusetts Cancer Registry*  
Susan T. Gershman, M.P.H.,  
Ph.D., *Director*

**ACKNOWLEDGMENTS**

This report was prepared by Susan T. Gershman, Director, Massachusetts Cancer Registry, Duke H. Rhoden, Director, Data Management, and Massachusetts Cancer Registry staff and consultants. Thanks are given to Mary Mroszczyk for coordinating and word processing this report. All of the above individuals are staff members of the Bureau of Health Statistics, Research and Evaluation. Thanks are given to Dennis Sterzin of the Graphics staff for his cover design. Also, special thanks are given to Suzanne Condon, Director, and Robert Knorr, Deputy Director for Epidemiology, Bureau of Environmental Health Assessment, for their support. The contributions of Mary McLaughlin and other staff in the Division of Data Processing, and the staff in approximately 100 reporting hospitals are gratefully acknowledged.

**Massachusetts Cancer Registry staff**

- Susan T. Gershman, M.P.H., Ph.D., *Director*
- Carol L. Lowenstein, C.T.R., M.B.A., *Asst. Director - Registry Operations*
- Nancy Lee Campbell, C.T.R., *Cancer Registrar*
- Robert A. Danley, Ph.D., *Demographer*
- Linda Everson, A.R.T., *Field Cancer Registrar*
- Diana Hughes, L.P.N., C.T.R., *Quality Assurance Analyst*
- Regina Kenney, *Data Editor*
- John A. Locke, M.P.H., *Geocoder*
- Laurie A. MacDougall, M.S., *Epidemiologist*
- Ann MacMillan, *Data Coordinator*
- Roberta McLaughlin, C.T.R., *Cancer Registrar*
- Mary Mroszczyk, C.T.R., *Geocoding Coordinator*
- David Rousseau, *Quality Assurance Coordinator*

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- Carol Venuti, C.T.R.
- Alexander Walker, M.D., Dr.P.H.

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For further information, please contact the following:

- Massachusetts Cancer Registry (617) 624-5645
- Research and Epidemiology (617) 624-5600
- Occupational Health Surveillance (617) 624-5600
- Bureau of Environmental Health Assessment (617) 624-5757

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## INTRODUCTION

### Content

This report:

- provides statewide information on cancer incidence for twenty-three types of cancer in Massachusetts for 1982 through 1992
- compares the four most commonly occurring types of cancer in males and females for the time periods 1982-1986 and 1987-1992;
- reviews Massachusetts cancer mortality trends for 1982-1986 and 1987-1992;
- compares Massachusetts average cancer incidence for 1982-1986 with 1984 data from the Surveillance, Epidemiology, and End Results (SEER) program, which collects data from nine geographic areas in the United States; and compares Massachusetts average cancer incidence for 1987-1992 with 1990 SEER data;
- reviews Massachusetts cancer incidence trends for 1982 through 1992.

The report is organized into the following four sections:

**CANCER INCIDENCE AND MORTALITY IN MASSACHUSETTS** provides an overview of cancer incidence and cancer mortality in Massachusetts from 1982 through 1992. For selected cancer sites, comparisons are made to data from the SEER program.

**METHODS** provides a detailed explanation of the data collection, processing and statistical techniques employed in this report.

**TABLES 1-4** present data for twenty-three types of cancer, by sex, for 1982-1986 and 1987-1992.

[Table 1](#) provides the number of cases and the proportion of all cases represented by each cancer type;

[Table 2](#) presents and compares Massachusetts age-adjusted incidence rates for time periods 1982-1986 and 1987-1992;

[Table 3](#) presents and compares Massachusetts age-adjusted cancer mortality rates for time periods 1982-1986 and 1987-1992;

[Table 4](#) presents and compares age-adjusted incidence rates for Massachusetts and the SEER areas.

### Comparison with Previous Reports

This report updates previous annual reports published by the Massachusetts Cancer Registry (MCR), and also provides a basis for comparison of cancer information to be contained in future reports.

This report differs from the **1982-1990 Annual Report** by the presentation of eleven years of data in two separate reports -- this **Statewide Report** and the **City/Town Supplement**. The **City/Town Supplement**

contains standardized incidence ratios for twenty-two types of cancer for the 351 towns and cities in Massachusetts for two time periods -- 1982-1986 and 1987-1992. It also presents risk factors associated with these types of cancer and highlights cities and towns having statistically significant cancer incidence excesses.

## **CANCER INCIDENCE AND MORTALITY IN MASSACHUSETTS**

### **Cancer Incidence and Mortality, 1982 - 1986 and 1987 - 1992**

In Massachusetts from 1982 through 1992, there were 289,419 newly diagnosed cases of cancer -- 140,491 in males and 148,928 in females. There were 123,818 newly diagnosed cases from 1982 through 1986 (59,362 in males and 64,456 in females), and 165,601 newly diagnosed cases from 1987 through 1992 (81,129 in males and 84,472 in females). (See Table 1.)

For all types of cancer combined, the age-adjusted incidence rate among males rose 8.6% between 1982-1986 (415.3 cases per 100,000) and 1987-1992 (451.0 cases per 100,000). (See Table 2.) Much of this overall increase is attributable to a large growth in the number of prostate cancer cases diagnosed in recent years.

The leading type of cancer in Massachusetts males for 1982-1986 was cancer of the bronchus and lung, followed by prostate cancer. For 1987-1992, these two types of cancer switched ranking, i.e., prostate cancer became the leading type and lung cancer became second most common. For both time periods, the third and fourth most common types in Massachusetts males were cancers of the colon/rectum and bladder.

Between time periods 1982-1986 and 1987-1992, the overall age-adjusted cancer incidence rate among females rose 7.0% (from 327.0 to 349.9 cases per 100,000). Much of this is attributable to increases in cancers of the breast and bronchus/lung.

Among Massachusetts females for both time periods, the leading cancer types were cancers of the breast, colon/rectum, bronchus and lung, and uterus.

In both sexes, the four leading types of cancer comprised over 60% of all new cancer cases for both time periods. No other type of cancer constituted more than 5% of new cases in either sex in either time period.

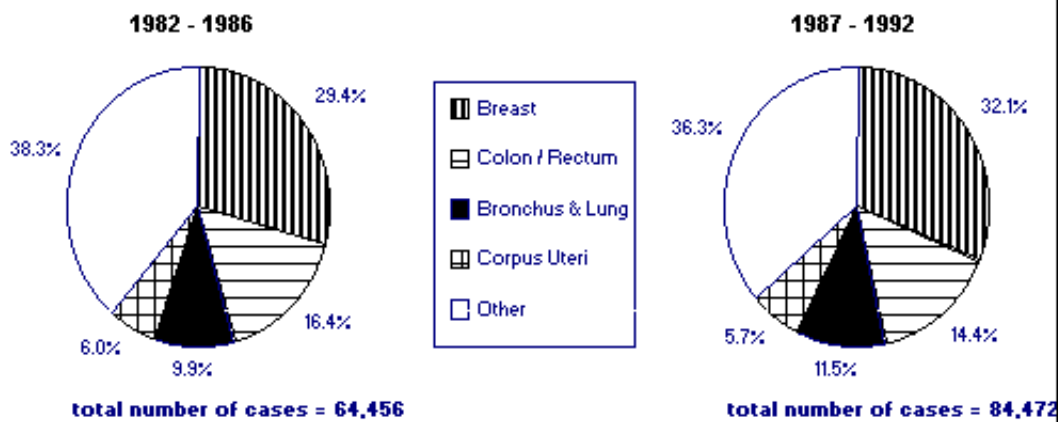
Between 1982-1986 and 1987-1992, age-adjusted cancer mortality rates showed little change in Massachusetts. (See Table 3.) The only striking trend between the two time periods was an increase in the female mortality rate for cancer of the bronchus and lung. The age-adjusted mortality rate for this type of cancer rose from approximately 26.3 to 32.4 deaths per 100,000 females, an increase of 23.2%.



**Figure 1B**

**Distribution of Cancer Incidence in Massachusetts**

**Females**



Data for the four leading types of cancer among males and females are summarized below. (Also see Figures 1A and 1B.)

**MALES**

% of all # Cases

Cancer Site Cases per 100,000

|                            | 1982 - 1986 | 1987 - 1992 |
|----------------------------|-------------|-------------|
| <b>Bronchus &amp; Lung</b> | 19.4        | 81.0        |
| <b>Prostate</b>            | 18.2        | 75.6        |

|                        |             |             |
|------------------------|-------------|-------------|
| <b>Colon / Rectum</b>  | 16.7        | 69.8        |
| <b>Urinary Bladder</b> | 6.6         | 27.6        |
| <b>Total</b>           | <b>60.9</b> | <b>62.8</b> |

## FEMALES

% of all # Cases

Cancer Site Cases per 100,000 Cancer Site Cases per 100,000

|                            | <b>1982 - 1986</b> | <b>1987 - 1992</b> |
|----------------------------|--------------------|--------------------|
| <b>Breast</b>              | 29.4               | 100.0              |
| <b>Colon / Rectum</b>      | 16.4               | 47.4               |
| <b>Bronchus &amp; Lung</b> | 9.9                | 33.9               |
| <b>Corpus Uteri</b>        | 6.0                | 20.6               |
| <b>Total:</b>              | <b>61.7</b>        | <b>63.7</b>        |

Other marked incidence increases between time periods 1982-1986 and 1987-1992 occurred for non-Hodgkin's lymphoma (for males and females), melanoma of the skin (for males), and cancers of the kidney and renal pelvis (for males and females). The stomach cancer incidence rate declined for males and females between the two time periods.

## Massachusetts Incidence Compared to the U.S.

The overall pattern of cancer incidence in Massachusetts is similar to the national pattern (as measured in the SEER areas). Overall average age-adjusted incidence rates for two time periods are presented below. (See Table 4 for comparable rates by cancer site/type.)

### TOTAL NUMBER OF CASES PER 100,000:

|         | Mass., 1982-1986 | SEER areas,<br>1984 | Mass., 1987-1992 | SEER areas,<br>1990 |
|---------|------------------|---------------------|------------------|---------------------|
| Males   | <b>415.3</b>     | <b>425.1</b>        | <b>451.0</b>     | <b>471.9</b>        |
| Females | <b>327.0</b>     | <b>327.1</b>        | <b>349.9</b>     | <b>344.5</b>        |

In the following summary, two simultaneous criteria have been employed to determine whether relative excesses or deficits existed for individual types of cancer in Massachusetts for 1982-1986 compared to the SEER areas in 1984, and in Massachusetts for 1987-1992 compared to the SEER areas in 1990: first, the average age-adjusted incidence rate in Massachusetts for a given time period is at least 20% higher or lower than the SEER areas' rate in the appropriate single year; and second, the average annual age-adjusted incidence rate in Massachusetts is at least five cases per 100,000 residents for a given time period. (See Figures 2A and 2B and the text below for summaries of these relative excesses and deficits.)

### 1982 - 1986: MALES

For this time period, relative excesses existed among Massachusetts males for:

- laryngeal cancer

Mass. rate = 10.5/100,000 1984 SEER rate = 8.5/100,000 (Mass. 23.3% above SEER)

- cancer of the brain and central nervous system

Mass. rate = 7.9/100,000 1984 SEER rate = 6.5/100,000 (Mass. 21.7% above SEER)

- esophageal cancer

Mass. rate = 6.9/100,000 1984 SEER rate = 5.7/100,000 (Mass. 21.4% above SEER)

A relative deficit existed for:

- leukemia

Mass. rate = 9.8/100,000 1984 SEER rate = 13.7/100,000 (Mass. 28.8% below SEER)

## **1982 - 1986: FEMALES**

A relative excess existed among Massachusetts females for:

- *cancer of the brain and central nervous system*

Mass. rate = 6.9/100,000 1984 SEER rate = 4.8/100,000 (Mass.44.0% above SEER)

A relative deficit existed for:

- *leukemia*

Mass. rate = 6.0/100,000 1984 SEER rate = 8.3/100,000 (Mass. 27.2% below SEER)

## **1987 - 1992: MALES**

A relative excess existed for:

- *laryngeal cancer*

Mass. rate = 9.9/100,000 1990 SEER rate = 8.1/100,000 (Mass.22.3% above SEER)

A relative deficit existed for:

- *leukemia*

Mass. rate = 9.4/100,000 1990 SEER rate = 12.6/100,000 (Mass. 25.2% below SEER)

## **1987 - 1992: FEMALES**

A relative excess existed for:

- *cancer of the brain and central nervous system*

Mass. rate = 7.0/100,000 1990 SEER rate = 5.6/100,000 (Mass.25.2% above SEER)

A relative deficit existed for:

- *leukemia*

Mass. rate = 5.4/100,000 1990 SEER rate = 7.1/100,000 (Mass. 23.5% below SEER)

## **Cancer Incidence Trends in Massachusetts Over Time**

When incidence rates are compared for the two endpoints of this report (1982 and 1992), notable increases and decreases can be seen to occur through time in the four leading cancers affecting Massachusetts men and women.

Among Massachusetts males, prostate cancer rose a dramatic 137.4% between 1982 and 1992. The 1982

incidence rate was 73.2 cases per 100,000 males, and the 1992 rate climbed to 173.8 cases per 100,000 males. The incidence rate increased most precipitously in the last three years covered by this report, increasing by 34.8% between 1990 and 1991, and increasing 29.7% between 1991 and 1992.

Devesa et al. (see **REFERENCES**) attribute recent national increases in prostate cancer incidence to changes in diagnostic methodology. In the 1980's transurethral resection was performed more frequently than in the preceding decade, resulting in increased detection of cases which would have been undetectable by clinical means. Other diagnostic procedures (such as serum testing for prostate-specific antigen, ultrasound-guided needle biopsy, computed tomography and bone scan) have also increased the number of prostate cancer diagnoses in recent years.

Another notable increase among males occurred in non-Hodgkin's lymphoma. In 1982, 11.5 males per 100,000 were diagnosed with non-Hodgkin's lymphoma; by 1992, the number of cases rose to 17.6 per 100,000, an increase of 53.0%. Devesa et al. (see **REFERENCES**) attribute the corresponding rise in national incidence rates to changes in case classification, greater exposure to potential causative agents, and the increasing incidence of AIDS-related lymphomas.

Age-adjusted incidence rates declined for the other three leading types of cancer among Massachusetts males. Bladder cancer decreased 15.3% from 1982 to 1992, falling from 27.5 cases per 100,000 males in 1982 to 23.3 cases per 100,000 in 1992. Colo-rectal cancer also declined from 1982 to 1992. The incidence rate fell from 68.5 cases per 100,000 males in 1982 to 61.5 cases per 100,000 in 1992, a decrease of 10.2%. The incidence rate for cancer of the bronchus and lung fell from 82.1 cases per 100,000 males in 1982 to 76.7 cases per 100,000 in 1992, a decrease of 6.6%.

Among Massachusetts females, breast cancer rose 30.3% between 1982 and 1992. The incidence rate increased from 90.0 cases per 100,000 females in 1982 to 117.3 cases per 100,000 in 1992. The overall increase in female breast cancer incidence has occurred gradually over time.

Devesa et al. (see **REFERENCES**) attribute most of the increase in national breast cancer incidence to the earlier detection of tumors resulting from the increasing use of mammography and other screening techniques. Other contributing factors may include recent trends in certain reproductive variables, diet, alcohol consumption and long-term use of menopausal estrogen therapy.

Cancer of the bronchus and lung increased even more dramatically among Massachusetts females, rising from 30.6 cases per 100,000 in 1982 to 44.4 cases per 100,000 in 1992, an increase of 45.1%. Uterine cancer, the fourth most common cancer among Massachusetts females, rose slightly from 1982 to 1992. The 1982 incidence rate of 20.6 cases per 100,000 females grew to 21.8 cases per 100,000 in 1992, an increase of 5.8%.

The third most common cancer among Massachusetts females, colo-rectal cancer, declined 14.8% between 1982 and 1992. The 1982 incidence rate was 46.6 cases per 100,000 females, and the 1992 rate fell to 39.7 cases per 100,000.

## **METHODS**

### **Data Collection**

The MCR collects reports of all newly diagnosed cancer cases from all Massachusetts acute care hospitals (103 reporting facilities in 1992). The MCR compiles summaries of cancer incidence, such as this report, and also produces special reports. These undertakings require data collection efforts that necessitate extensive interaction with hospital tumor registrars. Intensive data evaluation is also required to ensure data quality. The fundamental requirements of any central cancer registry include: (1) complete registration, (2) prevention



of duplication, (3) collection of uniform data, i.e., standardization of items, definitions, rules, classification and nomenclature of primary site, histology, staging and procedures, (4) quality control, and (5) efficient data processing.

The Massachusetts data summarized in this report are drawn from data entered on MCR computer files on or before June 9, 1995. The numbers herein may change slightly in future reports, reflecting late reported cases or corrections based on subsequent details from the reporting facilities.

MCR files are currently estimated to contain data on 90% of all reportable cases. A more precise estimate will not be possible until cases identified only by outpatient facilities, physician offices and death certificates are tracked (which will begin for cases diagnosed in 1995). Based on estimates of the number of cases projected by the American Cancer Society and comparisons with rates in Connecticut and other SEER areas, Massachusetts data seem reasonably complete.

Coding for primary sites in this report follows the International Classification of Diseases for Oncology (ICD-O, First and Second Editions) system. The list of reportable neoplasms is the same as that used for SEER program data with the exception of in situ neoplasms. The MCR began collecting data on in situ neoplasms diagnosed as of January 1, 1992; however, in situ cases are not included in this report. Comparisons between SEER and MCR data are valid because the codes used for primary site selection are identical.

## **Data Presentation**

### **Age-Adjusted Rates**

National (SEER) incidence rates and Massachusetts statewide incidence and mortality rates are sex-specific, age-adjusted rates per 100,000 population by the direct method using the 1970 U.S. Bureau of the Census population distribution as the standard. [It should be noted that the age-adjusted cancer mortality rates presented in this report cannot be compared to those appearing in the Massachusetts Department of Public Health's *Advance Data: Mortality* series because the latter rates are adjusted to the 1940 U.S. Standard Population.] Rates are age-adjusted using five-year age groups to correct for differences in the age distributions of different populations. Rates adjusted to the same standard can be compared.

For the computation of Massachusetts age-adjusted incidence and mortality rates in this report, the statewide population for individual years is derived from Massachusetts Department of Public Health estimates based on 1980 and 1990 U.S. Bureau of the Census counts. For reports prior to Cancer Incidence in Massachusetts, 1982-1989, the statewide population for individual years was derived from estimates based on 1980 U.S. Bureau of the Census counts and 1990 projections obtained from the Massachusetts Institute for Social and Economic Research. If rate comparisons are made to any of these prior reports, data may vary slightly due to these population adjustments.

National age-adjusted incidence rates in this report are obtained from the National Cancer Institute's SEER program data, representing the largest cancer incidence database in the U.S. These data serve as a stable reference point because the SEER areas include approximately 10% of the U.S. population. The SEER program incidence data included in this report are from population-based cancer registries in five states (Connecticut, Hawaii, Iowa, New Mexico and Utah) and four metropolitan areas (Detroit SMSA, Atlanta SMSA, San Francisco-Oakland SMSA and Seattle-Puget Sound).

Comparisons between Massachusetts and U.S. age-adjusted incidence rates are presented in this report for two time periods: Massachusetts (1982-1986) and the U.S. (SEER areas, 1984); and Massachusetts (1987-1992) and the U.S. (SEER areas, 1990).

## Data Limitations

Three limitations must be considered when interpreting cancer incidence data in this report: under-reporting in areas close to neighboring states; under-reporting for cancers that may not be diagnosed in hospitals; and minor incidence changes resulting in misleadingly large percent differences for rare types of cancer.

## Border Areas and Neighboring States

Some areas of Massachusetts appear to have low cancer incidence, but this may be due to loss of cases that were diagnosed in neighboring states and not reported to the MCR. This is especially true in Bristol County and the towns along the Rhode Island border. During 1982 the MCR had a reciprocal agreement to share data with the Rhode Island Department of Health, but this terminated after only one year because no statewide cancer registry existed in Rhode Island during 1983-1985. In late 1986 the Rhode Island Department of Health re-established a statewide cancer incidence database and resumed sharing data with Massachusetts. The New Hampshire Department of Health established a cancer incidence reporting system and began a reciprocal agreement with Massachusetts in mid-1986, and the Vermont Cancer Registry has just begun to collect cases this year (1995). Presently the MCR has reciprocal reporting agreements with the following seven states: Connecticut, Florida, Maine, New Hampshire, New York, Rhode Island and Vermont.

## Cases Diagnosed in Non-Hospital Settings

During the time period covered by this report (1982 through 1992), only Massachusetts hospitals reported newly diagnosed cases of cancer to the MCR. Some types of cancer in this report are undoubtedly under-reported because they may be diagnosed by private physicians, private laboratories, health maintenance organizations or radiotherapy centers that escape the case identification systems used by hospitals which are required to report cases to the MCR. Particular examples of this may be melanoma of the skin, prostate cancer and certain hematologic malignancies such as leukemia and multiple myeloma. The extent of this under-reporting has not been determined exactly, but cases included in this report represent the great majority of cases statewide and provide an essential basis for observing statewide cancer incidence patterns.

## Percent Differences

The interpretation of percent increases or decreases should be viewed with caution. Apparent increases or decreases in cancer incidence over time may reflect changes in diagnostic methods or case reporting rather than true changes in cancer occurrence. Also, an increase or decrease in percentage of cases for a cancer with a higher incidence rate has greater public health significance. For a cancer with a base incidence rate of 100 cases per 100,000 residents, an increase of 25% adds 25 cases per 100,000; for a rarer cancer with a base rate of only 8 cases per 100,000, the same amount of increase (25%) adds only 2 cases per 100,000.

## TABLES

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**Table 1. CANCER INCIDENCE BY SEX  
Massachusetts, 1982-1986 & 1987-1992**

| <i><b>MALES</b></i>           | <i><b>1982-1986</b></i> |                 | <i><b>1987-1992</b></i> |                 |
|-------------------------------|-------------------------|-----------------|-------------------------|-----------------|
| <i><b>CancerSite/Type</b></i> | <i><b>#</b></i>         | <i><b>%</b></i> | <i><b>#</b></i>         | <i><b>%</b></i> |
| All Sites                     | 59,362                  | 99.91           | 81,129                  | 100.01          |
| Brain & Central Nervous       |                         |                 |                         |                 |

|                                    |        |      |        |      |
|------------------------------------|--------|------|--------|------|
| System <sup>2</sup>                | 1124   | 1.9  | 1521   | 1.9  |
| Breast                             | 109    | 0.2  | 183    | 0.2  |
| Bronchus & Lung                    | 1,1526 | 19.4 | 14,250 | 17.6 |
| Cervix Uteri                       | 0      | 0.0  | 0      | 0.0  |
| Colon / Rectum                     | 9,938  | 16.7 | 12,073 | 14.9 |
| Corpus Uteri & Uterus, NOS         | 0      | 0.0  | 0      | 0.0  |
| Esophagus                          | 981    | 1.6  | 1,318  | 1.6  |
| Hodgkin's Disease                  | 586    | 1.0  | 716    | 0.9  |
| Kidney & Renal Pelvis <sup>3</sup> | 1,359  | 2.3  | 2,377  | 2.9  |
| Larynx                             | 1,485  | 2.5  | 1,721  | 2.1  |
| Leukemia                           | 1,357  | 2.3  | 1,645  | 2.0  |
| Liver & Intrahepatic Bile Ducts    | 385    | 0.6  | 617    | 0.8  |
| Melanoma of Skin                   | 1,476  | 2.5  | 2,096  | 2.6  |
| Multiple Myeloma                   | 540    | 0.9  | 736    | 0.9  |
| Non-Hodgkin's Lymphoma             | 1,889  | 3.2  | 2,961  | 3.6  |
| Oral Cavity & Pharynx              | 2,553  | 4.3  | 3,056  | 3.8  |
| Ovary                              | 0      | 0.0  | 0      | 0.0  |
| Pancreas                           | 1,313  | 2.2  | 1,563  | 1.9  |
| Prostate                           | 10,808 | 18.2 | 19,914 | 24.6 |
| Stomach                            | 1,785  | 3.0  | 1996   | 2.5  |
| Testis                             | 757    | 1.3  | 1,082  | 1.3  |
| Thyroid                            | 326    | 0.6  | 404    | 0.5  |
| Urinary Bladder                    | 3,935  | 6.6  | 4,621  | 5.7  |
| Other Sites                        | 5,130  | 8.6  | 6,279  | 7.7  |

| <b><i>FEMALES</i></b>                       | <b><i>1982-1986</i></b> |          | <b><i>1987-1992</i></b> |          |
|---------------------------------------------|-------------------------|----------|-------------------------|----------|
| <b>CancerSite/Type</b>                      | <b>#</b>                | <b>%</b> | <b>#</b>                | <b>%</b> |
| All Sites                                   | 64,456                  | 100.01   | 84,472                  | 99.91    |
| Brain & Central Nervous System <sup>2</sup> | 1,211                   | 1.9      | 1,538                   | 1.8      |
| Breast                                      | 18,949                  | 29.4     | 27,121                  | 32.1     |
| Bronchus & Lung                             | 6,390                   | 9.9      | 9,683                   | 11.5     |
| Cervix Uteri                                | 1,491                   | 2.3      | 1,816                   | 2.2      |
| Colon / Rectum                              | 10,552                  | 16.4     | 12,167                  | 14.4     |
| Corpus Uteri & Uterus, NOS                  | 3,855                   | 6.0      | 4,825                   | 5.7      |
| Esophagus                                   | 425                     | 0.7      | 558                     | 0.7      |
| Hodgkin's Disease                           | 504                     | 0.8      | 665                     | 0.8      |
|                                             |                         |          |                         |          |

|                                    |       |     |       |     |
|------------------------------------|-------|-----|-------|-----|
| Kidney & Renal Pelvis <sup>3</sup> | 955   | 1.5 | 1,553 | 1.8 |
| Larynx                             | 390   | 0.6 | 477   | 0.6 |
| Leukemia                           | 1,147 | 1.8 | 1,280 | 1.5 |
| Liver & Intrahepatic Bile Ducts    | 212   | 0.3 | 294   | 0.4 |
| Melanoma of Skin                   | 1,377 | 2.1 | 1,840 | 2.2 |
| Multiple Myeloma                   | 589   | 0.9 | 703   | 0.8 |
| Non-Hodgkin's Lymphoma             | 1,911 | 3.0 | 2,813 | 3.3 |
| Oral Cavity & Pharynx              | 1,241 | 1.9 | 1,388 | 1.6 |
| Ovary                              | 2,611 | 4.0 | 3,249 | 3.8 |
| Pancreas                           | 1,545 | 2.4 | 1,790 | 2.1 |
| Prostate                           | 0     | 0.0 | 0     | 0.0 |
| Stomach                            | 1,249 | 1.9 | 1,344 | 1.6 |
| Testis                             | 24    | 0.0 | 14    | 0.0 |
| Thyroid                            | 646   | 1.0 | 1,056 | 1.2 |
| Urinary Bladder                    | 1,567 | 2.4 | 1,809 | 2.1 |
| Other Sites                        | 5,637 | 8.8 | 6,502 | 7.7 |

1. Percents may not add to 100.0 due to rounding.
2. Some types of central nervous system cancers were under-reported to the MCR for years 1991 and 1992.
3. Mass. rates for this site include codes 189.0-189.1 (ICD-O-1) and 64.9 & 65.9 (ICD-O-2) only for comparability. Mass. hospital coding conventions may have assigned some cases to a "not otherwise specified" category not included in this site.
4. These cases of testicular cancer in females have been confirmed.

**Table 2. AGE-ADJUSTED INCIDENCE RATES for Selected Cancer Sites by Sex  
Massachusetts Residents, 1982-1986 & 1987-1992**

| <i><b>MALES</b></i>                         |                         |                         |                        |
|---------------------------------------------|-------------------------|-------------------------|------------------------|
| <b>Cancer Site/Type</b>                     | <i><b>1982-1986</b></i> | <i><b>1987-1992</b></i> | <i><b>% Change</b></i> |
| All Sites                                   | 415.3                   | 451.0                   | +8.6                   |
| Brain & Central Nervous System <sup>2</sup> | 7.9                     | 8.6                     | +9.4                   |
| Breast                                      | 0.8                     | 1.0                     | +31.2                  |
| Bronchus & Lung                             | 81.0                    | 80.4                    | -0.8                   |
| Cervix Uteri                                | 0.0                     | 0.0                     | 0.0                    |
| Colon / Rectum                              | 69.8                    | 67.4                    | -3.4                   |
| Corpus Uteri & Uterus, NOS                  | 0.0                     | 0.0                     | 0.0                    |
| Esophagus                                   | 6.9                     | 7.6                     | +9.2                   |
| Hodgkin's Disease                           | 3.8                     | 3.7                     | -3.1                   |
| Kidney & Renal Pelvis <sup>3</sup>          | 9.6                     | 13.5                    | +40.9                  |

|                                 |      |       |       |
|---------------------------------|------|-------|-------|
| Larynx                          | 10.5 | 9.9   | -5.4  |
| Leukemia                        | 9.8  | 9.4   | -3.3  |
| Liver & Intrahepatic Bile Ducts | 2.7  | 3.4   | +28.4 |
| Melanoma of Skin                | 10.2 | 11.5  | +13.3 |
| Multiple Myeloma                | 3.8  | 4.1   | +9.6  |
| Non-Hodgkin's Lymphoma          | 13.2 | 16.2  | +22.2 |
| Oral Cavity & Pharynx           | 18.0 | 17.5  | -3.2  |
| Ovary                           | 0.0  | 0.0   | 0.0   |
| Pancreas                        | 9.2  | 8.8   | -4.4  |
| Prostate                        | 75.6 | 109.3 | =44.6 |
| Stomach                         | 12.6 | 11.1  | -11.6 |
| Testis                          | 4.5  | 4.9   | +8.2  |
| Thyroid                         | 2.2  | 2.1   | -2.7  |
| Urinary Bladder                 | 27.6 | 25.8  | -6.5  |

| <b><i>FEMALES</i></b>                       |                         |                         |                        |
|---------------------------------------------|-------------------------|-------------------------|------------------------|
| <b>CancerSite/Type</b>                      | <b><i>1982-1986</i></b> | <b><i>1987-1992</i></b> | <b><i>% Change</i></b> |
| All Sites                                   | 415.3                   | 451.0                   | +8.6                   |
| Brain & Central Nervous System <sup>2</sup> | 7.9                     | 8.6                     | +9.4                   |
| Breast                                      | 0.8                     | 1.0                     | +31.2                  |
| Bronchus & Lung                             | 81.0                    | 80.4                    | -0.8                   |
| Cervix Uteri                                | 0.0                     | 0.0                     | 0.0                    |
| Colon / Rectum                              | 69.8                    | 67.4                    | -3.4                   |
| Corpus Uteri & Uterus, NOS                  | 0.0                     | 0.0                     | 0.0                    |
| Esophagus                                   | 6.9                     | 7.6                     | +9.2                   |
| Hodgkin's Disease                           | 3.8                     | 3.7                     | -3.1                   |
| Kidney & Renal Pelvis <sup>3</sup>          | 9.6                     | 13.5                    | +40.9                  |
| Larynx                                      | 10.5                    | 9.9                     | -5.4                   |
| Leukemia                                    | 9.8                     | 9.4                     | -3.3                   |
| Liver & Intrahepatic Bile Ducts             | 2.7                     | 3.4                     | +28.4                  |
| Melanoma of Skin                            | 10.2                    | 11.5                    | +13.3                  |
| Multiple Myeloma                            | 3.8                     | 4.1                     | +9.6                   |
| Non-Hodgkin's Lymphoma                      | 13.2                    | 16.2                    | +22.2                  |
| Oral Cavity & Pharynx                       | 18.0                    | 17.5                    | -3.2                   |
| Ovary                                       | 0.0                     | 0.0                     | 0.0                    |
| Pancreas                                    | 9.2                     | 8.8                     | -4.4                   |
| Prostate                                    | 75.6                    | 109.3                   | 44.6                   |
|                                             |                         |                         |                        |

|                 |      |      |       |
|-----------------|------|------|-------|
| Stomach         | 12.6 | 11.1 | -11.6 |
| Testis          | 4.5  | 4.9  | +8.2  |
| Thyroid         | 2.2  | 2.1  | -2.7  |
| Urinary Bladder | 27.6 | 25.8 | -6.5  |

**Table 3. AGE-ADJUSTED MORTALITY RATES for Selected Cancer Sites by Sex  
Massachusetts Residents, 1982-1986 & 1987-1992**

| <i><b>MALES</b></i>                         |                         |                         |                        |
|---------------------------------------------|-------------------------|-------------------------|------------------------|
| <b>CancerSite/Type</b>                      | <i><b>1982-1986</b></i> | <i><b>1987-1992</b></i> | <i><b>% Change</b></i> |
| All Sites                                   | 228.0                   | 227.7                   | -0.1                   |
| Brain & Central Nervous System <sup>2</sup> | 4.4                     | 5.1                     | +14.4                  |
| Breast                                      | 0.0                     | 0.0                     | 0.0                    |
| Bronchus & Lung                             | 70.9                    | 69.5                    | -2.0                   |
| Cervix Uteri                                | ---                     | ---                     | ---                    |
| Colon / Rectum                              | 30.1                    | 28.4                    | -5.9                   |
| Corpus Uteri & Uterus, NOS                  | ---                     | ---                     | ---                    |
| Esophagus                                   | +4.8                    | 7.0                     | 6.7                    |
| Hodgkin's Disease                           | 0.9                     | 0.9                     | -1.1                   |
| Kidney & Renal Pelvis <sup>3</sup>          | 4.8                     | 5.3                     | +10.9                  |
| Larynx                                      | 3.2                     | 3.0                     | -7.8                   |
| Leukemia                                    | 8.0                     | 8.0                     | +0.8                   |
| Liver & Intrahepatic Bile Ducts             | 2.4                     | 2.7                     | +13.0                  |
| Melanoma of Skin                            | 3.3                     | 3.5                     | +5.7                   |
| Multiple Myeloma                            | 2.8                     | 3.4                     | +19.2                  |
| Non-Hodgkin's Lymphoma                      | 7.2                     | 8.0                     | +10.6                  |
| Oral Cavity & Pharynx                       | 5.7                     | 5.2                     | -8.8                   |
| Ovary                                       | ---                     | ---                     | ---                    |
| Pancreas                                    | 10.1                    | 9.8                     | -3.6                   |
| Prostate                                    | 23.3                    | 25.6                    | +9.5                   |
| Stomach                                     | 9.2                     | 7.7                     | -15.7                  |
| Testis                                      | 0.3                     | 0.3                     | 0.0                    |
| Thyroid                                     | 0.4                     | 0.3                     | -5.7                   |
| Urinary Bladder                             | 6.7                     | 6.6                     | -1.5                   |

| <i><b>FEMALES</b></i>  |                         |                         |                        |
|------------------------|-------------------------|-------------------------|------------------------|
| <b>CancerSite/Type</b> | <i><b>1982-1986</b></i> | <i><b>1987-1992</b></i> | <i><b>% Change</b></i> |
| All Sites              | 151.2                   | 151.2                   | 0.0                    |

|                                             |      |      |       |
|---------------------------------------------|------|------|-------|
| Brain & Central Nervous System <sup>2</sup> | 3.2  | 3.4  | +6.3  |
| Breast                                      | 32.0 | 30.3 | -5.2  |
| Bronchus & Lung                             | 26.3 | 32.4 | +23.0 |
| Cervix Uteri                                | 2.6  | 2.4  | -8.9  |
| Colon / Rectum                              | 20.5 | 17.8 | -13.3 |
| Corpus Uteri & Uterus, NOS                  | 3.9  | 3.3  | -13.9 |
| Esophagus                                   | 1.8  | 1.7  | -2.3  |
| Hodgkin's Disease                           | 0.6  | 0.6  | +3.5  |
| Kidney & Renal Pelvis <sup>3</sup>          | 2.3  | 2.7  | +16.4 |
| Larynx                                      | 0.7  | 0.6  | -8.7  |
| Leukemia                                    | 5.0  | 4.5  | -10.0 |
| Liver & Intrahepatic Bile Ducts             | 0.8  | 0.9  | +20.0 |
| Melanoma of Skin                            | 1.7  | 1.9  | +14.9 |
| Multiple Myeloma                            | 2.2  | 2.4  | +8.0  |
| Non-Hodgkin's Lymphoma                      | 4.8  | 5.3  | +10.5 |
| Oral Cavity & Pharynx                       | 1.8  | 1.8  | +1.1  |
| Ovary                                       | 8.6  | 8.3  | 3.5   |
| Pancreas                                    | 7.6  | 7.6  | 0.0   |
| Prostate                                    | ---  | ---  | ---   |
| Stomach                                     | 4.4  | 3.6  | -17.2 |
| Testis                                      | ---  | ---  | ---   |
| Thyroid                                     | 0.4  | 0.3  | -20.0 |
| Urinary Bladder                             | 2.2  | 2.0  | -7.9  |

1. adjusted to the 1970 U.S. Standard Population per 100,000

**Table 4**

**AGE-ADJUSTED INCIDENCE RATES for Selected Cancer Sites by Sex  
Massachusetts Residents, 1982-1986 & 1987-1992 and SEER Registries, 1984 & 1990**

| <b>Males</b>                                  |              |             |                |              |             |                |
|-----------------------------------------------|--------------|-------------|----------------|--------------|-------------|----------------|
|                                               | <b>82-86</b> | <b>1984</b> |                | <b>87-92</b> | <b>90</b>   |                |
| <b>Cancer Site/Type</b>                       | <b>Mass.</b> | <b>SEER</b> | <b>% Diff.</b> | <b>Mass.</b> | <b>Seer</b> | <b>% Diff.</b> |
| All Sites                                     | 415.3        | 425.1       | -2.3           | 451.0        | 471.9       | -4.4           |
| Brain and Central Nervous System <sup>2</sup> | 7.9          | 6.5         | +21.7          | 8.6          | 7.3         | +18.5          |
| Breast                                        | 0.8          | 0.8         | -3.8           | 1.0          | 0.9         | +12.2          |
| Brochus & Lung                                | 81.0         | 86.6        | -6.4           | 80.4         | 80.9        | -0.7           |
| Cervix/Uteri                                  | ---          | ---         | ---            | ---          | ---         | ---            |
| Colon/Rectum                                  | 69.8         | 61.6        | +13.2          | 67.4         | 58.5        | +15.2          |

|                                      |      |      |       |       |       |       |
|--------------------------------------|------|------|-------|-------|-------|-------|
| Corpus Uteri & Uterus, NOS           | ---  | ---  | ---   | ---   | ---   | ---   |
| Esophagus                            | 6.9  | 5.7  | +21.4 | 7.6   | 7.1   | +6.5  |
| Hodgkin's Disease                    | 3.8  | 3.5  | +9.1  | 3.7   | 3.3   | +12.1 |
| Kidney and Renal Pelvis <sup>3</sup> | 9.6  | 11.0 | -13.0 | 13.5  | 12.3  | +9.6  |
| Larynx                               | 10.5 | 8.5  | +23.3 | 9.9   | 8.1   | +22.3 |
| Leukemia                             | 9.8  | 13.7 | -28.8 | 9.4   | 12.6  | -25.2 |
| Liver & Intrahepatic Bile Duct       | 2.7  | 3.5  | -23.4 | 3.4   | 4.9   | -29.8 |
| Melanoma                             | 10.2 | 10.9 | -6.7  | 11.5  | 13.1  | -12.1 |
| Multiple Myeloma                     | 3.8  | 5.6  | -32.7 | 4.1   | 5.6   | -26.3 |
| Non-Hogkin's Lymphoma                | 13.2 | 15.1 | -12.8 | 16.2  | 18.5  | -12.5 |
| Oral Cavity & Pharynx                | 18.0 | 17.9 | +0.8  | 17.5  | 16.7  | +4.6  |
| Ovary                                | --   | ---  | ---   | ---   | ---   | ---   |
| Pancreas                             | 9.2  | 11.1 | -17.0 | 8.8   | 10.2  | -13.7 |
| Prostate                             | 75.6 | 84.4 | -10.5 | 109.3 | 130.6 | -16.3 |
| Stomach                              | 12.6 | 12.0 | +4.8  | 11.1  | 10.8  | +3.0  |
| Testis                               | 4.5  | 3.9  | +15.6 | 4.9   | 4.5   | +8.4  |
| Thyroid                              | 2.2  | 2.3  | -4.3  | 2.1   | 2.4   | -10.8 |
| Urinary Bladder <sup>4</sup>         | 27.6 | 29.9 | -7.5  | 25.8  | 29.5  | -12.4 |

| <b>Females</b>                                |              |             |                |              |             |                |
|-----------------------------------------------|--------------|-------------|----------------|--------------|-------------|----------------|
|                                               | <b>82-86</b> | <b>1984</b> |                | <b>87-92</b> | <b>90</b>   |                |
| <b>Cancer Site/Type</b>                       | <b>Mass.</b> | <b>SEER</b> | <b>% Diff.</b> | <b>Mass.</b> | <b>Seer</b> | <b>% Diff.</b> |
| All Sites                                     | 327.0        | 327.1       | 0.0            | 349.9        | 344.5       | +1.6           |
| Brain and Central Nervous System <sup>2</sup> | 6.9          | 4.8         | +44.0          | 7.0          | 5.6         | +25.2          |
| Breast                                        | 100.0        | 96.7        | +3.4           | 117.2        | 109.4       | +7.1           |
| Brochus & Lung                                | 33.9         | 34.6        | -2.0           | 41.7         | 41.1        | +1.5           |
| Cervix/Uteri                                  | 8.2          | 9.2         | -10.5          | 8.0          | 8.9         | -10.0          |
| Colon/Rectum                                  | 47.4         | 44.2        | +7.2           | 43.6         | 40.3        | +8.1           |
| Corpus Uteri & Uterus, NOS                    | 20.6         | 22.6        | -9.1           | 21.3         | 21.7        | -1.9           |
| Esophagus                                     | 2.0          | 1.9         | +3.7           | 2.1          | 1.9         | +10.5          |
| Hodgkin's Disease                             | 2.9          | 2.4         | +21.7          | 3.1          | 2.4         | +29.6          |
| Kidney and Renal Pelvis <sup>3</sup>          | 4.9          | 5.3         | -6.8           | 6.6          | 6.0         | +9.2           |
| Larynx                                        | 2.1          | 1.4         | +52.1          | 2.2          | 1.7         | +27.1          |
| Leukemia                                      | 6.0          | 8.3         | -27.2          | 5.4          | 7.1         | -23.5          |
| Liver & Intrahepatic Bile Duct                | 1.0          | 1.6         | -35.6          | 1.2          | 1.8         | -36.1          |
| Melanoma                                      | 7.6          | 8.6         | -12.1          | 8.1          | 9.4         | -13.8          |
| Multiple Myeloma                              | 2.8          | 3.5         | -21.1          | 2.7          | 3.4         | -20.6          |
| Non-Hogkin's Lymphoma                         | 9.4          | 10.6        | -11.8          | 11.1         | 12.1        | -8.3           |



|                              |      |      |       |      |      |       |
|------------------------------|------|------|-------|------|------|-------|
| Oral Cavity & Pharynx        | 6.5  | 6.9  | -5.5  | 5.9  | 6.2  | -4.7  |
| Ovary                        | 14.1 | 14.0 | +0.5  | 14.3 | 15.1 | -5.2  |
| Pancreas                     | 7.0  | 8.6  | -18.3 | 6.6  | 8.0  | -17.0 |
| Prostate                     | ---  | ---  | ---   | ---  | ---  | ---   |
| Stomach                      | 5.4  | 5.6  | -3.6  | 4.7  | 4.8  | -2.9  |
| Testis                       | ---  | ---  | ---   | ---  | ---  | ---   |
| Thyroid                      | 3.7  | 6.0  | -39.0 | 4.8  | 6.8  | -30.0 |
| Urinary Bladder <sup>4</sup> | 7.2  | 7.3  | -1.5  | 6.8  | 7.6  | -10.7 |

<sup>1</sup> per 100,000

<sup>2</sup> Some types of central nervous system cancers were under-reported to the MCR for years 1991 and 1992.

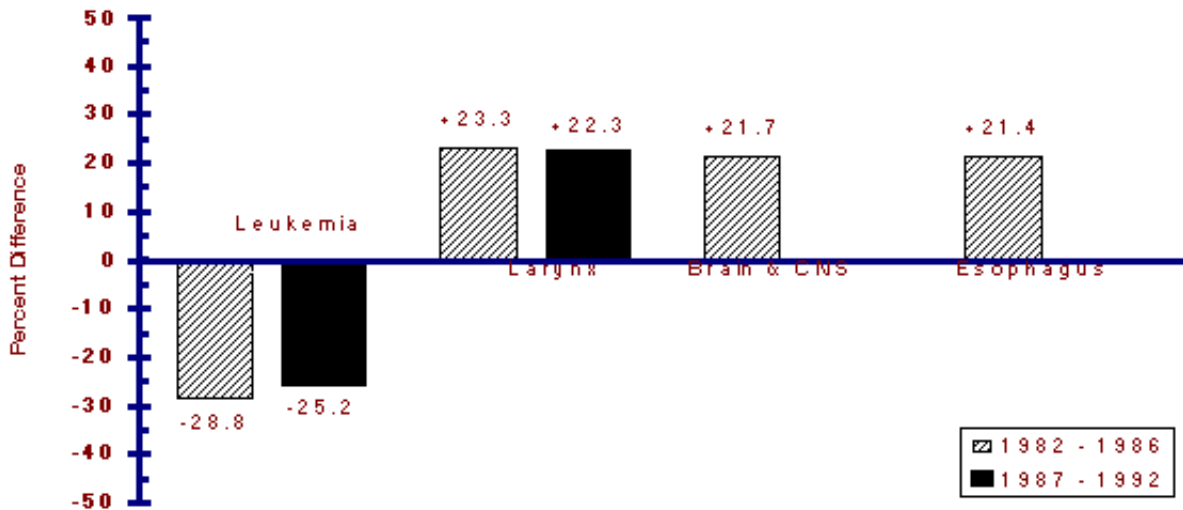
<sup>3</sup> Mass. rates for this site include codes 189.0-189.1 (ICD-O-1) and 64.9 & 65.9 (ICD-O-2) only for comparability. Mass. hospital coding conventions may have assigned some cases to a "not otherwise specified" category not included in this site.

<sup>4</sup> includes invasive bladder cancer only

**Figure 2A**

% Mass. Cancer Incidence Rates (1982-1986 and 1987-1992)  
Above or Below SEER (1984 and 1990)

**Males**



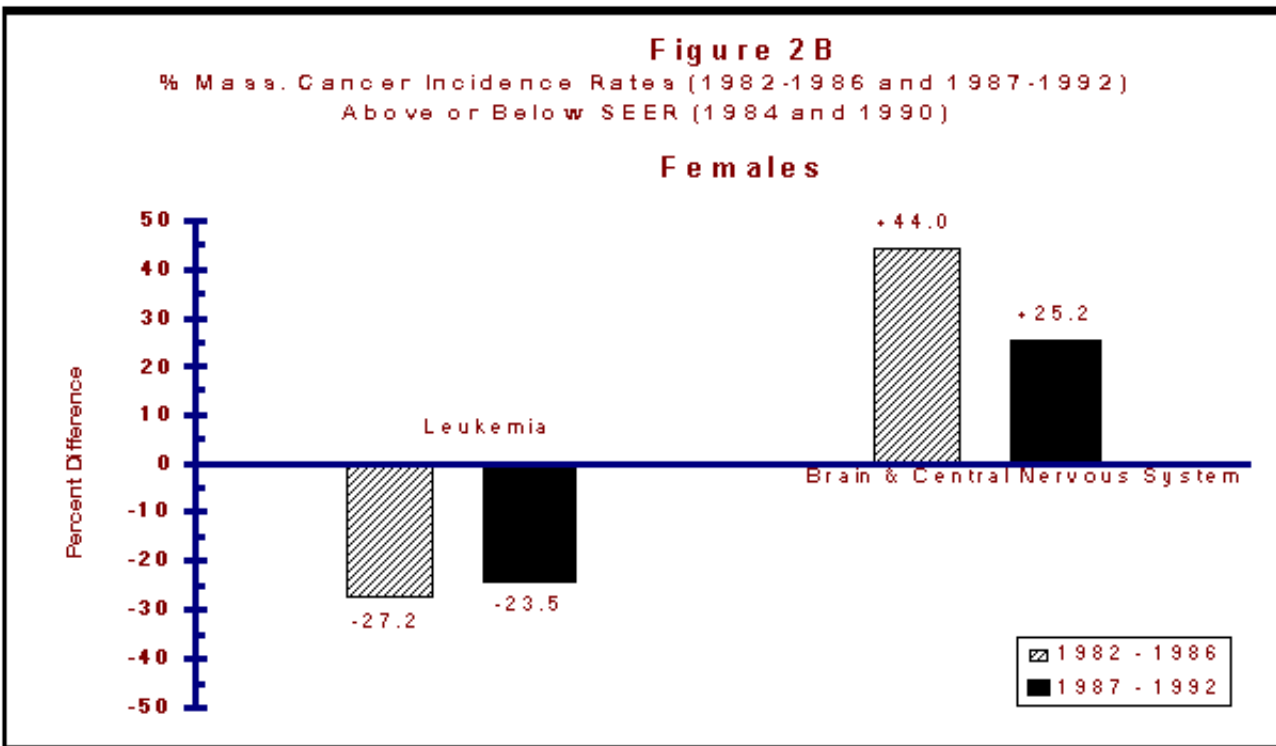
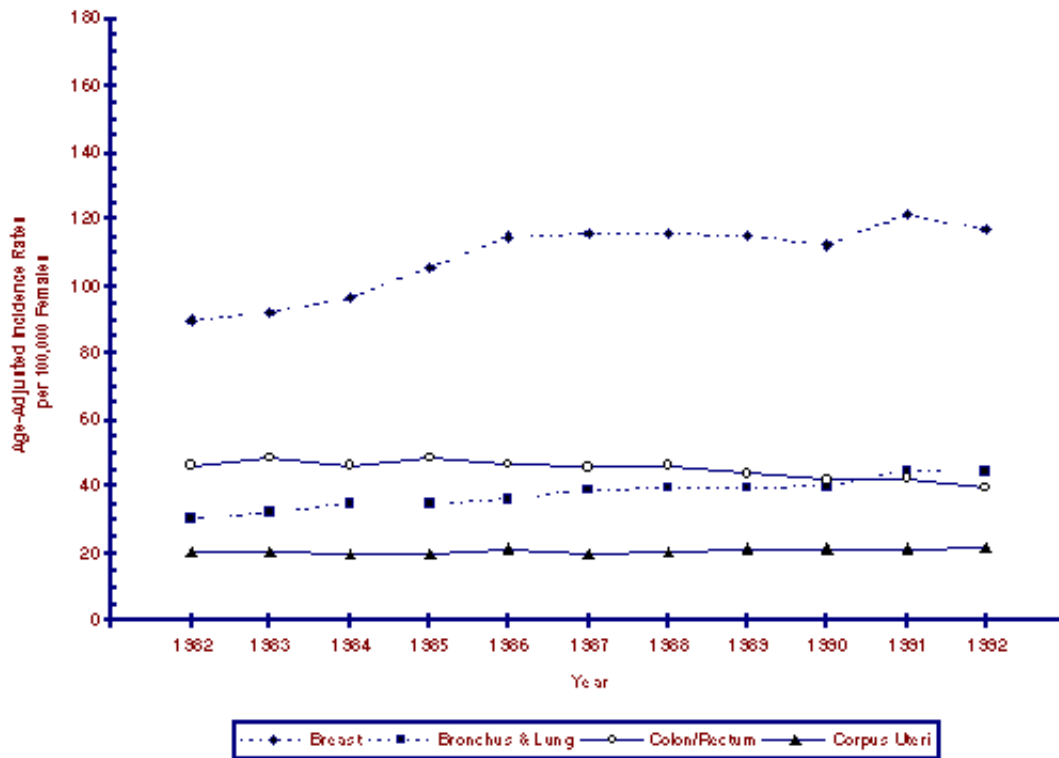


Fig. 3 A. - Massachusetts Cancer Incidence Trends 1982-1992 Male



**Figure 3B**  
**Massachusetts Cancer Incidence Trends 1982-1992**  
**Females**



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