
CANCER INCIDENCE AND MORTALITY IN MASSACHUSETTS 2010 – 2014:

STATEWIDE REPORT

The Office of Data Management and Outcomes Assessment

Massachusetts Department of Public Health

August 2017



This page intentionally left blank.

CANCER INCIDENCE AND MORTALITY IN MASSACHUSETTS 2010 – 2014:

STATEWIDE REPORT

Charlie Baker, Governor
Karyn Polito, Lieutenant Governor
Marylou Sudders, Secretary of Health and Human Services
Monica Bharel, Commissioner of Public Health

Natalie Nguyen Durham, Interim Director, Office of Data Management and
Outcomes Assessment
Susan T. Gershman, Director, Massachusetts Cancer Registry

Massachusetts Department of Public Health

August 2017

This page intentionally left blank.

ACKNOWLEDGMENTS

This report was prepared by Susan T. Gershman, Director, Massachusetts Cancer Registry, and Massachusetts Cancer Registry staff and consultants. Special thanks are given to Annie MacMillan and Richard Knowlton for their diligent work in preparing the data for this report. Thanks are also given to consultant Nancy Weiss for her editing efforts. Thanks are given to Malena Hood of the Division of Research and Epidemiology for providing the mortality and population data. Thanks are also given to Virginia Lijewski, MPH, Epidemiologist, formerly of the Bureau of Infectious Disease and Laboratory Sciences (BIDLS), Monina Klevens, DDS, MPH, also with BIDLS, and Richard Knowlton, MS, Epidemiologist, Massachusetts Cancer Registry, for their contribution to the special section "The Epidemiology of Cancer and Benign Brain Tumors among Massachusetts Residents with Hepatitis B or Hepatitis C from 2002-2012".

Massachusetts Cancer Registry Staff

Susan T. Gershman, MS, MPH, PhD, CTR, <i>Director</i>	
Bruce Caldwell, <i>Research Analyst/Geocoder</i>	Jeremiah Nesser, <i>Technical Assistant for Special Projects</i>
Nancy Donovan, MA, CTR, <i>Cancer Registrar</i>	Jayne Nussdorfer, CTR, <i>Cancer Registrar</i>
Patricia J. Drew, CTR, <i>Cancer Registrar/Quality Assurance Coordinator</i>	Barbara J. Rhodes, CMA, CTR, <i>Cancer Registrar/Death Clearance Coordinator</i>
Loi Huynh, <i>Software Developer</i>	Pamela Shuttle, CTR, RHIT, <i>Cancer Registrar/Non-Hospital Reporting Coordinator</i>
Richard Knowlton, MS, <i>Epidemiologist</i>	Hung Tran, <i>Software Developer</i>
Ann MacMillan, MPH, <i>Epidemiologist</i>	
Mary Mroszczyk, CTR, <i>Geocoding/ Special Projects Coordinator</i>	

Massachusetts Cancer Registry Advisory Committee

Lindsay Frazier, MD, ScM (<i>Chair</i>)	
Anita Christie, RN, MHA, CPHQ	Gail Merriam, MSW, MPH
Jan Sullivan, MS	J. David Naparstek, ScM, CHO
Deborah Dillon, MD	Larissa Nekhlyudov, MD, MPH
Joanna Haas, MD	Al Ozonoff, MA, PhD
Joseph Jacobson, MD	Paul C. Shroy, MD, MPH
Nancy Keating, MD, MPH	Ingrid Stendhal, CTR
Carol Lowenstein, CTR, MBA	Susan Sturgeon, DrPH, MPH
Reggie Mead	Michelle A. Williams, MS, SM, ScD

The data in this report are intended for public use and may be reproduced without permission. Proper acknowledgement of the source is requested.

For further information, please contact the following:

Massachusetts Cancer Registry.....	(617) 624-5642
Research and Epidemiology.....	(617) 624-5642
Occupational Health Surveillance.....	(617) 624-5632
Bureau of Environmental Health.....	(617) 624-5757
Cancer Prevention and Control Initiative.....	(617) 624-5479
Massachusetts Department of Public Health website.....	www.mass.gov/dph

We acknowledge the Centers for Disease Control and Prevention for its support of the staff and the printing and distribution of this report under cooperative agreement 5 NU58DP003920-05-00 awarded to the Massachusetts Cancer Registry at the Massachusetts Department of Public Health. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

This page intentionally left blank.

TABLE OF CONTENTS

	<u>Page</u>
Executive Summary.....	1
Introduction.....	7
Overall Content.....	9
Special Overview: The Epidemiology of Cancer and Benign Brain Tumors among Massachusetts Residents with Hepatitis B or Hepatitis C from 2002-2012.....	11
Figures & Tables.....	17
Figure 1. Percentage of cancer incident cases by cancer type and sex, Massachusetts, 2010-2014.....	18
Figure 2. Incidence rates for ten leading cancer types by sex, Massachusetts, 2010-2014.....	19
Figure 3. Percentage of cancer deaths by cancer type and sex, Massachusetts, 2010-2014.....	20
Figure 4. Mortality rates for ten leading cancer types by sex, Massachusetts, 2010-2014.....	21
Table 1. Age-specific incidence rates and median ages at diagnosis for selected cancer sites, Massachusetts, 2010-2014, males	22
Table 2. Age-specific incidence rates and median ages at diagnosis for selected cancer sites, Massachusetts, 2010-2014, females	23
Table 3. Age-specific incidence rates and median ages at diagnosis for selected cancer sites, Massachusetts, 2010-2014, total	24
Figure 5. Annual Percent Change (APC) in age-adjusted cancer rates among males, Massachusetts, 2010-2014	25
Figure 6. Annual Percent Change (APC) in age-adjusted cancer rates among females, Massachusetts, 2010-2014.....	26
Table 4. Annual age-adjusted incidence rates for selected cancer sites, Massachusetts, 2010-2014, males.....	27
Table 5. Annual age-adjusted incidence rates for selected cancer sites, Massachusetts, 2010-2014, females.....	28
Table 6. Annual age-adjusted incidence rates for selected cancer sites, Massachusetts, 2010-2014, total	29
Table 7. Annual age-adjusted mortality rates for selected cancer sites, Massachusetts, 2010-2014, males	30
Table 8. Annual age-adjusted mortality rates for selected cancer sites, Massachusetts, 2010-2014, females.....	31

Table 9. Annual age-adjusted mortality rates for selected cancer sites, Massachusetts, 2010-2014, total.	32
Table 10. Five leading cancer incidence rates by race/ethnicity and sex, Massachusetts, 2010-2014	33
Table 11. Number and percentage of incident cases for selected cancer sites by race/ethnicity, Massachusetts, males, 2010-2014	34
Table 12. Number and percentage of incident cases for selected cancer sites by race/ethnicity, Massachusetts, females, 2010-2014	35
Table 13. Number and percentage of incident cases for selected cancer sites by race/ethnicity, Massachusetts, total, 2010-2014	36
Table 14. Age-adjusted incidence rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, males.....	37
Table 15. Age-adjusted incidence rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, females.....	38
Table 16. Age-adjusted incidence rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, total.....	39
Table 17. Five leading cancer mortality rates by race/ethnicity and sex, Massachusetts, 2010-2014	40
Table 18. Number and percentage of deaths for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, males	41
Table 19. Number and percentage of deaths for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, females	42
Table 20. Number and percentage of deaths for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, total	43
Table 21. Age-adjusted mortality rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, males	44
Table 22. Age-adjusted mortality rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, females.....	45
Table 23. Age-adjusted mortality rates and 95% confidence limits (95% CL) for selected cancer sites by race/ethnicity, Massachusetts, 2010-2014, total	46
Table 24. Incidence rates for selected cancer sites by sex, Massachusetts and U.S. (2010-2014)	47

Table 25. Mortality rates for selected cancer sites by sex, Massachusetts and U.S. (2010-2014)	48
Appendices.....	49
Appendix I. ICD codes used for this report	50
Appendix II. Population and rate changes	52
Appendix III. Population estimates by age, race/ethnicity, and sex, Massachusetts, 2010-2014.....	53
Appendix IV. Racial/Ethnic Breakdown of the Massachusetts and NAACCR Populations, 2010-2014.....	54
References	55

This page intentionally left blank

EXECUTIVE SUMMARY

This page intentionally left blank.

EXECUTIVE SUMMARY

Cancer Incidence and Mortality in Massachusetts, 2010-2014: Statewide Report presents cancer incidence and mortality data for the Commonwealth from 2010 through 2014. The report includes numbers and rates for 24 types of cancer, information on age-specific patterns, an examination of patterns by race/ethnicity, and a comparison of Massachusetts and national cancer rates. A special section on hepatitis B/hepatitis C-related cancers is also included. Data are provided on invasive cancers only with the exceptions of urinary bladder (which includes *in situ* and invasive cancers combined) and *in situ* breast cancer.

All counts and average annual age-adjusted rates presented in this Executive Summary are for the period 2010-2014 and are for Massachusetts residents, unless otherwise stated.

OVERALL:

- Total number of new cases – 182,288, an average of 36,458 annually
- Total number of cancer deaths – 63,671, an average of 12,734 annually
- Incidence rate (age-adjusted) for all cancers combined for total population – 471.1 per 100,000 persons
- Mortality rate (age-adjusted) for all cancer deaths combined for total population – 157.8 per 100,000 persons.

MOST COMMONLY DIAGNOSED CANCERS & CANCER DEATH CAUSES BY SEX:

Incidence (newly diagnosed cases)

- Males – *prostate cancer* accounted for 24.2% of all newly diagnosed cancers among males
- Females – *invasive breast cancer* accounted for 29.8% of all newly diagnosed cancers among females.

Mortality (cancer deaths)

- Males – *cancer of the bronchus and lung* accounted for 26.5% of all cancer deaths among males
- Females – *cancer of the bronchus and lung* also accounted for 26.5% of all cancer deaths among females.

TRENDS 2010-2014:

Statistically Significant Incidence Trends – Males

- All cancers combined decreased 3.2% per year.
- Kidney and Renal Pelvis cancer increased 4.3% per year.
- Prostate cancer decreased by 11.1% per year.

Statistically Significant Mortality Trends – Males

- All cancers deaths combined decreased 2.0% per year.
- Bronchus and lung cancer decreased 1.4% per year.

- Breast cancer increased 23.1% per year. (Note: While this is a statistically significant increase, there were 64 deaths from 2010-2014 and the mortality rate increased from 0.2 to 0.4/100,000. With such small numbers even an increase of a few cases can result in a significant trend. The rates were comparable to national rates as well.)
- Kidney and renal pelvis cancer increased 10.4% per year.

Statistically Significant Incidence Trends – Females

- Bronchus and lung cancer decreased 1.4% per year.
- Colon and rectum cancer decreased 2.4% per year.
- Melanoma of skin cancer decreased 4.6% per year.
- Pancreatic cancer increased 3.0% per year.

Statistically Significant Mortality Trends – Females

- All cancers deaths combined decreased 1.5% per year.
- Bronchus and lung cancer decreased 1.0% per year.
- Hodgkin Lymphoma decreased 22.9% per year (Note: As with male breast cancer mortality, there were 44 deaths from 2010-2014 and the mortality rate decreased from 0.3 to 0.1/100,000. The rates were comparable to national rates as well.)

RATES BY RACE/ETHNICITY: *(Unless otherwise noted, the term ‘racial/ethnic groups’ in this report refers to white non-Hispanic, black non-Hispanic, Asian non-Hispanic and Hispanic).*

Males Incidence

- Black, non-Hispanic males had the highest total age-adjusted incidence rates, significantly higher than those of all other racial/ethnic groups.
- Cancers of prostate, bronchus and lung, and colon/rectum were the leading cancer types in each racial/ethnic group.
- White, non-Hispanic males had significantly higher rates of cancers of the brain and other nervous system, esophagus, leukemia, and urinary bladder when compared to all other race/ethnic groups.
- Black, non-Hispanic males had significantly higher rates of multiple myeloma and prostate cancer when compared to all other race/ethnic groups.
- Asian, non-Hispanic males had significantly higher rates of liver and intrahepatic bile duct cancer when compared to white, non-Hispanic and black, non-Hispanic males.

Males Mortality

- Black, non-Hispanic males had the highest total cancer mortality rate, significantly higher compared to all other racial/ethnic groups.
- Cancer of the bronchus and lung was the leading cause of cancer death for each racial/ethnic group. White and black, non-Hispanics had significantly elevated rates compared to the other two racial/ethnic groups.
- The mortality rate for prostate cancer and for multiple myeloma was significantly elevated among black, non-Hispanic males compared to the other racial/ethnic groups.
- The mortality rate for liver and intrahepatic cancer was significantly elevated among Asian, non-Hispanics compared to the other racial/ethnic groups.

Females Incidence

- White, non-Hispanic females had the highest total age-adjusted incidence rates, significantly higher than those of all other racial/ethnic groups.
- Breast cancer was the most commonly diagnosed cancer for each racial/ethnic group.
- The second most common cancer diagnosed was bronchus and lung for each racial/ethnic group.
- Compared to all other racial/ethnic groups, white, non-Hispanic females had significantly higher rates of the following cancer types: invasive breast, bronchus and lung, uterus, ovary, and urinary bladder.
- Black, non-Hispanic females had significantly higher rates of multiple myeloma compared to all other racial/ethnic groups.
- Black, non-Hispanic and Hispanic females had significantly higher rates of cervical cancer compared to white, non-Hispanic females, but not compared to Asian, non-Hispanic females.
- Asian, non-Hispanic females had significantly higher liver and intrahepatic bile duct cancer rates compared to white non-Hispanics and black non-Hispanics, but not compared to Hispanics.

Females Mortality

- Black and white, non-Hispanic females had the highest total cancer mortality rates, significantly higher than for Asian, non-Hispanic and Hispanic females.
- Cancer of the bronchus and lung was the leading cause of cancer death among all racial/ethnic groups. White, non-Hispanic females had significantly elevated rates compared to the other racial/ethnic groups.
- Black, non-Hispanic females had significantly elevated uterine cancer mortality rates when compared to the other racial/ethnic groups. Their breast cancer mortality rate was significantly elevated compared to that of Asian, non-Hispanic and Hispanic females, but was not significantly elevated compared to white, non-Hispanic females.

MASSACHUSETTS VS. NATIONAL RATES

Males and Females Incidence

Overall age-adjusted cancer incidence rates in Massachusetts were significantly lower than national rates for males, and were significantly higher than national rates for females. Among the cancers significantly elevated for females were invasive and *in situ* breast, bronchus and lung, uterine, esophageal, melanoma of skin, oral cavity and pharynx, thyroid, and urinary bladder. Among those cancers significantly elevated for males were esophagus, liver and intrahepatic bile ducts, testicular, thyroid and urinary bladder. Incidence rates that were significantly lower compared to the U.S. among females were cervix uteri, colon and rectum, and kidney and renal pelvis, while among males the cancer types included bronchus and lung, colon and rectum, larynx, and prostate.

Males and Females Mortality

Overall age-adjusted cancer mortality rates in Massachusetts were significantly lower from national rates for both males and females. However, there were some individual cancers that had significantly elevated mortality rates compared to the U.S. These include male esophagus and female urinary bladder. Those cancers that were significantly lower compared to the U.S. included breast, cervix uteri, colon/rectum, and kidney and renal pelvis among females, and bronchus and lung, colon/rectum, kidney and renal pelvis, multiple myeloma, non-Hodgkin lymphoma, prostate, and testis among males.

INTRODUCTION

This page intentionally left blank.

INTRODUCTION

The Massachusetts Cancer Registry (MCR) collects reports of newly diagnosed cases of cancer and routinely compiles summaries of cancer incidence and mortality data. This report, *Cancer Incidence and Mortality in Massachusetts, 2010-2014: Statewide Report* is produced annually with the most recently available statewide data. Another report, *Cancer Incidence in Massachusetts: City and Town Supplement*, is also produced annually and contains information for the 351 cities and towns in Massachusetts. Electronic versions of these reports may be found on the internet at www.mass.gov/dph/mcr.

Overall Content

This report:

- Provides statewide information on cancer incidence and mortality in Massachusetts for twenty-four types of cancer and for all cancers combined for 2010 through 2014;*
- Provides detailed information on the most commonly occurring types of cancer for 2010 through 2014;
- Examines cancer incidence patterns by age, sex, and race/ethnicity;
- Reviews Massachusetts cancer incidence and mortality trends for 2010 through 2014;
- Compares Massachusetts incidence and mortality data with respective national data; and
- Features a special section on the epidemiology of hepatitis B/C-related cancers.

The report is organized into the following sections:

- **SPECIAL OVERVIEW** which provides more detailed information on a specific topic of interest in Massachusetts. This report has a special overview of the epidemiology of hepatitis B/C-related cancers.
- **FIGURES & TABLES** which present cancer incidence and mortality data for 24 types of cancer for 2010-2014. There are 6 figures and 24 tables in this section with breakdowns by sex, race/ethnicity, year, age group, state and national comparisons, and cancer type.
- **APPENDICES** which provide information supplemental to this report, including a listing of codes used to prepare the report, information on population and rate changes, and population estimates.
- **REFERENCES**

**The Massachusetts incidence data in this report include only invasive cancers for 22 of the 24 types of cancer. Cancer of the urinary bladder includes both in situ and invasive cases. Cancer of the breast in situ is presented as a separate category but is not included in the "all sites combined" data.*

Note: For more detailed information on the methods of the Massachusetts Cancer Registry, please refer to Cancer Incidence and Mortality in Massachusetts 2006-2010: Statewide Report (1). For national trends, please refer to the Annual Report to the Nation on the Status of Cancer, 1975-2014, Featuring Survival (2).

This page intentionally left blank.

SPECIAL OVERVIEW:

The Epidemiology of Cancer and Benign Brain Tumors among Massachusetts Residents with Hepatitis B or Hepatitis C from 2002-2012

The Epidemiology of Cancer and Benign Brain Tumors among Massachusetts Residents with Hepatitis B or Hepatitis C from 2002-2012

INTRODUCTION

Hepatitis B is an infection of the liver caused by the hepatitis B virus (HBV). Of those infected with HBV 10% may progress to a chronic infection and can pass the virus to others via sexual contact and contact with infected blood, including needle sharing to inject drugs. Through maternal transmission, pregnant women can pass the infection to their babies at birth.¹ Hepatitis C is an infection of the liver caused by the hepatitis C virus (HCV). Unlike HBV infection, most people who get infected with HCV progress to a chronic infection. Risk factors for HCV transmission include receiving infected blood products before widespread screening in 1992, needle sharing to inject drugs, and maternal-fetal transmission. Sexual transmission of HCV is possible, but rare. Sexual transmission is increased by having a sexually transmitted disease or HIV infection, sex with multiple partners, or rough sex.²

Liver inflammation from chronic HBV or HCV infection can cause scarring of the liver or cirrhosis, which in turn can lead to liver cancer. The association of liver cancer and HBV was first proposed in 1972, shortly after the discovery of HBV.³ The association of liver cancer and HCV was established soon after the discovery of HCV in 1989.⁴ Recent studies have shown an increased risk of liver cancer among HCV infected people ranging from 23 to 35-fold.⁴ Other studies have shown associations between HBV or HCV infection and non-Hodgkin lymphoma (NHL) and lung cancer.^{4,5}

Hepatitis B vaccination can prevent HBV infection. While there is currently no hepatitis C vaccine, effective anti-viral treatments exist to prevent progression to cirrhosis, the stage of liver disease where the majority of liver cancers develop.⁶

Our objective was to explore the association of HBV and HCV with liver cancer and examine trends in liver cancer from 2002 to 2012 as well as assess associations with other cancers.

METHODS

HBV and HCV surveillance data are collected using a web-based system, the MA Virtual Epidemiologic Network (MAVEN). MAVEN is maintained by the Bureau of Infectious Disease and Laboratory Sciences (BIDLS) within the Massachusetts Department of Public Health. Demographics, clinical characteristics, risk history, and viral hepatitis laboratory results are collected when available. The Massachusetts Cancer Registry (MCR) collects information on all newly diagnosed cases of *in situ* and invasive cancers and benign brain tumors among Massachusetts residents from hospitals, nursing homes, doctors' offices, radiation centers and 43 state and territory central cancer registries. For the sake of brevity in this report, the term 'cancer' in reference to MCR cases will include invasive and *in situ* cancers and benign brain tumors.

HBV and HCV and MCR data were matched on name and date of birth using Link Plus TM software, a probabilistic record linkage program developed at CDC's Division of Cancer Prevention and Control in support of CDC's National Program of Cancer Registries (NPCR).⁷ Percentages of individual cancers among HBV- or HCV-infected MCR cases were compared with percentages among all MCR cases. The population proportions were compared using a T-test to determine statistical significance at the $p < .05$ level. Using cumulative age-adjusted incidence rates, relative risks were calculated for being diagnosed with all

cancers, liver cancer, and a non-liver cancer among people in the MCR with and without HBV or HCV infections. The annual percent change (APC) was calculated for incidence trends in liver cancer using Joinpoint software from the National Cancer Institute.⁸

RESULTS

Between 2002 and 2012, there were 28,070 HBV and 94,701 HCV chronic and acute infections reported to the MDPH. During the same time period, there were 447,087 cancer cases reported to the MCR. Of the HBV cases, 5.2% (n=1,471) matched with an MCR case while 5.8% of HCV cases matched with an MCR case (n=5,499). Of the MCR cancer cases, 1.5% (n=6,970) had an HBV or HCV infection reported from 2002 to 2012.

Liver cancer was the most common cancer among males and third most common among females infected with HBV or HCV (Table 1).

Table 1. MCR Cases with Hepatitis B or C infection (2002-2012)*			
Males:	HBV/HCV Cancers	All Cancers	% Infected with HBV/HCV
1) Liver	1,349 (28.6%)	4,285 (2.0%)	31.5%
2) Prostate	576 (12.2%)	55,105 (26.1%)	1.0%
3) Lung	500 (10.6%)	27,295 (12.9%)	1.8%
4) Others	2,287 (48.5%)	125,720 (59.2%)	1.8%
TOTAL	4,712 (100%)	212,405 (100%)	2.2%
Females:	HBV/HCV Cancers	All Cancers	% Infected with HBV/HCV
1) Breast	433 (19.2%)	57,762 (24.6%)	0.7%
2) Lung	268 (11.9%)	28,172 (12.0%)	1.0%
3) Liver	238 (10.6%)	1,484 (0.6%)	16.1%
4) Others	1,315 (58.3%)	147,239 (62.7%)	0.9%
TOTAL	2,254 (100%)	234,657 (100%)	1.0%

*-Note that there were 4 transgender HBV/HCV cases and 25 for all cancers.

Liver cancer was disproportionately represented among HBV/HCV cancers for both males and females; 28.6% and 10.6% of liver cancers among males and females, respectively, were infected with HBV or HCV. Additionally non-Hodgkin lymphoma (NHL) was also disproportionately represented among

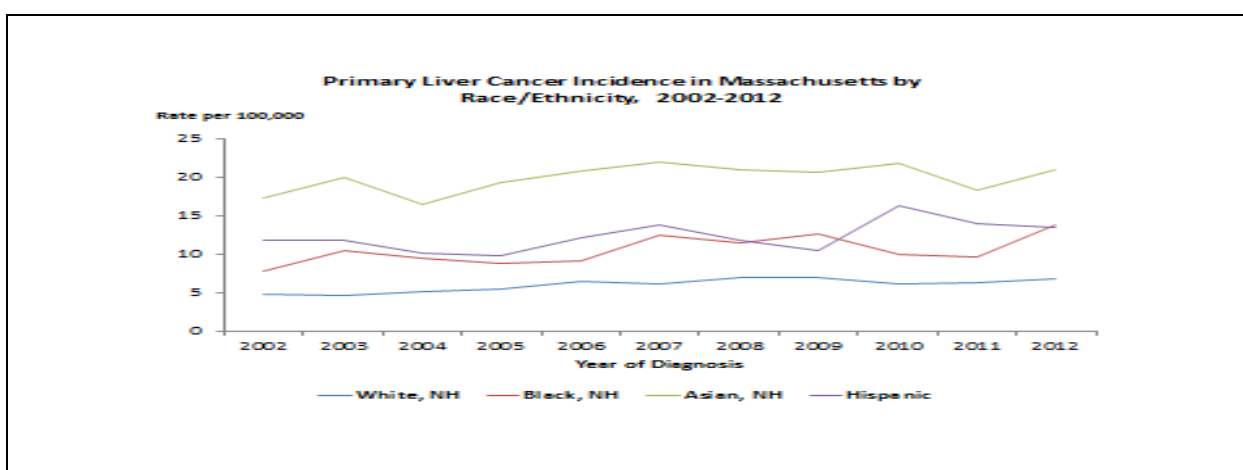
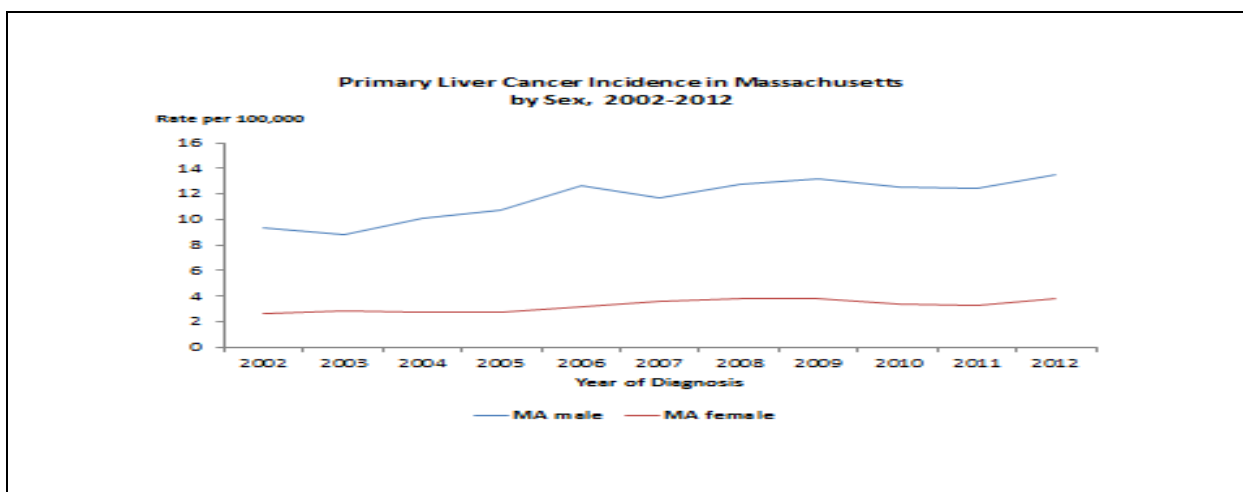
HBV/HCV cancers for both males (6.1% vs. 4.2%) and females (6.6% vs. 3.7%) (data not shown). These proportional differences were all statistically significant ($p<.05$). The other specific cancers in Table 1 (prostate, breast, and lung), while representing the top 3 percentages of HBV/HCV cancers, were not overrepresented among HBV and HCV cancer cases compared to their representation among all cancer cases.

Among males, a significantly higher percentage of HBV/HCV cancers among Asian, non-Hispanics (NHs) included liver (46.7%) compared to 27.1% of white, NHs, 24.7% of black, NHs, and 36.7% of Hispanics. Also seen among Asian, NHs females, was a significantly higher percentage of HBV/HCV-related liver cancer (23.4%) compared to 9.3% of white, NHs, 12.2% of black, NHs, and 14.8% of Hispanic females.

Between 2002 and 2012, people with HCV infection had 13 times the risk of liver cancer than did people without HCV infection and people with HBV infection had 15 times the risk of liver cancer than did people without HBV infection.

Table 2. Hepatitis B and C Infection and Cancer Relative Risks, 2002-2012		
Hepatitis C and Cancer (n=5,499)		
	Relative Risk	95% Confidence Interval
All Cancers	0.6	0.6, 0.6
Liver Cancer	13.1	12.2, 13.9
Non Liver Cancer	0.5	0.5, 0.5
Hepatitis B and Cancer (n=1,471)		
	Relative Risk	Confidence Interval
All Cancers	0.7	0.6, 0.7
Liver Cancer	15.3	13.7, 17.1
Non Liver Cancer	0.5	0.5, 0.6

The incidence rates for liver cancer for both males and females in Massachusetts increased significantly from 2002-2012 (APC=3.9 and APC=3.6, respectively). In addition, there were significant increases in trends for white, NHs (APC=6.5) and black, NHs (APC=3.3). Among MCR cases, 31.5% of males with liver cancer and 16.1% of females with liver cancer were infected with HBV or HCV.



LIMITATIONS

Prior to the electronic reporting with MAVEN in 2006, manual laboratory reporting was used and thus earlier years may be incomplete, resulting in fewer records available for the match and the potential for an underestimation of the association with cancer. HBV and HCV diagnosis date reflects the date of symptom onset, specimen collection date for the first lab result or MDPH notification date, whichever is the earliest, resulting in a possible misclassification of year of hepatitis infection. Likewise, MCR diagnosis date reflects the date the tumor was first diagnosed and not when the tumor first became malignant.

CONCLUSIONS

Liver cancer was statistically associated with prior HBV or HCV infection among Massachusetts residents from 2002 to 2012. The trends in liver cancer from 2002 to 2012 revealed a significant increase among males and females and white and black, non-Hispanics. These trends are certainly driven in part by HBV and HCV infections. It is estimated that 50% of liver cancers in the U.S. are HCV related, 15% are HBV related, and 35% are related to something else.(ref) Eighty-one percent of Americans with chronic HCV infection were born between 1945 and 1965. Many of those people were infected before the discovery of HCV in 1989 and have been living with an infection for at least twenty years, resulting in more liver cancer occurring as this population ages and enters the final stages of HCV infection.⁹ The strong association

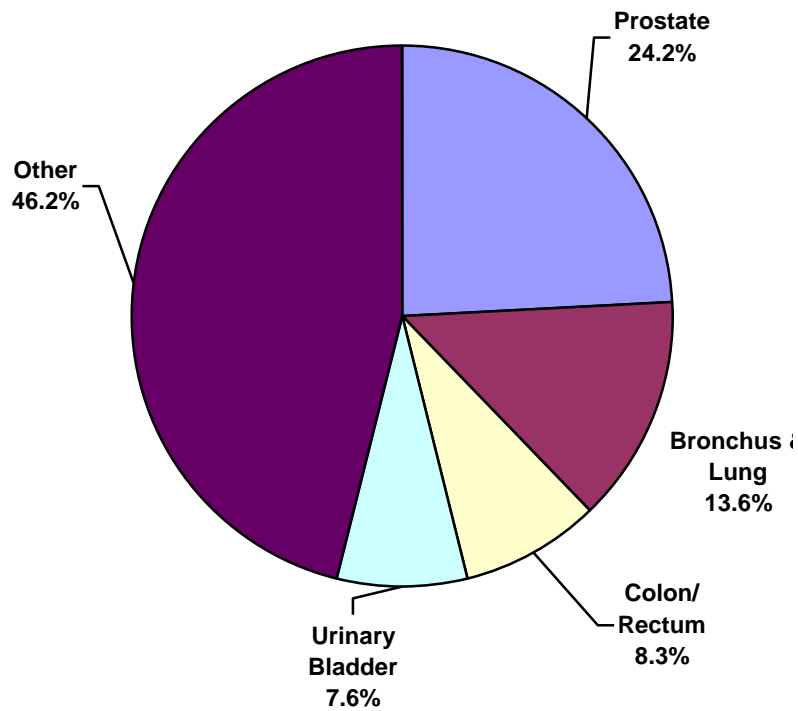
between HBC and HCV infection and liver cancer underscores the importance of prevention of liver cancer through hepatitis B vaccination and prompt antiviral treatment for HBV and HCV infected people.

Among MCR cases infected with HBV or HCV, non-Hodgkin lymphoma (NHL) was disproportionately represented among males and females. While this association was statistically significant, the disproportions were not as large as for liver cancer. HBV and HCV have strong lymphotropic properties (stimulating or acting on lymphatic system) and data have shown a causal association with NHL.⁴ This association with NHL, while not as strong as the association with liver cancer, has some biological foundation and further supports vaccination and early treatment for people with HBV and HCV infections.

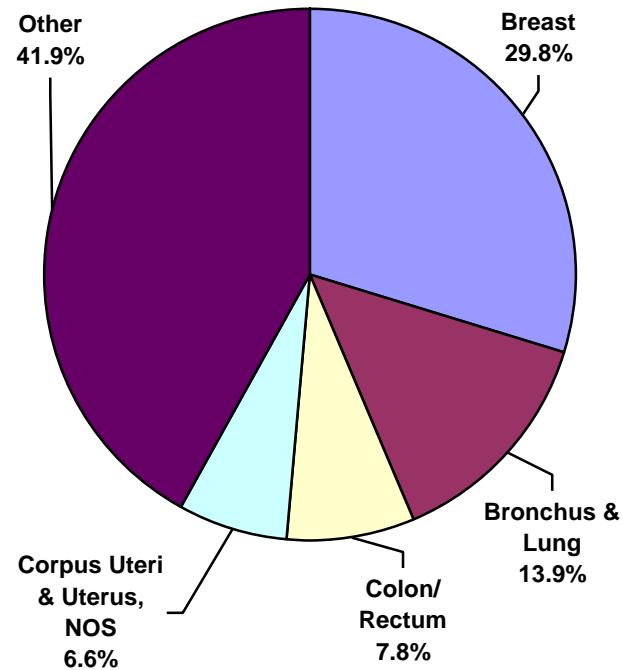
FIGURES & TABLES

Figure 1.
PERCENTAGE OF CANCER INCIDENT CASES BY CANCER TYPE AND SEX
Massachusetts, 2010-2014

MALES (N=87,975)

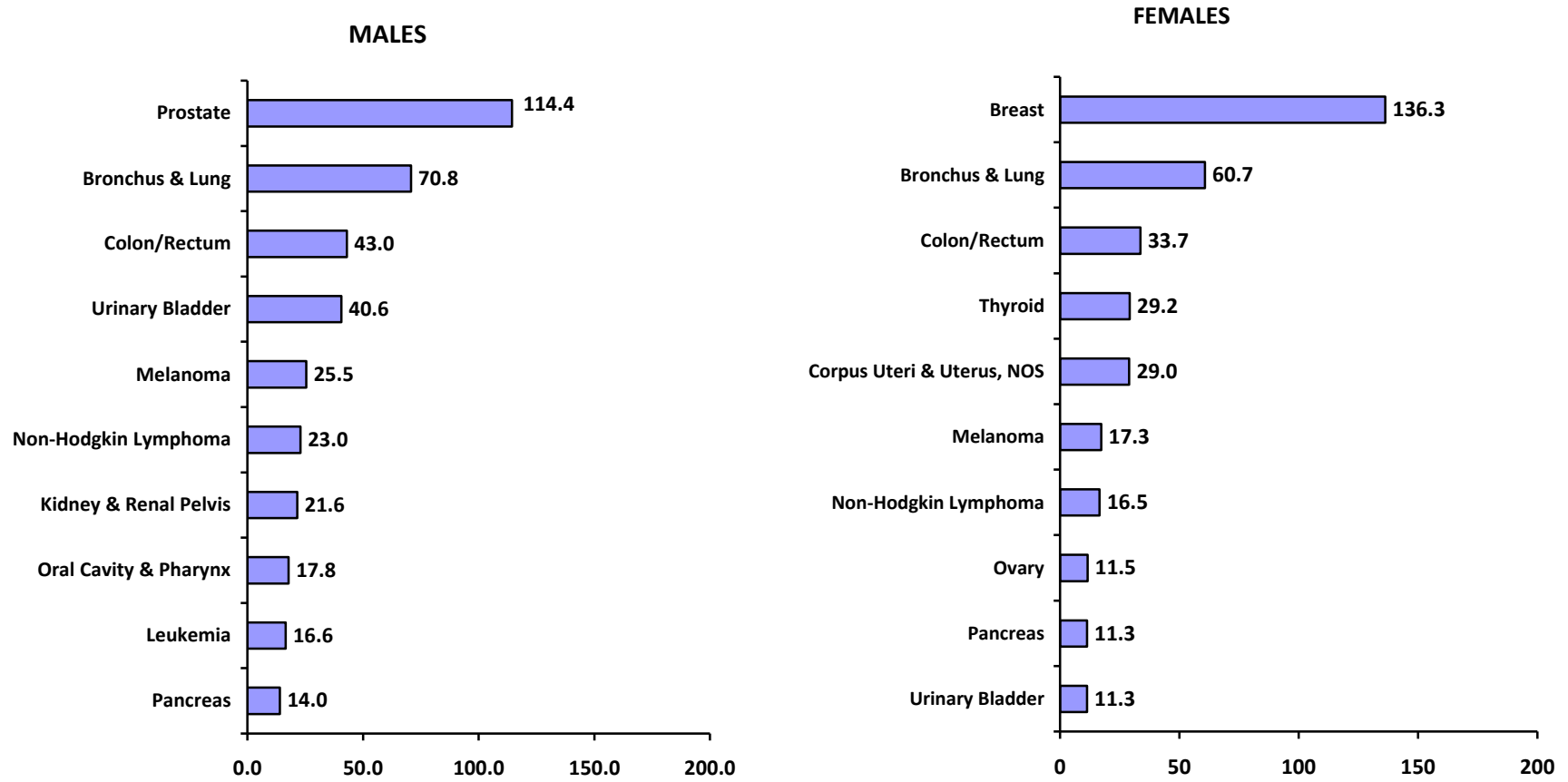


FEMALES (N=94,299)



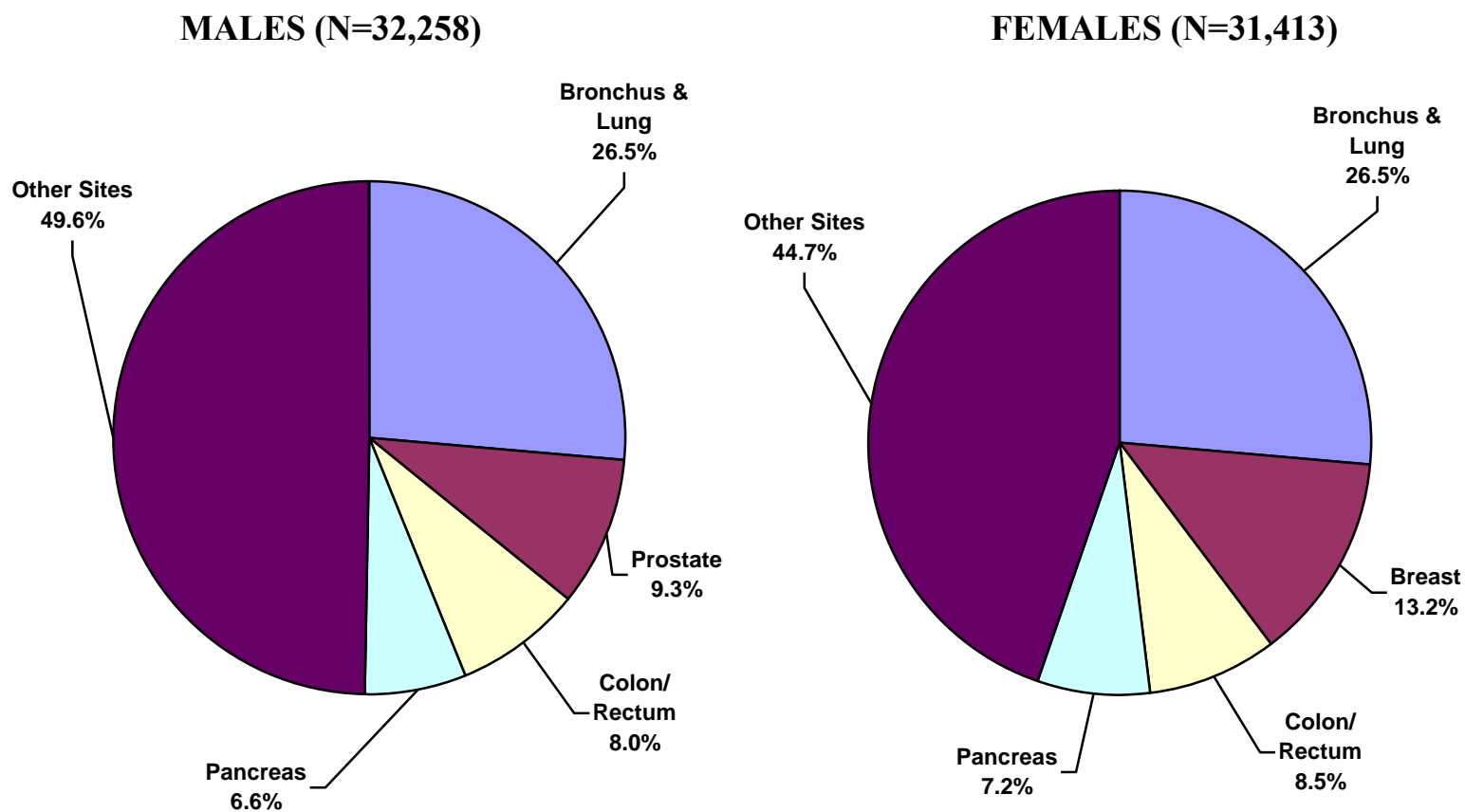
Source: Massachusetts Cancer Registry

Figure 2.
INCIDENCE RATES¹ FOR TEN LEADING CANCER TYPES BY SEX
Massachusetts, 2010-2014



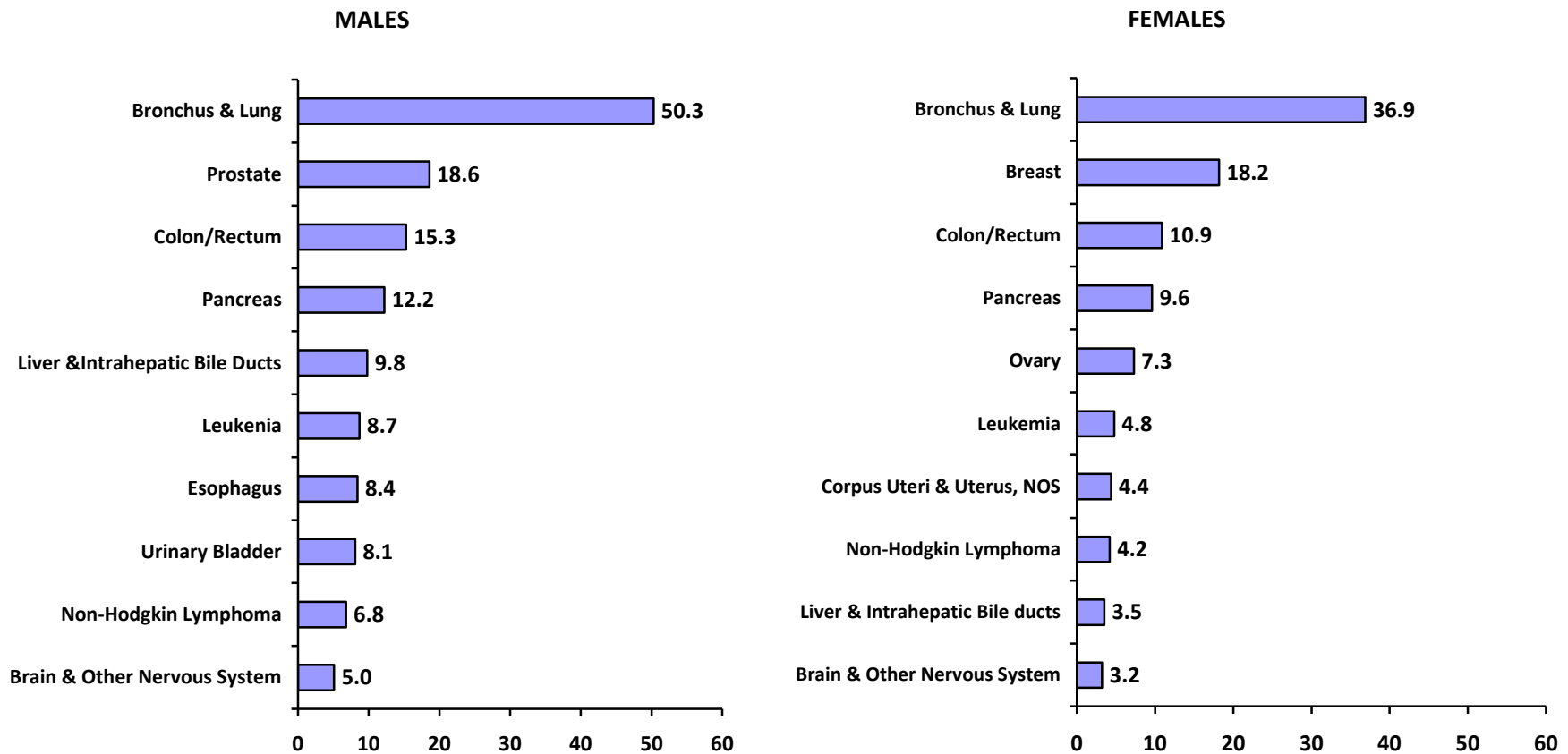
¹Rates are age-adjusted to the 2000 U.S. Standard Population. NOS – Not Otherwise Specified.
Source: Massachusetts Cancer Registry

Figure 3.
PERCENTAGE OF CANCER DEATHS BY CANCER TYPE AND SEX
Massachusetts, 2010-2014



Source: Massachusetts Vital Statistics

Figure 4.
MORTALITY RATES¹ FOR TEN LEADING CANCER TYPES BY SEX
Massachusetts, 2010-2014



¹Rates are age-adjusted to the 2000 U.S. Standard Population. *NOS – Not Otherwise Specified.
 Source: Massachusetts Vital Statistics

Table 1.
AGE-SPECIFIC INCIDENCE RATES¹ AND MEDIAN AGE AT DIAGNOSIS FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
MALES

Cancer Site / Type	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	Median Age
All Sites	28.2	12.3	13.2	23.0	38.1	54.1	74.8	100.8	164.7	290.3	569.5	928.7	1375.6	1918.7	2478.4	2704.8	2838.6	2845.0	66
Brain & Other Nervous System	5.8	4.1	2.9	2.9	2.7	5.0	3.9	3.5	4.9	6.8	8.5	11.8	15.9	20.7	25.6	31.2	29.4	23.2	59
Breast	--	0.1	--	--	--	--	0.3	0.2	0.6	0.7	1.7	2.1	3.1	5.7	7.4	8.0	10.2	7.9	68
Breast <i>in situ</i> ²				--	--	--	0.1	--	0.1	0.2	0.1	0.5	0.3	0.1	0.8	0.9	0.4	0.4	62
Bronchus & Lung	--	--	0.1	0.2	0.6	0.3	1.5	3.0	8.4	20.1	52.0	104.5	163.0	269.6	417.9	524.2	554.2	451.9	71
Colon / Rectum	--	--	0.1	0.3	0.8	2.0	5.6	10.1	20.7	32.4	69.0	66.8	89.6	129.9	184.1	225.0	269.4	341.4	67
Esophagus	--	--	--	--	0.1	0.2	0.3	0.6	1.8	6.3	10.3	19.4	31.5	39.2	55.2	53.3	58.4	53.0	67
Hodgkin Lymphoma	--	0.4	1.2	2.6	5.7	5.9	4.9	3.5	4.1	3.5	3.2	2.7	3.9	4.3	5.3	4.9	4.9	4.6	41
Kidney & Renal Pelvis	2.6	0.6	--	0.2	0.6	1.7	3.6	8.3	14.2	22.2	32.8	43.5	63.3	79.8	93.9	95.2	88.2	68.7	63
Larynx	--	--	0.1	--	--	0.2	0.2	0.4	0.7	3.2	7.0	14.2	17.9	23.5	30.3	30.1	36.2	17.8	66
Leukemia	8.8	3	3.2	3.6	3.5	3.0	4.0	4.1	6.8	10.3	12.3	20.7	34.0	48.5	67.7	90.3	102.8	115.9	67
Liver & Intrahepatic Bile Ducts	1.4	--	0.3	0.2	0.5	0.2	0.5	1.3	2.5	7.3	20.3	40.5	50.1	43.4	53.1	62.8	62.2	44.7	63
Melanoma of Skin	--	--	0.2	0.4	1.5	3.8	8.2	8.0	13.9	18.9	27.5	45.5	56.7	78.8	110.9	142.7	160.5	149.0	66
Multiple Myeloma	--	--	--	--	--	0.3	0.1	1.6	2.4	6.5	8.6	13.5	20.4	27.3	43.8	40.7	61.0	46.3	67
Non-Hodgkin Lymphoma	1.1	1.1	0.4	2.2	3.2	3.0	5.8	8.3	12.6	17.7	25.4	35.3	47.9	75.9	98.0	115.2	146.9	144.8	66
Oral Cavity & Pharynx	0.1	0.1	0.1	0.5	0.6	1.7	2.3	4.1	9.1	20.6	33.0	47.5	62.5	64.5	67.1	73.7	53.9	52.6	62
Pancreas	--	--	0.1		0.1	0.3	0.7	1.7	3.2	7.3	13.2	25.3	33.4	54.1	65.8	86.0	98.7	107.2	69
Prostate	0.1	--	--	--	--	--	0.1	0.4	9.7	40.4	151.8	292.5	477.3	646.5	670.3	515.3	329.6	331.9	65
Stomach	--	--	0.1	--	--	0.3	1.2	2.0	2.8	5.0	10.1	15.5	20.6	32.2	46.6	58.5	72.3	73.2	69
Testis	0.7	0.3	0.1	3.1	10.3	15.6	14.4	13.4	10.8	8.3	6.6	3.8	2.1	1.4	1.7	0.6	0.8	0.8	35
Thyroid	0.3	--	0.6	1.0	2.7	5.2	8.2	11.7	13.9	17.1	17.3	22.2	22.2	23.8	26.7	22.4	18.1	8.3	54.5
Urinary Bladder	--	--	--	0.2	0.7	0.8	1.4	2.2	6.6	11.2	26.1	45.0	80.3	137.5	226.4	280.0	344.7	403.5	72
Other Sites	7.4	2.6	3.7	5.6	4.5	4.7	7.6	12.0	15.0	24.6	32.6	56.3	79.8	112.0	180.7	244.8	336.4	398.5	70

¹ per 100,000 ² Breast *in situ* is excluded from 'All Sites'. ³ Dashes indicate age groups with no incident cases. Source: Massachusetts Cancer Registry

Table 2.
AGE-SPECIFIC INCIDENCE RATES¹ AND MEDIAN AGE AT DIAGNOSIS FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	Median Age
All Sites	23.6	12.1	16.1	20.9	45.6	72.8	127.2	196.2	331.4	472.8	661.9	814.4	1098.0	1448.3	1810.7	2039.0	2085.6	1828.2	65
Brain & Other Nervous System	4.0	3.6	3.8	2.8	2.4	2.1	2.7	3.3	4.7	4.3	5.8	9.1	11.6	14.5	16.3	20.5	17.3	17.7	60
Breast	--	--	0.1	--	1.9	10.1	29.0	67.3	141.2	213.2	251.2	271.9	366.1	452.9	502.7	493.3	451.9	327.8	62
Breast <i>in situ</i> ²	--	--	--	0.3	0.2	1.2	4.5	15.4	68.6	104.4	103.4	94.5	105.5	126.0	118.8	105.1	66.6	27.7	57
Bronchus & Lung	0.1	--	0.1	0.4	0.5	0.2	0.8	3.2	11.2	26.3	60.6	93.8	147.6	247.1	375.6	438.0	399.6	262.2	71
Cervix Uteri	--	--	--	0.1	0.5	3.1	6.9	9.3	10.5	8.7	8.2	7.9	9.1	9.8	6.8	8.4	7.8	6.2	51
Colon / Rectum	--	0.1	0.3	0.3	1.2	2.1	4.4	11.1	20.1	27.8	52.7	47.4	61.9	91.5	130.4	186.3	235.0	265.1	72
Corpus Uteri & Uterus, NOS	--	--	0.1	--	0.1	1.4	3.1	9.0	14.1	27.6	54.5	83.7	111.8	126.8	117.0	96.3	82.0	56.6	63
Esophagus	--	--	--	--	--	--	0.3	0.6	0.6	0.9	1.2	4.0	5.9	9.6	14.8	12.1	14.4	13.5	71
Hodgkin Lymphoma	--	0.1	1.0	3.3	6.1	3.9	3.8	2.8	2.8	1.3	2.2	2.7	2.3	2.5	3.3	3.9	5.6	1.7	38
Kidney & Renal Pelvis	1.7	0.7	0.2	0.3	0.4	0.9	2.3	4.1	7.5	10.0	16.6	19.6	28.2	34.4	47.4	54.0	45.9	34.1	65
Larynx	--	--	--	--	--	--	0.1	0.1	0.3	0.9	2.8	4.0	2.8	7.1	8.3	5.6	6.3	5.2	67
Leukemia	7.9	4.2	2.1	1.6	3.0	3.1	3.0	3.2	5.8	5.8	8.9	13.7	19.5	23.9	35.4	50.4	52.9	60.0	68
Liver & Intrahepatic Bile Ducts	0.3	--	0.2	0.2	0.3	0.5	0.5	0.9	1.7	3.9	9.0	12.4	12.7	15.8	22.0	23.2	18.5		68
Melanoma of Skin	--	--	0.3	1.1	4.9	10.5	13.4	11.1	16.9	21.1	27.4	32.2	38.9	42.8	51.2	55.1	61.7	61.0	61
Multiple Myeloma	--	--	--	--	--	0.3	0.4	0.9	1.3	3.2	6.6	9.0	13.2	20.3	23.8	29.9	34.2	31.4	70
Non-Hodgkin Lymphoma	0.1	0.7	0.9	1.1	1.7	2.7	4.1	5.5	8.3	12.1	19.9	28.1	41.9	53.7	68.9	81.4	103.2	88.3	68
Oral Cavity & Pharynx	0.1	0.1	0.4	0.5	0.6	0.6	1.5	2.7	3.7	5.5	10.8	15.1	18.0	24.6	27.4	29.7	32.9	33.5	66
Ovary	0.2	0.1	0.4	0.9	1.6	2.3	3.5	4.2	7.0	13.6	21.1	25.7	30.3	37.7	43.8	43.5	43.7	38.5	63
Pancreas	--	--	--	--	0.1	0.1	0.4	1.3	2.6	4.3	8.8	15.2	25.7	42.6	60.1	71.1	84.2	100.6	74
Stomach	--	--	--	0.3	0.3	0.3	0.5	1.1	3.6	4.0	4.7	7.3	8.2	11.8	18.8	23.5	34.9	37.7	72
Thyroid	0.2	0.1	1.8	4.3	17.1	24.6	39.1	44.2	49.1	53.2	52.6	46.8	44.9	47.6	39.9	34.9	24.4	13.5	49
Urinary Bladder	--	--	0.1	0.2	0.2	0.1	0.6	1.0	2.3	3.7	8.2	16.2	26.3	39.6	61.3	80.3	88.3	82.9	73
Other Sites	8.8	2.2	4.2	3.5	2.8	4.4	7.1	10.5	17.0	23.7	33.4	52.0	71.3	94.6	141.5	199.0	236.2	272.4	72

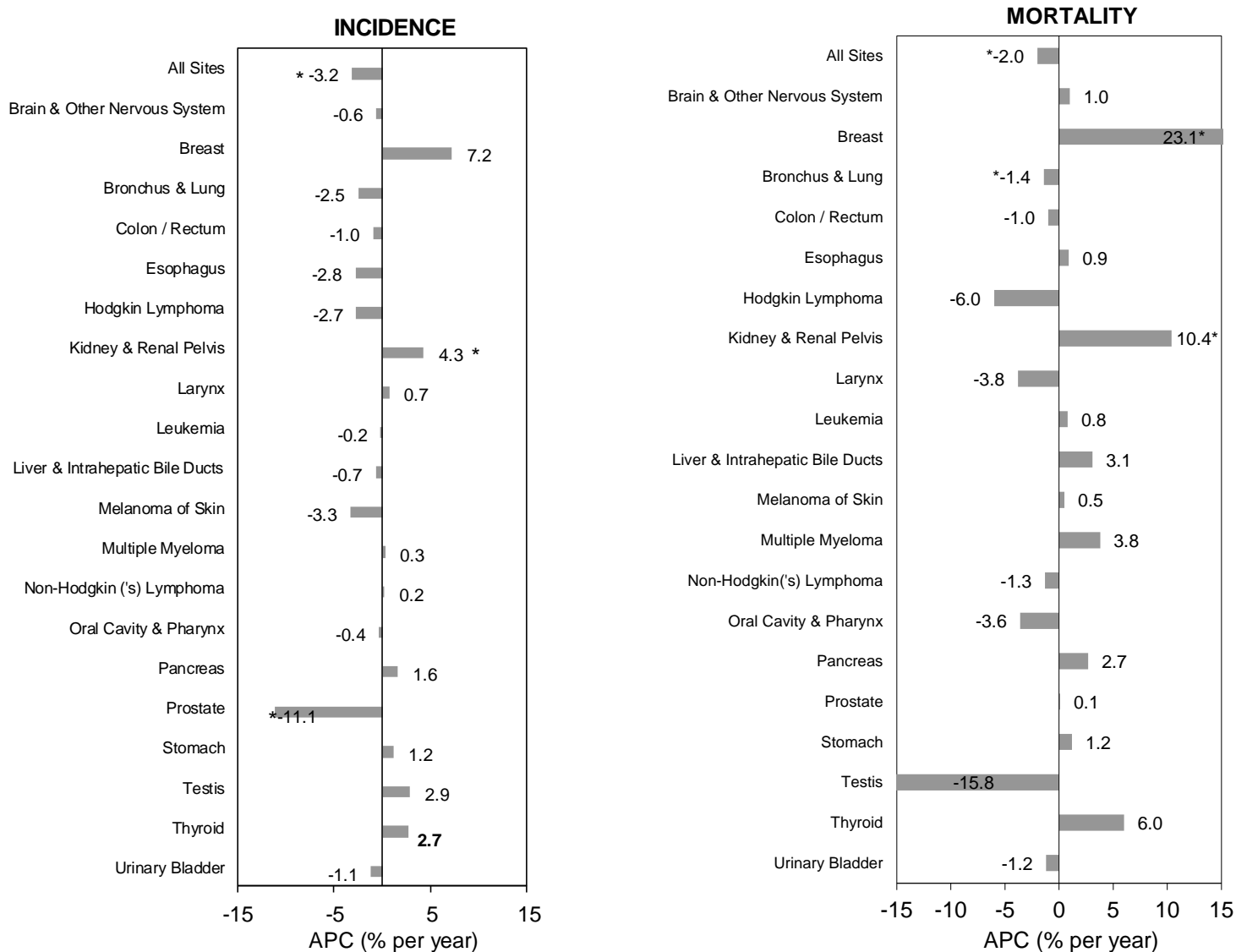
¹ per 100,000 ² Breast *in situ* is excluded from 'All Sites'. ³ Dashes indicate age groups with no incident cases. Source: Massachusetts Cancer Registry

Table 3.
AGE-SPECIFIC INCIDENCE RATES¹ AND MEDIAN AGE AT DIAGNOSIS FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
TOTAL

Cancer Site / Type	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	Median Age
All Sites	26.0	12.2	14.6	22.0	41.9	63.5	101.4	149.5	250.2	383.8	616.9	869.6	1230.3	1668.3	2111.7	2324.7	2381.7	2151.0	66
Brain & Other Nervous System	4.9	3.9	3.3	2.9	2.6	3.5	3.3	3.4	4.8	5.5	7.1	10.4	13.6	17.4	20.5	25.1	22.1	19.4	59
Breast	--	0.1	0.0	--	1.0	5.1	14.8	34.4	72.7	109.5	129.7	141.8	193.3	243.9	279.5	285.1	278.2	226.3	62
Breast <i>in situ</i> ²	--	--	--	0.1	0.1	0.6	2.3	7.9	35.2	53.5	53.1	49.2	55.4	67.2	65.6	60.4	40.6	19.0	57
Bronchus & Lung	0.1	--	0.1	0.3	0.5	0.3	1.2	3.1	9.8	23.3	56.4	98.9	155.0	257.6	394.7	475.0	460.4	322.4	71
Cervix Uteri	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Colon / Rectum	--	0.1	0.2	0.3	1.0	2.0	5.0	10.6	20.4	30.0	60.7	56.7	75.1	109.5	154.6	202.9	248.5	289.3	69
Corpus Uteri & Uterus, NOS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Esophagus	--	--	--	--	0.0	0.1	0.3	0.3	1.2	3.5	5.6	11.4	18.0	23.4	33.0	29.8	31.7	26.0	68
Hodgkin Lymphoma	--	0.3	1.1	3.0	5.9	4.9	4.4	3.2	3.4	2.4	2.6	2.7	3.1	3.4	4.2	4.3	5.3	2.6	40
Kidney & Renal Pelvis	2.1	0.7	0.1	0.2	0.5	1.3	3.0	6.1	10.8	16.0	24.5	31.1	44.9	55.6	68.4	71.7	62.5	45.0	64
Larynx	--	--	0.0	--	--	0.1	0.1	0.2	0.5	2.0	4.8	8.9	10.0	14.8	18.2	16.1	18.1	9.2	66
Leukemia	8.4	3.6	2.7	2.6	3.2	3.1	3.5	3.7	6.3	8.0	10.6	17.0	26.4	35.4	50.0	67.5	72.6	77.7	67
Liver & Intrahepatic Bile Ducts	0.9	--	0.2	0.2	0.4	0.1	0.5	0.9	1.7	4.4	11.9	24.3	30.4	27.0	32.6	39.5	38.5	26.8	64
Melanoma of Skin	--	--	0.2	0.8	3.2	7.2	10.8	9.6	15.4	20.0	27.5	38.6	47.4	59.7	78.1	92.7	100.7	88.9	64
Multiple Myeloma	--	--	--	--	--	0.3	0.2	1.2	1.8	4.8	7.6	11.2	16.6	23.6	32.8	34.6	44.7	36.1	69
Non-Hodgkin Lymphoma	0.6	0.9	0.6	1.7	2.5	2.8	4.9	6.9	10.4	14.9	22.6	31.6	44.8	64.1	82.0	95.9	120.4	106.2	67
Oral Cavity & Pharynx	0.1	0.1	0.2	0.5	0.6	1.2	1.9	3.4	6.3	12.9	21.6	30.7	39.2	43.2	45.3	48.6	41.2	39.5	63
Ovary	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pancreas	--	--	0.0	--	0.1	0.2	0.5	1.5	2.9	5.8	10.9	20.1	29.3	48.0	62.7	77.5	89.9	102.7	71
Prostate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Stomach	--	--	0.0	0.1	0.2	0.3	0.8	1.5	3.2	4.5	7.3	11.2	14.1	21.3	31.3	38.5	49.6	49.0	70
Testis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thyroid	0.3	0.1	1.2	2.7	9.9	15.0	23.9	28.3	31.9	35.6	35.4	35.0	34.1	36.5	34.0	29.5	21.9	11.8	51
Urinary Bladder	--	--	0.0	0.2	0.4	0.4	1.0	1.6	4.4	7.4	16.9	30.1	52.1	85.4	135.7	166.0	189.1	184.6	72
Other Sites	8.1	2.4	3.9	4.6	3.7	4.5	7.4	11.2	16.1	24.1	33.0	54.1	75.4	102.7	159.2	218.6	275.6	312.6	71

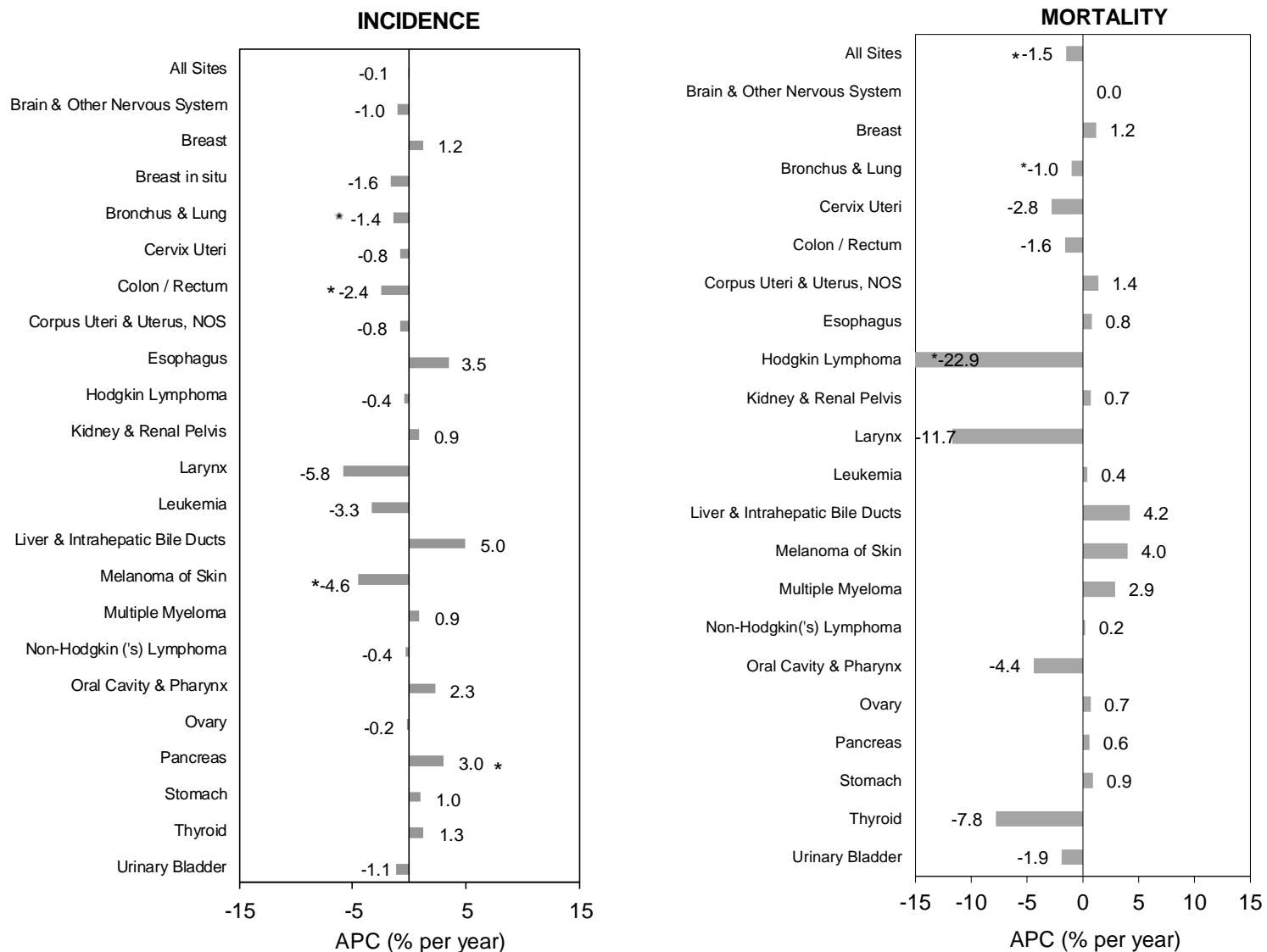
¹ per 100,000 ² Breast *in situ* is excluded from 'All Sites'. ³ Dashes indicate age groups with no incident cases or cancers found in only one sex. Source: Massachusetts Cancer Registry

Figure 5.
ANNUAL PERCENT CHANGE (APC) IN AGE-ADJUSTED CANCER RATES AMONG MALES
Massachusetts, 2010-2014



*APC is statistically significant ($p \leq 0.05$). Values appearing directly on a bar have been bolded for ease of reading only. Source: Massachusetts Cancer Registry.

Figure 6.
ANNUAL PERCENT CHANGE (APC) IN AGE-ADJUSTED CANCER RATES AMONG FEMALES
Massachusetts, 2010-2014



*APC is statistically significant ($p \leq 0.05$). Values appearing directly on a bar have been bolded for ease of reading only. Source: Massachusetts Cancer Registry.

Table 4.
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
MALES

Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	532.9	538.8	500.2	482.9	479.4
Brain & Other Nervous System	8.3	7.9	7.4	9.1	7.5
Breast	1.2	1.5	1.2	1.5	1.7
Breast <i>in situ</i>³	0.2	0.2	0.2	0.1	0.1
Bronchus & Lung	73.3	74.6	71.3	67.0	68.1
Colon / Rectum	44.7	43.5	42.2	40.7	44.0
Esophagus	9.9	11.0	9.8	9.8	9.1
Hodgkin Lymphoma	3.4	3.6	3.6	3.1	3.2
Kidney & Renal Pelvis	20.0	20.6	20.8	23.3	23.2
Larynx	6.0	5.3	5.2	6.3	5.7
Leukemia	15.8	17.4	17.6	16.1	16.3
Liver & Intrahepatic Bile Ducts	12.9	12.4	14.2	12.5	12.4
Melanoma of Skin	25.0	29.1	25.8	25.0	22.8
Multiple Myeloma	7.8	7.9	8.2	8.8	7.5
Non-Hodgkin Lymphoma	23.7	22.1	22.6	23.2	23.4
Oral Cavity & Pharynx	17.7	18.0	18.7	16.8	18.0
Pancreas	13.0	14.3	14.3	14.7	13.9
Prostate	140.5	138.2	106.9	97.6	92.9
Stomach	10.0	9.0	8.9	10.3	9.9
Testis	5.6	6.7	6.7	6.6	6.5
Thyroid	9.4	10.8	10.4	9.3	11.6
Urinary Bladder	40.3	41.6	42.3	39.6	39.0

Rates are age-adjusted to the 2000 U.S. Standard Population.

²per 100,000 males

³Breast *in situ* is excluded from “All Sites”

Source: Massachusetts Cancer Registry

Table 5.
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	444.4	457.4	457.0	447.0	446.5
Brain & Other Nervous System	5.8	6.3	5.6	6.1	5.6
Breast	130.7	137.3	137.1	137.4	138.6
Breast <i>in situ</i> ³	44.9	41.6	42.6	42.6	40.9
Bronchus & Lung	62.7	60.7	61.2	60.7	58.5
Cervix Uteri	5.6	5.1	5.0	4.9	5.5
Colon / Rectum	35.9	34.3	33.2	33.1	32.3
Corpus Uteri & Uterus, NOS	28.1	31.2	28.3	29.8	27.6
Esophagus	2.4	2.0	1.7	2.4	2.6
Hodgkin Lymphoma	2.6	2.7	2.6	2.4	2.7
Kidney & Renal Pelvis	10.4	10.6	10.9	10.7	10.8
Larynx	1.5	1.4	1.8	1.2	1.2
Leukemia	10.7	10.3	10.0	10.2	9.1
Liver & Intrahepatic Bile Ducts	3.5	3.3	3.8	4.1	4.0
Melanoma of Skin	18.4	18.6	17.8	16.2	15.6
Multiple Myeloma	4.4	6.0	5.2	5.3	4.9
Non-Hodgkin Lymphoma	16.7	15.5	17.8	16.7	15.8
Oral Cavity & Pharynx	6.5	6.2	7.9	7.3	6.7
Ovary	10.6	12.2	12.9	10.5	11.3
Pancreas	10.7	11.0	11.0	11.6	12.1
Stomach	4.7	4.5	4.3	4.4	5.0
Thyroid	27.4	30.7	29.7	26.9	31.2
Urinary Bladder	10.9	12.1	11.7	10.8	10.9

Rates are age-adjusted to the 2000 U.S. Standard Population.

²per 100,000 males

³Breast *in situ* is excluded from "All Sites"

Source: Massachusetts Cancer Registry

Table 6.
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014

TOTAL					
Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	479.5	489.8	472.4	459.3	456.9
Brain & Other Nervous System	7.0	7.0	6.4	7.5	6.4
Breast	--	--	--	--	--
Breast <i>in situ</i>³	--	--	--	--	--
Bronchus & Lung	66.7	66.4	65.1	63.1	62.3
Cervix Uteri	--	--	--	--	--
Colon / Rectum	39.8	38.3	37.2	36.5	37.5
Corpus Uteri & Uterus, NOS	--	--	--	--	--
Esophagus	5.7	5.9	5.3	5.7	5.5
Hodgkin Lymphoma	3.0	3.1	3.1	2.7	3.0
Kidney & Renal Pelvis	14.8	15.2	15.5	16.4	16.5
Larynx	3.5	3.2	3.3	3.5	3.2
Leukemia	12.8	13.4	13.4	12.8	12.2
Liver & Intrahepatic Bile Ducts	7.8	7.5	8.5	8.0	7.8
Melanoma of Skin	21.1	22.9	21.0	19.8	18.7
Multiple Myeloma	5.9	6.9	6.5	6.8	6.1
Non-Hodgkin Lymphoma	19.8	18.3	19.8	19.6	19.2
Oral Cavity & Pharynx	11.7	11.6	12.9	11.7	11.9
Ovary	--	--	--	--	--
Pancreas	11.8	12.5	12.6	13.0	12.9
Prostate	--	--	--	--	--
Stomach	6.9	6.5	6.4	7.0	7.2
Testis	--	--	--	--	--
Thyroid	18.7	21.0	20.3	18.4	21.7
Urinary Bladder	23.2	24.6	24.8	23.1	22.8

Rates are age-adjusted to the 2000 U.S. Standard Population.

²per 100,000 total population

³Breast *in situ* is excluded from "All Sites"

⁴Dashes indicate cancers found in only one sex or predominantly in one sex (breast cancer).

Source: Massachusetts Cancer Registry

Table 7.
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
MALES

Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	199.8	194.2	187.2	186.0	184.6
Brain & Other Nervous System	4.9	5.1	4.9	5.2	5.1
Breast	0.2	0.2	0.4	0.4	0.4
Bronchus & Lung	49.9	47.9	48.6	47.3	46.8
Colon / Rectum	15.4	14.8	14.6	14.1	15.0
Esophagus	7.5	8.3	8.5	7.6	8.2
Hodgkin Lymphoma	0.5	0.2	0.3	0.3	0.3
Kidney & Renal Pelvis	3.6	4.0	4.5	4.8	5.4
Larynx	1.7	1.6	1.2	1.4	1.5
Leukemia	8.2	8.4	8.1	9.1	8.2
Liver & Intrahepatic Bile Ducts	9.0	9.0	8.8	10.5	9.7
Melanoma of Skin	4.0	3.7	3.8	4.1	3.9
Multiple Myeloma	3.3	3.8	3.7	3.4	4.2
Non-Hodgkin Lymphoma	6.7	7.1	5.9	6.4	6.6
Oral Cavity & Pharynx	3.9	3.5	3.6	3.6	3.2
Pancreas	10.8	11.9	11.2	12.6	12.0
Prostate	18.4	17.3	17.5	17.8	18.2
Stomach	3.8	3.8	3.9	3.5	4.2
Testis	0.1	0.1	0.2	0.2	0.03
Thyroid	0.4	0.7	0.6	0.8	0.5
Urinary Bladder	8.4	7.5	7.2	7.9	7.7

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000 males

Source: Massachusetts Vital Statistics

Table 8
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	140.1	137.1	136.2	136.2	130.1
Brain & Other Nervous System	3.1	3.3	3.5	3.3	3.1
Breast	17.0	17.9	18.1	17.8	18.1
Bronchus & Lung	36.6	35.7	36.0	35.1	35.1
Cervix Uteri	1.2	1.4	1.1	0.9	1.3
Colon / Rectum	11.7	9.9	10.5	11.1	10.2
Corpus Uteri & Uterus, NOS	3.9	4.3	3.9	4.9	4.4
Esophagus	1.7	1.5	1.4	1.3	1.9
Hodgkin Lymphoma	0.3	0.3	0.2	0.2	0.1
Kidney & Renal Pelvis	1.7	2.2	1.9	2.1	1.8
Larynx	0.5	0.5	0.3	0.4	0.3
Leukemia	4.6	4.5	4.7	5.1	4.4
Liver & Intrahepatic Bile Ducts	3.4	2.9	3.2	3.7	3.7
Melanoma of Skin	1.6	1.8	1.8	2.1	1.8
Multiple Myeloma	2.3	2.5	2.7	2.6	2.6
Non-Hodgkin Lymphoma	4.2	4.0	4.1	4.3	4.1
Oral Cavity & Pharynx	1.7	1.1	1.1	1.2	1.3
Ovary	6.4	7.7	6.7	7.8	6.6
Pancreas	9.2	9.4	9.2	9.0	9.7
Stomach	2.3	2.1	2.2	2.5	2.2
Thyroid	0.6	0.5	0.2	0.5	0.4
Urinary Bladder	2.5	2.3	2.4	2.7	2.1

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000 females

Source: Massachusetts Vital Statistics

Table 9.
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 2010-2014
TOTAL³

Cancer Site / Type	2010	2011	2012	2013	2014
All Sites	163.8	160.0	157.0	156.3	152.4
Brain & Other Nervous System	3.7	4.2	4.1	4.1	4.2
Breast	-	-	-	-	-
Bronchus & Lung	42.1	40.8	41.3	40.1	39.9
Cervix Uteri	-	-	-	-	-
Colon / Rectum	13.3	12.0	12.2	12.4	12.3
Corpus Uteri & Uterus, NOS	-	-	-	-	-
Esophagus	4.3	4.4	4.5	4.0	4.7
Hodgkin Lymphoma	0.4	0.2	0.2	0.3	0.2
Kidney & Renal Pelvis	2.5	3.0	3.1	3.2	3.4
Larynx	1.0	1.0	0.7	0.8	0.8
Leukemia	6.1	6.2	6.2	6.8	5.9
Liver & Intrahepatic Bile Ducts	5.9	5.7	5.7	6.8	6.3
Melanoma of Skin	2.6	2.6	2.6	2.9	2.6
Multiple Myeloma	2.7	3.1	3.2	2.9	3.3
Non-Hodgkin Lymphoma	5.3	5.3	4.8	5.2	5.2
Oral Cavity & Pharynx	2.7	2.2	2.2	2.3	2.2
Ovary	3.6	4.3	3.8	4.4	3.7
Pancreas	9.9	10.5	10.2	10.6	10.7
Prostate	-	-	-	-	-
Stomach	2.9	2.8	3.0	2.9	3.1
Testis	-	-	-	-	-
Thyroid	0.5	0.6	0.4	0.6	0.4
Urinary Bladder	4.9	4.4	4.3	4.7	4.4

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000 total population

³Dashes indicate cancers found in only one sex or predominantly in one sex (breast cancer).

Table 10.
FIVE LEADING CANCER INCIDENCE RATES BY RACE/ETHNICITY AND SEX
Massachusetts, 2010-2014

MALES

AGE-ADJUSTED¹ INCIDENCE RATE²				
RANK	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Prostate 106.3	Prostate 198.5	Bronchus & Lung 58.5	Prostate 123.1
2	Bronchus & Lung 72.5	Bronchus & Lung 69.7	Prostate 56.7	Bronchus & Lung 39.7
3	Colon / Rectum 43.0	Colon / Rectum 46.8	Colon / Rectum 34.5	Colon / Rectum 36.2
4	Urinary Bladder 42.9	Kidney & Renal Pelvis 21.1	Liver & Intrahepatic Bile Ducts 28.5	Liver & Intrahepatic Bile Ducts 23.0
5	Melanoma of Skin 27.8	Liver & Intrahepatic Bile Ducts 20.0	Urinary Bladder 14.4	Non-Hodgkin Lymphoma 19.5

FEMALES

AGE-ADJUSTED¹ INCIDENCE RATE²				
RANK	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Breast ³ 142.3	Breast 116.4	Breast 90.2	Breast 88.4
2	Bronchus & Lung 64.1	Bronchus & Lung 46.8	Bronchus & Lung 33.7	Bronchus & Lung 28.4
3	Colon / Rectum 33.7	Colon / Rectum 37.2	Colon / Rectum 28.5	Thyroid 27.5
4	Corpus Uteri & Uterus, NOS 30.2	Corpus Uteri & Uterus, NOS 24.8	Thyroid 27.7	Colon / Rectum 27.2
5	Thyroid 29.5	Thyroid 23.4	Corpus Uteri & Uterus, NOS 13.2	Corpus Uteri & Uterus, NOS 21.2

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Breast cancer rates do not include *in situ* cases.

Source: Massachusetts Cancer Registry

Table 11.
NUMBER AND PERCENTAGE OF INCIDENT CASES FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
MALES

Cancer Site / Type	All Races ²		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases
All Sites	87975	100.0	76150	100.0	4498	100.0	2109	100.0	3270	100.0
Brain & Other Nervous System	1351	1.5	1193	1.6	47	1.0	27	1.3	71	2.2
Breast ³	244	0.3	216	0.3	9	0.2	12	0.6	6	0.2
Bronchus & Lung	11951	13.6	10783	14.2	512	11.4	341	16.2	267	8.2
Colon / Rectum	7338	8.3	6361	8.4	381	8.5	235	11.1	267	8.2
Esophagus	1745	2.0	1612	2.1	58	1.3	36	1.7	26	0.8
Hodgkin Lymphoma	558	0.6	447	0.6	38	0.8	16	0.8	50	1.5
Kidney & Renal Pelvis	3809	4.3	3340	4.4	182	4.0	72	3.4	167	5.1
Larynx	1017	1.2	894	1.2	47	1.0	11	0.5	50	1.5
Leukemia	2769	3.1	2418	3.2	107	2.4	59	2.8	110	3.4
Liver & Intrahepatic Bile Ducts	2368	2.7	1757	2.3	188	4.2	199	9.4	199	6.1
Melanoma of Skin	4342	4.9	4064	5.3	8	0.2	8	0.4	15	0.5
Multiple Myeloma	1384	1.6	1145	1.5	119	2.6	33	1.6	62	1.9
Non-Hodgkin Lymphoma	3902	4.4	3436	4.5	165	3.7	81	3.8	174	5.3
Oral Cavity & Pharynx	3256	3.7	2869	3.8	129	2.9	105	5.0	128	3.9
Pancreas	2413	2.7	2160	2.8	122	2.7	42	2.0	72	2.2
Prostate	21290	24.2	17259	22.7	1732	38.5	358	17.0	970	29.7
Stomach	1633	1.9	1294	1.7	127	2.8	75	3.6	121	3.7
Testis	1021	1.2	907	1.2	17	0.4	19	0.9	60	1.8
Thyroid	1780	2.0	1506	2.0	62	1.4	101	4.8	68	2.1
Urinary Bladder	6726	7.6	6306	8.3	122	2.7	82	3.9	118	3.6
Other Sites	7078	8.0	6183	8.1	326	7.2	197	9.3	269	8.2

¹ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category.

² The number of cases for all races is not the sum of cases by race/ethnicity. ³ Breast *in situ* cases are excluded from 'All Sites' and breast cancer counts.

Source: Massachusetts Cancer Registry

Table 12.
NUMBER AND PERCENTAGE OF INCIDENT CASES FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	All Races ²		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases
All Sites	94299	100.0	82633	100.0	4310	100.0	2555	100.0	3648	100.0
Brain & Other Nervous System	1133	1.2	977	1.2	46	1.1	39	1.5	62	1.7
Breast ³	28065	29.8	24764	30.0	1286	29.8	811	31.7	1030	28.2
Bronchus & Lung	13091	13.9	12056	14.6	484	11.2	244	9.5	260	7.1
Cervix Uteri	958	1.0	692	0.8	91	2.1	64	2.5	100	2.7
Colon / Rectum	7355	7.8	6385	7.7	405	9.4	220	8.6	271	7.4
Corpus Uteri & Uterus, NOS	6260	6.6	5552	6.7	276	6.4	117	4.6	243	6.7
Esophagus	489	0.5	441	0.5	20	0.5	11	0.4	14	0.4
Hodgkin Lymphoma	461	0.5	383	0.5	15	0.3	11	0.4	49	1.3
Kidney & Renal Pelvis	2221	2.4	1936	2.3	122	2.8	37	1.4	104	2.9
Larynx	311	0.3	280	0.3	15	0.3	5	0.2	8	0.2
Leukemia	2061	2.2	1750	2.1	86	2.0	65	2.5	105	2.9
Liver & Intrahepatic Bile Ducts	822	0.9	634	0.8	54	1.3	67	2.6	60	1.6
Melanoma of Skin	3520	3.7	3233	3.9	13	0.3	9	0.4	35	1.0
Multiple Myeloma	1139	1.2	874	1.1	148	3.4	21	0.8	77	2.1
Non-Hodgkin Lymphoma	3537	3.8	3069	3.7	141	3.3	78	3.1	176	4.8
Oral Cavity & Pharynx	1487	1.6	1293	1.6	54	1.3	56	2.2	64	1.8
Ovary	2420	2.6	2140	2.6	92	2.1	79	3.1	79	2.2
Pancreas	2543	2.7	2247	2.7	135	3.1	63	2.5	79	2.2
Stomach	1001	1.1	763	0.9	88	2.0	68	2.7	74	2.0
Thyroid	5323	5.6	4228	5.1	271	6.3	277	10.8	397	10.9
Urinary Bladder	2498	2.6	2314	2.8	71	1.6	18	0.7	50	1.4
Other Sites	7604	8.1	6622	8.0	397	9.2	195	7.6	311	8.5

¹ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category.

² The number of cases for all races is not the sum of cases by race/ethnicity. ³ Breast *in situ* cases are excluded from 'All Sites' and from breast cancer counts.

Source: Massachusetts Cancer Registry

Table 13.
NUMBER AND PERCENTAGE OF INCIDENT CASES FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
TOTAL²

Cancer Site / Type	All Races ³		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases	Cases	% of Cases
All Sites	182288	100.0	158794	100.0	8809	100.0	4665	100.0	6918	100.0
Brain & Other Nervous System	2485	1.4	2171	1.4	93	1.1	66	1.4	133	1.9
Breast ⁴	28310	15.5	24981	15.7	1295	14.7	823	17.6	1036	15.0
Bronchus & Lung	25043	13.7	22840	14.4	996	11.3	585	12.5	527	7.6
Cervix Uteri	958	0.5	692	0.4	91	1.0	64	1.4	100	1.4
Colon / Rectum	14694	8.1	12747	8.0	786	8.9	455	9.8	538	7.8
Corpus Uteri & Uterus, NOS	6260	3.4	5552	3.5	276	3.1	117	2.5	243	3.5
Esophagus	2234	1.2	2053	1.3	78	0.9	47	1.0	40	0.6
Hodgkin Lymphoma	1020	0.6	831	0.5	53	0.6	27	0.6	99	1.4
Kidney & Renal Pelvis	6030	3.3	5276	3.3	304	3.5	109	2.3	271	3.9
Larynx	1328	0.7	1174	0.7	62	0.7	16	0.3	58	0.8
Leukemia	4830	2.6	4168	2.6	193	2.2	124	2.7	215	3.1
Liver & Intrahepatic Bile Ducts	3192	1.8	2391	1.5	242	2.7	267	5.7	259	3.7
Melanoma of Skin	7863	4.3	7298	4.6	21	0.2	17	0.4	50	0.7
Multiple Myeloma	2523	1.4	2019	1.3	267	3.0	54	1.2	139	2.0
Non-Hodgkin Lymphoma	7440	4.1	6506	4.1	306	3.5	159	3.4	350	5.1
Oral Cavity & Pharynx	4743	2.6	4162	2.6	183	2.1	161	3.5	192	2.8
Ovary	2421	1.3	2141	1.3	92	1.0	79	1.7	79	1.1
Pancreas	4956	2.7	4407	2.8	257	2.9	105	2.3	151	2.2
Prostate	21290	11.7	17259	10.9	1732	19.7	358	7.7	970	14.0
Stomach	2634	1.4	2057	1.3	215	2.4	143	3.1	195	2.8
Testis	1021	0.6	907	0.6	17	0.2	19	0.4	60	0.9
Thyroid	7104	3.9	5734	3.6	334	3.8	378	8.1	465	6.7
Urinary Bladder	9225	5.1	8621	5.4	193	2.2	100	2.1	168	2.4
Other Sites	14684	8.1	12807	8.1	723	8.2	392	8.4	580	8.4

¹ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category.

²Total includes persons classified as a transsexual and persons of unknown sex. ³The number of cases for all races is not the sum of cases by race/ethnicity.

⁴Breast in situ cases are excluded from 'All Sites' and from breast cancer counts. Source: Massachusetts Cancer Registry

Table 14.
AGE-ADJUSTED¹ INCIDENCE RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
MALES

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	505.7	502.3-509.2	506.7	503.0-510.3	537.9	521.0-554.9	317.2	302.8-331.7	398.8	383.1-414.5
Brain & Other Nervous System	8.0	7.6-8.5	8.6	8.1-9.1	4.8	3.4-6.3	3.2	1.9-4.6	6.1	4.3-7.9
Breast	1.4	1.2-1.6	1.5	1.3-1.7	*	*	*	*	*	*
Breast <i>in situ</i>⁴	0.1	0.1-0.2	*	*	*	*	*	*	*	*
Bronchus & Lung	70.8	69.5-72.1	72.5	71.1-73.9	69.7	63.2-76.2	58.5	51.9-65.1	39.7	34.4-45.0
Colon / Rectum	43.0	42.0-44.0	43.0	41.9-44.1	46.8	41.7-51.9	34.5	29.8-39.1	36.2	31.1-41.2
Esophagus	9.9	9.4-10.4	10.4	9.9-11.0	7.5	5.4-9.5	5.8	3.8-7.9	4.2	2.4-5.9
Hodgkin Lymphoma	3.4	3.1-3.7	3.5	3.2-3.8	3.4	2.3-4.5	*	*	3.7	2.4-5.0
Kidney & Renal Pelvis	21.6	20.9-22.3	22.2	21.4-23.0	21.1	17.8-24.4	10.1	7.6-12.5	17.7	14.6-20.8
Larynx	5.7	5.3-6.0	5.7	5.3-6.1	5.9	4.1-7.7	*	*	6.0	4.1-7.9
Leukemia	16.6	16.0-17.3	17.0	16.3-17.7	11.7	9.3-14.1	8.3	6.0-10.6	11.3	8.7-13.9
Liver & Intrahepatic Bile Ducts	12.9	12.4-13.4	11.0	10.5-11.6	20.0	17.0-23.1	28.5	24.3-32.7	23.0	19.4-26.6
Melanoma of Skin	25.5	24.7-26.3	27.8	26.9-28.7	*	*	*	*	*	*
Multiple Myeloma	8.0	7.6-8.5	7.6	7.2-8.1	15.6	12.6-18.6	5.0	3.2-6.8	7.4	5.3-9.4
Non-Hodgkin Lymphoma	23.0	22.3-23.7	23.5	22.7-24.3	18.1	15.1-21.1	11.0	8.5-13.6	19.5	16.1-22.9
Oral Cavity & Pharynx	17.8	17.2-18.5	18.3	17.6-18.9	14.6	11.9-17.3	14.0	11.2-16.8	15.7	12.6-18.8
Pancreas	14.0	13.5-14.6	14.3	13.7-14.9	16.6	13.4-19.8	6.7	4.5-8.9	9.8	7.2-12.4
Prostate	114.4	112.8-115.9	106.3	104.7-108.0	198.5	188.6-208.5	56.7	50.5-62.8	123.1	114.5-131.6
Stomach	9.6	9.2-10.1	8.8	8.3-9.3	16.9	13.7-20.1	11.9	9.0-14.8	16.2	12.9-19.5
Testis	6.4	6.0-6.8	7.7	7.2-8.2	*	*	*	*	3.3	2.4-4.2
Thyroid	10.3	9.8-10.8	10.7	10.1-11.3	6.6	4.9-8.4	11.3	9.0-13.6	5.5	4.1-6.9
Urinary Bladder	40.6	39.6-41.5	42.9	41.9-44.0	17.0	13.8-20.3	14.4	11.1-17.7	17.6	13.9-21.2

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category. ⁴ Breast *in situ* is excluded from 'All Sites'.

*An age-adjusted incidence rate was not calculated when there were fewer than 20 cases.

Source: Massachusetts Cancer Registry

Table 15.
AGE-ADJUSTED¹ INCIDENCE RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	450.4	447.4-453.3	463.4	460.1-466.7	396.2	384.2-408.3	304.0	291.7-316.3	326.0	314.6-337.5
Brain & Other Nervous System	5.9	5.5-6.2	6.2	5.8-6.6	4.0	2.8-5.1	4.3	2.9-5.6	4.9	3.5-6.3
Breast	136.3	134.7-137.9	142.3	140.5-144.2	116.4	110.0-122.9	90.2	83.8-96.6	88.4	82.7-94.2
Breast <i>in situ</i>⁴	42.5	41.6-43.4	44.4	43.3-45.4	40.1	36.3-43.9	30.1	26.5-33.7	30.7	27.5-34.0
Bronchus & Lung	60.7	59.7-61.8	64.1	62.9-65.2	46.8	42.6-51.1	33.7	29.3-38.0	28.4	24.7-32.0
Cervix Uteri	5.2	4.9-5.6	4.8	4.4-5.2	8.2	6.5-9.9	6.9	5.1-8.6	8.4	6.6-10.2
Colon / Rectum	33.7	32.9-34.5	33.7	32.8-34.6	37.2	33.5-40.9	28.5	24.6-32.4	27.2	23.8-30.7
Corpus Uteri & Uterus, NOS	29.0	28.3-29.7	30.2	29.3-31.0	24.8	21.8-27.8	13.2	10.7-15.7	21.2	18.4-24.0
Esophagus	2.2	2.0-2.4	2.3	2.1-2.5	1.8	1.0-2.5	*	*	*	*
Hodgkin Lymphoma	2.6	2.3-2.8	2.8	2.5-3.1	*	*	*	*	3.3	2.3-4.4
Kidney & Renal Pelvis	10.7	10.2-11.1	10.9	10.4-11.4	11.1	9.1-13.1	4.8	3.2-6.4	8.9	7.1-10.8
Larynx	1.4	1.3-1.6	1.5	1.3-1.7	1.4	0.7-2.1	*	*	*	*
Leukemia	10.0	9.6-10.5	10.0	9.5-10.5	7.8	6.1-9.4	7.2	5.4-9.1	8.5	6.7-10.4
Liver & Intrahepatic Bile Ducts	3.7	3.5-4.0	3.3	3.0-3.6	4.7	3.4-6.0	9.2	6.9-11.5	6.7	4.9-8.5
Melanoma of Skin	17.3	16.7-17.9	19.3	18.6-20.0	*	*	*	*	3.0	1.9-4.1
Multiple Myeloma	5.2	4.9-5.5	4.5	4.2-4.8	14.2	11.9-16.5	2.8	1.6-4.1	7.5	5.7-9.2
Non-Hodgkin Lymphoma	16.5	15.9-17.0	16.6	16.0-17.2	12.8	10.6-14.9	9.5	7.3-11.7	16.8	14.1-19.5
Oral Cavity & Pharynx	6.9	6.6-7.3	6.9	6.6-7.3	4.6	3.4-5.9	7.3	5.3-9.3	6.4	4.7-8.1
Ovary	11.5	11.0-12.0	12.0	11.4-12.5	8.2	6.5-9.9	9.0	6.9-11.1	6.6	5.1-8.2
Pancreas	11.3	10.8-11.7	11.3	10.9-11.8	13.0	10.7-15.2	8.9	6.6-11.2	8.0	6.1-9.9
Stomach	4.6	4.3-4.9	3.9	3.6-4.2	8.6	6.7-10.4	8.8	6.6-11.0	7.2	5.4-8.9
Thyroid	29.2	28.4-30.0	29.5	28.5-30.4	23.4	20.6-26.2	27.7	24.3-31.0	27.5	24.6-30.3
Urinary Bladder	11.3	10.8-11.7	11.9	11.4-12.4	7.2	5.5-8.9	2.5	1.3-3.7	5.5	3.9-7.2

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category. ⁴ Breast *in situ* cases are excluded from 'All Sites'.

* An age-adjusted incidence rate was not calculated when there were fewer than 20 cases.

Source: Massachusetts Cancer Registry

Table 16.
AGE-ADJUSTED¹ INCIDENCE RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
TOTAL

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	471.1	468.9-473.3	478.5	476.0-480.9	453.4	443.6-463.2	308.5	299.2-317.9	354.3	345.0-363.6
Brain & Other Nervous System	6.9	6.6-7.1	7.3	7.0-7.6	4.3	3.4-5.2	3.8	2.8-4.7	5.5	4.4-6.6
Breast	-- ⁵	--	--	--	--	--	--	--	--	--
Breast <i>in situ</i> ⁴	--	--	--	--	--	--	--	--	--	--
Bronchus & Lung	64.7	63.8-65.5	67.3	66.4-68.2	55.7	52.1-59.3	44.7	40.9-48.5	33.0	29.9-36.0
Cervix Uteri	--	--	--	--	--	--	--	--	--	--
Colon / Rectum	37.8	37.2-38.4	37.8	37.2-38.5	41.0	38.0-44.0	31.3	28.3-34.4	30.8	27.9-33.7
Corpus Uteri & Uterus, NOS	--	--	--	--	--	--	--	--	--	--
Esophagus	5.6	5.4-5.9	5.9	5.7-6.2	4.0	3.1-5.0	3.4	2.4-4.5	2.6	1.7-3.5
Hodgkin Lymphoma	3.0	2.8-3.1	3.1	2.9-3.4	2.3	1.6-2.9	1.1	0.7-1.6	3.5	2.7-4.3
Kidney & Renal Pelvis	15.7	15.3-16.1	16.1	15.6-16.5	15.4	13.6-17.1	7.2	5.8-8.7	12.7	11.1-14.4
Larynx	3.3	3.1-3.5	3.4	3.2-3.6	3.3	2.5-4.2	*	*	3.0	2.2-3.9
Leukemia	12.9	12.5-13.3	13.1	12.7-13.5	9.4	8.1-10.8	7.6	6.2-9.0	9.7	8.2-11.2
Liver & Intrahepatic Bile Ducts	7.9	7.6-8.2	6.8	6.5-7.1	11.4	9.9-12.9	18.2	15.9-20.5	13.9	12.1-15.8
Melanoma of Skin	20.6	20.2-21.1	22.8	22.2-23.3	1.1	0.6-1.6	*	*	2.4	1.6-3.2
Multiple Myeloma	6.4	6.2-6.7	5.9	5.6-6.1	14.7	12.9-16.6	3.8	2.8-4.9	7.4	6.1-8.8
Non-Hodgkin Lymphoma	19.3	18.9-19.8	19.7	19.2-20.1	15.1	13.4-16.9	10.3	8.6-11.9	18.0	15.9-20.1
Oral Cavity & Pharynx	12.0	11.6-12.3	12.2	11.9-12.6	8.9	7.6-10.3	10.5	8.8-12.2	10.4	8.8-12.1
Ovary	--	--	--	--	--	--	--	--	--	--
Pancreas	12.5	12.2-12.9	12.7	12.3-13.1	14.6	12.8-16.5	7.9	6.3-9.5	8.7	7.2-10.2
Prostate	--	--	--	--	--	--	--	--	--	--
Stomach	6.8	6.5-7.0	6.0	5.8-6.3	11.9	10.3-13.6	10.2	8.4-11.9	10.9	9.2-12.6
Testis	--	--	--	--	--	--	--	--	--	--
Thyroid	20.0	19.6-20.5	20.3	19.8-20.9	15.6	13.9-17.4	20.0	17.9-22.1	17.2	15.5-18.9
Urinary Bladder	23.7	23.2-24.2	25.1	24.6-25.7	11.2	9.5-12.8	7.8	6.2-9.4	10.4	8.7-12.2

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category. ⁴ Breast *in situ* cases are excluded from 'All Sites'.

⁵ Dashes indicate cancers found in only one sex or predominantly in one sex (breast cancer). * An age-adjusted incidence rate was not calculated when there were fewer than 20 cases. Source: Massachusetts Cancer Registry

Table 17.
FIVE LEADING CANCER MORTALITY RATES BY RACE/ETHNICITY AND SEX
Massachusetts, 2010-2014

MALES

AGE-ADJUSTED¹ MORTALITY RATE²				
RANK	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Bronchus & Lung 51.7	Bronchus & Lung 50.2	Bronchus & Lung 37.7	Bronchus & Lung 24.2
2	Prostate 18.1	Prostate 39.8	Liver & Intrahepatic Bile Duct 21.4	Prostate 15.8
3	Colon/Rectum 15.7	Colon/Rectum 17.2	Colon/Rectum 8.7	Liver & Intrahepatic Bile Duct 12.5
4	Pancreas 12.5	Liver & Intrahepatic Bile Duct 13.6	Prostate 7.2	Colon/Rectum 10.4
5	Leukemia 9.1	Pancreas 13.6	Pancreas 5.8	Pancreas 8.1

FEMALES

AGE-ADJUSTED¹ MORTALITY RATE²				
RANK	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Bronchus & Lung 39.2	Bronchus & Lung 27.9	Bronchus & Lung 17.5	Bronchus & Lung 12.0
2	Breast 18.8	Breast 19.7	Colon/Rectum 8.9	Breast 10.5
3	Colon/Rectum 10.8	Colon/Rectum 13.9	Breast 7.9	Colon/Rectum 9.2
4	Pancreas 9.8	Pancreas 10.1	Pancreas 7.1	Pancreas 6.3
5	Ovary 7.7	Corpus Uteri & Uterus, NOS 7.7	Liver & Intrahepatic Bile Duct 6.6	Liver & Intrahepatic Bile Duct 4.6

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

Source: Massachusetts Vital Statistics

Table 18.
NUMBER AND PERCENTAGE OF DEATHS FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
MALES

Cancer Site / Type	All Races ²		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths
All Sites	32258	100.0	29057	100.0	1487	100.0	715	100.0	865	100.0
Brain & Other Nervous System	894	2.8	827	2.8	27	1.8	11	1.5	23	2.7
Breast	64	0.2	62	0.2	2	0.1	0	0.0	0	0.0
Bronchus & Lung	8555	26.5	7789	26.8	359	24.1	211	29.5	164	19.0
Colon / Rectum	2590	8.0	2332	8.0	132	8.9	54	7.5	61	7.1
Esophagus	1485	4.6	1388	4.8	49	3.3	21	2.9	21	2.4
Hodgkin Lymphoma	57	0.2	47	0.2	2	0.1	2	0.3	6	0.7
Kidney & Renal Pelvis	818	2.5	754	2.6	32	2.1	8	1.1	22	2.5
Larynx	272	0.8	239	0.8	13	0.9	5	0.7	13	1.5
Leukemia	1430	4.4	1313	4.5	42	2.8	25	3.5	45	5.2
Liver & Intrahepatic Bile Ducts	1775	5.5	1398	4.8	120	8.1	140	19.6	107	12.4
Melanoma of Skin	687	2.1	672	2.3	5	0.3	1	0.1	5	0.6
Multiple Myeloma	640	2.0	551	1.9	52	3.5	12	1.7	22	2.5
Non-Hodgkin Lymphoma	1116	3.5	1021	3.5	40	2.7	15	2.1	34	3.9
Oral Cavity & Pharynx	668	2.1	576	2.0	40	2.7	22	3.1	26	3.0
Pancreas	2113	6.6	1915	6.6	95	6.4	34	4.8	59	6.8
Prostate	3001	9.3	2647	9.1	223	15.0	32	4.5	86	9.9
Stomach	670	2.1	535	1.8	46	3.1	33	4.6	53	6.1
Testis	22	0.1	21	0.1	0	0.0	0	0.0	1	0.1
Thyroid	103	0.3	96	0.3	3	0.2	2	0.3	2	0.2
Urinary Bladder	1318	4.1	1258	4.3	28	1.9	13	1.8	4	3.0
Other Sites	3980	12.3	3616	12.4	177	11.9	74	10.3	100	11.6

¹ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

² The number of deaths for all races is not the sum of deaths by race/ethnicity.

Source: Massachusetts Vital Statistics

Table 19.
NUMBER AND PERCENTAGE OF DEATHS FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	All Races ²		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths
All Sites	31413	100.0	28497	100.0	1423	100.0	585	100.0	798	100.0
Brain & Other Nervous System	699	2.2	643	2.3	18	1.3	18	3.1	19	2.4
Breast	4142	13.2	3733	13.1	213	15.0	64	10.9	117	14.7
Bronchus & Lung	8337	26.5	7801	27.4	290	20.4	119	20.3	104	13.0
Cervix Uteri	251	0.8	199	0.7	23	1.6	6	1.0	19	2.4
Colon / Rectum	2640	8.4	2336	8.2	147	10.3	63	10.8	83	10.4
Corpus Uteri & Uterus, NOS	1029	3.3	885	3.1	82	5.8	20	4.5	36	4.5
Esophagus	372	1.2	338	1.2	13	0.9	8	1.4	11	1.4
Hodgkin Lymphoma	48	0.1	44	0.1	0	0.0	1	0.2	3	0.4
Kidney & Renal Pelvis	480	1.5	453	1.6	12	0.8	2	0.3	9	1.1
Larynx	93	0.3	88	0.3	2	0.1	1	0.2	2	0.3
Leukemia	1100	3.5	987	3.5	52	3.7	17	2.9	40	5.0
Liver & Intrahepatic Bile Ducts	799	2.5	668	2.3	40	2.8	50	8.6	40	5.0
Melanoma of Skin	420	1.3	409	1.4	4	0.3	2	0.3	4	0.5
Multiple Myeloma	635	2.0	536	1.9	67	4.7	5	0.9	24	3.0
Non-Hodgkin Lymphoma	1019	3.2	931	3.3	33	2.3	19	3.3	34	4.3
Oral Cavity & Pharynx	311	1.0	281	1.0	8	0.6	9	1.5	11	1.4
Ovary	1656	5.3	1528	5.4	69	4.8	28	4.8	26	3.3
Pancreas	2274	7.2	2057	7.2	105	7.4	46	7.9	58	7.3
Stomach	541	1.7	438	1.5	40	2.8	26	4.4	32	4.0
Thyroid	109	0.4	90	0.3	7	0.5	4	0.7	8	1.0
Urinary Bladder	614	2.0	588	2.1	18	1.3	3	0.5	5	0.6
Other Sites	3844	12.2	3464	12.2	180	12.7	74	12.7	113	14.2

¹ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

² The number of deaths for all races is not the sum of deaths by race/ethnicity.

Source: Massachusetts Vital Statistics

Table 20.
NUMBER AND PERCENTAGE OF DEATHS FOR SELECTED CANCER SITES BY RACE/ETHNICITY¹
Massachusetts, 2010-2014
TOTAL

Cancer Site / Type	All Races ²		White, non-Hispanic		Black, non-Hispanic		Asian, non-Hispanic		Hispanic	
	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths	Deaths	% of Deaths
All Sites	63671	100.0	57554	100.0	2910	100.0	1300	100.0	1663	100.0
Brain & Other Nervous System	1593	2.5	1470	2.6	45	1.6	29	2.2	42	2.5
Breast	4206	6.6	3795	6.6	215	7.4	64	4.9	117	7.0
Bronchus & Lung	16892	26.5	15590	27.1	649	22.3	330	25.4	268	16.1
Cervix Uteri	251	0.4	23	0.8	23	0.8	6	0.5	19	1.1
Colon / Rectum	5230	8.2	4668	8.1	279	9.6	117	9.0	144	8.7
Corpus Uteri & Uterus, NOS	1029	1.6	82	2.8	82	2.8	20	1.5	36	2.2
Esophagus	1857	2.9	1726	3.0	62	2.1	29	2.2	32	1.9
Hodgkin Lymphoma	105	0.2	91	0.2	2	0.1	3	0.2	9	0.5
Kidney & Renal Pelvis	1298	2.0	1207	2.1	44	1.5	10	0.8	31	1.9
Larynx	365	0.6	327	0.6	15	0.5	6	0.5	15	0.9
Leukemia	2530	4.0	2300	4.0	94	3.2	42	3.2	85	5.1
Liver & Intrahepatic Bile Ducts	2574	4.0	2066	3.6	160	5.5	190	14.6	147	8.8
Melanoma of Skin	1107	1.7	1081	1.9	9	0.3	3	0.2	9	0.5
Multiple Myeloma	1275	2.0	1087	1.9	119	4.1	17	1.3	46	2.8
Non-Hodgkin Lymphoma	2135	3.4	1952	3.4	73	2.5	34	2.6	68	4.1
Oral Cavity & Pharynx	979	1.5	857	1.5	48	1.7	31	2.4	37	2.2
Ovary	1656	2.6	1528	2.7	69	2.4	28	2.2	26	1.6
Pancreas	4387	6.9	3972	6.9	200	6.9	80	6.2	117	7.0
Prostate	3001	4.7	2647	4.6	223	7.7	32	2.5	86	5.2
Stomach	1211	1.9	973	1.7	86	3.0	59	4.5	85	5.1
Testis	22	0.03	21	0.5	0	0.0	0	0.0	1	0.0
Thyroid	212	0.3	186	3.2	10	0.3	6	0.5	10	0.6
Urinary Bladder	1932	3.0	1846	3.2	46	1.6	16	1.2	20	1.2
Other Sites	7824	12.3	7080	12.3	357	12.3	148	11.4	213	12.8

¹ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

² The number of deaths for all races is not the sum of deaths by race/ethnicity.

Source: Massachusetts Vital Statistics

Table 21.
AGE-ADJUSTED¹ MORTALITY RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
MALES

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	190.2	188.1-192.2	193.6	191.4-195.8	210.1	199.4-220.8	121.5	112.6-130.4	125.5	117.2-133.9
Brain & Other Nervous System	5.1	4.7-5.4	5.5	5.1-5.8	2.7	1.7-3.8	*	*	2.4	1.4-3.4
Breast	0.4	0.3-0.5	0.4	0.3-0.5	*	*	*	*	*	*
Bronchus & Lung	50.3	49.3-51.4	51.7	50.6-52.9	50.2	45.0-55.4	37.7	32.6-42.8	24.2	20.5-27.9
Colon / Rectum	15.3	14.8-15.9	15.6	15.0-16.3	17.2	14.3-20.2	8.7	6.4-11.0	10.4	7.8-13.0
Esophagus	8.4	8.0-8.8	8.9	8.4-9.4	6.5	4.7-8.3	4.4	2.5-6.2	3.1	1.8-4.5
Hodgkin Lymphoma	0.3	0.3-0.4	0.3	0.2-0.5	*	*	*	*	*	*
Kidney & Renal Pelvis	4.7	4.4-5.0	4.9	4.5-5.2	5.0	3.3-6.8	*	*	2.5	1.5-3.6
Larynx	1.6	1.4-1.8	1.6	1.4-1.8	*	*	*	*	*	*
Leukemia	8.7	8.3-9.2	9.1	8.6-9.5	6.0	4.2-7.8	4.3	2.6-6.0	6.2	4.4-8.0
Liver & Intrahepatic Bile Ducts	9.8	9.3-10.3	8.8	8.3-9.3	13.6	11.2-16.1	21.4	17.9-25.0	12.5	10.1-14.8
Melanoma of Skin	4.1	3.7-4.4	4.5	4.2-4.9	*	*	*	*	*	*
Multiple Myeloma	3.8	3.5-4.1	3.7	3.4-4.0	7.3	5.3-9.3	*	*	4.2	2.4-6.0
Non-Hodgkin Lymphoma	6.8	6.4-7.2	7.0	6.5-7.4	5.2	3.6-6.9	*	*	4.2	2.8-5.6
Oral Cavity & Pharynx	3.7	3.5-4.0	3.7	3.4-4.0	4.9	3.4-6.4	3.1	1.8-4.4	3.7	2.3-5.1
Pancreas	12.2	11.7-12.7	12.5	12.0-13.1	13.6	10.9-16.3	5.8	3.8-7.7	8.1	6.0-10.1
Prostate	18.6	17.9-19.3	18.1	17.5-18.8	39.8	34.6-45.0	7.2	4.7-9.8	15.8	12.5-19.2
Stomach	4.0	3.7-4.3	3.6	3.3-3.9	6.6	4.7-8.6	5.1	3.4-6.9	7.6	5.6-9.7
Testis	0.1	0.1-0.2	0.1	0.1-0.2	*	*	*	*	*	*
Thyroid	0.6	0.5-0.7	0.6	0.5-0.8	*	*	*	*	*	*
Urinary Bladder	8.1	7.6-8.5	8.5	8.1-9.0	4.8	3.0-6.6	*	*	*	*

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

*An age-adjusted mortality rate was not calculated when there were fewer than 20 deaths.

Source: Massachusetts Vital Statistics

Table 22.
AGE-ADJUSTED¹ MORTALITY RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
FEMALES

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	135.9	134.4-137.4	140.0	138.3-141.6	135.4	128.3-142.4	80.7	74.2-87.2	86.5	90.5-92.5
Brain & Other Nervous System	3.2	3.0-3.5	3.5	3.2-3.8	*	*	*	*	*	*
Breast	18.2	17.7-18.8	18.8	18.2-19.4	19.7	17.1-22.4	7.9	5.9-9.8	10.5	8.6-12.4
Bronchus & Lung	36.9	36.1-37.6	39.2	38.4-40.1	27.9	24.7-31.2	17.5	14.4-20.7	12.0	9.7-14.3
Cervix Uteri	1.2	1.0-1.3	1.1	1.0-1.3	2.0	1.2-2.8	*	*	*	*
Colon / Rectum	10.9	10.5-11.3	10.8	10.4-11.3	13.9	11.6-16.1	8.9	6.7-11.1	9.2	7.2-11.2
Corpus Uteri & Uterus, NOS	4.4	4.2-4.7	4.3	4.0-4.6	7.7	6.0-9.4	2.6	1.4-3.7	4.1	2.7-5.4
Esophagus	1.6	1.4-1.7	1.6	1.5-1.8	*	*	*	*	*	*
Hodgkin Lymphoma	0.2	0.2-0.3	0.2	0.2-0.3	*	*	*	*	*	*
Kidney & Renal Pelvis	2.0	1.8-2.2	2.1	2.0-2.3	*	*	*	*	*	*
Larynx	0.4	0.3-0.5	0.4	0.3-0.5	*	*	*	*	*	*
Leukemia	4.8	4.5-5.1	4.8	4.5-5.1	5.2	3.8-6.6	*	*	4.3	3.0-5.7
Liver & Intrahepatic Bile Ducts	3.5	3.2-3.7	3.3	3.0-3.5	3.7	2.6-4.9	6.6	4.8-8.5	4.6	3.2-6.1
Melanoma of Skin	1.9	1.7-2.0	2.1	1.9-2.3	*	*	*	*	*	*
Multiple Myeloma	2.6	2.4-2.8	2.5	2.3-2.7	6.5	5.0-8.1	*	*	2.7	1.6-3.8
Non-Hodgkin Lymphoma	4.2	4.0-4.5	4.3	4.0-4.6	3.1	2.0-4.2	*	*	4.3	2.9-5.8
Oral Cavity & Pharynx	1.3	1.2-1.5	1.3	1.2-1.5	*	*	*	*	*	*
Ovary	7.3	6.9-7.6	7.7	7.3-8.1	6.3	4.8-7.8	3.5	2.2-4.8	2.7	1.7-3.7
Pancreas	9.6	9.2-10.0	9.8	9.4-10.3	10.1	8.1-12.0	7.1	5.0-9.1	6.3	4.7-7.9
Stomach	2.3	2.1-2.5	2.0	1.8-2.2	3.9	2.7-5.1	3.5	2.1-4.8	3.1	2.0-4.2
Thyroid	0.5	0.4-0.5	0.4	0.3-0.5	*	*	*	*	*	*
Urinary Bladder	2.5	2.3-2.7	2.6	2.4-2.8	*	*	*	*	*	*

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

* An age-adjusted mortality rate was not calculated when there were fewer than 20 deaths.

Source: Massachusetts Vital Statistics

Table 23.
AGE-ADJUSTED¹ MORTALITY RATES² AND 95% CONFIDENCE LIMITS (95% CL)
FOR SELECTED CANCER SITES BY RACE/ETHNICITY³
Massachusetts, 2010-2014
TOTAL

Cancer Site / Type	All Races		White, non-Hispanics		Black, non-Hispanics		Asian, non-Hispanics		Hispanics	
	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL	Rates	95% CL
All Sites	157.8	156.6-159.0	161.6	160.3-162.9	163.3	157.4-169.2	98.9	93.5-104.3	102.6	97.7-107.6
Brain & Other Nervous System	4.1	3.9-4.3	4.4	4.2-4.6	2.2	1.5-2.8	1.8	1.2-2.5	2.1	1.5-2.7
Breast	-	-	-	-	-	-	-	-	-	-
Bronchus & Lung	42.4	41.7-43.0	44.3	43.6-45.0	36.7	33.9-39.5	26.4	23.6-29.3	17.2	15.1-19.2
Cervix Uteri	-	-	-	-	-	-	-	-	-	--
Colon / Rectum	12.8	12.5-13.1	12.9	12.5-13.3	15.4	13.6-17.2	8.8	7.2-10.5	9.6	8.1-11.2
Corpus Uteri & Uterus, NOS	-	-	-	-	-	-	-	-	-	-
Esophagus	4.6	4.4-4.8	4.8	4.6-5.1	3.3	2.5-4.1	2.5	1.6-3.4	2.1	1.3-2.8
Hodgkin Lymphoma	0.3	0.2-0.3	0.3	0.2-0.4	*	*	*	*	*	*
Kidney & Renal Pelvis	3.2	3.0-3.3	3.3	3.1-3.5	2.5	1.8-3.3	*	*	1.7	1.1-2.2
Larynx	0.9	0.8-1.0	0.9	0.8-1.0	*	*	*	*	*	*
Leukemia	6.4	6.1-6.6	6.6	6.3-6.8	5.3	4.3-6.4	3.1	2.1-4.0	5.1	4.0-6.2
Liver & Intrahepatic Bile Ducts	6.3	6.1-6.6	5.7	5.5-6.0	8.1	6.8-9.3	13.4	11.5-15.3	8.1	6.8-9.5
Melanoma of Skin	2.8	2.6-2.9	3.1	2.9-3.3	*	*	*	*	*	*
Multiple Myeloma	3.1	3.0-3.3	3.0	2.8-3.2	6.8	5.6-8.0	*	*	3.3	2.3-4.2
Non-Hodgkin Lymphoma	5.3	5.1-5.5	5.4	5.2-5.7	4.0	3.1-4.9	2.6	1.7-3.5	4.4	3.3-5.4
Oral Cavity & Pharynx	2.4	2.3-2.6	2.4	2.2-2.6	2.5	1.8-3.2	2.1	1.4-2.8	2.3	1.5-3.0
Ovary	-	-	-	-	-	-	-	-	-	-
Pancreas	10.8	10.5-11.1	11.0	10.7-11.4	11.5	10.0-13.2	6.5	5.1-8.0	7.1	5.8-8.3
Prostate	-	-	-	-	-	-	-	-	-	-
Stomach	3.0	2.8-3.2	2.7	2.5-2.9	5.0	3.9-6.1	3.1	2.0-4.2	4.9	3.9-6.0
Testis	-	-	-	-	-	-	-	-	-	-
Thyroid	0.5	0.5-0.6	0.5	0.4-0.6	*	*	*	*	*	*
Urinary Bladder	4.7	4.5-4.9	5.0	4.8-5.2	2.9	2.0-3.7	*	*	1.5	0.9-2.2

¹ Rates are age-adjusted to the 2000 U.S. Standard Population.

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

⁴ Dashes indicate cancers found in only one sex or predominantly in one sex (breast cancer).

Table 24.
INCIDENCE RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts (2010-2014 and U.S. (2009-2013))

Cancer Site / Type	MALES				FEMALES			
	Massachusetts		United States		Massachusetts		United States	
	Rate	95% CL	Rate	95% CL	Rate	95% CL	Rate	95% CL
All Sites	505.7*	502.3-509.2	512.1	511.6-512.6	450.4*	447.4-453.3	418.46	418.0-418.9
Brain & Other Nervous System	8.0	7.6-8.5	7.8	7.7-7.8	5.9	5.5-6.2	5.6	5.6-5.7
Breast	1.4	1.2-1.6	1.3	1.3-1.4	136.3*	134.7-137.9	123.3	123.1-123.6
Breast <i>in situ</i>²	0.1	0.1-0.2	N/A	N/A	42.5*	41.6-43.4	31.0	30.9-31.1
Bronchus & Lung	70.8*	69.5-72.1	75.0	74.8-75.2	60.7*	59.7-61.8	53.5	53.4-53.7
Cervix Uteri	--	--	--	--	5.2*	4.9-5.6	7.6	7.6-7.7
Colon / Rectum	43.0*	42.0-44.0	46.9	46.7-47.0	33.7*	32.9-34.5	35.6	35.5-35.7
Corpus Uteri & Uterus, NOS	--	--	--	--	29.0*	28.3-29.7	25.6	25.5-25.7
Esophagus	9.9*	9.4-10.4	8.1	8.1-8.2	2.2*	2.0-2.4	1.8	1.8-1.8
Hodgkin Lymphoma	3.4	3.1-3.7	3.1	3.0-3.1	2.6	2.3-2.8	2.4	2.3-2.4
Kidney & Renal Pelvis	21.6	20.9-22.3	21.7	21.6-21.8	10.7*	10.2-11.1	11.3	11.2-11.4
Larynx	5.7*	5.3-6.0	6.2	6.1-6.2	1.4	1.3-1.6	1.4	1.4-1.4
Leukemia	16.6	16.0-17.3	17.2	17.2-17.4	10.0	9.6-10.5	10.6	10.5-10.6
Liver & Intrahepatic Bile Ducts	12.9*	12.4-13.4	11.8	11.7-11.9	3.7	3.5-4.0	4.0	4.0-4.1
Melanoma of Skin	25.5	24.7-26.3	25.9	25.8-26.0	17.3*	16.7-17.9	16.1	16.0-16.2
Multiple Myeloma	8.0	7.6-8.5	8.0	7.9-8.0	5.2	4.9-5.5	5.2	5.2-5.3
Non-Hodgkin Lymphoma	23.0	22.3-23.7	23.0	22.9-23.1	16.5	15.9-17.0	15.9	15.8-16.0
Oral Cavity & Pharynx	17.8	17.2-18.5	17.2	17.1-17.2	6.9*	6.6-7.3	6.3	6.3-6.4
Ovary	--	--	--	--	11.5	11.0-12.0	11.6	11.6-11.7
Pancreas	14.0	13.5-14.6	14.1	14.0-14.2	11.3	10.8-11.7	10.9	10.9-11.0
Prostate	114.4*	112.8-115.9	123.2	123.0-123.5	--	--	--	--
Stomach	9.6	9.2-10.1	9.2	9.2-9.3	4.6	4.3-4.9	4.6	4.6-4.7
Testis	6.4*	6.0-6.8	5.5	5.4-5.5	--	--	--	--
Thyroid	10.3*	9.8-10.8	7.0	7.0-7.1	29.2*	28.4-30.0	20.8	20.7-20.9
Urinary Bladder	40.6*	39.6-41.5	36.2	36.0-36.3	11.3*	10.8-11.7	8.9	8.9-9.0

Rates are age-adjusted to the 2000 U.S. Standard Population.

²Breast *in situ* cases are excluded from "All Sites" and from breast cancer counts.

N/A – not available

* indicates that the Massachusetts incidence rate differed significantly from the national rate ($p < 0.05$).

Data Sources: Massachusetts: Massachusetts Cancer Registry and United States: NAACCR Fast Stats: An interactive tool for quick access to key NAACCR cancer statistics. North American Association of Central Cancer Registries.

<http://www.naaccr.org/>. (Accessed on 3-8-2017)

Table 25.
MORTALITY RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts and U.S. (2010-2014)

Cancer Site / Type	MALES				FEMALES			
	Massachusetts		United States		Massachusetts		United States	
	Rate	95% CL	Rate	95% CL	Rate	95% CL	Rate	95% CL
All Sites	190.2*	188.1-192.2	200.3	200.0-200.7	135.9*	134.4-137.4	142.0	141.7-142.2
Brain & Other Nervous System	5.1	4.7-5.4	5.3	5.3-5.4	3.2	3.0-3.5	3.5	3.5-3.6
Breast	0.4	0.3-0.5	0.3	0.3-0.3	18.2*	17.7-18.8	21.3	21.2-21.4
Bronchus & Lung	50.3*	49.3-51.4	55.8	55.6-56.0	36.9	36.1-37.6	36.3	36.2-36.4
Cervix Uteri	-	-	-	-	1.2*	1.0-1.3	2.3	2.3-2.3
Colon / Rectum	15.3*	14.8-15.9	17.8	17.7-17.9	10.9*	10.5-11.3	12.7	12.6-12.7
Corpus Uteri & Uterus, NOS	-	-	-	-	4.4	4.2-4.7	4.6	4.5-4.6
Esophagus	8.4*	8.0-8.8	7.3	7.2-7.4	1.6	1.4-1.7	1.5	1.5-1.5
Hodgkin Lymphoma	0.3	0.3-0.4	0.4	0.4-0.5	0.2	0.2-0.3	0.3	0.3-0.3
Kidney & Renal Pelvis	4.7*	4.4-5.0	5.7	5.6-5.7	2.0*	1.8-2.2	2.5	2.4-2.5
Larynx	1.6	1.4-1.8	1.9	1.8-1.9	0.4	0.3-0.5	0.4	0.4-0.4
Leukemia	8.7	8.3-9.2	9.1	9.0-9.1	4.8	4.5-5.1	5.1	5.0-5.1
Liver & Intrahepatic Bile Ducts	9.8	9.3-10.3	9.9	9.2-9.4	3.5	3.2-3.7	3.8	3.7-3.8
Melanoma of Skin	4.1	3.7-4.4	4.0	4.0-4.0	1.9	1.7-2.0	1.7	1.6-1.7
Multiple Myeloma	3.8*	3.5-4.1	4.4	4.3-4.4	2.6	2.4-2.8	2.8	2.8-2.8
Non-Hodgkin Lymphoma	6.8*	6.4-7.2	7.6	7.5-7.6	4.2	4.0-4.5	4.6	4.5-4.6
Oral Cavity & Pharynx	3.7	3.5-4.0	3.9	3.8-3.9	1.3	1.2-1.5	1.3	1.3-1.4
Ovary	-	-	-	-	7.3	6.9-7.6	7.4	7.4-7.5
Pancreas	12.2	11.7-12.7	12.6	12.5-12.7	9.6	9.2-10.0	9.6	9.5-9.6
Prostate	18.6*	17.9-19.3	20.0	19.9-20.1	-	-	-	-
Stomach	4.0	3.7-4.3	4.4	4.3-4.4	2.3	2.1-2.5	2.3	2.3-2.4
Testis	0.1*	0.1-0.2	0.3	0.3-0.3	-	-	-	-
Thyroid	0.6	0.5-0.7	0.5	0.5-0.5	0.5	0.4-0.5	0.5	0.5-0.5
Urinary Bladder	8.1	7.6-8.5	7.6	7.5-7.7	2.5*	2.3-2.7	2.2	2.1-2.2

Rates are age-adjusted to the 2000 U.S. Standard Population.

²Breast *in situ* cases are excluded from “All Sites” and from breast cancer counts.

N/A – not applicable

* indicates that the Massachusetts mortality rate differed significantly from the national rate ($p < 0.05$).

Data Sources: Massachusetts: Massachusetts Vital Statistics and United States: National Center for Health Statistics.

APPENDICES

APPENDIX I

ICD CODES USED FOR THIS REPORT

Cancer Site/Type <i>C o d e s</i>	
	ICD-O-3*	ICD-10**
Brain & Other Nervous System	C70.0-C72.9 except 9590-9989	C70-C72
Breast (includes <i>in situ</i>)	C50.0 – C50.9 except 9590 -9989	C50
Bronchus & Lung	C34.0 – C34.9 except 9590-9989	C34
Cervix Uteri	C53.0 – C53.9 except 9590-9989	C53
Colon/ Rectum	C18.0-C18.9, C19.9, C20.9, C26.0 except 9590-9989	C18 – C20, C26.0
Corpus Uteri & Uterus, NOS	C54.0 – C54.9, C55.9 except 9590 – 9989	C54 – C55
Esophagus	C15.0-C15.9 except 9590 – 9989	C15
Hodgkin Lymphoma	C00.00 – C80.9 (includes 9650-9667)	C81
Kidney & Renal Pelvis	C64.9, C65.9 except 9590-9989	C64- C65
Larynx	C32.0 – C32.9 except 9590- 9989	C32
Leukemia	C00.0 – C80.9 (includes 9733, 9742, 9800 – 9820, 9826, 9831 – 9948, 9963 – 9964) C42.0, C42.1, C42.4 (includes 9823, 9827)	C90.1, C91 – C95
Liver and Intrahepatic Bile Ducts	C22.0, C22.1 except 9590 – 9989	C22

Cancer Site/ TypeC o d e s.....	
	ICD-O-3*	ICD-10**
Melanoma of Skin	C44.0 – C44.9 (includes 8720-8790)	C43
Multiple Myeloma	C00.0-C80.9 (includes 9731, 9732, 9734)	C90.0, C90.2
Non – Hodgkin Lymphoma	C00.0 – C80.9 (includes 9590 – 9596, 9670 – 9729) All sites except C42.0, C42.1, C42.4 (includes 9823, 9827)	C82 – C85, C96.3
Oral Cavity & Pharynx	C00.0 – C14.8 except 9590 – 9989	C00 – C14
Ovary	C56.9 except 9590- 9989	C56
Pancreas	C25.0 – C25.9 except 9590 – 9989	
Prostate	C61.9 except 9590 – 9989	C61
Stomach	C16.0 – C16.9 except 9590- 9989	C16
Testis	C62.0 – C62.9 except 9590 – 9989	C62
Thyroid	C73.9 except 9590 – 9989	C73
Urinary Bladder (includes <i>in situ</i>)	C67.0 – C67.9 except 9590 – 9989	C67

* *International Classification of Diseases for Oncology, 3d Ed.* (includes codes added since publication) for incidence data

** *International Classification of Diseases, Tenth Revision* (includes codes added since publication) for mortality data

APPENDIX II:

Population and Rate Changes

The population estimates for 2010-2014 used in this report were produced by the National Center for Health Statistics (NCHS) in collaboration with the U.S. Census Bureau's Population Estimation Program. The NCHS takes the Census Bureau population estimates file and reallocates the multiple race categories required by the 1997 Office of Management and Budget (OMB) specifications back into the four race categories specified in the 1977 OMB specifications so that the estimates will be compatible with previous years' populations. (3) The estimates are divided into mutually exclusive racial/ethnic categories similar to those of the MCR.

Please note that the statewide age-adjusted rates published in this report cannot be compared with those published in reports prior to July 2007, because the overall population count and the age distribution of the population, which were based on the Census 2000 count, differ.

The difference in the new population estimates is pronounced for Hispanics and black, non-Hispanics. The Hispanic and black, non-Hispanic populations have increased 15% since 2000, while the overall state population has increased by 1%. It is important to remember that both age-adjusted cancer incidence and cancer death rates are not a measure of the actual risk of cancer or of death from it. Rather, age-adjusted rates are summary measures used to compare cancer incidence and mortality trends over time or among different populations whose age distributions differ. For specific examples of the effect of new population estimates on age-adjusted rates, see Appendix II in the report *Cancer Incidence and Mortality in Massachusetts 2000-2004: Statewide Report*, available at www.mass.gov/dph/mcr.

Appendix III

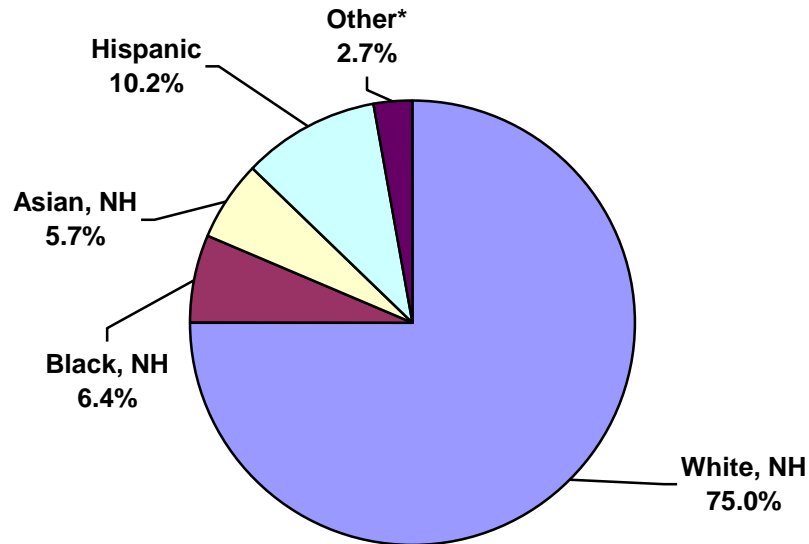
POPULATION ESTIMATES BY AGE, RACE/ETHNICITY, AND SEX Massachusetts, 2010-2014

Age Group	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
00-04	607101	579335	1186436	88339	83562	171901	68569	66722	135291	169590	162054	331644
05-09	661478	632397	1293875	87447	83076	170523	66506	66618	133124	155244	149359	304603
10-14	725431	690543	1415974	87321	83892	171213	59628	60969	120597	148002	142798	290800
15-19	826988	806078	1633066	101485	98853	200338	67925	74244	142169	162782	155403	318185
20-24	834770	837685	1672455	106468	104712	211180	87302	94991	182293	168747	161051	329798
25-29	811146	817602	1628748	88736	91360	180096	95342	107630	202972	152550	147251	299801
30-34	734828	746257	1481085	79931	86075	166006	90090	101846	191936	143809	143430	287239
35-39	705001	726954	1431955	74887	81772	156659	85455	92370	177825	122039	128392	250431
40-44	840321	875397	1715718	76031	83378	159409	76761	82904	159665	108745	117729	226474
45-49	968624	1006505	1975129	78763	83135	161898	64351	69346	133697	96706	107037	203743
50-54	1023251	1068831	2092082	73632	79294	152926	53855	58443	112298	77774	87933	165707
55-59	939972	998576	1938548	58986	65853	124839	43936	49846	93782	57458	67615	125073
60-64	809221	880725	1689946	44215	52283	96498	34745	39701	74446	40965	50404	91369
65-69	615458	691628	1307086	29425	38486	67911	23307	26809	50116	27091	35238	62329
70-74	417310	502632	919942	19346	27740	47086	17887	20448	38335	17149	24108	41257
75-79	311707	411392	723099	13185	21294	34479	12666	14505	27171	10667	16501	27168
80-84	243164	373559	616723	8190	15443	23633	7394	9712	17106	6296	10649	16945
85+	224282	485670	709952	6669	15659	22328	5268	8367	13635	5105	9562	14667

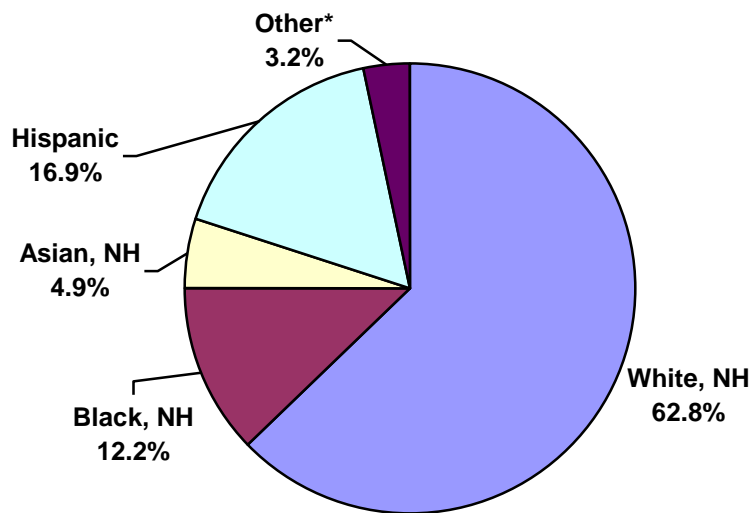
Population Data Source: United States Census Data (2010-2014)

Appendix IV
Racial/Ethnic Breakdown of the Massachusetts and United States Populations*

Massachusetts (2010-2014)



United States (2010-2014)



Data Source: United States Census Data, 2010-2014

*Other includes people reporting 2 or more races.

REFERENCES

This page intentionally left blank.

REFERENCES FOR GENERAL REPORT

1. Massachusetts Cancer Registry, Cancer Incidence and Mortality in Massachusetts, 2006-2010: Statewide Report, Available at: www.mass.gov/dph/mcr
2. Ahmadien Jemal et al. (2017), Annual Report to the Nation on the Status of Cancer, 1975-2014, Featuring Survival. J Natl Cancer Inst. <https://academic.oup.com/jnci/article-lookup/doi/10.1093/jnci/djx030>
3. National Center for Health Statistics, U.S. Department of Health and Human Services. Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Vintage 2009 Bridged Race postcensal population estimates for July 1, 2000 to July 1, 2009 by year, county, single year of age (0-85+ years), bridged race, Hispanic origin, and sex and Vintage 2013 Bridged Race postcensal population estimates for July 1, 2010 to July 1, 2013 by year, county, single year of age (0-85+ years), bridged race, Hispanic origin, and sex Available at: http://www.cdc.gov/nchs/nvss/bridged_race.htm

REFERENCES FOR SPECIAL OVERVIEW: THE EPIDEMIOLOGY OF CANCER AND BENIGN BRAIN TUMORS AMONG MASSACHUSETTS RESIDENTS WITH HEPATITIS B OR HEPATITIS C FROM 2002-2012

- ¹MANUAL OF CLINICAL MICROBIOLOGY - 11th Ed. (2015), ASM Press
- ² Block, T et al., A historic perspective on the discovery and elucidation of the hepatitis B virus, Antiviral Research, 131 (2016) 109-123.
- ³Omland, L et al., Hepatitis C virus infection and risk of cancer: a population-based cohort study. Clinical Epidemiology 2010;2:179-186.
- ⁴Datta, S et al. Hepatitis viruses and non-Hodgkin's lymphoma: A review. World Journal of Virology, 2012;1(6):162-163, 2012.
- ⁵ Lim, EJ, Torresi, J. Prevention of Hepatitis C Virus Infection and Liver Cancer, Recent Results in Cancer Research, pp. 113-133, September 2013.
- ⁶ Registry Plus™ Link Plus. Atlanta, GA; Centers for Disease Control's (CDC) Division of Cancer Prevention and control in support of CDC's National Program of Cancer Registries (NPCR). Available from: <http://www.cdc.gov/cancer/npcr/tools/registryplus/lp.htm>.
- ⁷ Joinpoint Regression Program [computer program]. Version 4.2. Bethesda, MD: National Cancer Institute; June 2015. Available at: <http://srab.cancer.gov/joinpoint/>.