Cancer in Connecticut:

A Report on the Burden of Cancer in the State

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Commissioner

Contents

Acknowledgements

This report is dedicated to all Connecticut residents whose lives are touched by cancer.

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Key Report Findings

This report describes the impact of cancer on the people of Connecticut. Cancer incidence and mortality rates and trends are presented, as well as the cancer stage at diagnosis and the years of potential life-years lost due to cancer (a measure of premature mortality). The key findings are summarized below.

Cancer Incidence (New Cases)

- From 2006 to 2010, 50,637 new cancers were diagnosed in Connecticut. The incidence rate of all invasive cancers was 567 per 100,000 persons in men, and 452 per 100,000 persons in women.
- The most commonly diagnosed cancer in Connecticut men was prostate cancer, accounting for more than one out of every four cancers. The incidence rate was highest in non-Hispanic black men (234 per 100,000 persons) and lowest in Hispanic men (151 per 100,000).
- The most commonly diagnosed cancer in Connecticut women was breast cancer, accounting for more than three out of every ten cancers diagnosed. The incidence rate was highest in non-Hispanic women (140 per 100,000) and lowest in non-Hispanic black women (116 per 100,000).
- The stage of cancer at diagnosis is an important prognostic indicator; cancers usually respond better to treatment and have better outcomes when they are diagnosed early whereas late stage cancers generally show poorer outcomes. About 1 in 20 breast cancers diagnosed in Connecticut women were late stage cancers, while almost half of all lung cancers and around 1 in 5 colorectal cancers in Connecticut residents were diagnosed at a late stage.
- Tracking cancer incidence rates over time allows us to monitor where progress has been made and highlight areas for future efforts. Substantial advances have been made in reducing the burden of colorectal cancer in Connecticut, primarily through colorectal cancer screening: the incidence rate decreased by around 4.5% per year in men and 4% per year in women over the period 2001-2010. In contrast, the rates of kidney cancer in men and thyroid cancer in women increased significantly over the same period (by 1.6% and 7.6% per year, respectively).

Cancer Mortality (Deaths)

- From 2006-2010, 16,951 Connecticut residents died from their cancers. The mortality rate of all cancers was 202 per 100,000 persons in men, and 145 per 100,000 persons in women.
- The leading cause of cancer death was lung cancer, accounting for more than one in every four cancer deaths in both men and women. The mortality rates were highest in non-Hispanic black men and non-Hispanic white women (63 per 100,000 and 41 per 100,000, respectively) and lowest in Hispanic men and women (26 per 100,000 and 16 per 100,000, respectively).
- The second leading cause of cancer death in Connecticut was prostate cancer in men and breast cancer in women. The

prostate cancer mortality rate was highest in non-Hispanic black men (40 per 100,000) and lowest in Hispanic men (17 per 100,000). The breast cancer mortality rate was highest in non-Hispanic black women (29 per 100,000) – despite their lower incidence rates compared with non-Hispanic white women – and lowest in Hispanic women (11 per 100,000).

- Examining potential life-years lost (PLL) gives emphasis to premature deaths, where interventions that extend life expectancy will have the greatest impact. For both men and women, brain/central nervous system cancer is one of the most common causes of premature cancer mortality, reflecting the younger age at diagnosis and death for this disease. PLL has declined for many cancers over recent years, including lung cancer, colorectal cancer, cervical cancer and leukemia, due in part to improved diagnosis and treatment of these cancers. Notably, PLL due to liver cancer has increased in men over the period 1999-2010.
- Monitoring cancer mortality rates over time allows us to determine where progress has been made and to identify areas where efforts to reduce death from cancer should be focused. Notable decreases were seen in mortality from colorectal cancer and female breast cancer, due in part to screening tests for the early detection of these cancers, as well as advances in treatment. Declines were observed in mortality from lung and esophageal cancer in males. A smaller but significant decrease in lung cancer mortality in females has also been observed. Increases in mortality have been seen for liver, pancreatic and uterine cancers.

Cancer-Related Risk Behaviors in Connecticut Residents

- The Behavioral Risk Factor Surveillance System (BRFSS) is an annual health survey that allows us to monitor health risk behaviors in the population. A number of cancer risk factors may be examined through the BRFSS including tobacco use, excessive alcohol consumption, diet, physical activity and obesity. In addition, use of preventive services such as cancer screening can be explored.
- While smoking prevalence in Connecticut adults is in decline, 16% of adults in the state are current smokers.
- More than half of adults in Connecticut meet national physical activity recommendations (at least 150 minutes a week of moderate intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity).
- 27% of men and 24% of women in Connecticut are obese. (Obesity is defined as having a body mass index of 30 or higher.)
- 29.2% of adults with an income of <$35,000 reported consuming vegetables less than once daily; the percentage that reported consuming fruit less than once daily was slightly higher at 39.6%.
- Binge drinking (men drinking 5 or more alcoholic drinks within a short period of time or women drinking 4 or more drinks within a short period of time) in the state

has increased over time. In 2012, 17.5% of Connecticut adults reported binge drinking within the past 30 days.

- In 2012, about 20% of Connecticut women aged 18 years or older reported not having a pap test in the past 3 years, and 18.5% of women aged 50 years or older had not received a mammogram in the past 2 years.
- In 2012, 74.5% of Connecticut adults had ever previously had a sigmoidoscopy or colonoscopy, and 16.4% had had a fecal occult blood test in the past 2 years.
- In 2012, 47.6% of Connecticut men aged 40 years or older reported having a PSA test within the past 2 years.

The Connecticut Tumor Registry

The Connecticut Tumor Registry (CTR), located within the Department of Public Health in Hartford, Connecticut, is the oldest statewide, population-based cancer registry in the United States, with cancer reports dating back to 1935. Cancer is a reportable disease in Connecticut, as described in Connecticut General Statute 19a-72.

Although all licensed medical providers are required by law to report cancer cases, the CTR receives the overwhelming majority of its cases from acute care hospitals and private clinical laboratories. In addition, the Registry has reciprocal cancer-reporting agreements with all of the adjacent states and several other states (including Florida). These agreements improve the quality of the registry data by allowing identification of Connecticut residents who are diagnosed or treated in other states, which is important in obtaining accurate estimates of cancer rates among Connecticut residents. The CTR adheres strictly to protecting the confidentiality and security of the data it collects.

History of the CTR

The CTR was established in 1941, due in large part to early surveillance in New Haven, funded by the New Haven Community Chest. In 1930, the Cancer Committee of New Haven surveyed the three local hospitals, and in 1935, urged the continued compilation and analysis of cancer statistics to further the primary purpose of cancer control. Upon its establishment, early registry efforts were focused on ensuring complete data collection retrospectively to 1935. Cancer surveillance and research progressed locally through the 1950s, and in 1956 the CTR joined the National Cancer Institute's (NCI) End Results Group (ERG). In 1973, CTR became part of the NCI's Surveillance, Epidemiology and End Results (SEER) program (***seer.cancer.gov/***).

CTR Data

The Connecticut Tumor Registry collects information on all invasive cancers (those that have penetrated into cells beyond the layer of tissue in which they developed) and in situ cancers (early cancers that have not spread to neighboring tissue), with the exception of non-melanoma skin cancers and in situ cancers of the cervix. The registry also collects information on certain benign (non-cancerous) tumors including benign tumors of the brain and central nervous system (CNS), as these produce similar clinical effects to malignant brain and CNS tumors and can be life-threatening. Data collected include the clinical characteristics of the tumor (site, histology, behavior, extent of disease), details of the first course of treatment and also sociodemographic information on the cancer patient (age, gender, race, Hispanic ethnicity).

CTR staff annually receives and processes approximately 33,000 reports, resulting in approximately 22,000 consolidated cancer cases. In addition to processing reports of cancer, staff work to ensure that patients are followed at least annually for life, and that various data quality standards are met. The registry has a comprehensive quality

assurance program in place to ensure that the data are complete, accurate and timely. The CTR consistently meets the standards to achieve 'gold certification' by the North American Association of Central Cancer Registries (NAACCR). This is the highest standard for completeness, timeliness and accuracy of cancer registry data.

Uses of CTR Data

The purpose of collecting the CTR data (and other cancer registry data) is to help us reduce cancer incidence, morbidity and mortality, identify new and emerging cancer challenges, and chart our progress toward those goals. The systematic collection of these data for all Connecticut residents helps make this possible. CTR data are used for: monitoring trends in cancer incidence, stage at diagnosis, treatments and outcomes for Connecticut residents; conducting and assisting in research projects to identify cancer's underlying causes and risk factors; assisting in cancer prevention and control activities; and responding to inquiries from researchers, public health professionals, and the general public.

Data from the Connecticut Tumor Registry are included in annual publications of national cancer statistics, including the 'Annual Report to the Nation on the Status of Cancer' and the NCI's 'Cancer Statistics Review', as well as in the 'Cancer in North America' series of publications from NAACCR. The Connecticut Tumor Registry has provided data to the Central Brain Tumor Registry of the United States (CBTRUS) since 1992. The Connecticut Tumor Registry also contributes data to the International Agency for Research on Cancer (IARC) series of publications 'Cancer Incidence in Five Continents', which is updated regularly. Data from the Connecticut Tumor Registry have been used in hundreds of scientific publications by researchers worldwide. A full publication list, updated periodically, can be downloaded from the registry website: ***www.ct.gov/dph/TumorRegistry***

Selected Research Studies

A few selected research studies undertaken by the Connecticut Tumor Registry, or using Connecticut Tumor Registry data, are described in brief below.

SEER Patterns of Care

The SEER Patterns of Care (POC) studies aim to evaluate the diffusion of state-of-the-art cancer therapy into community practice, to disseminate findings in scientific journals and through professional meetings, and to work with professional organizations to develop educational opportunities to increase the use of state-of-the-art cancer therapy and quality of care in community practice. Each year since 1987, NCI has selected different cancer sites to be included in the POC studies and randomly samples cases from those ascertained by the SEER registries.

In the most recently completed study, the cancers under study were ovarian cancer, mesothelioma, metastatic melanoma, astrocytoma/oligodendroglioma and pediatric neuroblastoma, diagnosed in 2011 (and 2010 for pediatric neuroblastoma). Hospital and physician reports were obtained in order to verify and supplement information on the first course of treatment.

Additionally, POC questionnaires were mailed to more than 300 physicians in the state. Other information, including insurance status and co-morbidity, was also collected for the patients. The CTR has participated in all of the SEER POC studies conducted by the SEER Program. Further information about the SEER Patterns of Care Studies is available at: ***healthservices.cancer.gov/surveys/poc/***

NCI Cancer Match Studies

The Transplant Cancer Match Study uses electronically linked data from the Scientific Registry of Transplant Recipients (SRTR) and cancer registries to study the epidemiology of cancer in the U.S. transplant population. This study is the largest study of cancer risk in solid organ transplant recipients in the world. A major goal of the study is to determine the overall pattern of cancer in transplant recipients and identify key risk factors for individual cancer types. These findings will yield information on the role of the immune system in the development of cancer.

The HIV/AIDS Cancer Match Study examines cancer risk in people living with HIV infection or AIDS. The study utilizes data collected by state and regional HIV/AIDS and cancer registries throughout the United States. By studying the patterns of cancer risk among people with HIV and AIDS, the investigators seek to better understand how the immune system protects people from developing cancer. Another goal of the study is to look for trends in cancer risk in the HIV and AIDS populations and identify important opportunities for cancer prevention.

Both studies are led by Dr. Eric Engels from the NCI's Division of Cancer Epidemiology & Genetics. Further information about these studies is available at: ***transplantmatch.cancer.gov/*** and ***hivmatch.cancer.gov/***

WTC Health Studies

The National Institute for Occupational Safety and Health at the Centers for Disease Control and Prevention leads the federal government's efforts to track health effects following the attacks on the World Trade Center (WTC) on September 11, 2001. The CTR undertakes regular linkages with several WTC health monitoring programs including the WTC Health Registry and the WTC Medical Monitoring and Treatment Programs in order to monitor cancer incidence in WTC Health Program members. Further information about the WTC Health Programs is available at: ***www.cdc.gov/wtc/***; ***www.nyc.gov/html/doh/wtc/;*** and ***www.nyc.gov/html/fdny/insider/bhs/wtcmm***

Cancer Incidence in Connecticut

Cancer incidence is a measure of the new occurrence (diagnosis) of cancer in a population and is one indicator of the cancer burden in that population.

Most Commonly Diagnosed Cancers

The ten most commonly diagnosed cancers in Connecticut males are shown below.

Table 1: The ten most commonly diagnosed cancers in males in Connecticut in 2010.

Cancer site	Count	Percent
Prostate	2,676	27.3%
Lung and Bronchus	1,285	13.1%
Colon and Rectum	858	8.8%
Urinary Bladder	828	8.5%
Melanoma of the Skin	545	5.6%
Non-Hodgkin Lymphoma	431	4.4%
Kidney and Renal Pelvis	373	3.8%
Leukemia	321	3.3%
Oral Cavity and Pharynx	298	3.0%
Pancreas	262	2.7%
Other cancers	1,909	19.5%
All cancers combined	**9,786**	**100.0%**

The five most common cancers accounted for more than 6 out of every 10 cancers diagnosed in males in Connecticut in 2010.

The ten most commonly diagnosed cancers in Connecticut females are shown in Table 2.

The five most common cancers accounted for more than 6 out of every 10 cancers diagnosed in females in Connecticut in 2010.

Table 2: The ten most commonly diagnosed cancers in females in Connecticut in 2010.

Cancer site	Count	Percent
Breast	3,078	30.5%
Lung and Bronchus	1,307	12.9%
Colon and Rectum	866	8.6%
Corpus and Uterus, NOS	696	6.9%
Thyroid	521	5.2%
Melanoma of the Skin	389	3.9%
Non-Hodgkin Lymphoma	374	3.7%
Urinary Bladder	304	3.0%
Ovary	301	3.0%
Pancreas	290	2.9%
Other cancers	1,971	19.5%
All cancers combined	**10,097**	**100.0%**

Incidence rates[1] for the most common cancers, by racial and ethnic group, are shown in Table 3. There is considerable variation in cancer incidence between racial/ethnic groups.

Compared with non-Hispanic white men, non-Hispanic black men have significantly higher incidence rates of all invasive cancers, prostate cancer and colorectal cancer, and significantly lower rates of bladder cancer, non-Hodgkin lymphoma and leukemia. Similarly, Hispanic men have significantly lower incidence rates of bladder cancer and malignant melanoma when compared with non-Hispanic white men.

Compared with non-Hispanic white women, non-Hispanic black women have significantly higher incidence rates of colorectal cancer, and significantly lower rates of all invasive cancers, breast cancer, lung cancer, thyroid cancer, bladder cancer and ovarian cancer.

[1] The incidence rate is the number of new cancer cases in a given population per year and is expressed per 100,000 population at risk. Incidence rates are usually age-adjusted which takes into account differences in the age distributions in different populations or in a population over time.

Similarly, Hispanic women have significantly lower incidence rates of all invasive cancers, breast cancer, lung cancer, uterine cancer and malignant melanoma when compared with non-Hispanic white women.

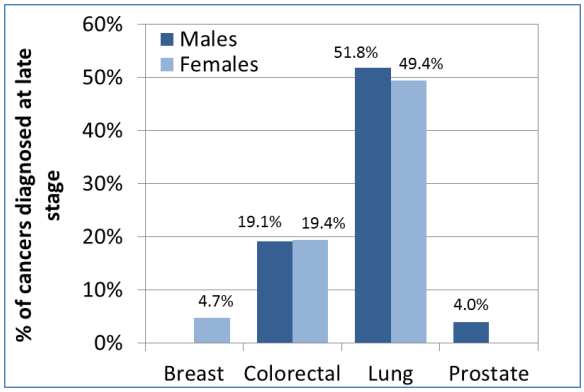
The reasons for these differences in rates are complex and vary for different cancer sites. Contributory factors include variations in cancer screening rates, prevalence of risk factors (modifiable and non-modifiable) and access to health insurance and health care services.

Stage at Diagnosis

The stage of a cancer describes how far it has spread at the time of diagnosis, and is an important prognostic indicator. Cancers that are diagnosed early respond better to treatment and lead to improved survival outcomes, whereas late stage cancers generally have poorer outcomes.

Figure 1 below shows the percentage of late stage diagnoses for the 4 most commonly diagnosed cancers in Connecticut residents.

Figure 1: The percentage of late stage cancers for the four most commonly diagnosed cancers in Connecticut residents, diagnosed 2008-2010.



Half of all lung cancers were diagnosed at a late stage, whereas one in five colorectal cancers and fewer than one in twenty female breast and prostate cancers were late stage cancers.

This is primarily because colorectal, prostate and female breast cancers can be detected early through cancer screening tests. There is currently no screening test for the early detection of lung cancer in the general (asymptomatic) population. Recently, low-dose computed tomography (LDCT) has been shown to be effective in screening a small, well-defined fraction of the population who are at increased risk for developing lung cancer. Current guidelines therefore only recommend LDCT screening for certain high-risk individuals (see Table 10 for more details).

The Connecticut Department of Public Health (DPH), in collaboration with the Centers for Disease Control and Prevention (CDC), offer early detection programs for breast, cervical and colorectal cancers which are free to eligible residents. Further details are available on the DPH web site ***www.ct.gov/dph/*** or by calling 860-509-7804.

Table 3: Age-adjusted incidence rates for the ten most commonly diagnosed cancers in males and females in Connecticut, 2006-2010.

	All races/ethnicities				Non-Hispanic white				Non-Hispanic black				Hispanic (all races)			
	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL
MALES																
All invasive cancers	50,637	567.0	562.0	572.0	43,002	563.4	558.0	568.8	3,595	609.9 ^	588.7	631.7	2,635	541.8	517.8	566.5
Prostate	14,740	160.0	157.4	162.6	12,114	152.8	150.0	155.6	1,413	234.4 ^	221.7	247.7	681	150.5	138.1	163.5
Lung and Bronchus	6,588	75.5	73.6	77.4	5,742	75.5	73.5	77.5	468	84.2	76.3	92.7	272	65.9	57.3	75.3
Colon and Rectum	4,519	51.3	49.8	52.8	3,806	50.2	48.6	51.8	336	60.7 ^	53.9	68.1	276	58.5	50.7	67.1
Urinary Bladder	4,029	46.8	45.3	48.2	3,761	49.7	48.1	51.3	82	16.2 ˅	12.6	20.4	134	35.4 ˅	29.0	42.6
Melanoma of the Skin	2,607	29.4	28.2	30.5	2,456	32.8	31.5	34.1	12	-	-	-	24	4.0 ˅	2.3	6.3
Non-Hodgkin Lymphoma	2,213	25.2	24.1	26.3	1,878	25.2	24.1	26.4	114	17.2 ˅	14.0	20.9	146	25.8	20.9	31.5
Kidney and Renal Pelvis	1,972	21.7	20.7	22.7	1,638	21.4	20.3	22.5	164	24.5	20.7	28.8	110	20.7	16.5	25.6
Leukemia	1,475	17.1	16.2	18.0	1,258	17.2	16.2	18.2	70	12.4 ˅	9.5	16.0	108	18.1	14.0	22.8
Oral Cavity and Pharynx	1,519	16.1	15.3	16.9	1,289	16.2	15.3	17.1	118	18.0	14.8	21.8	75	12.8	9.7	16.5
Pancreas	1,364	15.6	14.8	16.4	1,173	15.4	14.5	16.3	108	20.1	16.2	24.6	66	15.7	11.7	20.6
FEMALES																
All invasive cancers	50,014	451.5	447.5	455.6	42,677	460.4	455.9	465.0	3,230	395.2 ˅	381.4	409.3	2,899	425.1 ˅	408.3	442.4
Breast	14,858	136.3	134.0	138.5	12,647	140.2	137.7	142.8	985	116.4 ˅	109.1	124	864	119.6 ˅	111.1	128.5
Lung and Bronchus	6,743	59.5	58.1	61.0	6,059	62.2	60.6	63.9	375	47.6 ˅	42.8	52.7	244	44.8 ˅	39.0	51.1
Colon and Rectum	4,627	39.2	38.0	40.3	3,915	38.2	36.9	39.5	358	45.8 ^	41.1	50.9	257	43.5	37.9	49.6
Corpus and Uterus, NOS	3,260	29.2	28.2	30.2	2,777	29.6	28.5	30.7	249	29.7	26.1	33.7	167	24.1 ˅	20.3	28.3
Thyroid	2,494	25.7	24.7	26.8	1,994	26.9	25.7	28.2	125	14.0 ˅	11.7	16.8	252	27.3	23.8	31.2
Melanoma of the Skin	2,049	19.4	18.6	20.3	1,910	22.8	21.8	23.9	10	-	-	-	37	5.4 ˅	3.6	7.6
Non-Hodgkin Lymphoma	1,945	17.3	16.6	18.1	1,649	17.3	16.5	18.2	111	13.7	11.2	16.6	128	19.6	16.0	23.7
Urinary Bladder	1,473	12.6	12.0	13.3	1,319	13.1	12.3	13.8	67	9.0 ˅	7.0	11.5	62	12.4	9.3	16.0
Ovary	1,412	12.6	12.0	13.3	1,229	13.1	12.4	13.9	65	8.0 ˅	6.2	10.2	81	12.3	9.5	15.5
Pancreas	1,396	11.9	11.3	12.6	1,209	11.8	11.2	12.6	100	13.1	10.6	16.0	67	12.8	9.7	16.4

* Rates are age-adjusted to the 2000 US standard population and are expressed per 100,000 persons. Rates not reported for cancer sites with fewer than 15 cases.
LCL: 95%lower confidence limit; UCL: 95% upper confidence limit.
^ denotes the rate is significantly higher than the rate for non-Hispanic white males/females (95% significance level).
˅ denotes the rate is significantly lower than the rate for non-Hispanic white males/females (95% significance level).

Changes in Cancer Incidence over Time

Cancer continues to impose a significant burden on the nation and in Connecticut. It is estimated that one in two men and one in three women in the US will develop cancer during their lifetimes. While advances in cancer prevention and detection have led to declines in the incidence of some cancers, rates of other cancers continue to increase year on year. Monitoring cancer incidence rates over time allows us to determine where progress has been made and to identify areas where efforts to reduce the cancer burden should be focused.

Figures 2 and 3 show the annual percentage change in the incidence rates of commonly diagnosed cancers in men and women in Connecticut over the ten year period 2001-2010. Clearly, great progress has been made in reducing the burden of many major cancers, including cancers of the colon and rectum, prostate, lung and bronchus in males, breast in females, ovary and non-Hodgkin lymphoma. These decreases have been driven in part by public health efforts: cancer screening for cancers of the colon and rectum, and tobacco control activities for lung and bronchus cancer in males.

However, incidence rates of some cancers are still increasing, including cancers of the thyroid, kidney in males, pancreas, uterus and melanoma of the skin. Further public health interventions have the potential to greatly impact the burden of these cancers.

While changes in tobacco use have led to the decreasing incidence of lung cancer in males, a similar decrease in females is yet to be observed. In addition, several of these cancers have been associated with increases in obesity (thyroid, kidney, uterus), and melanoma skin cancer is strongly linked to exposure to UV radiation (from sun exposure or tanning beds).

Hence, continued efforts in tobacco control, as well as promoting a healthy weight and reduced personal exposure to UV radiation would likely lead to decreases in the incidence of these cancers.

Figure 2: Annual percentage change (APC) for common cancers diagnosed 2001-2010 in Connecticut males. * Indicates that the APC is significantly different from zero ($p<0.05$).

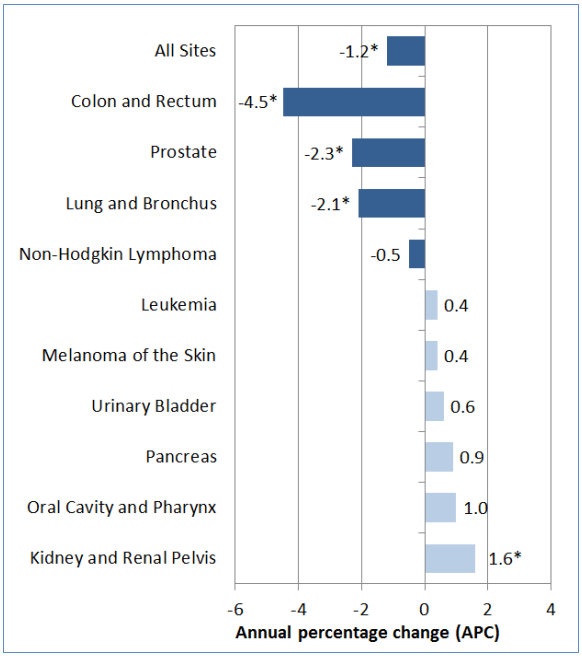
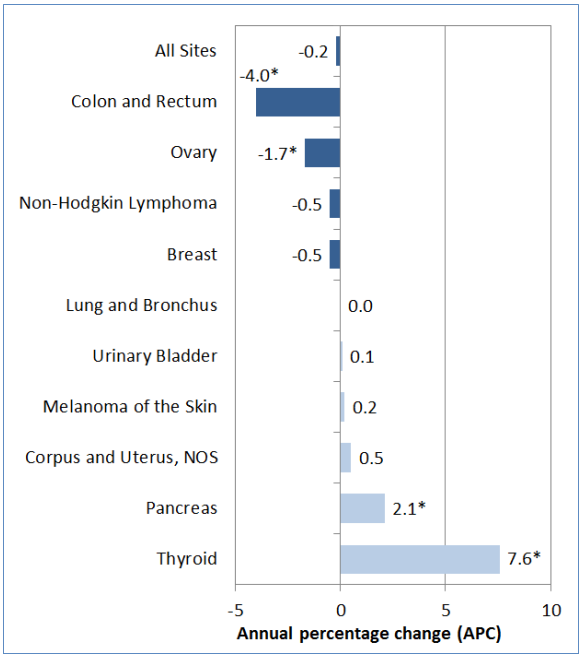


Figure 3: Annual percentage change (APC) for common cancers diagnosed 2001-2010 in Connecticut females. * Indicates that the APC is significantly different from zero (p<0.05).



Cancer Mortality in Connecticut

Cancer mortality is another indicator of the cancer burden in a population.

Leading Cancer Causes of Death

The ten most common site-specific causes of cancer death in Connecticut males are shown below.

Table 4: The ten most common causes of cancer death in males in Connecticut in 2010.

Cause of cancer death	Count	Percent
Lung	919	26.8%
Prostate	347	10.1%
Colon and Rectum	268	7.8%
Pancreas	228	6.7%
Bladder	154	4.5%
Liver & intrahepatic bile duct	152	4.4%
Leukemia	148	4.3%
Esophagus	122	3.6%
Brain & Central Nervous System	107	3.1%
Stomach	92	2.7%
Other cancers	886	25.9%
All malignant neoplasms	**3,423**	**100.0%**

The five leading cancer deaths accounted for more than half of all cancer deaths in males in Connecticut in 2010.

The ten most common causes of site-specific cancer death in Connecticut females are shown in Table 5.

The five leading cancer deaths accounted for more than 6 out of every 10 cancer deaths in females in Connecticut in 2010.

Table 5: The ten most common causes of cancer death in females in Connecticut in 2010.

Cancer site	Count	Percent
Lung	919	26.8%
Breast	492	14.3%
Colon and Rectum	275	8.0%
Pancreas	240	7.0%
Ovary	177	5.2%
Leukemia	123	3.6%
Uterus	99	2.9%
Brain & Central Nervous System	90	2.6%
Liver & intrahepatic bile duct	72	2.1%
Stomach	67	2.0%
All other cancers	879	25.6%
All malignant neoplasms	**3,433**	**100.0%**

Mortality rates[2] for the leading causes of cancer death, by racial and ethnic group, are shown in Table 6. There is considerable variation in cancer mortality between racial/ethnic groups.

Compared with non-Hispanic white men, non-Hispanic black men have significantly higher mortality rates of all malignant neoplasms, prostate cancer, pancreatic cancer, liver cancer and stomach cancer, and significantly lower rates of bladder cancer. Similarly, Hispanic men have significantly higher incidence rates of liver cancer and significantly lower rates of all malignant neoplasms, lung cancer, colorectal cancer, bladder cancer, leukemia and brain cancer when compared with non-Hispanic white men.

Compared with non-Hispanic white women, non-Hispanic black women have significantly higher mortality rates of breast cancer and

[2] The mortality rate is the number of cancer deaths in a given population per year and is expressed per 100,000 population at risk. Mortality rates are usually age-adjusted which takes into account differences in the age distributions in different populations or in a population over time.

uterine cancer, and significantly lower rates of lung cancer. Hispanic women have significantly lower mortality rates of all malignant neoplasms, lung cancer, breast cancer, pancreatic cancer, ovarian cancer and leukemia when compared with non-Hispanic white women.

The reasons for these differences in rates are complex and vary for different cancer sites. Contributory factors include differences in the stage of diagnosis of the cancer, lifestyle factors (such as smoking) and access to health insurance and health care services.

Table 6: Age-adjusted mortality rates for the ten leading causes of cancer deaths in males and females in Connecticut, 2006-2010.

	All races/ethnicities				Non-Hispanic white				Non-Hispanic black				Hispanic (all races)			
	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL	Count	Rate*	95% LCL	95% UCL
MALES																
All malignant neoplasms	16,951	202.1	199.0	205.2	14,924	203.0	199.7	206.3	1,182	239.6 ^	224.9	254.3	602	138.3 ᵛ	125.8	150.7
Lung and Bronchus	4,504	53.4	51.8	55.0	4,018	54.4	52.7	56.1	317	62.9	55.5	70.3	109	25.5 ᵛ	20.3	30.8
Prostate	1,811	22.8	21.7	23.8	1,581	22.1	21.0	23.2	164	40.0 ^	33.5	46.5	50	16.5	11.7	21.4
Colon and Rectum	1,390	16.5	15.6	17.3	1,224	16.6	15.6	17.5	107	21.3	16.9	25.7	45	8.8 ᵛ	5.9	11.7
Pancreas	1,192	14.1	13.3	14.9	1,049	14.1	13.3	15.0	84	17.5 ^	13.5	21.5	43	9.1 ᵛ	6.0	12.2
Bladder	692	8.5	7.9	9.1	657	9.0	8.3	9.7	17	3.3 ᵛ	1.6	5.0	14	-	-	-
Liver and Intrahepatic Bile Duct	678	7.6	7.0	8.2	505	6.6	6.0	7.2	68	11.5 ^	8.6	14.4	75	15.4 ^	11.5	19.3
Leukemia	739	9.1	8.5	9.8	656	9.3	8.5	10.0	38	8.0	5.3	10.7	31	5.9 ᵛ	3.4	8.4
Esophagus	664	7.7	7.1	8.3	588	7.9	7.2	8.5	42	7.6	5.2	10.0	27	6.4	3.8	9.1
Brain and Central Nervous System	459	5.2	4.7	5.7	418	5.7	5.1	6.2	16	2.4 ᵛ	1.1	3.6	15	2.7 ᵛ	1.1	4.3
Stomach	496	5.8	5.3	6.4	390	5.3	4.7	5.8	50	10.1 ^	7.0	13.1	43	9.5 ^	6.2	12.7
FEMALES																
All malignant neoplasms	17,132	145.3	143.1	147.6	15,186	147.8	145.3	150.2	1,183	156.9	147.7	166.0	554	92.5 ᵛ	84.3	100.8
Lung and Bronchus	4,408	38.4	37.3	39.6	4,039	40.5	39.2	41.8	250	33.3 ᵛ	29.1	37.5	86	16.0 ᵛ	12.4	19.5
Breast	2,517	21.7	20.8	22.5	2,181	21.8	20.9	22.8	228	29.0 ^	25.2	32.8	73	11.1 ᵛ	8.4	13.8
Colon and Rectum	1,529	12.3	11.7	12.9	1,340	12.2	11.5	12.8	111	15.3	12.4	18.1	65	11.3	8.4	14.2
Pancreas	1,190	10.0	9.4	10.6	1,057	10.1	9.5	10.8	83	11.6	9.1	14.2	33	6.3 ᵛ	4.0	8.6
Ovary	925	8.0	7.4	8.5	839	8.3	7.8	8.9	46	6.1	4.3	7.9	25	4.0 ᵛ	2.3	5.6
Leukemia	597	4.9	4.5	5.3	533	5.0	4.6	5.5	32	4.3	2.8	5.8	22	3.1 ᵛ	1.7	4.5
Uterus	502	4.4	4.0	4.8	419	4.2	3.8	4.6	61	7.7 ^	5.7	9.6	16	2.8	1.4	4.2
Brain and Central Nervous System	374	3.4	3.1	3.8	345	3.8	3.4	4.2	11	-	-	-	11	-	-	-
Liver and Intrahepatic Bile Duct	327	2.8	2.5	3.1	261	2.5	2.2	2.8	33	4.3	2.8	5.8	23	4.3	2.4	6.1
Stomach	315	2.6	2.3	2.9	254	2.3	2.0	2.6	27	3.9	2.4	5.4	26	3.8	2.3	5.3

* Rates are age-adjusted to the 2000 US standard population and are expressed per 100,000 persons. Rates not reported for causes of deaths with fewer than 15 deaths.
LCL: 95%lower confidence limit; UCL: 95% upper confidence limit.
^ denotes the rate is significantly higher than the rate for non-Hispanic white males/females (95% significance level).
ᵛ denotes the rate is significantly lower than the rate for non-Hispanic white males/females (95% significance level).

Potential Life Years Lost

Mortality rates predominately reflect mortality patterns among the elderly, where death rates are highest. Alternative measures have been proposed to reflect the mortality experienced by younger age-groups. One important alternative measure that gives more emphasis to deaths occurring at younger ages is Potential Life-Years Lost (PLL). By giving more weight to deaths at younger ages, additional emphasis is given to premature deaths, where interventions that extend life expectancy will have the largest impact on a population. This report provides figures for PLL rates to age 75.

Table 7: Potential life-years lost (PLL) to age 75. Top ten cancer sites for Connecticut males.

Cancer site	Mortality 2010		Trend in rates, 1999-2010
	Years of PLL	Percent	Ave. Annual % Change**
Lung and Bronchus	5,747	25.4	-4.03
Colon and Rectum	2,187	9.7	-2.53
Pancreas	1,460	6.5	--
Brain & Nervous System	1,394	6.2	--
Liver	1,345	5.9	+3.32
Leukemia	1,067	4.7	--
Stomach	852	3.8	--
Esophageal	805	3.6	--
Kidney *	755	3.3	--
Prostate	682	3.0	-3.41
All cancers combined	**22,611**	**100.0**	**-2.49**

* This site is in top 10 for PLL <75, but not for total deaths.
** Annual Percent Change (APC) figures are displayed if statistically significant (p<.05).

Top-ranked cancer sites based on PLL vary somewhat from the rankings based on all cancer deaths. In particular, mortality due to cancers of the Brain and Nervous System rank higher when we focus on premature deaths (tables 7 and 8). For both men and women brain cancer is five ranks higher in the premature mortality tables, reflecting the younger age at incidence and death associated with this disease.

Also, cancer of the cervix is included among the top 10 in the premature mortality ranking for females, but it does not appear in the overall death rankings (table 5).

Among males, cancer of the kidney is ranked among the top ten premature deaths (table 7), but not in the all-ages death rankings.

Table 8: Potential life-years lost (PLL) to age 75. Top ten cancer sites for Connecticut females.

Cancer site	Mortality 2010		Trend in rates, 1999-2010
	Years of PLL	Percent	Ave. Annual % Change**
Lung and Bronchus	4,800	22.8%	-3.35
Breast	4,252	20.2%	-2.81
Brain & Nervous System	1,252	6.0%	--
Colon and Rectum	1,222	5.8%	-4.54
Pancreas	1,202	5.7%	--
Ovary	1,180	5.6%	-3.44
Corpus and Uterus, NOS	550	2.6%	--
Leukemia	537	2.6%	-4.52
Cervix *	525	2.5%	-3.57
Stomach	425	2.0%	--
All cancers combined	**21,019**	**100.0%**	**-2.59**

* This site is in top 10 for PLL <75, but not for total deaths.
** Annual Percent Change (APC) figures are displayed if statistically significant (p<.05).

Between 1999 and 2010 premature mortality due to all cancers declined significantly for females (-2.6% per year), and for males (-2.5% per year). This

represents a net decline over this 12-year period in PLL of 25% for females and 24% for males. However, progress was not uniform across all cancer sites. Among females, only six of 10 cancer sites had significant declines over this 12-year period. These six sites account for about 78% of the total potential life years lost before age 75 among the top 10 sites for females (table 8). Among males, site-specific declines over this period were less common, with only four of 10 sites achieving statistically significant declines. Nevertheless, these four sites accounted for a significant share of male premature mortality due to cancer in 2010, about 61% of the potential life years lost in all 10 sites (table 7). Notably, PLL due to liver cancer has increased in men over the period 1999-2010. Liver cancer is strongly associated with viral hepatitis B and C infection, thus appropriate health interventions targeted at high risk populations might reduce their risk of developing or dying from liver cancer.

Changes in Cancer Mortality over Time

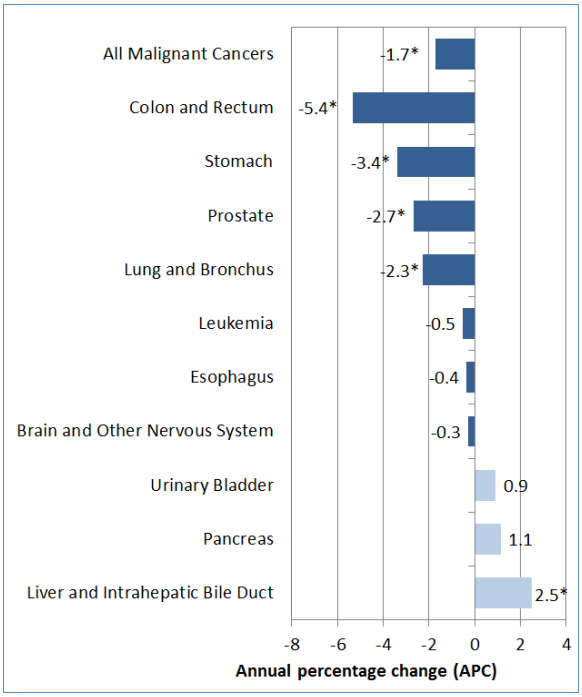
Cancer is the second leading cause of death in the nation and in Connecticut. It is estimated that one in four men and one in five women in the US will die from cancer. Advances in the early detection and treatment of cancer have led to declines in deaths from some cancers. However, deaths from other cancers continue to increase year on year. Monitoring cancer mortality rates over time allows us to determine where progress has been made and to identify areas where efforts to reduce death from cancer should be focused.

Figures 4 and 5 show the changes in the cancer mortality rates in men and women in Connecticut over the period 1999-2010. There are encouraging declines in mortality from a number of cancers in both males and females. Decreases in mortality from cancers of the (female) breast, colon and rectum and prostate are due in part to the early detection of these cancers through screening, as well as advances in the treatment of these cancers.

Changes in patterns of tobacco use have led to a significant decrease in esophageal and lung cancer mortality in males; a smaller decrease in lung cancer mortality is observed in females. Stomach cancer has decreased significantly in both males and females.

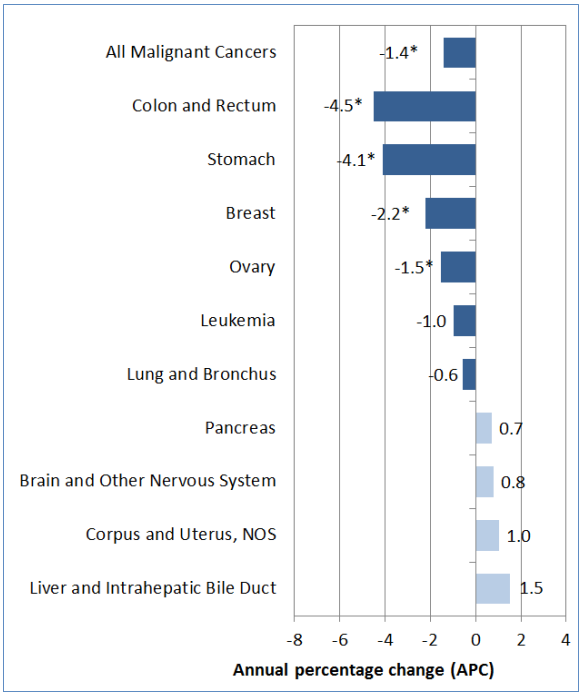
Cancers where the death rates have been increasing, albeit not significantly, include liver and bile duct, pancreatic and uterine cancers, all of which are associated with obesity. Increasing public awareness of these cancers, their symptoms and how to make lifestyle changes to reduce the risk of developing them could lead to a reduction in the deaths from these diseases.

Figure 4: Average annual percentage change (APC) for mortality from selected cancers 1999-2010 in Connecticut males.



* Indicates that the APC is significantly different from zero ($p<0.05$)

Figure 5: Average annual percentage change (APC) for mortality from selected cancers 1999-2010 in Connecticut females.



* Indicates that the APC is significantly different from zero ($p<0.05$).

Reducing the Burden of Cancer

It is estimated that more than half of all cancers are preventable.[3] By making healthy lifestyle choices and getting recommended cancer screening tests, individuals can greatly reduce their risk of developing cancer.

Table 9 summarizes known modifiable cancer risk factors (a cancer risk factor is something that raises a person's chance of developing cancer).

Table 9. Modifiable Cancer Risk Factors. Adapted from NCI's Cancer Prevention Overview (PDQ®).

Cancer site	Tobacco	Infection§	UV radiation	Alcohol	Diet¶	Physical activity	Obesity
Anus		✓					
Bladder	✓						
Breast	✓			✓		✓	✓
Cervix		✓					
Colon and rectum	✓			✓	✓	✓	✓
Endometrium						✓	✓
Esophagus	✓			✓			✓
Kidney	✓						✓
Liver		✓		✓			
Lung and Bronchus	✓						
Oral cavity and pharynx	✓	✓		✓			
Ovary							✓
Pancreas	✓						✓
Penis		✓					
Skin			✓				
Stomach	✓						
Vagina		✓					

§ HPV: Anus; cervix; oral cavity & pharynx; penis; vagina. Hepatitis B/C: Liver. H. pylori: Stomach.
¶ Diet high in saturated fats and red meat and/or low in fruits, vegetables and whole grains.

[3] Colditz GA, Wolin KY and Gehlert, Applying what we know to accelerate cancer prevention. Sci Transl Med. 2012; 4(127):127rv4. (stm.sciencemag.org/content/4/127/127rv4.full)

Cancer-Related Risk Behaviors in Connecticut Residents

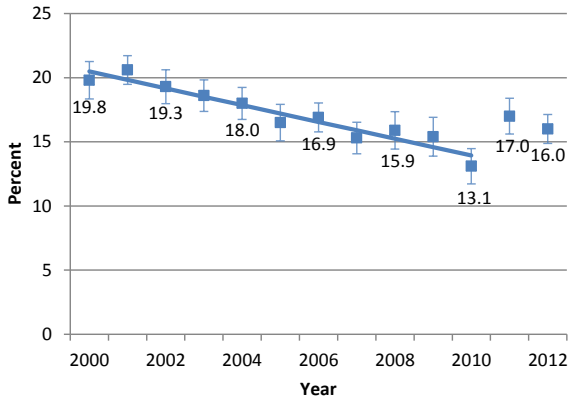
The Connecticut Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing annual telephone survey that collects information on health-related risk behaviors and events, chronic disease conditions and use of preventive services such as cancer screening from a sample of Connecticut adults.

Several questions in the BRFSS survey are relevant to cancer, allowing health professionals to monitor patterns in cancer risk behaviors (tobacco use, physical activity and exercise, obesity, diet) and screening practices.

The following data are derived from the CT BRFSS.[4] In 2011, two methodological refinements were made to the BRFSS. The first was to expand the sample to include data received from cell phone users. This change was made to better reflect the population. The second change was to modify the statistical method to weight BRFSS survey data. The new approach simultaneously adjusts survey respondent data to known proportions of demographics such as age, race and ethnicity, and gender. These changes should be considered when comparing BRFSS data before and after 2011. More information about CT BRFSS is available at: ***www.ct.gov/dph/brfss***

Smoking Prevalence

Figure 6. Trend in prevalence of adults who currently smoke in Connecticut, 2000-2012



From 2000 through 2010, the prevalence of smoking among adults was 19.8% in 2000 and 16.0% in 2012.Smoking prevalence was highest in adults without a high school degree (24.7% in 2012) and in adults aged less than 35 years old (21.4% in 2012) (data not shown).

Physical Activity

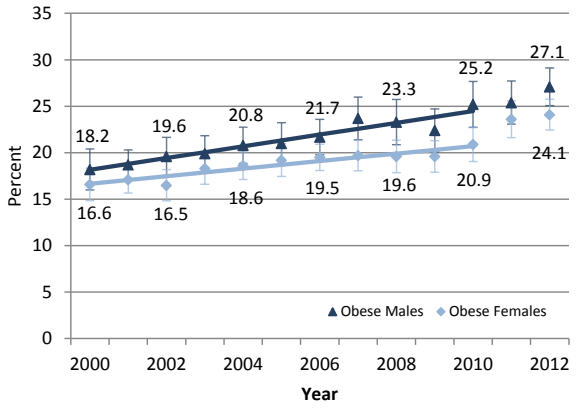
The *2008 Physical Activity Guidelines for Americans*[5] recommend that for substantial health benefits, adults should do at least 150 minutes a week of moderate intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity. In addition, adults should also do muscle-strengthening activities that are moderate or high intensity and involve all muscle groups on 2 or more days a week. In 2011, 52.6% of Connecticut adults met the recommended level of physical activity.

The percentage of adults that met both the aerobic *and* muscle-strengthening activity guidelines was associated with income; 17.0% of adults with an income <$35,000 met the guidelines compared with 28.4% of adults earning $75,000 or more.

[4] CT BRFSS data and interpretation kindly provided by state BRFSS coordinator, Carol Stone, PhD, MPH, MAS, MA.
[5] www.health.gov/paguidelines/guidelines/summary.aspx

Obesity

Figure 7. Percent of obese adults in Connecticut, 2000-2012



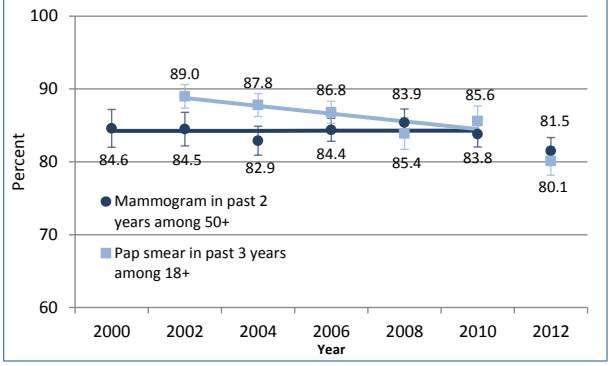
From 2000 through 2010, there was a steady increase in obesity among both male and female adults in Connecticut. The annual rate of increase was 0.6% for males and 0.4% for females. The rate of increase for males was significantly higher than that for females, suggesting that in future years the percent of obesity among males may significantly exceed that of females. In 2012, the percent obesity among males and females was 27.1% and 24.1%, respectively, affecting an estimated 360,000 men and 320,000 women in the state.

Cancer Screening

Cancer screening tests can help find cancer at an early or even pre-invasive stage, before symptoms appear. When abnormal tissue or cancer is found early, it may be easier to treat or cure. The U.S. Preventive Services Task Force (USPSTF) and American Cancer Society (ACS) provide recommendations for the screening of the following cancers: female breast; cervical, colorectal, lung and prostate cancer. The current recommendations are summarized in Table 10.

Breast and Cervical Cancer Screening

Figure 10. Breast and cervical cancer screening behavior in Connecticut, 2000-2012



The percent of women aged 18 and over who received a pap test in the past three years decreased, although not significantly, between 2002 and 2010. The percent of women at least 50 years old who received a mammogram in the past two years did not change significantly from 2000 to 2010, with an average percent across the decade of 84%. In 2012, about 20% of adult women did not receive a pap test in the past three years, affecting about 230,000 women in the state, and 18.5% of women at least 50 years old did not receive a mammography in the past two years, affecting about 120,000 women in this age group.

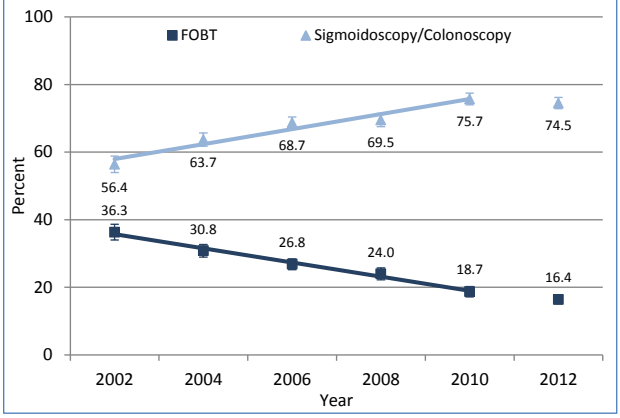
Table 10. American Cancer Society and US Preventive Services Task Force cancer screening guidelines in the US for breast, cervical, colorectal, lung and prostate cancers (as of April 2014).

Cancer Site	Organization	Screening Test	Population Targeted	Frequency
Breast	ACS (2003)	Clinical breast examination Mammography	Women aged 20 years and older Women aged 40 years and older	20-39 years: every 3 years; 40+ years: annual Annual
	USPSTF (2009)¶	Mammography	Women aged 50 to 74 years	Biennial
Cervix	ACS (2012)	Pap test, HPV test	21-29 years 30-65 years	Pap test every 3 years Pap test + HPV test every 5 years or Pap test every 3 years
	USPSTF (2012)	Pap test, HPV test	Women 21-65 years, or Women 30-65 years	Pap test every 3 years Pap test + HPV test every 5 years
Colorectal	ACS (2008)	Fecal Occult Blood Test (FOBT), fecal immunochemical test (FIT), sigmoidoscopy or colonoscopy	Men and women aged 50 years and older	FOBT: annual FIT: annual Sigmoidoscopy: every 5 years Colonoscopy: every 10 years
	USPSTF (2008)	FOBT, sigmoidoscopy or colonoscopy	Men and women aged 50 to 75 years	FOBT: annual Sigmoidoscopy: every 5 years (with FOBT every 3 years) Colonoscopy: every 10 years
Lung	ACS (2013)	The American Cancer Society does not recommend tests to screen for lung cancer in people who are at average risk of this disease. However, the ACS does have screening guidelines for individuals who are at high risk of lung cancer due to cigarette smoking. If you meet all of the following criteria then you might be a candidate for screening: 55 to 74 years of age; in fairly good health; have at least a 30 pack-year smoking history *and* are either still smoking or have quit smoking within the last 15 years.		
	USPSTF (2013)	Low-dose computed tomography	Men and women aged 55-80 years with a 30 pack-year smoking history, who are current smokers or who have quit within past 15 years. §	Annual
Prostate	ACS (2010)	The ACS recommends that men make an informed decision with their doctor about whether to be tested for prostate cancer. Research has not yet proven that the potential benefits of testing outweigh the harms of testing and treatment. The ACS believes that men should not be tested without learning about what we know and don't know about the risks and possible benefits of testing and treatment.		
	USPSTF (2012)	The USPSTF recommends against PSA-based screening for prostate cancer.		

ACS: American Cancer Society (www.cancer.org)
USPSTF: United States Preventive Services Task Force (www.uspreventiveservicestaskforce.org)
¶ The USPSTF has started the process of updating its recommendation on screening for breast cancer.
§ Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.

Colorectal Cancer Screening

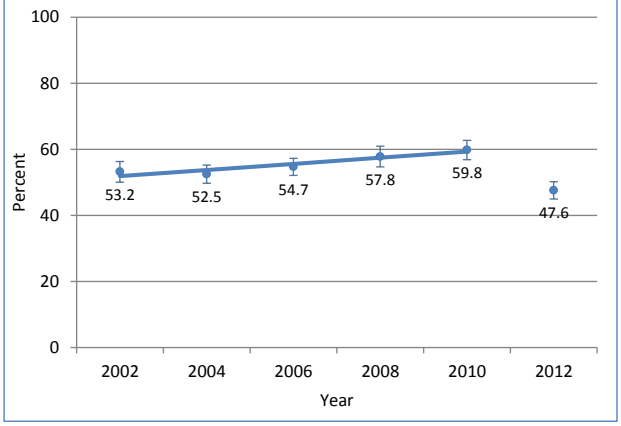
Figure 11. Colorectal cancer screening behavior in Connecticut, 2000-2012



The percent of adults at least 50 years old in Connecticut who have ever received a sigmoidoscopy/colonoscopy increased steadily and significantly from a low of 56.4% in 2002 to a high of 75.7% in 2010. Conversely, the percent in this age group who received a fecal occult blood test (FOBT) within the past two years decreased significantly from 36.3% in 2002 to 18.7% in 2010. In 2012, 74.5% had ever had a sigmoidoscopy/colonoscopy and 16.4% had an FOBT in the past two years. There was no significant difference between men and women receiving either screening technique across this time period (data not shown).

Prostate Cancer Screening

Figure 12. Prostate cancer screening behavior in Connecticut, 2000-2012



Prostate cancer screening by prostate specific antigen (PSA) testing remains highly controversial because of uncertainty over the benefits versus the risk of harm. Potential side-effects of diagnostic and therapeutic procedures include erectile dysfunction and urinary and bowel incontinence.

In Connecticut the percentage of men at least 40 years old who received a PSA test within the previous two years increased steadily and significantly from 53.2% in 2002 to 59.8% in 2010. 2012 BRFSS data[6] indicate that 61.2% of men aged 40 years or older discussed the advantages and disadvantages of PSA testing with their health care provider, and 47.6% had a PSA test within the past 2 years. Of the men receiving a PSA test, more than 2 out of 3 of them received the test as part of a routine exam.

[6] Connecticut Department of Public Health. (2014). Health Risk Behaviors in Connecticut: Results of the 2012 Connecticut Behavioral Risk Factor Surveillance Survey. www.ct.gov/dph/lib/dph/hisr/pdf/brfss2012_ct_report.pdf

Recent Publications

The following list includes journal articles co-authored by CTR staff. A complete bibliography of studies utilizing CTR data can be found on the CTR web page: ***www.ct.gov/dph/TumorRegistry***

1. Buchanich JM, Youk AO, Marsh GM, et al. Long-term health experience of jet engine manufacturing workers: IV. A comparison of central nervous system cancer ascertainment using mortality and incidence data. *Ann Epidemiol* 2010; 20(10): 759-65.
2. Marsh GM, Buchanich JM, Youk AO, et al. Long-term health experience of jet engine manufacturing workers: III. Incidence of malignant central nervous system neoplasms. *Neuroepidemiology* 2010; 35(2): 123-41.
3. Polednak AP, Phillips CE. Obtaining data on comorbid diabetes among patients in a U.S. population-based tumor registry. *J Registry Manag* 2010; 37(2): 57-64.
4. Wideroff L, Garceau AO, Greene MH, et al. Coherence and completeness of population-based family cancer reports. *Cancer Epidemiol Biomarkers Prev* 2010; 19(3): 799-810.
5. Abrams JA, Sharaiha RZ, Gonsalves L, et al. Dating the rise of esophageal adenocarcinoma: analysis of connecticut tumor registry data, 1940-2007. *Cancer Epidemiol Biomarkers Prev* 2011; 20(1): 183-6.
6. Buchanich JM, Youk AO, Marsh GM, et al. Long-term health experience of jet engine manufacturing workers: V. Issues with the analysis of non-malignant central nervous system neoplasms. *J Registry Manag* 2011; 38(3): 115-9.
7. Engels EA, Pfeiffer RM, Fraumeni JF, Jr., et al. Spectrum of cancer risk among US solid organ transplant recipients. *JAMA* 2011; 306(17): 1891-901.
8. Mai PL, Garceau AO, Graubard BI, et al. Confirmation of family cancer history reported in a population-based survey. *J Natl Cancer Inst* 2011; 103(10): 788-97.
9. Moran MS, Gonsalves L, Goss DM, et al. Breast cancers in U.S. residing Indian-Pakistani versus non-Hispanic White women: comparative analysis of clinical-pathologic features, treatment, and survival. *Breast Cancer Res Treat* 2011; 128(2): 543-51.
10. Swede H, Gregorio DI, Tannenbaum SH, et al. Prevalence and prognostic role of triple-negative breast cancer by race: a surveillance study. *Clin Breast Cancer* 2011; 11(5): 332-41.
11. Gonsalves L, Cartmel B, Mueller L. The Burden of Cancer in Connecticut. *Conn Med* 2012; 76(6): 335-51.
12. Polednak AP, Phillips C. Coding of specific subgroups of myelodysplastic syndromes in a population-based cancer registry: prospects for improvement. *J Registry Manag* 2012; 39(3): 107-14.
13. Polednak AP, Phillips C. Leukemia as a Cause of Death among Patients with Myelodysplastic Syndromes (MDS) in a Population- Based Cancer Registry: Improving Estimates of MDS-Related Mortality in the Population. *J Registry Manag* 2012; 39(3): 115-20.
14. Abrams JA, Gonsalves L, Neugut AI. Diverging Trends in the Incidence of Reflux-related and Helicobacter pylori-related Gastric Cardia Cancer. *J Clin Gastroenterol* 2013; 47(4):322-7.

15. Geller AC, Clapp RW, Sober AJ, et al. Melanoma epidemic: an analysis of six decades of data from the Connecticut Tumor Registry. *J Clin Oncol* 2013; 31(33):4172-8.
16. Huang H, Ma X, Waagepetersen R, et al. A new estimation approach for combining epidemiological data from multiple sources. *J Am Stat Assoc* 2014; 109(505):11-23.
17. Marsh GM, Buchanich JM, Youk AO, et al. Long-term health experience of jet engine manufacturing workers: results from a 12-year exploratory investigation. *J Occup Environ Med* 2013; 55(6):652-3.
18. Marsh GM, Youk AO, Buchanich JM, et al. Long-term health experience of jet engine manufacturing workers: VI: incidence of malignant central nervous system neoplasms in relation to estimated workplace exposures. *J Occup Environ Med* 2013; 55(6):654-75.
19. Marsh GM, Youk AO, Buchanich JM, et al. Long-term health experience of jet engine manufacturing workers: VIII. glioblastoma incidence in relation to workplace experiences with parts and processes. *J Occup Environ Med* 2013; 55(6):690-708.
20. Solan S, Wallenstein S, Shapiro M, et al. Cancer Incidence in World Trade Center Rescue and Recovery Workers, 2001-2008. *Environ Health Perspect* 2013; 121(6):699-704.
21. Clairwood M, Ricketts J, Grant-Kels J, et al. Melanoma in skin of color in Connecticut: an analysis of melanoma incidence and stage at diagnosis in non-Hispanic blacks, non-Hispanic whites, and Hispanics. *Int J Dermatol* 2014; 53(4):425-33.
22. Suneja G, Shiels MS, Angulo R, et al. Cancer Treatment Disparities in HIV-Infected Individuals in the United States. *J Clin Oncol*. Epub 30 June 2014.