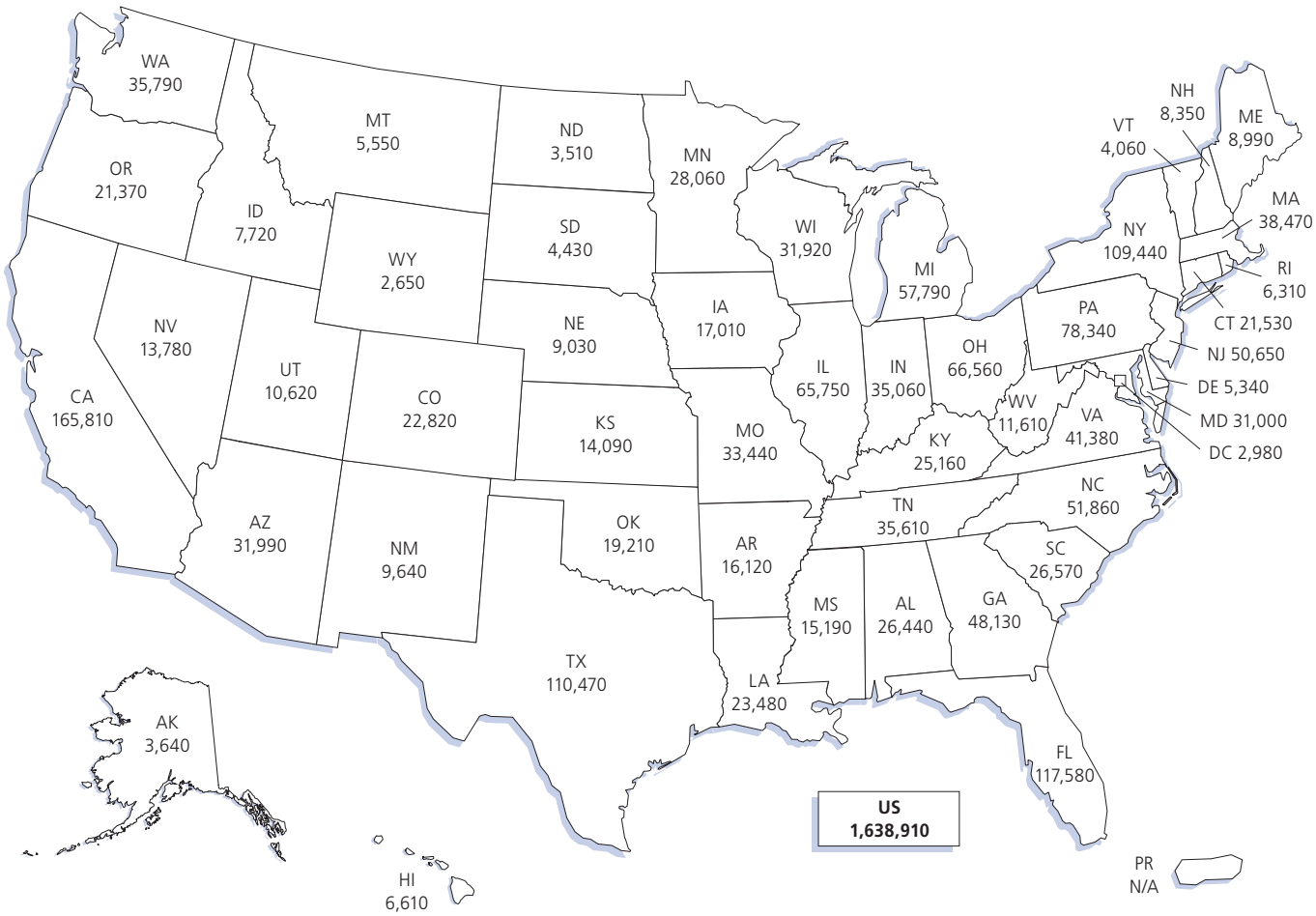
Cancer Facts & Figures 2012



Estimated numbers of new cancer cases for 2012, excluding basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.
Note: State estimates are offered as a rough guide and should be interpreted with caution. State estimates may not add to US total due to rounding.

Special Section:
Cancers with Increasing Incidence Trends
see page 25

American Cancer Society®

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**Indicates a figure or table*

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This publication attempts to summarize current scientific information about cancer.
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Suggested citation: American Cancer Society. *Cancer Facts & Figures 2012*. Atlanta: American Cancer Society; 2012.

Basic Cancer Facts

What Is Cancer?

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the spread is not controlled, it can result in death. Cancer is caused by both external factors (tobacco, infectious organisms, chemicals, and radiation) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). These causal factors may act together or in sequence to initiate or promote the development of cancer. Ten or more years often pass between exposure to external factors and detectable cancer. Cancer is treated with surgery, radiation, chemotherapy, hormone therapy, biological therapy, and targeted therapy.

Can Cancer Be Prevented?

All cancers caused by cigarette smoking and heavy use of alcohol could be prevented completely. The American Cancer Society estimates that in 2012 about 173,200 cancer deaths will be caused by tobacco use. Scientific evidence suggests that about one-third of the 577,190 cancer deaths expected to occur in 2012 will be related to overweight or obesity, physical inactivity, and poor nutrition and thus could also be prevented. Certain cancers are related to infectious agents, such as hepatitis B virus (HBV), human papillomavirus (HPV), human immunodeficiency virus (HIV), *Helicobacter pylori (H. pylori),* and others, and could be prevented through behavioral changes, vaccines, or antibiotics. In addition, many of the more than 2 million skin cancers that are diagnosed annually could be prevented by protecting skin from intense sun exposure and avoiding indoor tanning.

Regular screening examinations by a health care professional can result in the detection and removal of precancerous growths, as well as the diagnosis of cancers at an early stage, when they are most treatable. Cancers of the cervix, colon, and rectum can be prevented by removal of precancerous tissue. Cancers that can be diagnosed early through screening include cancers of the breast, colon, rectum, cervix, prostate, oral cavity, and skin. However, screening is known to reduce mortality only for cancers of the breast, colon, rectum, and cervix. A heightened awareness of changes in the breast or skin may also result in detection of these tumors at earlier stages. Cancers that can be prevented or detected earlier by screening account for at least half of all new cancer cases.

Who Is at Risk of Developing Cancer?

Anyone can develop cancer. Since the risk of being diagnosed with cancer increases with age, most cases occur in adults who are middle aged or older. About 77% of all cancers are diagnosed in persons 55 years of age and older. Cancer researchers use the word "risk" in different ways, most commonly expressing risk as lifetime risk or relative risk.

Lifetime risk refers to the probability that an individual will develop or die from cancer over the course of a lifetime. In the US, men have slightly less than a 1 in 2 lifetime risk of developing cancer; for women, the risk is a little more than 1 in 3.

Relative risk is a measure of the strength of the relationship between risk factors and a particular cancer. It compares the risk of developing cancer in persons with a certain exposure or trait to the risk in persons who do not have this characteristic. For example, male smokers are about 23 times more likely to develop lung cancer than nonsmokers, so their relative risk is 23. Most relative risks are not this large. For example, women who have a first-degree relative (mother, sister, or daughter) with a history of breast cancer have about twice the risk of developing breast cancer, compared to women who do not have this family history.

All cancers involve the malfunction of genes that control cell growth and division. About 5% of all cancers are strongly hereditary, in that an inherited genetic alteration confers a very high risk of developing one or more specific types of cancer. However, most cancers do not result from inherited genes but from damage to genes occurring during one's lifetime. Genetic damage may result from internal factors, such as hormones or the metabolism of nutrients within cells, or external factors, such as tobacco, chemicals, and excessive exposure to sunlight.

How Many People Alive Today Have Ever Had Cancer?

The National Cancer Institute estimates that nearly 12 million Americans with a history of cancer were alive in January 2008. Some of these individuals were cancer free, while others still had evidence of cancer and may have been undergoing treatment.

How Many New Cases Are Expected to Occur This Year?

About 1,638,910 new cancer cases are expected to be diagnosed in 2012. This estimate does not include carcinoma in situ (noninvasive cancer) of any site except urinary bladder, and does not include basal and squamous cell skin cancers, which are not required to be reported to cancer registries.

How Many People Are Expected to Die of Cancer This Year?

In 2012, about 577,190 Americans are expected to die of cancer, more than 1,500 people a day. Cancer is the second most common cause of death in the US, exceeded only by heart disease, accounting for nearly 1 of every 4 deaths.

What Percentage of People Survive Cancer?

The 5-year relative survival rate for all cancers diagnosed between 2001 and 2007 is 67%, up from 49% in 1975-1977 (see page 18). The improvement in survival reflects both progress in diagnosing certain cancers at an earlier stage and improvements

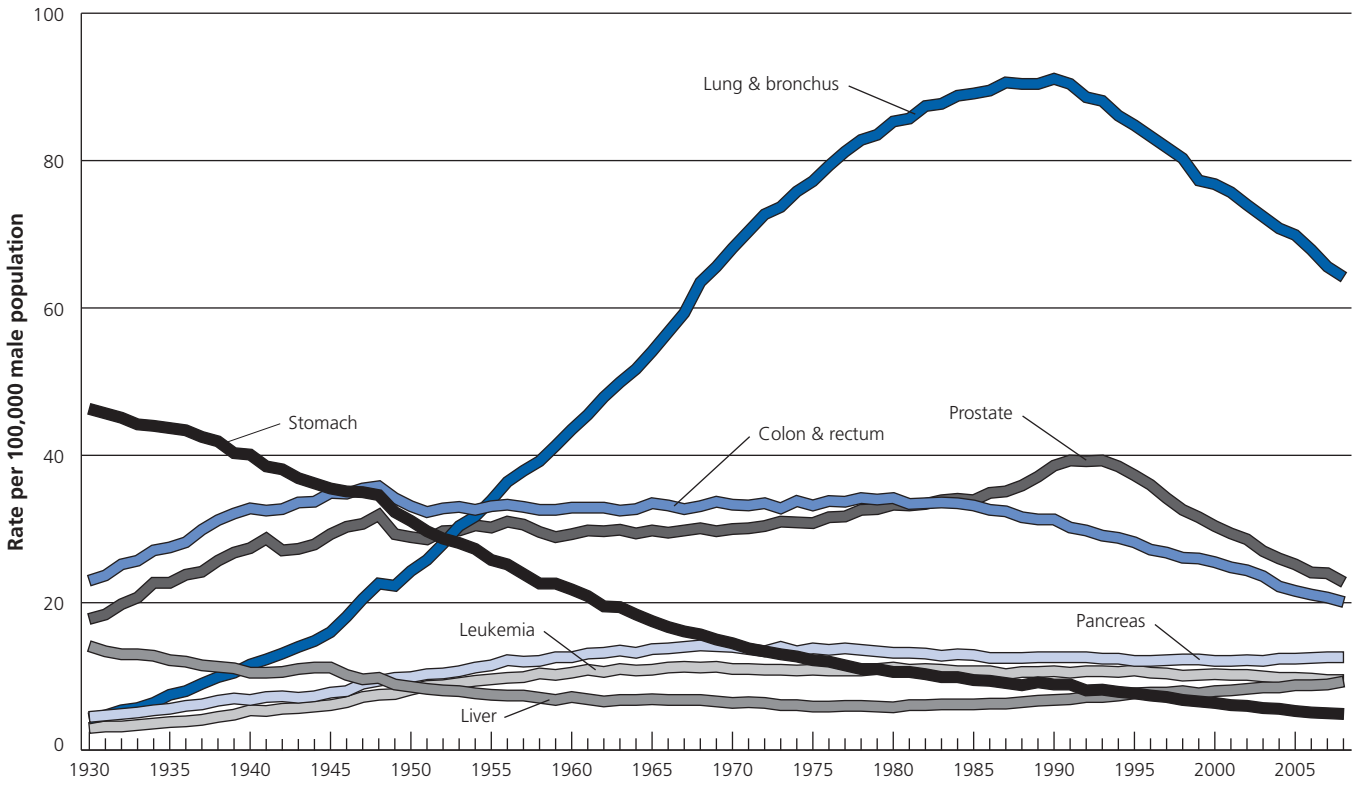
in treatment. Survival statistics vary greatly by cancer type and stage at diagnosis. Relative survival compares survival among cancer patients to that of people not diagnosed with cancer who are of the same age, race, and sex. It represents the percentage of cancer patients who are alive after some designated time period (usually 5 years) relative to persons without cancer. It does not distinguish between patients who have been cured and those who have relapsed or are still in treatment. While 5-year relative survival is useful in monitoring progress in the early detection and treatment of cancer, it does not represent the proportion of people who are cured permanently, since cancer deaths can occur beyond 5 years after diagnosis.

Although relative survival for specific cancer types provides some indication about the average survival experience of cancer patients in a given population, it may or may not predict individual prognosis and should be interpreted with caution. First, 5-year relative survival rates for the most recent time period are based on patients who were diagnosed from 2001 to 2007 and thus, do not reflect recent advances in detection and treatment. Second, factors that influence survival, such as treatment protocols, other illnesses, and biological or behavioral differences of each individual, cannot be taken into account in the estimation of relative survival rates. For more information about survival rates, see Sources of Statistics on page 62.

How Is Cancer Staged?

Staging describes the extent or spread of the disease at the time of diagnosis. Proper staging is essential in determining the choice of therapy and in assessing prognosis. A cancer's stage is based on the primary tumor's size and whether it has spread to other areas of the body. A number of different staging systems are used to classify tumors. The TNM staging system assesses tumors in three ways: extent of the primary tumor (T), absence or presence of regional lymph node involvement (N), and absence or presence of distant metastases (M). Once the T, N, and M are determined, a stage of I, II, III, or IV is assigned, with stage I being early and stage IV being advanced disease. A different system of summary staging (in situ, local, regional, and distant) is used for descriptive and statistical

Age-adjusted Cancer Death Rates,* Males by Site, US, 1930-2008



*Per 100,000, age adjusted to the 2000 US standard population.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2008, National Center for Health Statistics, Centers for Disease Control and Prevention.

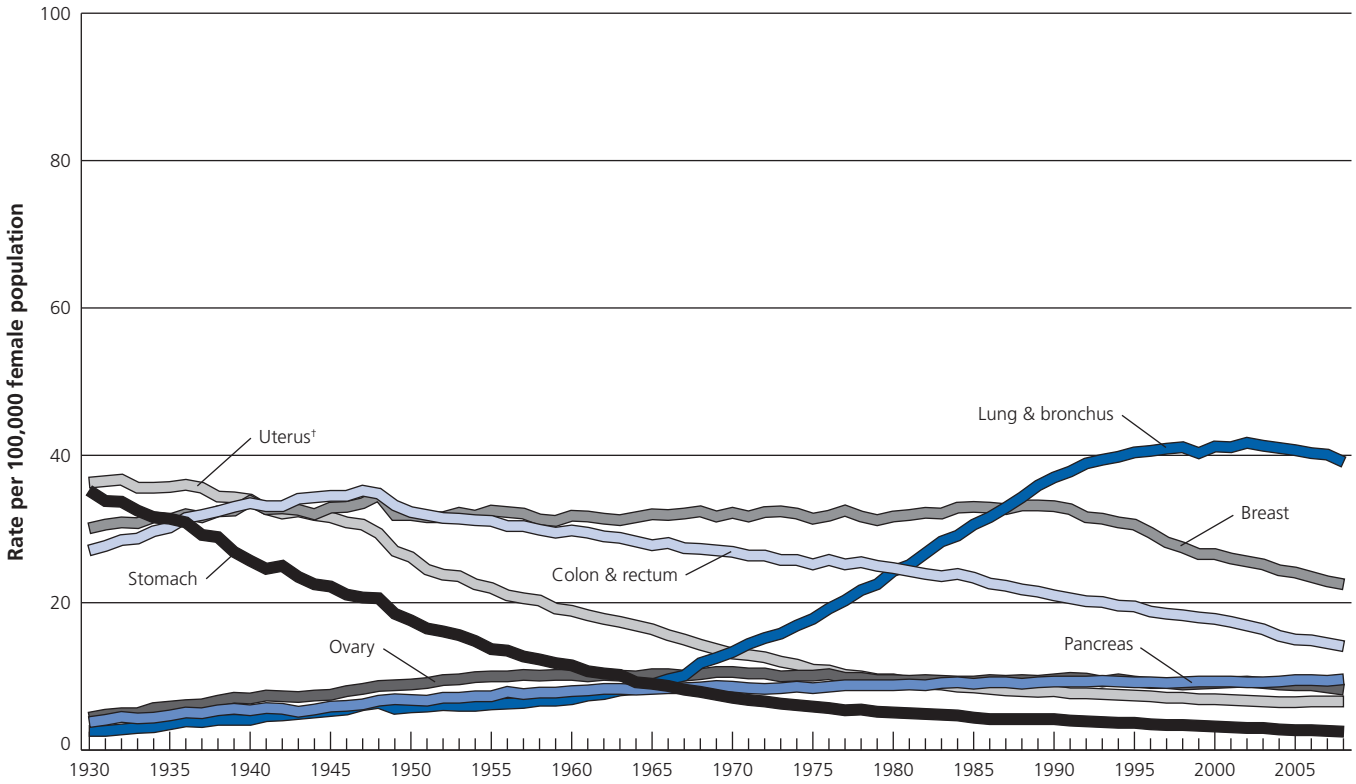
analysis of tumor registry data. If cancer cells are present only in the layer of cells where they developed and have not spread, the stage is in situ. If cancer cells have penetrated the original layer of tissue, the cancer is invasive and categorized as local, regional, or distant stage. (For a description of the summary stage categories, see the footnotes in the table on page 17, Five-year Relative Survival Rates (%) by Stage at Diagnosis, 2001-2007.) As the molecular properties of cancer have become better understood, prognostic models and treatment plans for some cancer sites (e.g., breast) have incorporated the tumor's biological markers and genetic features in addition to stage.

What Are the Costs of Cancer?

The National Institutes of Health (NIH) estimates that the overall costs of cancer in 2007 were $226.8 billion: $103.8 billion for direct medical costs (total of all health expenditures) and $123.0 billion for indirect mortality costs (cost of lost productivity due to premature death). PLEASE NOTE: These estimates are not comparable to those published in previous years because as of 2011, the NIH is using a different data source: the Medical Expenditure Panel Survey (MEPS) of the Agency for Healthcare Research and Quality. The MEPS estimates are based on more current, nationally representative data and are used extensively in scientific publications. As a result, direct and indirect costs will no longer be projected to the current year, and estimates of indirect morbidity costs have been discontinued. For more information, please visit nhlbi.nih.gov/about/factpdf.htm.

Lack of health insurance and other barriers prevents many Americans from receiving optimal health care. According to the US Census Bureau, almost 51 million Americans were uninsured in 2009; almost one-third of Hispanics (32%) and one in 10 children (17 years of age and younger) had no health insurance coverage. Uninsured patients and those from ethnic minorities are substantially more likely to be diagnosed with cancer at a later stage, when treatment can be more extensive and more costly. For more information on the relationship between health insurance and cancer, see *Cancer Facts & Figures 2008*, Special Section, available online at cancer.org/statistics.

Age-adjusted Cancer Death Rates,* Females by Site, US, 1930-2008



*Per 100,000, age adjusted to the 2000 US standard population. †Uterus cancer death rates are for uterine cervix and uterine corpus combined.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the lung and bronchus, colon and rectum, and ovary are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2008, National Center for Health Statistics, Centers for Disease Control and Prevention.

Estimated New Cancer Cases and Deaths by Sex, US, 2012*

	Estimated New Cases			Estimated Deaths		
	Both Sexes	**Male**	**Female**	**Both Sexes**	**Male**	**Female**
All Sites	1,638,910	848,170	790,740	577,190	301,820	275,370
Oral cavity & pharynx	40,250	28,540	11,710	7,850	5,440	2,410
Tongue	12,770	9,040	3,730	2,050	1,360	690
Mouth	11,620	7,030	4,590	1,790	1,070	720
Pharynx	13,510	10,790	2,720	2,330	1,730	600
Other oral cavity	2,350	1,680	670	1,680	1,280	400
Digestive system	284,680	156,760	127,920	142,510	80,560	61,950
Esophagus	17,460	13,950	3,510	15,070	12,040	3,030
Stomach	21,320	13,020	8,300	10,540	6,190	4,350
Small intestine	8,070	4,380	3,690	1,150	610	540
Colon†	103,170	49,920	53,250	51,690	26,470	25,220
Rectum	40,290	23,500	16,790			
Anus, anal canal, & anorectum	6,230	2,250	3,980	780	300	480
Liver & intrahepatic bile duct	28,720	21,370	7,350	20,550	13,980	6,570
Gallbladder & other biliary	9,810	4,480	5,330	3,200	1,240	1,960
Pancreas	43,920	22,090	21,830	37,390	18,850	18,540
Other digestive organs	5,690	1,800	3,890	2,140	880	1,260
Respiratory system	244,180	130,270	113,910	164,770	91,110	73,660
Larynx	12,360	9,840	2,520	3,650	2,880	770
Lung & bronchus	226,160	116,470	109,690	160,340	87,750	72,590
Other respiratory organs	5,660	3,960	1,700	780	480	300
Bones & joints	2,890	1,600	1,290	1,410	790	620
Soft tissue (including heart)	11,280	6,110	5,170	3,900	2,050	1,850
Skin (excluding basal & squamous)	81,240	46,890	34,350	12,190	8,210	3,980
Melanoma-skin	76,250	44,250	32,000	9,180	6,060	3,120
Other nonepithelial skin	4,990	2,640	2,350	3,010	2,150	860
Breast	229,060	2,190	226,870	39,920	410	39,510
Genital system	340,650	251,900	88,750	58,360	28,840	29,520
Uterine cervix	12,170		12,170	4,220		4,220
Uterine corpus	47,130		47,130	8,010		8,010
Ovary	22,280		22,280	15,500		15,500
Vulva	4,490		4,490	950		950
Vagina & other genital, female	2,680		2,680	840		840
Prostate	241,740	241,740		28,170	28,170	
Testis	8,590	8,590		360	360	
Penis & other genital, male	1,570	1,570		310	310	
Urinary system	141,140	97,610	43,530	29,330	19,670	9,660
Urinary bladder	73,510	55,600	17,910	14,880	10,510	4,370
Kidney & renal pelvis	64,770	40,250	24,520	13,570	8,650	4,920
Ureter & other urinary organs	2,860	1,760	1,100	880	510	370
Eye & orbit	2,610	1,310	1,300	270	120	150
Brain & other nervous system	22,910	12,630	10,280	13,700	7,720	5,980
Endocrine system	58,980	14,600	44,380	2,700	1,240	1,460
Thyroid	56,460	13,250	43,210	1,780	780	1,000
Other endocrine	2,520	1,350	1,170	920	460	460
Lymphoma	79,190	43,120	36,070	20,130	10,990	9,140
Hodgkin lymphoma	9,060	4,960	4,100	1,190	670	520
Non-Hodgkin lymphoma	70,130	38,160	31,970	18,940	10,320	8,620
Myeloma	21,700	12,190	9,510	10,710	6,020	4,690
Leukemia	47,150	26,830	20,320	23,540	13,500	10,040
Acute lymphocytic leukemia	6,050	3,450	2,600	1,440	820	620
Chronic lymphocytic leukemia	16,060	9,490	6,570	4,580	2,730	1,850
Acute myeloid leukemia	13,780	7,350	6,430	10,200	5,790	4,410
Chronic myeloid leukemia	5,430	3,210	2,220	610	370	240
Other leukemia‡	5,830	3,330	2,500	6,710	3,790	2,920
Other & unspecified primary sites‡	31,000	15,620	15,380	45,900	25,150	20,750

*Rounded to the nearest 10; estimated new cases exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. About 63,300 carcinoma in situ of the female breast and 55,560 melanoma in situ will be newly diagnosed in 2012. †Estimated deaths for colon and rectal cancers are combined. ‡More deaths than cases may reflect lack of specificity in recording underlying cause of death on death certificates or an undercount in the case estimate.

Source: Estimated new cases are based on 1995-2008 incidence rates from 47 states and the District of Columbia as reported by the North American Association of Central Cancer Registries (NAACCR), represesnting about 95% of the US population. Estimated deaths are based on US Mortality Data, 1994 to 2008, National Center for Health Statistics, Centers for Disease Control and Prevention.

Estimated Numbers of New Cases for Selected Cancers by State, US, 2012*

State	All Sites	Female Breast	Uterine Cervix	Colon & Rectum	Uterine Corpus	Leukemia	Lung & Bronchus	Melanoma of the Skin	Non-Hodgkin Lymphoma	Prostate	Urinary Bladder
Alabama	26,440	3,450	220	2,540	590	630	4,440	1,090	1,000	3,860	1,050
Alaska	3,640	470	†	290	100	120	490	70	160	490	160
Arizona	31,990	4,470	250	2,700	820	960	3,970	1,650	1,390	4,390	1,520
Arkansas	16,120	2,150	130	1,590	370	460	2,760	570	680	2,400	690
California	165,810	25,040	1,450	14,370	4,960	5,070	18,060	9,250	7,460	23,410	6,880
Colorado	22,820	3,420	140	1,750	600	730	2,400	1,470	1,000	3,830	1,070
Connecticut	21,530	3,140	110	1,730	680	550	2,720	1,290	890	3,340	1,170
Delaware	5,340	740	†	410	170	140	800	280	220	850	230
Dist. of Columbia	2,980	460	†	260	80	70	370	80	100	540	90
Florida	117,580	15,540	910	10,200	2,910	3,310	17,860	5,450	4,970	17,160	5,460
Georgia	48,130	6,970	410	4,090	1,170	1,230	6,570	2,150	1,840	7,900	1,680
Hawaii	6,610	1,120	50	680	220	180	860	280	230	740	220
Idaho	7,720	1,000	50	640	210	230	920	400	320	1,320	380
Illinois	65,750	9,090	510	6,030	1,900	1,980	9,190	2,460	2,870	8,950	3,030
Indiana	35,060	4,490	250	3,200	1,070	1,020	5,460	1,450	1,500	4,320	1,690
Iowa	17,010	2,350	90	1,680	540	560	2,330	850	800	2,640	850
Kansas	14,090	1,990	90	1,330	420	440	1,910	610	630	1,890	630
Kentucky	25,160	3,160	180	2,280	630	670	4,430	1,370	1,070	3,200	1,080
Louisiana	23,480	3,320	200	2,350	520	660	3,660	810	930	4,040	930
Maine	8,990	1,170	50	750	300	240	1,340	480	390	1,320	520
Maryland	31,000	4,700	210	2,420	920	780	4,250	1,420	1,280	5,190	1,200
Massachusetts	38,470	5,480	190	2,990	1,250	930	4,920	2,190	1,590	6,180	2,000
Michigan	57,790	7,710	350	5,080	1,770	1,700	8,210	2,700	2,550	9,450	2,830
Minnesota	28,060	4,110	150	2,370	910	900	3,750	1,130	1,290	4,520	1,320
Mississippi	15,190	1,990	140	1,580	330	360	2,550	510	540	2,330	550
Missouri	33,440	4,440	230	3,250	1,060	1,010	5,370	1,280	1,460	4,110	1,510
Montana	5,550	740	†	470	150	170	700	320	250	1,000	270
Nebraska	9,030	1,270	60	910	280	300	1,230	380	440	1,240	430
Nevada	13,780	1,770	120	1,260	330	390	1,930	510	530	1,850	610
New Hampshire	8,350	1,160	†	680	280	240	1,130	470	350	1,260	460
New Jersey	50,650	6,970	390	4,630	1,670	1,460	5,990	2,340	2,160	7,550	2,480
New Mexico	9,640	1,310	70	840	260	310	1,090	560	420	1,430	380
New York	109,440	14,730	850	9,390	3,730	2,970	13,620	4,700	4,680	17,090	5,460
North Carolina	51,860	7,090	390	4,140	1,390	1,410	7,950	2,360	2,050	8,010	2,100
North Dakota	3,510	490	†	350	110	120	460	130	160	530	170
Ohio	66,560	8,990	400	6,020	2,110	1,810	10,270	3,030	2,920	8,560	3,160
Oklahoma	19,210	2,630	170	1,780	470	600	3,370	750	850	2,560	820
Oregon	21,370	3,200	130	1,670	620	610	2,920	1,290	950	3,460	1,020
Pennsylvania	78,340	10,290	460	7,330	2,570	2,340	10,890	3,470	3,510	11,890	4,150
Rhode Island	6,310	870	†	540	200	170	860	290	240	810	330
South Carolina	26,570	3,570	220	2,350	670	700	4,270	1,150	1,040	4,140	1,060
South Dakota	4,430	600	†	420	140	130	620	170	200	700	220
Tennessee	35,610	4,680	270	3,240	850	920	6,140	1,640	1,440	4,900	1,490
Texas	110,470	15,050	1,080	9,700	2,600	3,530	14,810	4,020	4,750	15,730	3,940
Utah	10,620	1,480	70	780	290	370	880	780	480	1,850	420
Vermont	4,060	560	†	330	130	110	550	220	160	580	210
Virginia	41,380	6,190	290	3,250	1,220	1,020	5,550	2,150	1,700	6,860	1,620
Washington	35,790	5,240	220	2,770	1,080	1,050	4,700	2,140	1,600	5,060	1,670
West Virginia	11,610	1,430	80	1,080	330	330	2,070	520	490	1,540	510
Wisconsin	31,920	4,270	190	2,730	1,040	1,110	4,220	1,370	1,460	4,310	1,600
Wyoming	2,650	360	†	240	70	80	330	150	110	480	130
United States	1,638,910	226,870	12,170	143,460	47,130	47,150	226,160	76,250	70,130	241,740	73,510

*Rounded to nearest 10. Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. †Estimate is fewer than 50 cases.

Note: These estimates are offered as a rough guide and should be interpreted with caution. State estimates may not sum to US total due to rounding and exclusion of state estimates fewer than 50 cases.

Estimated Numbers of Deaths for Selected Cancers by State, US, 2012*

State	All Sites	Brain/ Nervous System	Female Breast	Colon & Rectum	Leukemia	Liver	Lung & Bronchus	Non-Hodgkin Lymphoma	Ovary	Pancreas	Prostate
Alabama	10,290	230	710	980	390	320	3,240	320	300	600	560
Alaska	930	†	70	80	†	†	260	†	†	60	†
Arizona	11,090	300	780	1,010	460	440	2,850	400	330	720	570
Arkansas	6,570	150	420	610	260	180	2,160	170	150	370	290
California	56,620	1,540	4,110	5,140	2,430	2,880	12,830	2,000	1,680	3,860	3,110
Colorado	7,190	230	510	680	300	270	1,690	250	250	490	380
Connecticut	6,940	160	480	560	270	230	1,780	230	210	510	380
Delaware	1,930	50	120	170	70	70	580	60	50	120	90
Dist. of Columbia	1,010	†	80	100	†	†	250	†	†	80	60
Florida	42,170	850	2,600	3,660	1,760	1,460	12,200	1,400	1,040	2,670	2,160
Georgia	15,790	350	1,140	1,470	600	480	4,650	470	450	970	860
Hawaii	2,380	†	140	240	80	120	580	80	60	200	100
Idaho	2,640	90	170	220	130	80	660	100	70	190	160
Illinois	23,970	500	1,650	2,300	990	730	6,590	760	620	1,580	1,140
Indiana	13,240	320	850	1,160	560	350	4,140	450	340	790	560
Iowa	6,410	180	400	590	290	180	1,790	230	190	390	330
Kansas	5,400	150	370	510	250	160	1,580	200	140	340	230
Kentucky	9,890	190	570	890	350	250	3,530	310	220	530	360
Louisiana	9,150	210	660	900	330	380	2,730	270	220	570	390
Maine	3,230	80	180	260	120	90	970	110	70	200	130
Maryland	10,440	230	810	940	420	350	2,850	320	280	720	510
Massachusetts	12,930	300	800	1,060	500	480	3,570	420	370	910	600
Michigan	20,430	530	1,350	1,730	890	660	5,910	720	550	1,370	840
Minnesota	9,490	240	600	800	440	320	2,500	330	260	600	480
Mississippi	6,330	140	440	640	240	220	1,960	170	140	370	310
Missouri	12,710	300	900	1,120	550	390	3,970	390	280	800	580
Montana	2,010	60	110	170	90	50	580	70	60	130	110
Nebraska	3,450	100	210	360	150	80	900	130	90	210	190
Nevada	4,590	140	350	510	170	210	1,490	140	120	340	260
New Hampshire	2,700	70	180	220	100	80	750	80	60	200	120
New Jersey	16,650	340	1,340	1,600	650	540	4,200	550	490	1,130	720
New Mexico	3,530	90	240	350	140	170	780	110	100	240	200
New York	34,140	740	2,420	3,090	1,430	1,350	8,880	1,080	1,010	2,420	1,610
North Carolina	18,440	390	1,290	1,530	690	580	5,600	560	460	1,130	1,020
North Dakota	1,300	†	90	130	60	†	320	50	†	90	70
Ohio	25,030	570	1,750	2,250	970	720	7,350	800	600	1,710	1,210
Oklahoma	7,800	200	500	720	310	240	2,440	260	180	420	430
Oregon	7,790	220	510	670	310	270	2,120	280	240	520	410
Pennsylvania	28,790	570	1,950	2,460	1,190	880	7,750	1,030	810	1,940	1,330
Rhode Island	2,190	50	130	170	100	80	620	70	60	130	90
South Carolina	9,670	220	660	830	350	300	2,970	280	220	570	440
South Dakota	1,630	†	110	160	70	†	450	60	50	100	80
Tennessee	13,880	340	890	1,230	510	410	4,570	430	330	790	580
Texas	36,820	900	2,650	3,400	1,490	1,830	9,780	1,180	930	2,240	1,630
Utah	2,780	110	250	240	160	90	460	110	90	210	270
Vermont	1,300	†	80	110	50	†	370	†	†	90	60
Virginia	14,610	320	1,110	1,290	570	440	4,150	450	420	990	660
Washington	12,170	400	800	990	510	500	3,270	390	390	810	670
West Virginia	4,600	100	280	440	160	110	1,460	160	120	220	160
Wisconsin	11,240	300	690	920	510	350	3,000	400	320	760	570
Wyoming	940	†	60	90	†	†	250	†	†	70	†
United States	577,190	13,700	39,510	51,690	23,540	20,550	160,340	18,940	15,500	37,390	28,170

*Rounded to nearest 10. †Estimate is fewer than 50 deaths.
Note: State estimates may not add to US total due to rounding and exclusion of state estimates fewer than 50 deaths.

Incidence Rates* for Selected Cancers by State, US, 2004-2008

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin Lymphoma		Prostate	Urinary Bladder	
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Male**	**Female**
Alabama†	579.9	391.1	117.2	61.3	42.0	106.8	54.1	19.8	13.8	160.8	32.8	7.6
Alaska	531.4	441.0	130.4	55.1	45.5	85.3	64.8	22.3	18.2	141.5	39.4	8.6
Arizona	447.5	360.6	106.7	43.4	32.5	63.9	48.2	18.0	13.3	122.9	32.5	8.6
Arkansas	556.4	385.6	109.0	56.2	41.4	109.2	61.0	21.7	15.4	156.4	32.8	8.4
California	512.8	396.9	122.4	51.2	38.6	63.3	45.7	22.8	15.6	146.5	34.3	8.1
Colorado	498.2	393.5	122.3	48.4	37.0	57.6	45.0	22.0	15.8	156.3	32.1	8.3
Connecticut	590.0	458.5	136.2	57.4	42.9	80.2	60.0	26.3	17.9	162.1	47.6	12.3
Delaware	614.3	446.9	126.6	59.6	42.6	94.4	69.5	24.3	17.0	181.7	44.4	11.9
Dist. of Columbia‡	573.2	398.3	126.7	54.1	43.7	80.3	45.3	22.7	12.8	187.9	24.4	7.7
Florida	531.2	402.6	113.6	51.9	39.3	85.1	59.0	21.7	15.3	137.3	35.9	9.1
Georgia	571.9	395.7	119.2	55.7	40.0	97.3	54.5	21.7	14.5	167.4	33.1	8.0
Hawaii	503.7	393.3	122.4	59.7	39.8	70.5	40.7	20.3	12.4	132.1	26.2	6.4
Idaho	532.0	408.7	116.5	46.5	37.8	66.8	49.0	22.5	17.1	162.5	36.6	9.2
Illinois	577.0	433.8	123.9	63.9	46.5	89.9	59.8	24.2	16.3	157.7	40.1	10.2
Indiana	544.0	418.6	115.1	59.5	44.2	99.8	63.6	23.0	17.0	132.7	36.7	9.2
Iowa	563.7	431.4	122.5	61.3	47.1	88.0	55.3	26.4	18.4	141.7	42.1	8.9
Kansas	556.4	420.6	124.4	57.9	41.7	85.0	53.6	23.9	17.6	158.1	37.0	9.3
Kentucky	612.1	456.4	120.5	66.7	47.4	130.1	79.5	24.7	17.3	139.8	40.1	10.1
Louisiana†	618.1	409.9	118.2	66.0	44.7	105.8	58.6	24.0	17.1	172.0	35.0	8.4
Maine	612.7	468.1	128.9	58.3	46.0	97.2	66.6	26.0	18.6	163.3	48.2	13.5
Maryland‡	533.1	411.6	123.4	52.4	39.3	80.0	57.4	20.5	14.2	157.0	33.0	9.7
Massachusetts	588.6	459.2	133.4	56.8	42.0	82.4	64.1	24.6	16.6	160.8	45.6	12.7
Michigan	582.8	432.7	120.3	54.6	41.6	89.1	61.8	25.1	18.3	169.4	41.7	10.7
Minnesota	573.1	421.1	126.4	53.7	41.1	67.6	49.6	26.9	18.1	184.2	40.7	9.7
Mississippi†	608.1	392.1	112.8	64.7	45.7	117.2	56.0	21.6	14.2	174.1	31.3	7.3
Missouri	547.1	418.8	120.6	59.7	43.1	101.3	63.8	22.1	16.0	131.8	35.8	8.4
Montana	518.7	410.9	120.0	51.2	39.3	72.8	58.2	22.2	15.5	160.7	36.3	9.7
Nebraska	559.7	425.4	125.0	65.2	46.9	82.3	52.0	24.4	17.5	157.2	37.2	9.1
Nevada‡	507.6	404.1	111.7	51.2	41.1	79.0	66.8	20.4	15.7	135.5	37.6	10.6
New Hampshire	576.3	455.7	132.2	54.3	41.4	82.2	62.2	23.1	17.3	154.8	46.0	13.2
New Jersey	595.1	453.8	129.7	60.6	44.4	76.7	56.7	25.6	17.7	171.0	46.7	12.2
New Mexico	467.4	369.5	110.5	46.2	35.5	54.5	39.4	18.5	14.4	137.6	25.9	7.0
New York	580.9	438.4	124.3	56.7	43.0	77.3	54.8	25.5	17.5	166.9	42.5	11.0
North Carolina	576.6	412.5	123.3	55.8	39.9	101.6	57.8	22.7	15.6	158.8	37.1	9.1
North Dakota	559.3	417.1	124.2	66.4	44.5	72.5	46.2	23.1	17.4	169.5	40.8	9.9
Ohio	551.1	421.2	119.8	58.5	43.6	94.9	60.0	23.2	16.2	146.0	39.0	9.6
Oklahoma	566.3	428.0	125.6	56.8	42.7	103.2	65.6	23.0	17.7	151.8	35.8	8.7
Oregon	531.6	431.5	130.3	50.0	38.7	76.0	59.8	24.2	16.3	149.2	38.7	10.0
Pennsylvania	586.6	449.4	124.8	61.4	46.0	88.4	57.6	24.9	17.6	155.8	45.1	11.0
Rhode Island	603.1	464.5	132.5	59.0	44.8	90.8	63.2	24.4	17.5	155.1	53.1	13.4
South Carolina	569.1	396.9	119.9	55.6	41.0	97.9	53.4	20.5	14.1	165.5	30.9	7.8
South Dakota	515.1	386.8	117.4	55.8	40.9	76.3	46.6	20.3	16.7	158.5	34.0	7.9
Tennessee	558.0	404.6	117.2	57.4	42.2	108.7	60.7	22.1	16.1	142.2	34.4	8.3
Texas†	529.9	388.5	113.7	54.4	37.8	82.3	49.9	22.3	15.8	143.3	29.4	7.0
Utah	476.2	344.7	109.5	42.2	31.2	34.1	22.3	23.4	16.0	173.7	28.7	5.8
Vermont	552.6	453.2	130.1	46.7	41.5	81.9	62.1	23.7	17.4	152.1	43.8	13.1
Virginia	542.1	396.9	124.2	52.3	39.5	88.0	54.3	21.2	14.2	159.4	34.0	8.4
Washington	552.5	434.8	129.8	49.5	37.4	73.4	58.3	26.5	17.7	157.9	39.7	9.5
West Virginia	581.9	441.2	112.6	64.7	47.4	115.0	73.2	23.9	17.3	140.4	40.0	11.1
Wisconsin	555.8	430.9	123.4	53.2	41.0	78.1	54.3	28.3	20.1	150.9	38.7	10.0
Wyoming	517.6	391.2	114.6	51.2	39.6	59.5	48.1	22.4	14.8	166.2	41.4	10.1
United States	553.0	416.5	121.2	55.7	41.4	84.4	55.7	23.4	16.3	152.9	37.6	9.4

*Per 100,000, age adjusted to the 2000 US standard population. †Data for 2005 are limited to cases diagnosed from January-June due to the effect of large migrations of populations on this state as a result of Hurricane Katrina in September 2005. ‡This state's data are not included in the rates for the US overall because its cancer registry did not achieve high-quality data standards for one or more years during 2004-2008 according to the North American Association of Central Cancer Registry (NAACCR) data quality indicators.

Source: NAACCR, 2011. Data are collected by cancer registries participating in the National Cancer Institute's SEER program and the Centers for Disease Control and Prevention's National Program of Cancer Registries.

American Cancer Society, Surveillance Research, 2012

Death Rates* for Selected Cancers by State, US, 2004-2008

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin Lymphoma		Pancreas		Prostate
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Alabama	262.0	158.7	24.5	23.6	15.2	90.3	41.0	8.5	5.5	12.9	9.4	29.9
Alaska	212.4	157.2	21.7	21.5	13.5	62.3	46.3	7.7	5.1	11.9	10.4	22.5
Arizona	186.7	132.4	21.0	17.5	11.9	52.1	33.9	7.7	4.9	11.4	7.8	20.6
Arkansas	254.9	164.1	24.0	23.2	15.6	93.2	47.4	8.6	5.2	12.7	9.5	26.2
California	197.4	143.4	22.5	18.4	13.3	50.3	33.9	8.2	5.1	11.8	9.3	23.6
Colorado	187.3	135.7	20.5	18.3	13.3	46.1	32.3	8.2	4.7	11.2	8.8	24.3
Connecticut	216.4	152.5	23.2	18.1	13.8	58.5	39.1	8.2	5.4	14.4	10.1	25.7
Delaware	238.5	167.5	24.3	20.8	15.0	73.7	50.3	9.0	5.1	12.1	9.8	26.7
Dist. of Columbia	260.4	161.1	27.6	23.0	18.1	68.6	35.1	8.8	3.2	16.1	10.1	41.7
Florida	209.4	143.9	21.9	18.7	13.3	65.1	40.1	8.0	5.0	11.9	8.6	20.3
Georgia	237.1	149.5	23.2	20.7	14.3	78.9	38.9	8.0	4.8	12.8	8.8	28.6
Hawaii	186.2	120.7	17.8	18.8	10.7	51.8	27.4	7.2	4.4	12.9	9.4	16.8
Idaho	197.9	145.7	21.2	15.9	13.8	52.0	34.9	8.2	5.8	11.6	10.2	27.3
Illinois	233.3	162.0	24.7	23.2	16.2	69.9	42.0	9.1	5.6	13.2	10.1	26.1
Indiana	247.3	164.8	24.0	23.1	15.6	82.8	47.2	9.9	5.8	12.9	9.5	25.2
Iowa	224.7	151.7	22.1	21.3	15.5	70.0	39.3	9.2	5.6	12.1	8.8	25.1
Kansas	224.7	151.3	23.1	21.8	14.5	71.8	40.9	9.7	5.5	12.7	9.4	22.2
Kentucky	271.2	175.1	23.5	24.4	17.0	103.0	56.1	9.3	6.0	12.3	9.3	25.6
Louisiana	268.1	168.6	26.8	25.8	16.3	87.8	45.0	9.3	5.5	14.0	10.9	28.6
Maine	243.4	164.7	21.5	20.9	15.4	75.6	47.3	9.3	6.0	12.7	10.0	25.0
Maryland	229.7	159.7	25.6	22.6	15.0	67.4	42.2	8.1	5.0	12.8	10.5	27.5
Massachusetts	227.3	156.0	22.3	20.1	14.4	64.0	42.7	8.7	5.4	13.2	10.3	24.1
Michigan	231.1	162.1	24.4	20.6	15.1	71.5	43.9	9.2	6.2	13.6	9.9	23.6
Minnesota	208.8	147.6	21.6	18.2	13.0	57.0	37.3	9.5	5.4	11.8	9.3	25.1
Mississippi	276.1	161.4	25.5	25.2	16.6	98.9	43.3	8.5	4.6	13.6	9.6	31.7
Missouri	242.0	162.7	25.4	22.1	15.0	83.1	46.4	8.5	5.5	12.9	9.5	23.1
Montana	208.1	153.0	20.7	17.5	13.9	59.5	42.4	8.5	5.6	12.3	9.3	28.0
Nebraska	217.1	147.2	22.0	22.9	15.6	64.1	35.9	9.0	5.9	12.2	8.7	24.9
Nevada	214.7	163.0	23.5	21.3	16.4	62.7	50.0	6.8	4.9	12.1	10.0	24.5
New Hampshire	223.4	159.1	22.8	20.5	13.9	63.4	43.7	8.3	5.1	12.8	11.0	25.1
New Jersey	218.5	160.6	26.5	22.6	16.0	59.7	39.1	8.5	5.7	13.3	9.9	23.4
New Mexico	193.0	136.8	21.5	19.6	13.4	45.5	29.5	6.6	4.8	11.5	9.3	24.6
New York	204.6	148.0	23.1	20.2	14.5	56.6	36.4	8.0	5.1	12.6	9.8	23.0
North Carolina	241.4	155.5	24.4	20.4	14.2	81.1	41.9	8.0	5.3	12.5	9.7	27.0
North Dakota	212.8	146.0	22.3	22.2	14.3	59.3	35.4	8.0	5.1	12.4	9.5	25.9
Ohio	246.5	165.5	25.9	23.3	16.0	78.5	45.0	9.5	5.6	13.1	9.7	26.3
Oklahoma	245.4	161.5	24.1	23.3	14.9	84.0	46.8	9.2	5.7	11.8	8.7	23.9
Oregon	217.7	158.7	22.5	19.0	14.1	62.9	44.3	9.1	5.9	12.3	10.3	26.0
Pennsylvania	235.6	161.1	24.8	22.7	15.8	69.9	40.3	9.4	5.9	13.5	9.8	24.5
Rhode Island	234.4	155.0	22.2	20.6	13.5	69.0	43.4	9.1	4.8	12.3	8.7	23.8
South Carolina	245.7	153.9	24.3	20.9	14.6	81.7	39.9	7.8	5.1	12.6	9.5	28.5
South Dakota	214.2	142.7	21.8	20.5	14.3	65.4	36.3	8.7	5.3	11.2	9.2	24.4
Tennessee	261.1	164.0	24.5	22.7	15.6	93.9	47.2	9.3	5.5	12.8	9.4	26.3
Texas	217.8	145.1	22.6	20.7	13.4	65.7	36.9	8.2	5.2	11.8	8.6	22.6
Utah	158.3	112.4	22.1	14.6	10.2	29.5	16.9	7.8	5.0	9.7	7.9	25.6
Vermont	214.2	155.5	21.7	20.2	15.0	62.5	43.2	7.7	5.1	11.5	9.6	24.3
Virginia	232.7	155.5	25.1	21.0	14.4	73.0	41.3	8.3	5.1	13.1	9.9	26.3
Washington	211.9	155.7	22.4	18.2	13.1	59.7	43.2	8.9	5.7	12.1	9.8	25.2
West Virginia	257.1	174.0	23.9	24.4	16.9	89.1	50.8	9.6	6.5	11.7	7.6	21.6
Wisconsin	222.8	154.3	22.1	19.4	13.6	61.4	39.2	9.5	5.9	12.8	9.7	26.7
Wyoming	199.4	150.7	22.1	19.9	14.6	52.5	38.2	8.1	6.3	12.4	10.4	22.7
United States	223.0	153.2	23.5	20.7	14.5	67.4	40.1	8.6	5.4	12.5	9.4	24.4

*Per 100,000, age adjusted to the 2000 US standard population.

Source: US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention.

American Cancer Society, Surveillance Research, 2012

Selected Cancers

Breast

New Cases: An estimated 226,870 new cases of invasive breast cancer are expected to occur among women in the US during 2012; about 2,190 new cases are expected in men. Excluding cancers of the skin, breast cancer is the most frequently diagnosed cancer in women. The breast cancer incidence rate began to decline in 2000 after peaking at 142 per 100,000 women in 1999. The dramatic decrease of almost 7% from 2002 to 2003 has been attributed to reductions in the use of menopausal hormone therapy (MHT), previously known as hormone replacement therapy, following the publication of results from the Women's Health Initiative in 2002; this study found that the use of combined estrogen plus progestin MHT was associated with an increased risk of breast cancer, as well as coronary heart disease. From 2004-2008, the most recent five years for which data are available, breast cancer incidence rates were stable.

In addition to invasive breast cancer, 63,300 new cases of in situ breast cancer are expected to occur among women in 2012. Of these, approximately 85% will be ductal carcinoma in situ (DCIS). Since 2004, in situ breast cancer incidence rates have been stable in white women and increasing in African American women by 2.0% per year.

Deaths: An estimated 39,920 breast cancer deaths (39,510 women, 410 men) are expected in 2012. Breast cancer ranks second as a cause of cancer death in women (after lung cancer). Death rates for breast cancer have steadily decreased in women since 1990, with larger decreases in younger women; from 2004 to 2008, rates decreased 3.1% per year in women younger than 50 and 2.1% per year in women 50 and older. The decrease in breast cancer death rates represents progress in earlier detection, improved treatment, and possibly decreased incidence.

Signs and symptoms: Breast cancer typically produces no symptoms when the tumor is small and most treatable. Therefore, it is important for women to follow recommended screening guidelines for detecting breast cancer at an early stage, before symptoms develop. Larger tumors may become evident as a painless mass. Less common symptoms include persistent changes to the breast, such as thickening, swelling, distortion, tenderness, skin irritation, redness, scaliness, or nipple abnormalities, such as ulceration, retraction, or spontaneous discharge. Typically, breast pain results from benign conditions and is not an early symptom of breast cancer.

Risk factors: Besides being female, increasing age is the most important risk factor for breast cancer. Potentially modifiable risk factors include weight gain after age 18, being overweight or obese (for postmenopausal breast cancer), use of MHT (combined estrogen and progestin hormone therapy), physical inactivity, and alcohol consumption. Medical findings that predict higher risk include high breast tissue density (a mammographic measure of the amount of glandular tissue relative to fatty tissue in the breast), high bone mineral density (women with low density are at increased risk for osteoporosis), and biopsy-confirmed hyperplasia (overgrowth of cells), especially atypical hyperplasia (overgrowth of cells that do not appear normal). High-dose radiation to the chest for cancer treatment also increases risk. Reproductive factors that increase risk include a long menstrual history (menstrual periods that start early and/or end later in life), recent use of oral contraceptives, never having children, and having one's first child after age 30.

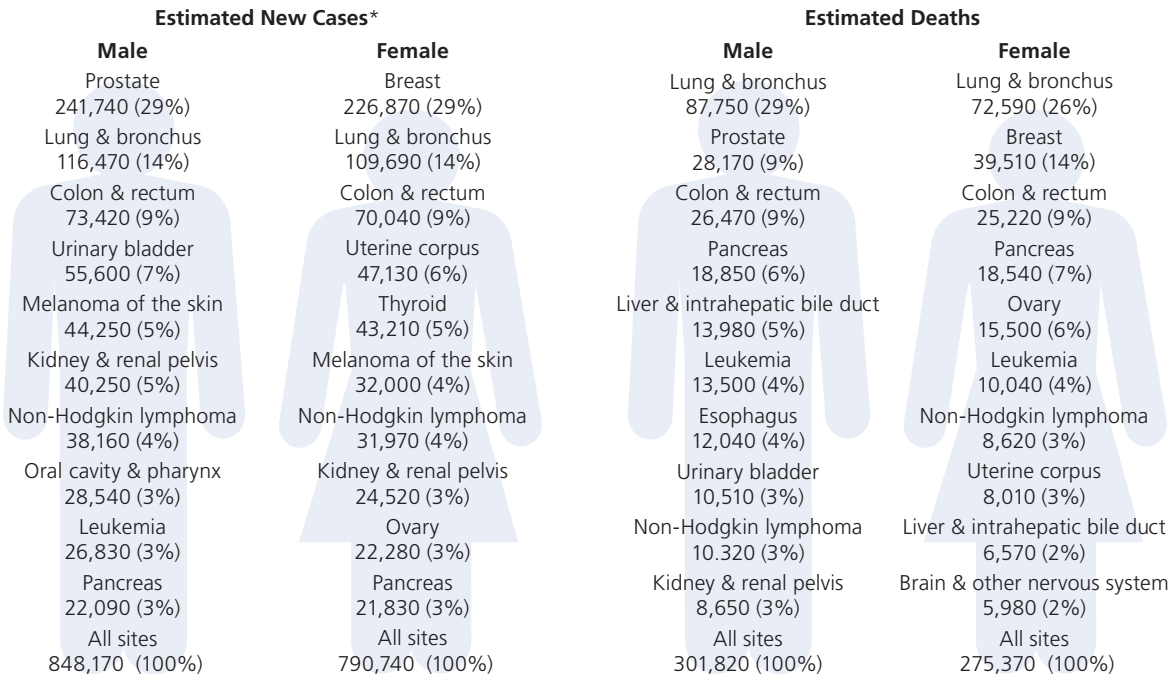
Risk is also increased by a family history of one or more first-degree relatives with breast cancer (though most women with breast cancer do not have a family history of the disease). Inherited mutations (alterations) in breast cancer susceptibility genes account for approximately 5%-10% of all female and male breast cancer cases, but are very rare in the general population (much less than 1%). Most of these mutations are located in BRCA1 and BRCA2 genes, although mutations in other known genes have also been identified. Individuals with a strong family history of breast cancer and cancer at other sites, such as ovarian and colon cancer, should consider counseling to determine if genetic testing is appropriate. Prevention measures may be possible for individuals with breast cancer susceptibility mutations. In BRCA1 and BRCA2 mutation carriers, studies suggest that prophylactic removal of the ovaries and/or breasts decreases the risk of breast cancer considerably, although not all women who choose this surgery would have developed breast cancer. Women who consider prophylactic surgery should undergo counseling before reaching a decision.

The International Agency for Research on Cancer has concluded that there is limited evidence that tobacco smoking and shift work, particularly at night, are associated with an increased risk of breast cancer.

Modifiable factors that are associated with a lower risk of breast cancer include breastfeeding, moderate or vigorous physical activity, and maintaining a healthy body weight. Two medications, tamoxifen and raloxifene, have been approved to reduce breast cancer risk in women at high risk. Raloxifene appears to have a lower risk of certain side effects, such as uterine cancer and blood clots.

Early detection: Mammography can often detect breast cancer at an early stage, when treatment is more effective and a cure is more likely. Numerous studies have shown that early detection with mammography saves lives and increases treatment options. Steady declines in breast cancer mortality among women since 1990 have been attributed to a combination of early detection and improvements in treatment. Mammography is a very accurate screening tool, both for women at average and increased risk;

Leading New Cancer Cases and Deaths – 2012 Estimates



*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.

however, like most medical tests, it is not perfect. On average, mammography will detect about 80%-90% of breast cancers in women without symptoms. Although the majority of women with an abnormal mammogram do not have cancer, all suspicious lesions should be biopsied for a definitive diagnosis. Annual screening using magnetic resonance imaging (MRI) in addition to mammography is recommended for women at high lifetime risk of breast cancer starting at age 30. (For more information, see *Breast Cancer Facts & Figures 2011-2012* at cancer.org/statistics.) Concerted efforts should be made to improve access to health care and to encourage all women 40 and older to receive regular mammograms. For more information on the American Cancer Society's recommendations for breast cancer screening, see page 64.

Treatment: Taking into account tumor size, extent of spread, and other characteristics, as well as patient preference, treatment usually involves lumpectomy (surgical removal of the tumor and surrounding tissue) or mastectomy (surgical removal of the breast). Numerous studies have shown that for women whose cancer has not spread to the skin, chest wall, or distant organs, long-term survival for lumpectomy plus radiation therapy is similar to that for mastectomy. For women undergoing mastectomy, significant advances in reconstruction techniques provide several options for breast reconstruction, including the timing of the procedure (i.e., during mastectomy or in the time period following the procedure).

Removal of some of the underarm lymph nodes during surgery is usually recommended to determine whether the tumor has spread beyond the breast. In women with early stage disease, sentinel lymph node biopsy, a procedure in which only the first lymph nodes to which cancer is likely to spread are removed, is as effective as and less damaging than full axillary node dissection, in which many underarm nodes are removed.

Treatment may also involve radiation therapy, chemotherapy (before or after surgery), hormone therapy (tamoxifen, aromatase inhibitors), or targeted therapy. Postmenopausal women with breast cancer that tests positive for hormone receptors benefit from treatment with an aromatase inhibitor (e.g., letrozole, anastrozole, or exemestane), either after, or instead of, tamoxifen. For women whose cancer tests positive for HER2/neu, approved targeted therapies include trastuzumab (Herceptin) and, for advanced disease, lapatinib (Tykerb). The US Food and Drug Administration (FDA) revoked approval of bevacizumab (Avastin) for the treatment of metastatic breast cancer in 2011 because subsequent studies have shown minimal benefit and some potentially dangerous side effects.

It is recommended that all patients with ductal carcinoma in situ (DCIS) be treated to avoid potential progression to invasive cancer. Treatment options for DCIS include lumpectomy with radiation therapy or mastectomy; either of these options may be followed by treatment with tamoxifen if the tumor is hormone receptor-positive. Removal of axillary lymph nodes is not generally needed. A report by a panel of experts convened by the National Institutes of Health concluded that in light of the noninvasive nature and favorable prognosis of DCIS, the primary goal for future research is the ability to accurately group patients into risk categories that will allow the most successful outcomes with the minimum necessary treatment.

Survival: The 5-year relative survival rate for female breast cancer patients has improved from 63% in the early 1960s to 90% today. The 5-year relative survival for women diagnosed with localized breast cancer (cancer that has not spread to lymph nodes or other locations outside the breast) is 99%; if the cancer has spread to nearby lymph nodes (regional stage) or distant lymph nodes or organs (distant stage), the survival rate falls to 84% or 23%, respectively. For all stages combined, relative survival rates at 10 and 15 years after diagnosis are 82% and 77%, respectively. Caution should be used when interpreting long-term survival rates because they represent patients who were diagnosed many years ago and do not reflect recent advances in detection and treatment. For example, 15-year relative survival is based on patients diagnosed as early as 1990.

Many studies have shown that being overweight adversely affects survival for postmenopausal women with breast cancer. In addition, women who are more physically active are less likely to die from the disease than those who are inactive.

For more information about breast cancer, see the American Cancer Society's *Breast Cancer Facts & Figures 2011-2012*, available online at cancer.org/statistics.

Childhood Cancer

New cases: An estimated 12,060 new cases are expected to occur among children 0 to 14 years of age in 2012. Childhood cancers are rare, representing less than 1% of all new cancer diagnoses. Overall, childhood cancer incidence rates increased slightly by 0.5% per year from 2004 to 2008, a consistent trend since 1975.

Deaths: An estimated 1,340 cancer deaths are expected to occur among children 0 to 14 years of age in 2012, about one-third of these from leukemia. Although uncommon, cancer is the second leading cause of death in children, exceeded only by accidents. Mortality rates for childhood cancer have declined by 66% over the past four decades, from 6.5 (per 100,000) in 1969 to 2.2 in 2008. The substantial progress in reducing childhood cancer mortality is largely attributable to improvements in treatment and high rates of participation in clinical trials.

Signs and symptoms: Early symptoms are usually nonspecific. Parents should ensure that children have regular medical checkups and be alert to any unusual, persistent symptoms. Signs of childhood cancer include an unusual mass or swelling; unexplained paleness or loss of energy; sudden tendency to bruise; a persistent, localized pain; prolonged, unexplained fever or illness; frequent headaches, often with vomiting; sudden eye or vision changes; and excessive, rapid weight loss. Major categories of pediatric cancer and specific symptoms include:

- Leukemia (34% of all childhood cancers), which may be recognized by bone and joint pain, weakness, pale skin, bleeding, and fever
- Brain and other nervous system (27%), which may cause headaches, nausea, vomiting, blurred or double vision, dizziness, and difficulty walking or handling objects
- Neuroblastoma (7%), a cancer of the nervous system that is most common in children younger than 5 years of age and usually appears as a swelling in the abdomen
- Wilms tumor (5%), a kidney cancer that may be recognized by a swelling or lump in the abdomen
- Non-Hodgkin lymphoma (4%) and Hodgkin lymphoma (4%), which affect lymph nodes but may spread to bone marrow and other organs, and may cause swelling of lymph nodes in the neck, armpit, or groin, as well as weakness and fever
- Rhabdomyosarcoma (3%), a soft tissue sarcoma that can occur in the head and neck, genitourinary area, trunk, and extremities, and may cause pain and/or a mass or swelling
- Retinoblastoma (3%), an eye cancer that is typically recognized because of discoloration of the eye pupil and usually occurs in children younger than 5 years of age
- Osteosarcoma (3%), a bone cancer that most often occurs in adolescents and commonly appears as sporadic pain in the affected bone that may worsen at night or with activity, with eventual progression to local swelling
- Ewing sarcoma (1%), another type of cancer that usually arises in bone, is most common in adolescents, and typically appears as pain at the tumor site.

(Proportions are provided for all races combined and may vary according to race/ethnicity.)

Treatment: Childhood cancers can be treated by a combination of therapies (surgery, radiation, and chemotherapy) chosen based on the type and stage of the cancer. Treatment is coordinated by a team of experts, including pediatric oncologists, pediatric nurses, social workers, psychologists, and others who assist children and their families. Because these cancers are uncommon, outcomes are more successful when treatment is managed by a children's cancer center. If the child is eligible, placement in a clinical trial, which compares a new treatment to the best current treatment, should also be considered.

Survival: For all childhood cancers combined, the 5-year relative survival rate has improved markedly over the past 30 years, from 58% in the mid-1970s to 83% today, due to new and improved treatments. However, rates vary considerably depending on cancer type, patient age, and other characteristics. For the most recent time period (2001-2007), the 5-year survival among children 0-14 years of age for Hodgkin lymphoma is 95%; Wilms tumor, 88%; non-Hodgkin lymphoma, 86%; leukemia, 83%; neuroblastoma, 74%; brain and other nervous system tumors, 71%; osteosarcoma, 70%; and rhabdomyosarcoma, 68%.

Pediatric cancer patients may experience treatment-related side effects not only during treatment, but many years after diagnosis as well. Late treatment effects include impairment in the function of specific organs, secondary cancers, and cognitive impairments. The Children's Oncology Group (COG) has developed long-term follow-up guidelines for screening and management of late effects in survivors of childhood cancer. For more information on childhood cancer management, see the COG Web site at survivorshipguidelines.org. The Childhood Cancer Survivor Study, which has followed more than 14,000 long-term childhood cancer survivors, has also provided important and valuable information about the late effects of cancer treatment; for more information, visit ccss.stjude.org.

Colon and Rectum

New cases: An estimated 103,170 cases of colon and 40,290 cases of rectal cancer are expected to occur in 2012. Colorectal cancer is the third most common cancer in both men and women. Colorectal cancer incidence rates have been decreasing for most of the past two decades, which has largely been attributed to increases in the use of colorectal cancer screening tests that allow the detection and removal of colorectal polyps before they progress to cancer. From 2004 to 2008, annual declines in white men were much larger than those in African American men, 2.9% versus 0.8%, respectively; whereas, among women, declines among whites (2.2% per year) and African Americans (1.7% per year) were similar. In contrast to the overall declines, colorectal cancer incidence rates have been increasing by 1.7% per year since 1992 among adults younger than 50 years of age, for whom screening is not recommended for those at average risk.

Deaths: An estimated 51,690 deaths from colorectal cancer are expected to occur in 2012, accounting for 9% of all cancer deaths. Mortality rates for colorectal cancer have declined in both men and women over the past two decades; from 2004 to 2008, the rate declined by 2.7% per year in men and by 2.5% per year in women. This decrease reflects declining incidence rates and improvements in early detection and treatment.

Signs and symptoms: Early stage colorectal cancer does not typically have symptoms; therefore, screening is usually necessary to detect colorectal cancer in its early stages. Advanced disease may cause rectal bleeding, blood in the stool, a change in bowel habits, and cramping pain in the lower abdomen. In some cases, blood loss from the cancer leads to anemia (low red blood cells), causing symptoms such as weakness and excessive fatigue. Due to an increase in colorectal cancer incidence in younger adults in recent years, timely evaluation of symptoms consistent with colorectal cancer in adults under age 50 is especially important.

Risk factors: The risk of colorectal cancer increases with age; 91% of cases are diagnosed in individuals 50 years of age and older. Modifiable factors associated with increased risk include obesity, physical inactivity, a diet high in red or processed meat, alcohol consumption, long-term smoking, and possibly very low intake of fruits and vegetables. Hereditary and medical factors that increase risk include a personal or family history of colorectal cancer and/or polyps, a personal history of chronic inflammatory bowel disease, and certain inherited genetic conditions (e.g., Lynch syndrome, also known as hereditary nonpolyposis colorectal cancer, and familial adenomatous polyposis [FAP]). Studies have also found that individuals with type 2 diabetes are at higher risk of colorectal cancer.

Consumption of milk and calcium and higher blood levels of vitamin D appear to decrease colorectal cancer risk. Studies suggest that regular use of nonsteroidal anti-inflammatory drugs, such as aspirin, and menopausal hormone therapy also reduce risk. However, these drugs are not recommended for the prevention of colorectal cancer among individuals at average risk because they can have serious adverse health effects.

Early detection: Beginning at age 50, men and women who are at average risk for developing colorectal cancer should begin screening. Screening can result in the detection and removal of colorectal polyps that might have become cancerous, as well as the detection of cancer at an early stage, when treatment is usually less extensive and more successful. In 2008, the American Cancer Society collaborated with several other organizations to release updated colorectal cancer screening guidelines. These joint guidelines emphasize cancer prevention and draw a distinction between colorectal screening tests that primarily detect cancer and those that can detect both cancer and precancerous polyps. There are a number of recommended screening options that vary by the extent of bowel preparation, as well as test performance, limitations, time interval, and cost. For detailed information on colorectal cancer screening options, see *Colorectal Cancer Facts & Figures 2011-2013* at cancer.org/statistics; see page 64 for the American Cancer Society's screening guidelines for colorectal cancer

Treatment: Surgery is the most common treatment for colorectal cancer. For cancers that have not spread, surgical removal may be curative. A permanent colostomy (creation of an abdominal opening for elimination of body waste) is rarely needed for colon cancer and is infrequently required for rectal cancer. Chemotherapy alone, or in combination with radiation, is given before

or after surgery to most patients whose cancer has penetrated the bowel wall deeply or spread to lymph nodes. Adjuvant chemotherapy (anticancer drugs in addition to surgery or radiation) for colon cancer in otherwise healthy patients 70 years of age and older is equally effective as in younger patients; toxicity in older patients can be limited if certain drugs (e.g., oxaliplatin) are avoided. Patients who have chemotherapy soon after surgery have better survival than those who begin later. Three targeted monoclonal antibody therapies are approved by the FDA to treat metastatic colorectal cancer: bevacizumab (Avastin) blocks the growth of blood vessels to the tumor, and cetuximab (Erbitux) and panitumumab (Vectibix) block the effects of hormone-like factors that promote cancer growth.

Survival: The 1- and 5-year relative survival rates for persons with colorectal cancer are 83% and 64%, respectively. Survival continues to decline to 58% at 10 years after diagnosis. When colorectal cancers are detected at an early, localized stage, the 5-year survival is 90%; however, only 39% of colorectal cancers are diagnosed at this stage, in part due to the underuse of screening. After the cancer has spread regionally to involve adjacent organs or lymph nodes, the 5-year survival drops to 69%. When the disease has spread to distant organs, the 5-year survival is 12%.

Kidney

New cases: An estimated 64,770 new cases of kidney (renal) cancer are expected to be diagnosed in 2012. Kidney cancer includes renal cell carcinoma (92%), renal pelvis carcinoma (7%), and Wilms tumor (1%), a childhood cancer that usually develops before age 5 (see Childhood Cancer, page 11). From 2004 to 2008, kidney cancer incidence rates increased by 4.1% per year in men and 3.3% per year in women, primarily due to an increase in early stage disease. Early stage kidney cancer does not typically produce symptoms, and some of the increase in kidney cancer rates over the past two decades may be due to incidental diagnosis during abdominal imaging performed for other reasons.

Deaths: An estimated 13,570 deaths from kidney cancer are expected to occur in 2012. Death rates for kidney cancer decreased by 0.6% per year in women and by 0.4% per year in men from 2004 to 2008.

Signs and symptoms: Early stage kidney cancer usually has no symptoms. Symptoms that may develop as the tumor progresses include blood in the urine, a pain or lump in the lower back or abdomen, fatigue, weight loss, fever, or swelling in the legs and ankles.

Risk factors: Tobacco use is a strong risk factor for kidney cancer, with the largest increased risk for cancer of the renal pelvis, particularly for heavy smokers. Additional risk factors for renal cell carcinoma include obesity, to which an estimated 30% of cases can be attributed; hypertension (high blood pressure); chronic renal failure; and occupational exposure to certain chemicals, such as trichloroethylene, an industrial agent used as a metal degreaser and chemical additive. Radiation exposure (e.g., in medical procedures) slightly increases risk. A small proportion of renal cell cancers are the result of rare hereditary conditions, such as von Hippel-Lindau disease.

Early detection: There are no reliable screening tests for people at average risk.

Treatment: Surgery (traditional or laparoscopic, i.e., minimally invasive, performed through very small incisions) is the primary treatment for most kidney cancers. Patients who are not surgical candidates may be offered ablation therapy, a procedure that uses heat or cold to destroy the tumor. Kidney cancer tends to be resistant to both traditional chemotherapy and radiation therapy. Improved understanding of the biology of kidney cancer has led to the development of new targeted therapies that control cancer growth by blocking the tumor's blood supply or through other mechanisms. Since 2005, six of these agents have been approved by the FDA for the treatment of metastatic disease: sorafenib (Nexavar), sunitinib (Sutent), temsirolimus (Torisel), everolimus (Afinitor), bevacizumab (Avastin), and pazopanib (Votrient).

Survival: The 1- and 5-year relative survival rates for cancers of the kidney are 84% and 70%, respectively. More than half of cases are diagnosed at the local stage, for which the 5-year relative survival rate is 91%. Five-year survival is lower for renal pelvis (50%) than for renal cell (71%) carcinoma.

Leukemia

New cases: An estimated 47,150 new cases of leukemia are expected in 2012. Leukemia is a cancer of the bone marrow and blood and is classified into four main groups according to cell type and rate of growth: acute lymphocytic (ALL), chronic lymphocytic (CLL), acute myeloid (AML), and chronic myeloid (CML). Almost 90% of leukemia cases are diagnosed in adults 20 years of age and older, in whom the most common types are AML and CLL. Among children and teens, ALL is most common, accounting for three-fourths of leukemia cases (see Childhood Cancer, page 11). From 2004 to 2008, overall leukemia incidence rates increased slightly by 0.5% per year, a consistent trend since 1992.

Deaths: An estimated 23,540 deaths are expected to occur in 2012. Death rates for leukemia have been declining for the past several decades; from 2004 to 2008, rates decreased by 0.8% per year among males and by 1.4% per year among females.

Signs and symptoms: Symptoms may include fatigue, paleness, weight loss, repeated infections, fever, bruising easily, and nosebleeds or other hemorrhages. In acute leukemia, these signs can appear suddenly. Chronic leukemia typically progresses slowly with few symptoms and is often diagnosed during routine blood tests.

Risk factors: Exposure to ionizing radiation increases risk of several types of leukemia. Medical radiation, such as that used

Probability (%) of Developing Invasive Cancers over Selected Age Intervals by Sex, US, 2006-2008*

		Birth to 39	40 to 59	60 to 69	70 and Older	Birth to Death
All sites†	Male	1.45 (1 in 69)	8.68 (1 in 12)	16.00 (1 in 6)	38.27 (1 in 3)	44.85 (1 in 2)
	Female	2.15 (1 in 46)	9.10 (1 in 11)	10.34 (1 in 10)	26.68 (1 in 4)	38.08 (1 in 3)
Urinary bladder‡	Male	0.02 (1 in 5,035)	0.38 (1 in 266)	0.92 (1 in 109)	3.71 (1 in 27)	3.84 (1 in 26)
	Female	0.01 (1 in 12,682)	0.12 (1 in 851)	0.25 (1 in 400)	0.98 (1 in 102)	1.15 (1 in 87)
Breast	Female	0.49 (1 in 203)	3.76 (1 in 27)	3.53 (1 in 28)	6.58 (1 in 15)	12.29 (1 in 8)
Colon & rectum	Male	0.08 (1 in 1,236)	0.92 (1 in 109)	1.44 (1 in 70)	4.32 (1 in 23)	5.27 (1 in 19)
	Female	0.08 (1 in 1,258)	0.73 (1 in 137)	1.01 (1 in 99)	3.95 (1 in 25)	4.91 (1 in 20)
Leukemia	Male	0.16 (1 in 614)	0.22 (1 in 445)	0.34 (1 in 291)	1.24 (1 in 81)	1.57 (1 in 64)
	Female	0.14 (1 in 737)	0.15 (1 in 665)	0.21 (1 in 482)	0.81 (1 in 123)	1.14 (1 in 88)
Lung & bronchus	Male	0.03 (1 in 3,631)	0.91 (1 in 109)	2.26 (1 in 44)	6.69 (1 in 15)	7.66 (1 in 13)
	Female	0.03 (1 in 3,285)	0.76 (1 in 132)	1.72 (1 in 58)	4.91 (1 in 20)	6.33 (1 in 16)
Melanoma of the skin§	Male	0.15 (1 in 677)	0.63 (1 in 158)	0.75 (1 in 133)	1.94 (1 in 52)	2.80 (1 in 36)
	Female	0.27 (1 in 377)	0.56 (1 in 180)	0.39 (1 in 256)	0.82 (1 in 123)	1.83 (1 in 55)
Non-Hodgkin lymphoma	Male	0.13 (1 in 775)	0.45 (1 in 223)	0.60 (1 in 167)	1.77 (1 in 57)	2.34 (1 in 43)
	Female	0.09 (1 in 1,152)	0.32 (1 in 313)	0.44 (1 in 228)	1.41 (1 in 71)	1.94 (1 in 51)
Prostate	Male	0.01 (1 in 8,499)	2.63 (1 in 38)	6.84 (1 in 15)	12.54 (1 in 8)	16.48 (1 in 6)
Uterine cervix	Female	0.15 (1 in 650)	0.27 (1 in 373)	0.13 (1 in 771)	0.18 (1 in 549)	0.68 (1 in 147)
Uterine corpus	Female	0.07 (1 in 1,373)	0.77 (1 in 130)	0.87 (1 in 114)	1.24 (1 in 81)	2.61 (1 in 38)

*For people free of cancer at beginning of age interval. †All sites excludes basal and squamous cell skin cancers and in situ cancers except urinary bladder.
‡Includes invasive and in situ cancer cases. §Statistic is for whites only.

Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.6.0. Statistical Research and Applications Branch, National Cancer Institute, 2011. www.srab.cancer.gov/devcan.

American Cancer Society, Surveillance Research, 2012

in cancer treatment, is a substantial source of radiation exposure. Leukemia may also occur as a side effect of chemotherapy. Children with Down syndrome and certain other genetic abnormalities have higher incidence rates of leukemia. Some recent studies suggest that obesity may also be associated with an increased risk of leukemia. Family history is one of the strongest risk factors for CLL. Cigarette smoking and exposure to certain chemicals such as benzene, a component in gasoline and cigarette smoke, are risk factors for AML. There is limited evidence that parental smoking and maternal exposure to paint increases the risk of childhood leukemia. Infection with human T-cell leukemia virus type I (HTLV-I) can cause a rare type of CLL called adult T-cell leukemia/lymphoma. The prevalence of HTLV-I infection is geographically localized and is most common in southern Japan and the Caribbean; infected individuals in the US tend to be descendants or immigrants from endemic regions.

Early detection: Leukemia can be difficult to diagnose early because symptoms often resemble those of other, less serious conditions. When a physician does suspect leukemia, diagnosis can be made using blood tests and a bone marrow biopsy.

Treatment: Chemotherapy is the most effective method of treating leukemia. Various anticancer drugs are used, either in combination or as single agents. Imatinib (Gleevec), nilotinib (Tasigna), and dasatinib (Sprycel) are very effective targeted drugs for the treatment of CML. These drugs are also sometimes used to treat a certain type of ALL. Some people with CLL may not need treatment right away, unless the leukemia is progressing or causing symptoms. Recent clinical trials have shown that adults with AML who are treated with twice the conventional dose of daunorubicin experience higher and more rapid rates of remission. Antibiotics and transfusions of blood components are used as supportive treatments. Under appropriate conditions, stem cell transplantation may be useful in treating certain types of leukemia.

Survival: Survival rates vary substantially by leukemia type, ranging from a 5-year relative survival of 24% for patients diagnosed with AML to 81% for those with CLL. Advances in treatment have resulted in a dramatic improvement in survival over the past three decades for most types of leukemia. For example, from 1975-1977 to 2001-2007, the 5-year relative survival rate for ALL increased from 41% to 67% overall, and from 58% to 91% among children. In large part due to the discovery of the targeted cancer drug imatinib (Gleevec), the 5-year survival rate for CML increased from 31% for cases diagnosed during 1990-1992 to 55% for those diagnosed during 2001-2007.

Liver

New Cases: An estimated 28,720 new cases of liver cancer (including intrahepatic bile duct cancers) are expected to occur in the US during 2012. More than 80% of these cases are hepato-

cellular carcinoma (HCC), originating from hepatocytes, the predominant liver cell type. Liver cancer incidence rates increased by 3.6% per year in men and by 3.0% per year in women from 2004 to 2008, trends that have persisted since 1992.

Deaths: An estimated 20,550 liver cancer deaths (6,570 women, 13,980 men) are expected in 2012. From 2004 to 2008, death rates for liver cancer increased by 2.2% per year in men and were stable in women. Incidence and mortality rates are more than twice as high in men as in women.

Signs and symptoms: Common symptoms include abdominal pain and/or swelling, weight loss, weakness, loss of appetite, jaundice (a yellowish discoloration of the skin and eyes), and fever. Enlargement of the liver is the most common physical sign, occurring in 50%-90% of patients.

Risk factors: In the US and other western countries, alcohol-related cirrhosis, and possibly non-alcoholic fatty liver disease associated with obesity, account for the majority of liver cancer cases. Chronic infections with hepatitis B virus (HBV) and hepatitis C virus (HCV) are associated with less than half of liver cancer cases in the US, although they are the major risk factors for the disease worldwide. In the US, rates of HCC are higher in immigrants from areas where HBV is endemic, such as China, Southeast Asia, and sub-Saharan Africa. A vaccine that protects against HBV has been available since 1982. The HBV vaccination is recommended for all infants at birth; for all children under 18 years of age who were not vaccinated at birth; and for adults in high-risk groups, including health care workers. It is also recommended that all pregnant women be tested for HBV. There is no vaccine available against HCV. The Centers for Disease Control and Prevention (CDC) recommends routine HCV testing for individuals at high risk (e.g., injection drug users) so that infected individuals can receive counseling in order to reduce the risk of HCV transmission to others. Other preventive measures for HCV infection include screening of donated blood, organs, and tissues; instituting infection control practices during all medical, surgical, and dental procedures; and needle-exchange programs for injecting drug users. Treatment of chronic HCV infection with interferon and other drugs may reduce the risk of liver cancer and is the subject of ongoing research. For more information on hepatitis infections, including who is at risk, visit the CDC Web site at cdc.gov/hepatitis/.

Other risk factors for liver cancer, particularly in economically developing countries, include parasitic infections (schistosomiasis and liver flukes) and consumption of food contaminated with aflatoxin, a toxin produced by mold during the storage of agricultural products in a warm, humid environment.

Early detection: Screening for liver cancer has not been proven to improve survival. Nonetheless, many doctors in the US screen high-risk persons (e.g., HCV-infected persons with cirrhosis) with ultrasound or blood tests.

Treatment: Early stage liver cancer can sometimes be successfully treated with surgery in patients with sufficient healthy liver tissue; liver transplantation may also be an option. Fewer surgical options exist for patients diagnosed at an advanced stage of the disease, often because the portion of the liver not affected by cancer is also damaged. Patients whose tumors cannot be surgically removed may choose ablation (tumor destruction) or embolization, a procedure that cuts off blood flow to the tumor. Sorafenib (Nexavar) is a targeted drug approved for the treatment of HCC in patients who are not candidates for surgery.

Survival: The overall 5-year relative survival rate for patients with liver cancer is 14%. Thirty-nine percent of patients are diagnosed at an early stage, for which five-year survival is 27%. Survival decreases to 9% and 4% for patients who are diagnosed at regional and distant stages of disease, respectively.

Lung and Bronchus

New cases: An estimated 226,160 new cases of lung cancer are expected in 2012, accounting for about 14% of cancer diagnoses. The incidence rate has been declining in men over the past two decades, from a high of 102 (cases per 100,000 men) in 1984 to 72 in 2008. In women, the rate has just begun to decrease after a long period of increase. From 2004 to 2008, lung cancer incidence rates decreased by 1.9% per year in men and by 0.3% per year in women.

Deaths: Lung cancer accounts for more deaths than any other cancer in both men and women. An estimated 160,340 deaths, accounting for about 28% of all cancer deaths, are expected to occur in 2012. Death rates began declining in men in 1991; from 2004 to 2008, rates decreased 2.6% per year. Lung cancer death rates did not begin declining in women until 2003; from 2004 to 2008, rates decreased by 0.9% per year. Gender differences in lung cancer mortality patterns reflect historical differences between men and women in the uptake and reduction of cigarette smoking over the past 50 years.

Signs and symptoms: Symptoms may include persistent cough, sputum streaked with blood, chest pain, voice change, and recurrent pneumonia or bronchitis.

Risk factors: Cigarette smoking is by far the most important risk factor for lung cancer; risk increases with both quantity and duration of smoking. Cigar and pipe smoking also increase risk. Exposure to radon gas released from soil and building materials is estimated to be the second leading cause of lung cancer in Europe and North America. Other risk factors include occupational or environmental exposure to secondhand smoke, asbestos (particularly among smokers), certain metals (chromium, cadmium, arsenic), some organic chemicals, radiation, air pollution, and paint (occupational). Risk is also probably increased among people with a medical history of tuberculosis. Genetic susceptibility plays a contributing role in the development of lung cancer, especially in those who develop the disease at a younger age.

Early detection: Recently published results from a large clinical trial showed that annual screening with chest x-ray does not reduce lung cancer mortality. Newer tests, such as low-dose spiral computed tomography (CT) scans and molecular markers in sputum, have produced promising results in detecting lung cancers at earlier, more operable stages in high-risk patients. Results from the National Lung Screening Trial, a clinical trial designed to determine the effectiveness of lung cancer screening in high-risk individuals, showed 20% fewer lung cancer deaths among current and former heavy smokers who were screened with spiral CT compared to standard chest x-ray. However, it is not known how relevant these results are to individuals with a lesser smoking history compared with the study participants, who had a history of very heavy smoking – the equivalent of at least a pack of cigarettes per day for 30 years. In addition, the potential risks associated with screening, including cumulative radiation exposure from multiple CT scans, and unnecessary lung biopsy and surgery, have not yet been evaluated. It will take some time to develop formal guidelines based on a careful evaluation of the benefits, limitations, and harms associated with screening an asymptomatic population at high risk for lung cancer. In the interim, the Society has issued lung cancer screening guidance for adults who would have met the criteria for participation in the screening trial. For more information, visit cancer.org/healthy/findcancerearly.

Treatment: Lung cancer is classified as small cell (14%) or non-small cell (85%) for the purposes of treatment. Based on type and stage of cancer, treatments include surgery, radiation therapy, chemotherapy, and targeted therapies such as bevacizumab (Avastin), erlotinib (Tarceva), and crizotinib (Xalkori). For localized non-small cell lung cancers, surgery is usually the treatment of choice, and survival for most of these patients is improved by giving chemotherapy after surgery. Because the disease has usually spread by the time it is discovered, radiation therapy and chemotherapy are often used, sometimes in combination with surgery. Advanced-stage non-small cell lung cancer patients are usually treated with chemotherapy, targeted drugs, or some combination of the two. Chemotherapy alone or combined with radiation is the usual treatment of choice for small cell lung cancer; on this regimen, a large percentage of patients experience remission, though the cancer often returns.

Survival: The 1-year relative survival for lung cancer increased from 37% in 1975-1979 to 43% in 2003-2006, largely due to improvements in surgical techniques and combined therapies. However, the 5-year survival rate for all stages combined is only 16%. The 5-year survival rate is 52% for cases detected when the disease is still localized, but only 15% of lung cancers are diagnosed at this early stage. The 5-year survival for small cell lung cancer (6%) is lower than that for non-small cell (17%).

Lymphoma

New cases: An estimated 70,130 new cases of lymphoma will occur in 2012. Lymphoma is cancer of the lymphocytes, a type of white blood cell, and is classified as Hodgkin (9,060 cases in 2012) or non-Hodgkin (70,130 cases in 2012). Incidence rates were stable in men and women for both non-Hodgkin and Hodgkin lymphoma from 2004 to 2008. However, non-Hodgkin lymphoma (NHL) encompasses a wide variety of disease subtypes for which incidence patterns vary.

Deaths: An estimated 20,130 deaths from lymphoma will occur in 2012 (Hodgkin lymphoma, 1,190; non-Hodgkin lymphoma, 18,940). Death rates for NHL began decreasing in 1998 in both men and women; from 2004 to 2008, rates decreased 2.8% per year in men and 3.4% per year in women. Death rates for Hodgkin lymphoma have been decreasing in both men and women for the past four decades. Declines in lymphoma death rates reflect improvements in treatment over time.

Signs and symptoms: Symptoms may include swollen lymph nodes, itching, night sweats, fatigue, unexplained weight loss, and intermittent fever.

Risk factors: Like most cancers, the risk of developing NHL increases with age. In contrast, the risk of Hodgkin lymphoma is highest during adolescence and early adulthood. In most cases of lymphoma the cause is unknown, although various risk factors associated with altered immune function have been identified. Non-Hodgkin lymphoma risk is elevated in persons who receive immune suppressants to prevent organ transplant rejection, in people with severe autoimmune conditions, and in people infected with human immunodeficiency virus (HIV) and human T-cell leukemia virus type I. Epstein Barr virus causes Burkitt lymphoma (an aggressive type of NHL that occurs most often in children and young adults) and is associated with a number of autoimmune-related NHLs and some types of Hodgkin lymphoma. *H. pylori* infection increases the risk of gastric lymphoma. A family history of lymphoma and a growing number of common genetic variations are associated with modestly increased risk. Occupational and environmental exposures to certain chemicals may also be associated with moderately increased risk.

Treatment: Non-Hodgkin lymphoma patients are usually treated with chemotherapy; radiation, alone or in combination with chemotherapy, is used less often. Highly specific monoclonal antibodies directed at lymphoma cells, such as rituximab (Rituxan) and alemtuzumab (Campath), are used for initial treatment and recurrence of some types of NHL, as are antibodies linked to a radioactive atom, such as ibritumomab tiuxetan (Zevalin) and tositumomab (Bexxar). High-dose chemotherapy with stem cell transplantation and low-dose chemotherapy with stem cell transplantation (called nonmyeloablative) may be options if NHL persists or recurs after standard treatment.

Five-year Relative Survival Rates* (%) by Stage at Diagnosis, 2001-2007

	All Stages	Local	Regional	Distant		All Stages	Local	Regional	Distant
Breast (female)	89	99	84	23	Ovary	44	92	72	27
Colon & rectum	64	90	69	12	Pancreas	6	22	9	2
Esophagus	17	37	18	3	Prostate	99	100	100	29
Kidney†	70	91	63	11	Stomach	26	62	28	4
Larynx	61	77	42	33	Testis	95	99	96	73
Liver‡	14	27	9	4	Thyroid	97	100	97	56
Lung & bronchus	16	52	24	4	Urinary bladder§	78	71	35	5
Melanoma of the skin	91	98	61	15	Uterine cervix	69	91	57	19
Oral cavity & pharynx	61	82	56	34	Uterine corpus	82	96	67	16

*Rates are adjusted for normal life expectancy and are based on cases diagnosed in the SEER 17 areas from 2001-2007, followed through 2008.
†Includes renal pelvis. ‡Includes intrahepatic bile duct. §Rate for in situ cases is 97%.

Local: an invasive malignant cancer confined entirely to the organ of origin. **Regional:** a malignant cancer that 1) has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; 2) involves regional lymph nodes by way of lymphatic system; or 3) has both regional extension and involvement of regional lymph nodes. **Distant:** a malignant cancer that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis to distant organs, tissues, or via the lymphatic system to distant lymph nodes.

Source: Howlader N, Krapcho M, Neyman N, et al. (eds). *SEER Cancer Statistics Review, 1975-2008*, National Cancer Institute, Bethesda, MD, www.seer.cancer.gov/csr/1975_2008/, 2011.

American Cancer Society, Surveillance Research 2012

Hodgkin lymphoma is usually treated with chemotherapy, radiation therapy, or a combination of the two, depending on stage and cell type of the disease. Bone marrow or stem cell transplantation may be an option if these are not effective. The FDA recently approved the targeted drug brentuximab vedotin (Adcetris) to treat Hodgkin lymphoma (as well as a rare form of NHL) in patients whose disease has failed to respond to other treatment.

Survival: Survival varies widely by cell type and stage of disease. For NHL, the overall 1- and 5-year relative survival is 81% and 67%, respectively; survival declines to 55% at 10 years after diagnosis. For Hodgkin lymphoma, the 1-, 5-, and 10-year relative survival rates are 92%, 84%, and 79%, respectively.

Oral Cavity and Pharynx

New cases: An estimated 40,250 new cases of cancer of the oral cavity and pharynx (throat) are expected in 2012. Incidence rates are more than twice as high in men as in women. From 2004 to 2008, incidence rates declined by 1.0% per year in women and were stable in men. However, recent studies have shown that incidence is increasing for cancers of the oropharynx that are associated with human papillomavirus (HPV) infection among white men and women.

Deaths: An estimated 7,850 deaths from oral cavity and pharynx cancer are expected in 2012. Death rates have been decreasing over the past three decades; from 2004 to 2008, rates decreased by 1.2% per year in men and by 2.2% per year in women.

Signs and symptoms: Symptoms may include a sore in the throat or mouth that bleeds easily and does not heal, a red or white patch that persists, a lump or thickening, ear pain, a neck mass, or coughing up blood. Difficulties in chewing, swallowing, or moving the tongue or jaws are often late symptoms.

Risk factors: Known risk factors include all forms of smoked and smokeless tobacco products and excessive consumption of alcohol. Many studies have reported a synergism between smoking and alcohol use, resulting in a more than 30-fold increased risk for individuals who both smoke and drink heavily. HPV infection is associated with cancers of the tonsil, base of tongue, and some other sites within the oropharynx and is believed to be transmitted through sexual contact.

Early detection: Cancer can affect any part of the oral cavity, including the lip, tongue, mouth, and throat. Through visual inspection, dentists and primary care physicians can often detect premalignant abnormalities and cancer at an early stage, when treatment is both less extensive and more successful.

Treatment: Radiation therapy and surgery, separately or in combination, are standard treatments; chemotherapy is added for advanced disease. Targeted therapy with cetuximab (Erbitux) may be combined with radiation in initial treatment or used alone to treat recurrent cancer.

Survival: For all stages combined, about 84% of persons with oral cavity and pharynx cancer survive 1 year after diagnosis. The 5-year and 10-year relative survival rates are 61% and 50%, respectively.

Ovary

New cases: An estimated 22,280 new cases of ovarian cancer are expected in the US in 2012. Ovarian cancer accounts for about 3% of all cancers among women. Incidence rates have been relatively stable since 1992.

Deaths: An estimated 15,500 deaths are expected in 2012. Ovarian cancer causes more deaths than any other cancer of the female reproductive system. The death rate for ovarian cancer decreased by 1.9% per year from 2004 to 2008.

Trends in 5-year Relative Survival Rates* (%) by Race, US, 1975-2007

	All races			White			African American		
	1975-77	1987-89	2001-2007	1975-77	1987-89	2001-2007	1975-77	1987-89	2001-2007
All sites	49	56	67†	50	57	69†	39	43	59†
Brain	22	29	35†	22	28	34†	25	31	40†
Breast (female)	75	84	90†	76	85	91†	62	71	77†
Colon	51	60	65†	51	61	67†	45	53	55†
Esophagus	5	10	19†	6	11	20†	3	7	13†
Hodgkin lymphoma	72	79	86†	72	80	88†	70	72	81†
Kidney & renal pelvis	50	57	71†	50	57	71†	49	55	68†
Larynx	66	66	63†	67	67	65	59	56	52
Leukemia	34	43	57†	35	44	57†	33	36	50†
Liver & intrahepatic bile duct	3	5	15†	3	6	15†	2	3	10†
Lung & bronchus	12	13	16†	12	13	17†	11	11	13†
Melanoma of the skin	82	88	93†	82	88	93†	58‡	79‡	73‡
Myeloma	25	28	41†	25	27	42†	30	30	41†
Non-Hodgkin lymphoma	47	51	70†	47	52	71†	48	46	62†
Oral cavity & pharynx	53	54	63†	54	56	65†	36	34	45†
Ovary	36	38	44†	35	38	43†	42	34	36
Pancreas	2	4	6†	3	3	6†	2	6	4†
Prostate	68	83	100†	69	85	100†	61	72	98†
Rectum	48	58	68†	48	59	69†	45	52	61†
Stomach	15	20	27†	14	19	26†	16	19	27†
Testis	83	95	96†	83	95	97†	73‡#	88‡	86
Thyroid	92	95	97†	92	94	98†	90	92	95
Urinary bladder	73	79	80†	74	80	81†	50	63	64†
Uterine cervix	69	70	69	70	73	70	65	57	61
Uterine corpus	87	83	83†	88	84	85†	60	57	61

*Survival rates are adjusted for normal life expectancy and are based on cases diagnosed in the SEER 9 areas from 1975-77, 1987-89, and 2001 to 2007, and followed through 2008. †The difference in rates between 1975-1977 and 2001-2007 is statistically significant ($p < 0.05$). ‡The standard error is between 5 and 10 percentage points. #Survival rate is for cases diagnosed in 1978-1980.

Source: Howlader N, Krapcho M, Neyman N, et al. (eds). *SEER Cancer Statistics Review, 1975-2008*, National Cancer Institute, Bethesda, MD. seer.cancer.gov/csr/1975_2008/, 2011.

American Cancer Society, Surveillance Research, 2012

Signs and symptoms: Early ovarian cancer usually has no obvious symptoms. Studies have indicated, however, that some women may experience persistent, nonspecific symptoms, such as bloating, pelvic or abdominal pain, difficulty eating or feeling full quickly, or urinary urgency or frequency. Women who experience such symptoms daily for more than a few weeks should seek prompt medical evaluation. The most common sign is enlargement of the abdomen, which is caused by the accumulation of fluid. Abnormal vaginal bleeding is rarely a symptom of ovarian cancer, though it is a symptom of cervical and uterine cancers.

Risk factors: The most important risk factor is a strong family history of breast or ovarian cancer. Women who have had breast cancer or who have tested positive for inherited mutations in BRCA1 or BRCA2 genes are at increased risk. Studies indicate that preventive surgery to remove the ovaries and fallopian tubes in these women can decrease the risk of ovarian cancer. Other medical conditions associated with increased risk include pelvic inflammatory disease and a genetic condition called Lynch syndrome. The use of estrogen alone as postmenopausal hormone therapy has been shown to increase risk in several large studies. Tobacco smoking increases risk of mucinous ovarian cancer. Heavier body weight may be associated with increased risk of ovarian cancer. Pregnancy, long-term use of oral contraceptives, and tubal ligation reduce the risk of developing ovarian cancer; hysterectomy also appears to decrease risk.

Early detection: There is currently no sufficiently accurate screening test proven to be effective in the early detection of ovarian cancer. Pelvic examination only occasionally detects ovarian cancer, generally when the disease is advanced. However, for women who are at high risk of ovarian cancer and women who have persistent, unexplained symptoms, the combination of a thorough pelvic exam, transvaginal ultrasound, and a blood test for the tumor marker CA125 may be offered. Although one clinical trial in the US showed that these tests had no effect on ovarian cancer mortality when used as a screening tool, another large screening trial using these methods is under way in the United Kingdom, with results expected in 2015.

Treatment: Treatment includes surgery and usually chemotherapy. Surgery usually involves removal of one or both ovaries and fallopian tubes (salpingo-oophorectomy) and the uterus (hysterectomy). In younger women with very early stage tumors who wish to have children, only the involved ovary and fallopian tube may be removed. Among patients with early ovarian cancer, more complete surgical staging has been associated with better outcomes. For women with advanced disease, surgically removing all abdominal metastases enhances the effect of chemotherapy and helps improve survival. For women with stage III ovarian cancer that has been optimally debulked (removal of as much of the cancerous tissue as possible), studies have shown that chemotherapy administered both intravenously and directly into the abdomen improves survival. Studies have also found that ovarian cancer patients whose surgery is performed by a gynecologic oncologist have more successful outcomes. Clinical trials are currently under way to test targeted drugs such as bevacizumab and cediranib in the treatment of ovarian cancer.

Survival: Relative survival varies by age; women younger than 65 are twice as likely to survive 5 years (57%) following diagnosis as women 65 and older (27%). Overall, the 1-, 5-, and 10-year relative survival of ovarian cancer patients is 75%, 44%, and 35%, respectively. If diagnosed at the localized stage, the 5-year survival rate is 93%; however, only 15% of all cases are detected at this stage, usually incidentally during another medical procedure. The majority of cases (63%) are diagnosed at distant stage. For women with regional and distant disease, 5-year survival rates are 72% and 27%, respectively.

Pancreas

New cases: An estimated 43,920 new cases of pancreatic cancer are expected to occur in the US in 2012. Since 2004, incidence rates of pancreatic cancer have been increasing by 1.5% per year.

Deaths: An estimated 37,390 deaths are expected to occur in 2012, about the same number in women (18,540) as in men (18,850). During 2004 to 2008, the death rate for pancreatic cancer increased by 0.4% per year.

Signs and symptoms: Cancer of the pancreas often develops without early symptoms. Symptoms may include weight loss, pain in the upper abdomen that may radiate to the back, and occasionally glucose intolerance (high blood glucose levels). Tumors that develop near the common bile duct may cause a blockage that leads to jaundice (yellowing of the skin and eyes), which can sometimes allow the tumor to be diagnosed at an early stage.

Risk factors: Tobacco smoking and smokeless tobacco use increase the risk of pancreatic cancer; incidence rates are about twice as high for cigarette smokers as for nonsmokers. Risk also increases with a family history of pancreatic cancer and a personal history of pancreatitis, diabetes, obesity, and possibly high levels of alcohol consumption. Individuals with Lynch syndrome and certain other genetic syndromes are also at increased risk. Though evidence is still accumulating, consumption of red meat may increase risk.

Early detection: At present, there is no widely used method for the early detection of pancreatic cancer, though research is under way in this area.

Treatment: Surgery, radiation therapy, and chemotherapy are treatment options that may extend survival and/or relieve symptoms in many patients, but seldom produce a cure. Less than 20% of patients are candidates for surgery because pancreatic cancer is usually detected after it has spread beyond the pancreas; even when surgery is performed, it often cannot remove all of the cancer. For patients who do undergo surgery, adjuvant treatment with the chemotherapy drug gemcitabine lengthens survival. The targeted anticancer drug erlotinib (Tarceva) has demonstrated a small improvement in advanced pancreatic cancer survival when used in combination with gemcitabine. Clinical trials with several new agents, combined with radiation and surgery, may offer improved survival and should be considered as a treatment option.

Survival: For all stages combined, the 1-and 5-year relative survival rates are 26% and 6%, respectively. Even for those people diagnosed with local disease, the 5-year survival is only 22%. More than half of patients are diagnosed at a distant stage, for which 5-year survival is 2%.

Prostate

New cases: An estimated 241,740 new cases of prostate cancer will occur in the US during 2012. Prostate cancer is the most frequently diagnosed cancer in men aside from skin cancer. For reasons that remain unclear, incidence rates are significantly higher in African Americans than in whites, 241 (per 100,000 men) versus 149, respectively, in 2008. Incidence rates for prostate cancer changed substantially between the mid-1980s and mid-1990s and have since fluctuated widely from year to year, in large part reflecting changes in prostate cancer screening with the prostate-specific antigen (PSA) blood test. Since 2004, incidence rates have decreased by 2.7% per year among men 65 years of age and older and have remained stable among men younger than 65 years.

Deaths: With an estimated 28,170 deaths in 2012, prostate cancer is the second-leading cause of cancer death in men. Prostate cancer death rates have been decreasing since the early 1990s in both African Americans and whites. Although death rates have decreased more rapidly among African American than white men, rates in African Americans remain more than twice as high as those in whites. Prostate cancer death rates decreased 3.0% per year in white men and 3.5% per year in African American men from 2004 to 2008.

Signs and symptoms: Early prostate cancer usually has no symptoms. With more advanced disease, men may experience weak or interrupted urine flow; inability to urinate or difficulty starting or stopping the urine flow; the need to urinate frequently, especially at night; blood in the urine; or pain or burning with urination. Advanced prostate cancer commonly spreads to the bones, which can cause pain in the hips, spine, ribs, or other areas.

Risk factors: The only well-established risk factors for prostate cancer are increasing age, African ancestry, and a family history of the disease. About 60% of all prostate cancer cases are diagnosed in men 65 years of age and older, and 97% occur in men 50 and older. African American men and Jamaican men of African descent have the highest documented prostate cancer incidence rates in the world. The disease is common in North America and northwestern Europe, but less common in Asia and South America. Genetic studies suggest that strong familial predisposition may be responsible for 5%-10% of prostate cancers. Recent studies suggest that a diet high in processed meat or dairy foods may be a risk factor, and obesity appears to increase risk of aggressive prostate cancer. There is some evidence that risk is elevated in firefighters.

Prevention: The chemoprevention of prostate cancer is an active area of research. Two drugs of interest, finasteride and dutasteride, reduce the amount of certain male hormones in the body and are already used to treat the symptoms of benign prostate enlargement. Both drugs have been found to lower the risk of prostate cancer by about 25% in large clinical trials with similar potential side effects, including reduced libido and risk of erectile dysfunction. However, it is not entirely clear which men are most likely to gain benefit from prophylactic treatment with these agents, and in December 2010, an advisory committee to the FDA recommended against approval for both finasteride and dutasteride for the prevention of prostate cancer based on risk-benefit analyses.

Early detection: At this time, there are insufficient data to recommend for or against routine testing for early prostate cancer detection with the PSA test. The American Cancer Society recommends that beginning at age 50, men who are at average risk of prostate cancer and have a life expectancy of at least 10 years receive information about the potential benefits and known limitations associated with testing for early prostate cancer detection and have an opportunity to make an informed decision about testing. Men at high risk of developing prostate cancer (African Americans or men with a close relative diagnosed with prostate cancer before age 65) should have this discussion with their health care provider beginning at age 45. Men at even higher risk (because they have several close relatives diagnosed with prostate cancer at an early age) should have this discussion with their provider at age 40. All men should be given sufficient information about the benefits and limitations of testing and early detection to allow them to make a decision based on their personal values and preferences.

Results from clinical trials designed to determine the efficacy of PSA testing for reducing prostate cancer deaths have been mixed; two European studies found a lower risk of death from prostate cancer among men receiving PSA screening while a study in the US found no reduction. Current research is exploring new biologic markers for prostate cancer, as well as alternative ages of screening initiation and timing of testing, with the goal of identifying and treating men at highest risk for aggressive disease while minimizing unnecessary testing and over-treatment of men at low risk for prostate cancer death. See page 64 for the American Cancer Society's screening guidelines for the early detection of prostate cancer.

Treatment: Treatment options vary depending on age, stage, and grade of cancer, as well as other medical conditions. The grade assigned to the tumor, typically called the Gleason score, indicates the likely aggressiveness of the cancer and ranges from 2 (nonaggressive) to 10 (very aggressive). Surgery (open, laparoscopic, or robotic-assisted), external beam radiation, or radioactive seed implants (brachytherapy) may be used to treat early stage disease. Data show similar survival rates for patients with early stage disease treated with any of these methods, and there is no current evidence supporting a "best" treatment for prostate cancer. Adjuvant hormonal therapy may be indicated in some cases. All of these treatments may impact a man's quality of life through side effects or complications that include urinary and erectile difficulties. Accumulating evidence suggests that careful observation ("active surveillance"), rather than immediate treatment, can be an appropriate option for men with less aggressive tumors and for older men.

Hormonal therapy, chemotherapy, radiation, or a combination of these treatments is used to treat more advanced disease. Hormone treatment may control advanced prostate cancer for long periods by shrinking the size or limiting the growth of the cancer, thus helping to relieve pain and other symptoms. An option for some men with advanced prostate cancer that is no longer responding to hormones is a cancer vaccine known as sipuleucel-T (Provenge). For this treatment, special immune cells are removed from a man's body, exposed to prostate proteins in a lab, and then re-infused back into the body, where they attack prostate cancer cells. Another option for these men is Abiraterone (Zytiga), which was recently approved for the treatment of metastatic disease that is resistant to hormone and chemotherapy.

Survival: More than 90% of all prostate cancers are discovered in the local or regional stages, for which the 5-year relative survival rate approaches 100%. Over the past 25 years, the 5-year relative survival rate for all stages combined has increased from 68% to almost 100%. According to the most recent data, 10- and 15-year relative survival rates are 98% and 91%, respectively. Obesity and smoking are associated with an increased risk of dying from prostate cancer.

Skin

New cases: The number of basal cell and squamous cell skin cancers (i.e., nonmelanoma skin cancers, or NMSC) is difficult to estimate because these cases are not required to be reported to cancer registries. One report on NMSC occurrence in the US estimated that 3.5 million cases were diagnosed and 2.2 million people were treated for the disease in 2006, with some patients having multiple diagnoses. Most, but not all, of these forms of skin cancer are highly curable. Melanoma is expected to be diagnosed in about 76,250 persons in 2012, accounting for less than 5% of all skin cancer cases but the vast majority of skin cancer deaths. Melanoma is 10 times more common in whites than in African Americans. Although before age 40, incidence rates are higher in women than in men, after 40, rates are almost twice as high in men as in women. Melanoma incidence rates have been increasing for at least 30 years. Since 2004, incidence rates among whites have been increasing by almost 3% per year in both men and women.

Deaths: An estimated 12,190 deaths (9,180 from melanoma and 3,010 from other nonepithelial skin cancers) will occur in 2012. The death rate for melanoma has been declining rapidly in whites younger than 50 years of age; from 2004 to 2008, rates decreased by 2.9% per year in men and by 2.3% per year in women. In contrast, among whites 50 years of age and older, death rates increased by 1.0% per year in men and have been stable in women during this same time period.

Signs and symptoms: Important warning signs of melanoma include changes in size, shape, or color of a mole or other skin lesion or the appearance of a new growth on the skin. Changes that occur over a few days are usually not cancer, but changes that progress over a month or more should be evaluated by a doctor. Basal cell carcinomas may appear as growths that are flat, or as small, raised, pink or red, translucent, shiny areas that may bleed following minor injury. Squamous cell cancer may appear as growing lumps, often with a rough surface, or as flat, reddish patches that grow slowly. Another sign of basal and squamous cell skin cancers is a sore that doesn't heal.

Risk factors: Risk factors vary for different types of skin cancer. For melanoma, major risk factors include a personal or family history of melanoma and the presence of atypical or numerous moles (more than 50). Other risk factors for all types of skin cancer include sun sensitivity (sunburning easily, difficulty tanning, natural blond or red hair color); a history of excessive sun exposure, including sunburns; use of tanning booths; diseases that suppress the immune system; and a past history of basal cell or squamous cell skin cancers.

Prevention: Skin should be protected from intense sun exposure by covering with tightly woven clothing and a wide-brimmed hat, applying sunscreen that has a sun protection factor (SPF) of 15 or higher to unprotected skin, seeking shade (especially at midday, when the sun's rays are strongest), and avoiding sunbathing and indoor tanning. Sunglasses should be worn to protect the skin around the eyes. Children in particular should be protected from the sun because severe sunburns in childhood may greatly increase risk of melanoma in later life. Tanning beds and sun lamps, which provide an additional source of UV radiation, are associated with cancer risk and should be avoided. In 2009, the International Agency for Research on Cancer upgraded their classification of indoor tanning devices from "probably" to "definitively" carcinogenic to humans after a reassessment of the scientific evidence.

Early detection: At this time, the best way to detect skin cancer early is to recognize changes in skin growths, including the appearance of new growths. Adults should periodically examine their skin so that they develop an awareness of any changes. New or unusual lesions or a progressive change in a lesion's appearance (size, shape, or color, etc.) should be evaluated promptly by a physician. Melanomas often start as small, mole-like growths that increase in size and may change color. A simple ABCD rule outlines the warning signals of the most common type of melanoma: A is for asymmetry (one half of the mole does not match the other half); B is for border irregularity (the edges are ragged, notched, or blurred); C is for color (the pigmentation is not uniform, with variable degrees of tan, brown, or black); D is for diameter greater than 6 millimeters (about the size of a pencil eraser). Other types of melanoma may not have these signs, so be alert for any new or changing skin growths.

Treatment: Removal and microscopic examination of all suspicious skin lesions are essential. Early stage basal and squamous cell cancers can be removed in most cases by one of several methods: surgical excision, electrodesiccation and curettage (tissue destruction by electric current and removal by scraping with a curette), or cryosurgery (tissue destruction by freezing). Radiation therapy and certain topical medications may be used in some cases. For malignant melanoma, the primary growth and surrounding normal tissue are removed and sometimes a sentinel lymph node is biopsied to determine stage. More extensive lymph node surgery may be needed if the lymph nodes contain cancer. Melanomas with deep invasion or that have spread to lymph nodes may be treated with surgery, immunotherapy, chemotherapy, and/or radiation therapy. Advanced cases of melanoma are treated with palliative surgery, immunotherapy, and/or chemotherapy, and sometimes radiation therapy. Two newer targeted drugs, ipilimumab (Yervoy) and vemurafenib (Zelboraf), have recently been approved by the FDA and may extend survival in people with advanced melanoma.

Survival: Most basal and squamous cell cancers can be cured, especially if the cancer is detected and treated early. Melanoma is also highly curable if detected in its earliest stages and treated properly. However, melanoma is more likely than other skin tumors to spread to other parts of the body. The 5-and 10-year

relative survival rates for persons with melanoma are 91% and 89%, respectively. For localized melanoma (84% of cases), the 5-year survival rate is 98%; survival declines to 62% and 15% for regional and distant stage disease, respectively.

Thyroid

New cases: An estimated 56,460 new cases of thyroid cancer are expected to be diagnosed in 2012 in the US, with 3 in 4 cases occurring in women. The incidence rate of thyroid cancer has been increasing sharply since the mid-1990s, and it is the fastest-increasing cancer in both men and women. Since 2004, incidence rates have been increasing by 5.5% per year in men and 6.6% per year in women.

Deaths: An estimated 1,780 deaths from thyroid cancer are expected in 2012 in the US. From 2004 to 2008, the death rate for thyroid cancer increased slightly from 0.47 (per 100,000) to 0.50 in men, and from 0.47 to 0.52 in women.

Signs and symptoms: The most common symptom of thyroid cancer is a lump in the neck that is noticed by a patient or felt by a health care provider in a clinical exam. Other symptoms include a tight or full feeling in the neck, difficulty breathing or swallowing, hoarseness or swollen lymph nodes, and pain in the throat or neck that does not go away. Although most lumps in the thyroid gland are not cancerous, individuals who detect an abnormality should seek timely medical attention.

Risk factors: Risk factors for thyroid cancer include being female, having a history of goiter (enlarged thyroid) or thyroid nodules, a family history of thyroid cancer, and radiation exposure related to medical treatment during childhood. Radiation exposure as a result of radioactive fallout from atomic weapons testing and nuclear power plant accidents, such as Chernobyl, has also been linked to increased risk of thyroid cancer, especially in children. Certain rare genetic syndromes also increase risk. People who test positive for an abnormal gene that causes a hereditary form of thyroid cancer can decrease the chance of developing the disease by surgical removal of the thyroid gland. Unlike other adult cancers, for which older age increases risk, 80% of newly diagnosed thyroid cancer patients are under 65 years of age.

Early detection: At present, there is no screening test recommended for the early detection of thyroid cancer in people without symptoms. However, because symptoms usually develop early, most thyroid cancers (68%) are diagnosed at an early stage. Tests used in the evaluation of thyroid nodules include: blood tests to determine levels of hormones related to normal functions of the thyroid gland; medical imaging techniques to determine the size and characteristics of the nodule and nearby lymph nodes; and biopsy to determine if the cells in the nodule are benign or malignant.

Treatment: Most thyroid cancers are highly curable, though about 5% of cases (medullary and anaplastic) are more aggressive and tend to spread to other organs. Treatment depends on the cell type, tumor size, and extent of the disease. The first choice of treatment is surgery in nearly all cases. Total removal of the thyroid gland (thyroidectomy), with or without lymph node removal, is recommended for most patients. Treatment with radioactive iodine (I-131) after surgery to destroy any remaining thyroid tissue may be recommended for more advanced disease. Hormone therapy is given to replace hormones normally produced by the thyroid gland after thyroidectomy and to prevent the body from making thyroid-stimulating hormone, decreasing the likelihood of recurrence.

Survival: The 5-year relative survival rate for all thyroid cancer patients is 97%. However, survival varies by stage, age at diagnosis, and disease subtype. The 5-year survival rate approaches 100% for localized disease, is 97% for regional stage disease, and 56% for distant stage disease. For all stages combined, survival is highest for patients under 45 years of age (almost 100%), and progressively decreases to 82% for those 75 or older.

Urinary Bladder

New cases: An estimated 73,510 new cases of bladder cancer are expected to occur in 2012. Since 2004, bladder cancer incidence rates have been stable in men and decreasing slightly (by 0.3% per year) in women, trends that have persisted since 1992. Bladder cancer incidence is about four times higher in men than in women, and is almost twice as high in white men as in African American men.

Deaths: An estimated 14,880 deaths will occur in 2012. From 2004 to 2008, death rates were stable in men and decreasing slowly in women (by 0.5% per year).

Signs and symptoms: The most common symptom is blood in the urine. Other symptoms may include increased frequency or urgency of urination and irritation during urination.

Risk factors: Smoking is the most well-established risk factor for bladder cancer. Smokers' risk of bladder cancer is approximately four-fold that of nonsmokers', and smoking is estimated to cause about half of all bladder cancer cases in both men and women. Workers in the dye, rubber, or leather industries, painters, and people who live in communities with high levels of arsenic in the drinking water also have increased risk.

Early detection: There is currently no screening method recommended for people at average risk. Bladder cancer is diagnosed by microscopic examination of cells from urine or bladder tissue and examination of the bladder wall with a cystoscope, a slender tube fitted with a lens and light that can be inserted through the urethra. These tests may be used to screen people at increased risk due to occupational exposure or certain bladder birth

defects, or for follow up after bladder cancer treatment to detect recurrent or new tumors.

Treatment: Surgery, alone or in combination with other treatments, is used in more than 90% of cases. Localized cancers may be treated by administering immunotherapy or chemotherapy directly into the bladder after surgery. More advanced cancers may require removal of the entire bladder (cystectomy). Chemotherapy, alone or with radiation before cystectomy, has improved treatment results. Timely follow-up care is extremely important because of the high rate of bladder cancer recurrence.

Survival: For all stages combined, the 5-year relative survival rate is 78%. Survival declines to 71% at 10 years and 65% at 15 years after diagnosis. Half of all bladder cancer patients are diagnosed while the tumor is in situ (noninvasive, present only in the layer of cells in which the cancer developed), for which the 5-year survival is 97%. Patients with invasive tumors diagnosed at a localized stage have a 5-year survival rate of 71%; 35% of cancers are detected at this early stage. For regional and distant staged disease, 5-year survival is 35% and 5%, respectively.

Uterine Cervix

New cases: An estimated 12,170 cases of invasive cervical cancer are expected to be diagnosed in 2012. Incidence rates have declined over most of the past several decades in both white and African American women. Since 2004, rates have decreased by 2.1% per year in women younger than 50 years of age and by 3.1% per year in women 50 and older.

Deaths: An estimated 4,220 deaths from cervical cancer are expected in 2012. Mortality rates declined rapidly in past decades, due to prevention and early detection as a result of screening with the Pap test, but have slowed in recent years. From 2004 to 2008, rates decreased by 2.6% per year in African American women and were stable in white women.

Signs and symptoms: Symptoms usually do not appear until abnormal cervical cells become cancerous and invade nearby tissue. When this happens, the most common symptom is abnormal vaginal bleeding. Bleeding may start and stop between regular menstrual periods, or it may occur after sexual intercourse, douching, or a pelvic exam. Menstrual bleeding may last longer and be heavier than usual. Bleeding after menopause or increased vaginal discharge may also be symptoms.

Risk factors: The primary cause of cervical cancer is infection with certain types of human papillomavirus (HPV). While women who begin having sex at an early age or who have had many sexual partners are at increased risk for HPV infection and cervical cancer, a woman may be infected with HPV even if she has had only one sexual partner. In fact, it is important to understand that HPV infections are common in healthy women and are typically cleared successfully by the immune system; only rarely does the infection persist and result in cervical cancer. Persistence of HPV infection and progression to cancer may be influenced by many factors, including immunosuppression, high parity (number of childbirths), and cigarette smoking. Long-term use of oral contraceptives (birth control pills) is also associated with increased risk of cervical cancer.

Prevention: There are two vaccines approved for the prevention of the most common types of HPV infection that cause cervical cancer; Gardasil is recommended for use in females 9 to 26 years of age, and Cervarix in females 9 to 25 years of age. Gardasil is also approved for use in males 9 to 26 years of age to prevent anal cancer and associated precancerous lesions; approximately 90% of anal cancers have been linked to HPV infection. These vaccines cannot protect against established infections, nor do they protect against all HPV types.

Screening can prevent cervical cancer by detecting precancerous lesions. As screening has become more common, precancerous lesions of the cervix are detected far more frequently than invasive cancer. The Pap test is the most widely used cervical cancer screening method. It is a simple procedure in which a small sample of cells is collected from the cervix and examined under a microscope. Pap tests are effective, but not perfect. Sometimes results are reported as normal when abnormal cells are present (false negative), and likewise, sometimes test results are abnormal when no abnormal cells are present (false positive). DNA tests that detect HPV strains associated with cervical cancer may be used in conjunction with the Pap test, either as an additional screening test or when Pap test results are uncertain. Fortunately, most cervical precancers develop slowly, so nearly all cancers can be prevented if a woman is screened regularly. It is important for all women, even those who have received the HPV vaccine, to follow cervical cancer screening guidelines.

Early detection: In addition to preventing cancer, cervical cancer screening can detect cancer early, when treatment is most successful. Today, liquid-based Pap tests are used by most clinicians as an alternative to conventional Pap tests. See page 64 for the American Cancer Society's screening guidelines for the early detection of cervical cancer.

Treatment: Preinvasive lesions may be treated by electrocoagulation (the destruction of tissue through intense heat by electric current), cryotherapy (the destruction of cells by extreme cold), laser ablation, or local surgery. Invasive cervical cancers are generally treated with surgery, radiation, or both, and with chemotherapy in selected cases.

Survival: One- and 5-year relative survival rates for cervical cancer patients are 87% and 69%, respectively. The 5-year survival rate for patients diagnosed with localized disease is 91%. Cervical cancer is diagnosed at an early stage more often in whites (49%) than in African Americans (42%) and more often in women younger than 50 years of age (60%) than in women 50 and older (34%).

Uterine Corpus (Endometrium)

New cases: An estimated 47,130 cases of cancer of the uterine corpus (body of the uterus) are expected to be diagnosed in 2012. These usually occur in the endometrium (lining of the uterus). Since 2004, incidence rates of endometrial cancer have been stable in white women, but increasing in African American women by 1.9% per year.

Deaths: An estimated 8,010 deaths are expected in 2012. Death rates for cancer of the uterine corpus are stable in both white and African American women.

Signs and symptoms: Abnormal uterine bleeding or spotting (especially in postmenopausal women) is a frequent early sign. Pain during urination, intercourse, or in the pelvic area is also a symptom.

Risk factors: Obesity and greater abdominal fatness increase the risk of endometrial cancer, most likely by increasing the amount of estrogen in the body. Estrogen exposure is a strong risk factor for endometrial cancer. Other factors that increase estrogen exposure include menopausal estrogen therapy (without use of progestin), late menopause, never having children, and a history of polycystic ovary syndrome. (Estrogen plus progestin menopausal hormone therapy does not appear to increase risk.) Tamoxifen, a drug used to reduce breast cancer risk, increases risk slightly because it has estrogen-like effects on the uterus. Medical conditions that increase risk include Lynch syndrome, also known as hereditary nonpolyposis colon cancer (HNPCC), and diabetes. Pregnancy, use of oral contraceptives, and physical activity provide protection against endometrial cancer.

Early detection: There is no standard or routine screening test for endometrial cancer. Most endometrial cancer (68%) is diagnosed at an early stage because of postmenopausal bleeding. Women are encouraged to report any unexpected bleeding or spotting to their physicians. The American Cancer Society recommends that women with known or suspected Lynch syndrome be offered annual screening with endometrial biopsy and/or transvaginal ultrasound beginning at 35 years of age.

Treatment: Uterine corpus cancers are usually treated with surgery, radiation, hormones, and/or chemotherapy, depending on the stage of disease.

Survival: The 1- and 5-year relative survival rates for uterine corpus cancer are 92% and 82%, respectively. The 5-year survival rate is 96%, 67%, or 16%, if the cancer is diagnosed at a local, regional, or distant stage, respectively. Relative survival in whites exceeds that for African Americans by more than 7 percentage points at every stage of diagnosis.

Special Section: Cancers with Increasing Incidence Trends in the US: 1999-2008

Introduction

The incidence rates of many cancers have declined in recent years due to numerous factors. Decreases in smoking have manifested as declines in lung cancer incidence rates among men, and more recently among women.[1] Colorectal and cervical cancer incidence rates have declined due in part to early detection and removal of precancerous lesions.[2] The incidence of stomach cancer has declined due to a decreasing prevalence of *Helicobacter pylori* infection associated with improved hygiene and overall improvements in diet and food storage practices.[3] More recently, declines in prostate cancer incidence may be associated with a plateau in prostate-specific antigen (PSA) screening among men. Female breast cancer incidence rates have remained stable after declining 7% from 2002 to 2003, largely due to reductions in the use of hormone replacement therapy, an important risk factor for breast cancer.[4]

Despite these improvements in incidence trends for the major cancer sites, incidence rates for several cancers are increasing, including: human papillomavirus (HPV)-related oropharyngeal cancer; esophageal adenocarcinoma; melanoma of the skin; and cancers of the pancreas, liver and intrahepatic bile duct, thyroid, and kidney and renal pelvis. The causes of these increasing incidence trends are unclear, but may reflect the combined effects of changes in cancer risk factors and detection practices. Notably, as the US population continues to shift to older age groups where cancer risk is highest, if rates of other more common cancers remain unchanged or decline, cancers with increasing trends will account for a greater proportion of all cancer cases over time.[5]

The purpose of this special section is to highlight cancers with increasing incidence rates among people 15 years of age or older and to describe trends by age, race/ethnicity, and stage at diagnosis. This information is intended to inform communities, policy makers, researchers, and private and governmental health agencies charged with cancer prevention and control. Additional information for most of these cancers, including estimated numbers of new cases and deaths, signs and symptoms, and treatment, can be found in Selected Cancers, beginning on page 9 of this report.

Data and Methods

Cancer incidence rates are based on surveillance data from the North American Association of Central Cancer Registries (NAACCR),[6] a compilation of population-based incidence data from the National Cancer Institute's Surveillance, Epidemiology and End Result program and the Centers for Disease Control and Prevention's National Program of Cancer Registries. Average incidence rates per 100,000 population are reported by gender and race/ethnicity for the most recent five-year period combined (2004-2008). Trends in rates were assessed for the most recent 10-year period (1999-2008) and expressed as the average annual percentage change (AAPC). Average five-year incidence rates during 2004-2008 are also reported by state and gender to inform local cancer control programs. Average annual incidence rates by stage at cancer diagnosis and five-year relative survival rates are also presented to assess trends over time.[7]

HPV-related Oropharynx

The oropharynx is the part of the throat just behind the mouth. It includes the back one-third of the tongue, the soft palate (back of the roof of mouth), the tonsils, and the side and back walls of the throat. Most oropharyngeal cancers are called squamous cell carcinomas because they begin in squamous cells – the cells that line the mouth and throat. Oropharyngeal cancers can be categorized as human papillomavirus (HPV) related or unrelated, based on whether the tumor tests positive for HPV. Most oropharyngeal cancers that are not caused by HPV infection are due to tobacco and alcohol use.[8]

Risk factors: Although there are many different types of HPV, most (90%) HPV-related oropharyngeal cancers are due to infection with the HPV 16 subtype.[9,10] Prior infection with HPV 16 is associated with a nine-fold increased risk of oropharyngeal cancer, specifically for squamous cell carcinomas of the base of the tongue, tonsil, and epiglottis.[11] Sexual behaviors as well as open-mouth kissing are important routes of exposure to oral HPV infection.[12] Risk of oral HPV infection is also increased among smokers. Persistent HPV infection of the oral cavity may lead to genetic damage and altered immune function, promoting progression to cancer.

Rates and trends: During 1999-2008, incidence rates of HPV-related oropharyngeal cancers increased by 4.4% per year among white men and by 1.9% per year among white women; however, there were no significant changes among men and women of other racial and ethnic groups (Table 1). Incidence rates increased among men in all age groups and among women for those 15-64 years of age (Figure 1, A). By stage, rates increased for regional-

Table 1. Rates (2004-2008) and Trends (1999-2008) for Cancers with Increasing Incidence by Race/Ethnicity and Sex, Ages 15 Years and Older, US

	Overall		White		African American		Asian or Pacific Islander		American Indian or Alaska Native		Hispanic/ Latino†	
	Rate	AAPC	Rate	AAPC	Rate	AAPC	Rate	AAPC	Rate	AAPC	Rate	AAPC
Male												
HPV-related oropharynx	7.8	3.9*	8.0	4.4*	8.0	-0.1	2.1	0.7	4.1	-0.1	4.4	0.3
Esophageal adenocarcinoma	7.2	1.7*	8.0	1.8*	1.8	0.9	1.3	4.0	3.6	-0.1	3.7	2.8*
Pancreas	17.1	0.8*	16.8	0.9*	21.3	0.5	12.3	0.3	11.8	-0.2	14.6	0.3
Liver & intrahepatic bile duct	12.3	3.9*	10.9	3.8*	17.9	5.4*	27.6	-0.2	17.4	3.4	21.5	2.4*
Thyroid	7.0	6.2*	7.4	6.3*	3.8	5.6*	6.3	5.0*	3.1	0.6	5.4	4.5*
Kidney & renal pelvis	26.2	2.4*	26.3	2.3*	28.5	3.1*	12.5	3.5*	29.4	1.9	24.5	2.0*
Melanoma of the skin	30.3	2.1*	33.4	2.1*	1.4	-0.1	2.0	0.0	4.6	0.3	5.9	-0.3
Female												
HPV-related oropharynx	1.7	1.6*	1.8	1.9*	1.7	-0.6	0.5	-2.2	0.8	NA	0.9	-0.7
Esophageal adenocarcinoma	1.0	1.9*	1.1	2.1*	0.5	1.0	0.3	6.4	0.9	3.2	0.6	-1.1
Pancreas	13.2	0.9*	12.8	1.0*	17.6	0.4	10.3	-0.4	11.5	-0.4	12.6	0.2
Liver & intrahepatic bile duct	4.1	1.9*	3.7	1.5	5.1	2.7*	10.4	0.2	8.5	4.4	8.1	1.0
Thyroid	21.0	7.3*	21.6	7.3*	12.6	6.8*	21.5	6.4*	10.0	3.1*	20.4	6.7*
Kidney & renal pelvis	13.6	2.9*	13.7	2.8*	14.6	3.8*	6.1	3.7*	17.0	3.4*	14.0	2.7*
Melanoma of the skin	19.5	2.3*	22.1	2.4*	1.3	1.0	1.6	-1.9	4.0	1.9	5.4	0.2

AAPC = average annual percent change from 1999 to 2008. HPV = human papillomavirus. NA = trend could not be calculated due to sparse data.Incidence rates are per 100,000 population and were age-adjusted to the 2000 US standard population. *AAPC is significantly different from zero (p <0.05). †Persons of Hispanic origin may be of any race.

Source: North American Association of Central Cancer Registries (NAACCR) 2011. Data are collected by cancer registries participating in NCI's SEER program and CDC's National Program of Cancer Registries.

American Cancer Society, Surveillance Research, 2012

and distant-staged tumors, but not for localized disease (Figure 2). The increasing incidence rates for HPV-related oropharyngeal cancers are in stark contrast to steady declines in rates for HPV-unrelated oropharyngeal cancers, which are largely due to decreases in smoking prevalence.[13] Reasons for these increasing rates are unclear, but may be related to changing sexual practices among men (such as an increase in the prevalence of oral sex).[12,14] The most dramatic increase in rates was among men 55-64 years of age, consistent with changes in sexual behaviors that increase risk of HPV-exposure in this population.[10] The rapid increase in whites may reflect trends in risk factors such as oral-genital sexual behavior. However, existing data do not provide a clear explanation for the observed differences by race. Additional research is needed to clarify the routes of oral HPV transmission and to develop appropriate, targeted prevention strategies.

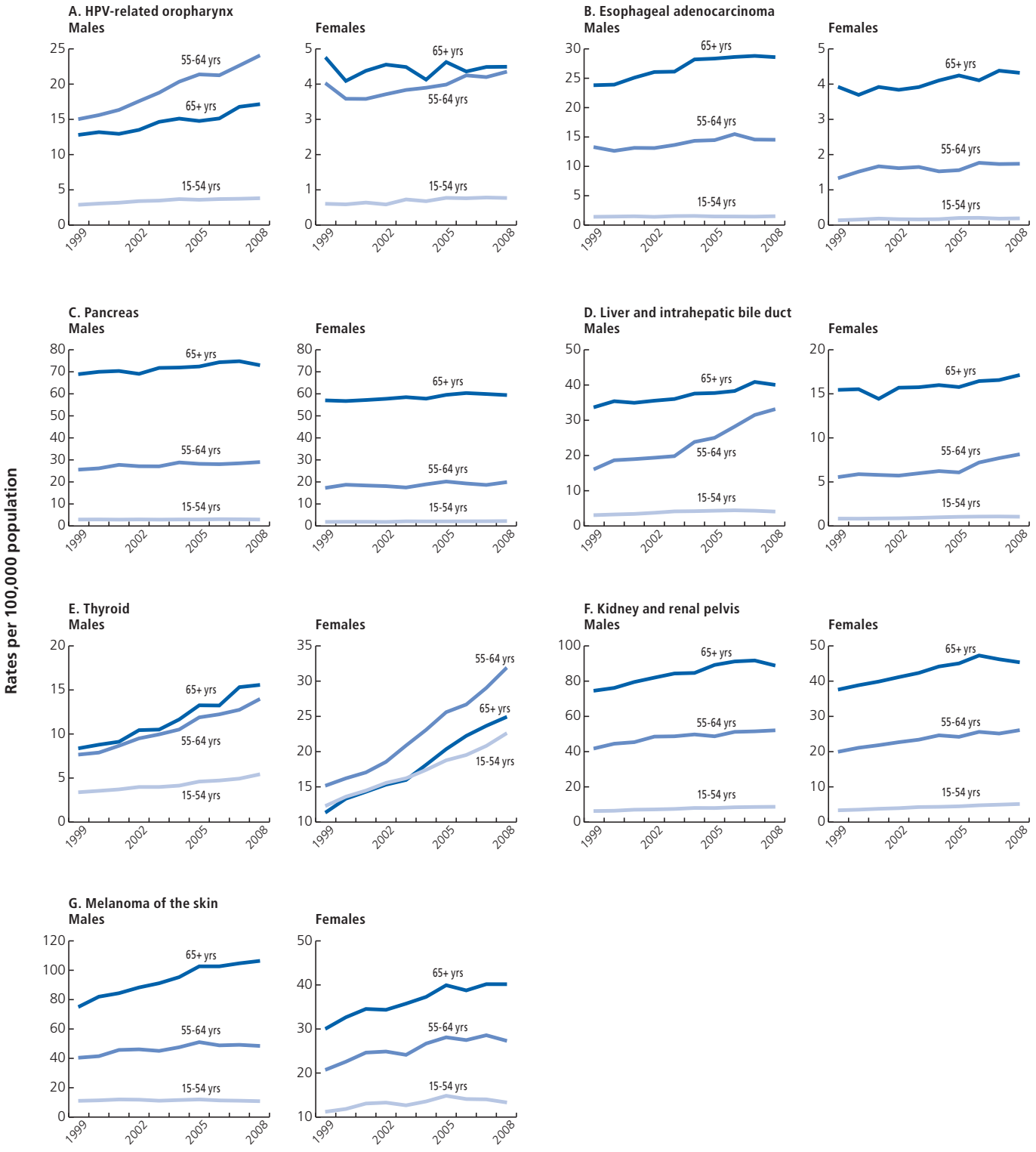
Survival: Despite the concerning trends in increasing incidence rates, survival rates for HPV-related oropharyngeal cancer are generally higher than those for HPV-unrelated oropharyngeal cancers.[10] Five-year survival rates for HPV-related oropharyngeal cancer have increased over time for each stage of diagnosis, with the largest improvement (20%) for regional disease (Table 3).

Prevention and early detection: The continued increases in incidence rates among white men and women and sustained high burden of disease among African American men suggests the need for interventions specific to these groups. Education to promote safer sexual practices (particularly oral sex), as well as continued reductions in tobacco use, may be important prevention strategies to consider. Additional research is also needed to determine if the HPV vaccine (currently recommended to prevent cervical cancer in women) might also prevent HPV-related oropharyngeal cancer among men and women.[15] The observation that incidence of regionally advanced oropharyngeal cancer was greater than less-advanced stages points to the need for improved early detection methods. Although survival was generally optimistic among those with localized tumors, poorer survival among those with advanced tumors also underscores the need for improvements in treatment.

Esophageal adenocarcinoma

Overall, esophageal cancer incidence rates have declined rapidly in African American men and women, remained unchanged in white women, and increased slightly among white men. Rates were historically higher among African Americans compared to whites, but more recently, the highest incidence is observed among non-Hispanic white men.[16,17] Although both major subtypes of

Figure 1. Incidence Rates* by Sex and Age for Cancers with Increasing Trends, 1999-2008.



HPV = human papillomavirus

*Age adjusted to the 2000 US standard population. Note the scale of the Y axis differs between cancer sites and genders.

Source: North American Association of Central Cancer Registries. Data are collected by cancer registries participating in NCI's SEER program and CDC's National Program of Cancer Registries.

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Table 2. Incidence Rates* for Cancers with Increasing Trends by State and Sex, Ages 15 Years and Older, 2004-2008

	HPV-related oropharynx		Esophageal adenocarcinoma		Pancreas		Liver & intrahepatic bile duct		Thyroid		Kidney & renal pelvis		Melanoma of the skin	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Alabama†	8.6	2.2	6.5	0.6	17.6	12.4	10.2	3.6	5.3	14.2	25.9	13.3	31.5	18.0
Alaska	7.6	1.2	7.3	1.7	17.2	14.3	14.0	6.0	7.2	22.0	26.4	15.6	14.4	12.9
Arizona	6.2	1.7	5.9	0.7	14.5	11.2	11.5	3.9	7.6	23.6	23.3	13.2	24.7	14.5
Arkansas	8.6	2.1	5.6	0.7	16.4	11.8	9.9	3.1	5.1	12.8	27.2	14.3	22.7	13.8
California	7.0	1.5	5.4	0.7	16.3	13.3	16.2	5.7	6.1	18.2	23.2	11.2	34.3	20.0
Colorado	6.5	1.3	7.4	0.9	15.0	12.8	10.5	3.8	7.4	21.4	22.5	11.5	32.3	23.5
Connecticut	7.8	1.5	7.9	1.1	20.6	14.9	13.2	3.6	9.8	29.2	26.4	13.7	37.9	25.8
Delaware	9.6	1.9	7.6	1.2	18.1	13.8	12.0	3.0	6.9	20.7	25.8	14.8	42.0	22.8
District of Columbia	8.9	3.3	4.3	0.6	19.7	12.9	17.3	4.7	7.4	15.9	21.9	10.5	15.7	7.2
Florida	9.7	2.2	6.4	0.8	16.7	12.5	12.3	3.8	6.4	18.9	24.0	12.3	30.3	17.9
Georgia	8.5	1.8	5.5	0.6	17.2	12.7	11.4	3.5	5.7	17.1	24.7	12.5	35.5	20.5
Hawaii	7.3	1.3	3.4	0.3	18.0	14.3	19.1	7.2	7.9	24.7	21.8	10.6	34.5	19.1
Idaho	7.6	1.5	8.1	1.0	16.4	13.5	8.1	2.9	7.9	28.9	22.9	12.8	38.1	23.6
Illinois	8.0	1.9	8.1	1.1	18.9	14.2	11.6	4.1	7.1	21.0	28.8	15.1	25.0	16.6
Indiana	8.1	1.8	9.3	1.1	17.0	12.7	9.5	3.4	6.0	18.1	28.3	15.9	26.6	18.1
Iowa	7.1	1.5	9.8	1.2	17.0	12.4	8.6	3.2	7.5	19.8	29.0	14.6	29.7	22.1
Kansas	6.9	1.2	7.0	0.8	15.9	12.2	8.2	2.9	8.2	24.5	25.4	13.7	31.7	22.7
Kentucky	8.8	2.1	8.4	1.0	16.6	13.1	9.8	3.7	7.1	21.4	30.6	16.3	35.2	23.8
Louisiana†	9.3	1.6	6.0	0.7	18.7	15.4	15.1	4.2	5.8	16.1	32.4	17.0	23.4	12.8
Maine	8.7	2.2	12.0	1.2	17.7	14.4	9.2	3.4	6.3	21.4	25.8	15.3	32.6	24.6
Maryland‡	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Massachusetts	8.0	1.8	10.7	1.5	17.8	14.0	14.2	3.8	10.6	31.1	28.4	13.7	35.5	23.9
Michigan	7.5	1.8	8.1	1.3	18.5	14.0	10.8	4.1	6.5	18.5	25.8	14.1	27.8	20.0
Minnesota	6.9	1.7	8.5	1.1	14.9	11.3	8.1	2.9	7.0	19.2	26.4	13.6	32.5	24.5
Mississippi†	8.9	2.0	5.3	0.6	17.8	12.6	11.6	3.8	5.6	14.6	30.1	15.5	25.4	15.2
Missouri	8.8	1.8	7.8	1.0	17.3	13.2	11.5	3.6	6.8	19.7	29.5	15.0	28.4	17.3
Montana	6.8	1.5	8.4	1.1	16.2	12.2	6.7	3.3	6.5	22.9	21.2	11.0	26.0	21.0
Nebraska	6.4	1.2	8.4	1.0	17.7	12.3	8.5	2.9	6.9	22.9	25.9	15.0	27.6	19.2
Nevada	6.3	2.1	6.9	0.8	16.3	13.5	11.3	4.8	7.7	23.0	22.6	11.5	26.5	14.4
New Hampshire	7.7	2.2	12.3	1.8	16.9	14.7	8.3	2.4	8.0	24.7	24.4	12.3	43.2	30.3
New Jersey	6.9	1.6	7.0	1.1	18.8	14.3	12.7	4.2	9.1	27.2	27.4	13.4	34.5	22.6
New Mexico	5.1	1.2	5.8	0.6	15.0	12.0	15.3	5.5	7.3	23.9	21.1	11.7	28.9	17.8
New York	6.9	1.5	6.7	1.2	18.7	14.7	15.5	4.7	8.7	25.1	27.4	13.0	25.9	16.2
North Carolina	9.3	2.0	6.7	0.9	16.5	13.4	10.8	3.4	6.7	19.4	29.8	13.6	32.6	20.5
North Dakota	5.8	1.1	7.3	1.5	18.0	11.9	6.3	2.9	7.0	22.9	25.6	13.4	22.4	21.6
Ohio	7.7	1.9	9.1	1.3	17.2	12.9	9.3	3.1	6.1	18.8	25.8	14.8	28.7	21.5
Oklahoma	8.0	1.9	7.4	0.8	16.1	12.0	11.3	4.5	5.0	15.6	27.2	15.1	30.5	19.2
Oregon	8.6	1.7	9.1	1.1	15.7	13.4	11.0	3.9	6.5	19.0	24.4	12.7	38.2	30.3
Pennsylvania	7.5	1.7	9.0	1.3	18.4	14.1	12.5	3.6	9.3	30.2	28.4	14.7	27.5	19.3
Rhode Island	8.0	2.2	10.3	1.5	16.4	12.1	14.3	4.4	10.0	28.7	29.5	15.3	33.8	23.8
South Carolina	9.0	2.1	5.6	0.7	16.9	13.1	10.0	2.8	4.9	15.4	24.4	13.5	34.7	22.2
South Dakota	4.5	1.1	8.5	1.1	14.2	11.2	5.8	2.2	5.4	18.5	23.3	13.9	20.9	16.2
Tennessee	8.2	2.0	6.2	0.9	16.0	12.0	10.0	3.2	6.9	19.4	26.6	14.0	32.0	19.9
Texas†	7.6	1.6	6.1	0.7	16.4	12.5	16.7	5.6	6.7	19.0	28.3	15.6	23.2	12.9
Utah	5.0	0.6	6.3	0.5	13.6	10.9	6.6	2.4	8.4	26.8	17.2	10.5	46.5	26.7
Vermont	9.6	1.7	8.7	1.5	17.2	14.7	9.3	2.8	7.1	24.6	24.8	13.5	41.9	34.2
Virginia	8.0	1.6	6.5	0.8	16.9	13.2	11.1	3.6	6.2	17.3	24.9	12.4	33.8	20.3
Washington	7.9	1.5	7.9	1.3	16.8	13.8	12.3	4.7	7.2	20.6	25.4	13.4	37.1	28.2
West Virginia	8.6	2.4	8.8	1.2	16.0	11.3	8.6	3.6	7.1	20.1	27.5	15.5	29.1	20.0
Wisconsin	7.1	1.9	8.7	1.4	17.7	13.1	10.3	4.0	6.1	18.2	26.5	14.0	26.7	18.9
Wyoming	6.7	1.7	9.2	1.2	14.3	11.4	7.5	3.3	7.4	27.1	24.2	11.6	29.6	23.8

HPV = human papillomavirus. *Per 100,000, age adjusted to the 2000 US standard population. †Data for 2005 are limited to cases diagnosed from January-June due to the effect of large migrations of populations on this state as a result of Hurricane Katrina in September 2005. ‡Data from this state are not available.

Source: North American Association of Central Cancer Registries. Data are collected by cancer registries participating in NCI's SEER program and CDC's National Program of Cancer Registries.

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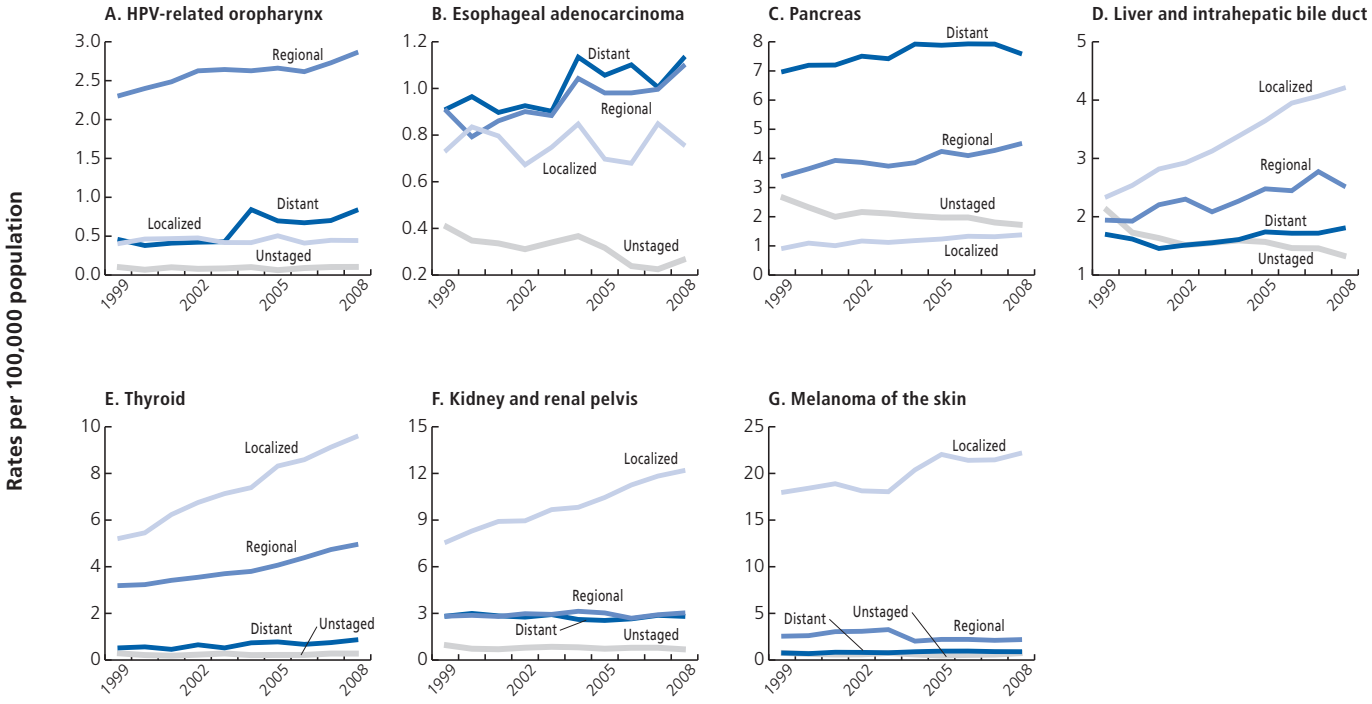
Figure 2. Incidence Rates* by Stage at Diagnosis for Cancers with Increasing Trends, Ages 15 years and older, 1999-2008.



HPV = human papillomavirus

*Age adjusted to the 2000 US standard population. Note the scale of the Y axis differs between cancer sites and genders. Trends in incidence rates by stage at diagnosis should be interpreted with caution because of the introduction of Collaborative Staging criteria in 2004, which may have impacted the stage distribution for some cancers.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 13 database 1992-2008. National Cancer Institute.

American Cancer Society, Surveillance Research, 2012

esophageal cancer (squamous cell carcinoma and adenocarcinoma) are related to smoking, decreases in smoking prevalence have only manifested declines in squamous cell carcinoma of the esophagus.

Risk factors: Obesity is associated with a 16-fold increased risk of esophageal adenocarcinoma.[18] Gastroesophageal reflux also increases risk through the establishment of Barrett's esophagus, a premalignant condition that can progress to esophageal adenocarcinoma.[19,20] Abdominal obesity is associated with both gastroesophageal reflux and Barrett's esophagus, possibly by increasing intra-abdominal pressure promoting acid reflux, which can initiate the malignant transformation of esophageal cells.[21] Current and former smoking is also associated with a two-fold increased risk of esophageal adenocarcinoma.[21]

Rates and trends: Incidence rates for esophageal adenocarcinoma increased significantly among white men (1.8% per year), white women (2.1% per year), and Hispanic men (2.8% per year) during 1999-2008, while there were no significant changes for men or women of other racial/ethnic groups (Table 1). Overall rates increased in men and women 55 years of age or older (Figure 1, B) and for distant- and regional-staged disease (Figure 2, B). These increasing trends coincide with rises in obesity and gastroesophageal reflux disease.[22] However, the extent to which increasing obesity rates contribute to the increasing trends and higher burden in whites is unclear because obesity prevalence has increased in men and women of all racial/ethnic groups and because obesity prevalence is highest among African Americans.[23] Rather, these patterns may reflect the higher prevalence of abdominal obesity among whites.[24]

Survival: Five-year survival rates for esophageal adenocarcinoma increased from 33.5% in 1992-1995 to 49.3% in 2001-2007 for local-staged tumors, and from 9.4% to 20.6% for regional-staged tumors. Survival was poor for distant-staged tumors, with a five-year relative survival rate of 2.8% during 2001-2007 (Table 3).

Prevention and early detection: Maintaining a healthy body weight may reduce the risk for esophageal adenocarcinoma. Treatment of gastroesophageal reflux disease with proton-pump inhibitors, which reduces gastric acid, thereby slowing or preventing the development of Barrett's esophagus, may also lower risk, although the most effective regimen to reduce cancer

Table 3. Trends in Five-year Relative Survival Rates (%) for Cancers with Increasing Incidence by Stage at Diagnosis, Ages 15 Years and Older, 1992-2007

	Localized		Regional		Distant	
	1992-1995	2001-2007	1992-1995	2001-2007	1992-1995	2001-2007
HPV-related oropharynx	63.3	78.3	47.3	66.7	21.7	37.2
Esophageal adenocarcinoma	33.5	49.3	9.4	20.6	1.9	2.8
Pancreas	15.4	21.9	6.3	9.1	1.6	1.8
Liver & intrahepatic bile duct	12.5	27.4	5.8	8.8	1.6	2.5
Thyroid	99.4	99.7	94.5	97.0	60.5	57.3
Kidney & renal pelvis	88.4	91.1	60.0	62.7	7.3	10.1
Melanoma of the skin	96.1	99.5	58.9	66.1	11.9	14.8

HPV = human papillomavirus.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 13 database 1992-2008. National Cancer Institute.

American Cancer Society, Surveillance Research, 2012

risk in these patients is not known.[21] In addition, medical surveillance for people diagnosed with Barrett's esophagus to monitor for the development of esophageal adenocarcinoma may also be beneficial; however, the timing and frequency of such screening is unclear.[25]

Pancreas

Pancreatic cancer is one of the most deadly forms of cancer and the fourth leading cause of cancer death among men and women.

Risk factors: Cigarette smoking accounts for 25%-30% of pancreatic cancer cases and confers about a two-fold increased pancreatic cancer risk relative to nonsmokers.[26] Cigar and pipe smoking, as well as use of smokeless tobacco, are also associated with elevated risks. Obesity is another important modifiable risk factor for pancreatic cancer, and obese individuals have a 20% increased risk relative to normal-weight individuals.[27] Additional risk factors include inherited genetic disorders, preexisting diabetes, and a history of pancreatitis.

Rates and trends: Increases in pancreatic cancer incidence rates were limited to white men (0.9% per year) and white women (1.0% per year) during 1999-2008 (Table 1). Incidence rates increased for men 55 years of age or older and for women of all ages, as well as for local-, regional-, and distant-staged tumors, though these increase were likely limited to whites (Figures 1, C and 2, C). Increases in obesity prevalence are thought to contribute to the rising incidence rates.[26,27] However, the prevalence of obesity has increased among all racial/ethnic groups, suggesting the presence of other factors resulting in increasing pancreatic cancer rates among white men and women only.[23]

During 2004-2008, pancreatic cancer incidence rates (per 100,000) were highest among African American men (21.3) and women (17.6), and second highest among white men (16.8) and women (12.8) (Table 1). The racial disparity in the burden of pancreatic cancer has been explained in part by higher rates of cigarette smoking and diabetes mellitus among African American men versus white men and elevated body mass index among African American women versus white women.[28]

Survival: Five-year survival for pancreatic cancer was poor regardless of stage and improved little over time. During the most recent time period (2001-2007), the five-year survival rate was 21.9% for local-staged cancer, 9.1% for regional-staged cancer, and 1.8% for distant-staged cancer. The overall poor survival for pancreatic cancer underscores the lack of effective treatments for this malignancy (Table 3).

Prevention and early detection: Avoiding tobacco use is important in the prevention of pancreatic cancer.[26] Risk can also be reduced by maintaining a healthy weight throughout life.[26] There is no recommended screening procedure for pancreatic cancer, and symptoms do not usually appear until the disease has spread to distant organs, creating a challenge for early detection.

Liver and intrahepatic bile duct

Surveillance reporting for liver cancer includes hepatocellular carcinoma (HCC), the major subtype of liver cancer accounting for approximately 80% of all cases, and tumors of the intrahepatic bile duct (cholangiocarcinomas).[29]

Risk factors: Chronic infection with hepatitis B virus (HBV) or hepatitis C virus (HCV) can lead to fibrosis and cirrhosis (scarring) of the liver, which dramatically increases risk of HCC. Among people with chronic HBV infection, the lifetime risk of liver cancer is 10%-25%, and these cases account for approximately 16% of all liver cancers in the US. [29,30] Among people with chronic HCV infection, there is an estimated 17-fold increased risk of HCC, and these cases account for approximately 48% of liver cancers occurring in the US.[30,31] In other parts of the world where these infections are more common, they account for a greater proportion of liver cancers. Other important risk factors for liver cancer include alcohol-induced liver disease, smoking, obesity, and diabetes.[29,32,33] A recent study found an increased

risk associated with metabolic syndrome, which reflects the interaction between obesity, diabetes, and hypertension and underscores the complex nature of multiple shared risk factors for these cancers.[34] The following sections refer to the combined group of liver and intrahepatic bile duct malignancies as "liver cancer."

Rates and trends: Significant increases in liver cancer incidence rates were observed among white (3.8% per year), African American (5.4% per year), and Hispanic men (2.4% per year) and among African American women (2.7% per year) during 1999-2008 (Table 1). Incidence rates increased for all age groups, most notably for men 55-64 years of age (Figure 1, D). Liver cancer incidence rates increased for all stages at diagnosis, although most notably for localized disease, from 2.3 (per 100,000) in 1999 to 4.2 in 2008 (Figure 2). The increasing burden of liver cancer among African American men and women, and white men, is consistent with an aging cohort of people infected with HCV through injection drug use in the past who are now reaching ages at which liver cancer risk is highest.[35]

Incidence rates continue to be highest among Asian or Pacific Islander men (27.6 per 100,000 population) and women (10.4 per 100,000 population), consistent with the substantial burden of endemic HBV infection among Asian and Pacific Islanders born elsewhere who emigrated to the US (Table 1).[36,37] The increasing incidence trends and high burden of disease in some population subgroups warrant continued monitoring as rates may continue to rise.

Survival: Five-year survival for localized liver cancer increased from 12.5% during 1992-1995 to 27.4% during 2001-2007 (Table 3). There was little improvement in five-year survival for regional- (5.8% during 1992-1995 to 8.8% during 2001-2007) or distant- (1.6% during 1992-1995 to 2.5% during 2001-2007) staged liver cancers.

Prevention and early detection: Hepatitis B vaccination, which prevents chronic HBV infection and thus HBV-related liver cancer, is recommended for all newborn children, with catch-up vaccination recommended for adolescents.[38] Hepatitis B vaccination is also recommended for high-risk adults (such as health care workers and people who inject drugs).[39] Both HBV and HCV are transmitted through injection drug use, so safe injection practices (using a sterile needle, not sharing injection drug equipment) may reduce transmission. Risk of sexual transmission of HBV and HCV may also be reduced by proper and consistent condom use. Antiviral treatment for those with chronic HBV or HCV infections also reduces liver cancer risk.[40] Risk can also be decreased by limiting alcohol intake and not smoking. Finally, maintaining a healthy body weight also decreases risk of liver cancer. Persons at high risk for liver cancer (for example, those with HBV- or HCV-related cirrhosis) may be screened every six months via ultrasound, although the effectiveness of such screening is unclear.[41]

Thyroid

Risk factors: Childhood exposure to ionizing radiation is a strong risk factor for thyroid cancer, with risk increasing with greater levels of exposure.[42] Goiter and benign thyroid nodules, as well as certain genetic characteristics, are also risk factors.[43] Thyroid cancer is more common among women than men, and various female hormonal and reproductive factors have been investigated, including miscarriage as a first pregnancy and later age at first birth.[44] These risk factors are weakly associated with thyroid cancer risk, with the associations stronger for younger versus older women, suggesting an additional role of age-specific sex hormone changes. Certain genetic factors also increase the risk of thyroid cancer.

Rates and trends: Thyroid cancer incidence rates significantly increased among men and women of every racial/ethnic background except American Indian or Alaska Native men during 1999-2008 (Table 1). Rates increased for men and women of all ages, most notably for women 55-64 years of age (Figure 1). Incidence rates (per 100,000 population) increased for tumors of all stages, although the greatest increase was for localized disease (from 5.2 in 1999 to 9.6 in 2008) (Figure 2). Reasons for these increases are not known. Some studies suggested the increasing rates are due to detection of small tumors (through ultrasound and confirmation via fine needle aspiration),[45,46] while other, more recent studies argue that the increase is in part real, and involves both small and large tumors.[47-49]

Survival: During 2001-2007, five-year survival rates were 99.7% for localized tumors, 97.0% for regional-staged tumors, and 57.3% for distant-staged tumors (Table 3).

Prevention and early detection: People with genetic risk factors for thyroid cancer may have their thyroid removed to prevent cancer.[42] There are no clear recommendations to prevent thyroid cancer or established early detection methods.

Kidney and renal pelvis

Risk factors for kidney and renal pelvis cancers are somewhat different, although the two cancers are typically combined for surveillance purposes, as they are for the incidence and survival statistics presented herein.

Risk factors: Cigarette smoking is a risk factor for kidney and renal pelvis cancers, though smoking is most strongly associated with renal pelvis cancer. Risk increases with both quantity and duration of smoking. For kidney cancer, smoking accounts for approximately 20%-30% of cases among men (conferring a 54% increased risk) and approximately 10%-20% of cases among women (conferring a 22% increased risk).[50] For cancer of the renal pelvis, smoking accounts for approximately 70%-82% of cases among men and approximately 37%-61% of cases among women.[51] Obesity also increases risk of kidney cancer, and accounts for 30%-40% of cases.[50,51] Hypertension (high blood pressure) also

increases risk of kidney cancer. There are also inherited forms of kidney cancer, which account for a small fraction of cases.

Rates and trends: During 1999-2008, kidney cancer incidence rates significantly increased for men and women of every race/ethnicity except American Indian or Alaska native men, for every age group, and most dramatically for localized tumors from 7.6 (per 100,000) in 1999 to 12.2 in 2008 (Table 1, Figures 1, F and 2, F). Previous studies analyzing data through 1995 or 1998 found increases in local- and regional-staged kidney cancer.[52, 53] However, in the current analysis from 1999 through 2008, only incidence of localized disease increased, suggesting that these trends may be due to greater uptake of imaging procedures (ultrasound, computed tomography, and magnetic resonance imaging), which detect asymptomatic early stage cancers that may have otherwise gone undiagnosed.

Rates (per 100,000) during 2004-2008 rates were two-fold higher among men (26.2) than among women (13.6), and highest for African American and American Indian or Alaska Native men (28.5 and 29.4, respectively), perhaps reflecting the higher prevalence of obesity in these populations (Table 1).

Survival: The five-year survival rate for kidney cancer increased slightly over time for localized disease, from 88.4% during 1992-1995 to 91.1% during 2001-2007 (Table 3). Survival for regional-staged kidney cancer also increased slightly from 60.0% (1992-1995) to 62.7% (2001-2007) and for distant-staged disease from 7.3% (1992-1995) to 10.1% (2001-2007).

Prevention and early detection: Avoiding smoking and maintaining a healthy weight throughout life are likely important preventive steps for kidney cancer. In addition, avoiding hypertension (through diet and exercise) and treatment of existing hypertension are also likely preventive measures.

Melanoma of the skin

Melanoma is the deadliest form of skin cancer, and is more common among whites of European descent than other racial and ethnic groups.

Risk factors: The major risk factor for melanoma of the skin is exposure to ultraviolet light. Immunosuppression, which is common among organ transplant recipients and those with HIV infection and autoimmune diseases, is also a risk factor. Exposure to ionizing radiation and some chemicals may also increase risk. People with fair skin, freckles, and/or moles and those with a family history of skin cancer and certain genetic markers may also be at increased risk for melanoma.[54] In the following section melanoma of the skin is referred to as "melanoma."

Rates and trends: Melanoma incidence rates continued to increase among white men (2.1% per year) and white women (2.4% per year) during 1999-2008 (Table 1). Rates increased for men over 55 years of age and for women of all ages (Figure 1). By stage at diagnosis, only rates of localized disease increased (from 18.0 per 100,000 in 1999 to 22.2 per 100,000 in 2008) (Figure 2). Other studies have shown that rates have increased for both thin and thick lesions.[55] Overall, the continued increases in melanoma incidence rates may reflect changing sun exposure patterns and the use of indoor tanning booths by young women, as well as increased awareness and detection practices.[55,56]

Melanoma incidence rates in whites are 5 times higher than in Hispanics and 20 times higher than in African Americans. During the most recent period (2004-2008), rates (per 100,000) were higher among men (30.3) than among women (19.5) (Table 1), reflecting differences in sun exposure.

Survival: Five-year survival rates for melanoma increased slightly for localized disease from 96.1% (1992-1995) to 99.5% (2001-2007), for regional-staged disease from 58.9% (1992-1995) to 66.1% (2001-2007), and for distant-staged disease from 11.9% (1992-1995) to 14.8% (2001-2007) (Table 3).

Prevention and early detection: Strategies to reduce risk of certain types of melanoma include proper and consistent use of sunscreen, wearing sun-protective clothing, seeking shade, and avoiding tanning beds.[54] In addition to individual-level policies, community-level policies that restrict access to tanning beds for minors and facilitate sun-safe behaviors among children are also likely to be important. Finally, increased melanoma awareness among both individuals and health care providers may also increase early detection of cancerous lesions, leading to successful treatment.

Future challenges

In 2012, cancers with increasing incidence rates are expected to account for approximately 135,000 new cancer cases among men and 110,000 cases among women. Increasing incidence of esophageal adenocarcinoma and cancers of the pancreas and liver is particularly concerning because of their poor survival, highlighting the need for early detection and treatment options for these highly fatal cancers. Additional studies are needed to determine the underlying causes of the observed increases in incidence rates for the seven cancers discussed and to address the determinants of gender and racial/ethnic differences in incidence rates and trends. While temporal trends in risk factors (in particular, the recent rise in obesity in the US) can be plausibly linked to a number of these cancers, other factors, such as increased diagnostic imaging may also be important, although the precise nature and relative contribution of these and other factors remains unclear.

Research into cancer biology utilizing genome-wide association studies may yield important etiologic findings for some cancers with strong genetic risks.[57] In addition, identification of bio-

markers of tumor aggressiveness may enable more individualized treatment options. The extensive efforts to develop personalized and/or targeted therapies hold some promise as they take into account the complex molecular composition and gene expression profiles of individual tumors.[58-60] Additionally, the development of improved early detection techniques and screening guidelines for specific high-risk populations are also important future considerations. However, the most prudent cancer prevention activities include avoiding tobacco use and obesity and increasing physical activity.

Due to population growth and aging, the number of new cancer patients is expected to double to 2.6 million people by 2050.[5] This number could further increase if the trends for cancers that are increasing are not reversed. Further, as survival from some of the cancers highlighted in this special section was generally good (in particular, thyroid cancer and melanoma of the skin), this will add to the growing population of cancer survivors with complex health care and societal needs, including reduced income and productivity due to a prolonged illness, economic stress, and limited or diminishing social support.[61] In addition, as cancer survivors age, some will be at increased risk for second cancers, requiring additional medical surveillance. The need will also grow for access to comprehensive cancer centers, for trained medical professionals (oncologists, specialized nursing staff, and others), and for health officials to develop appropriate plans to meet these needs.[62]

In summary, cancers with increasing incidence rates in the US represent an area of focus for cancer prevention and control programs and the public at-large. A number of these cancers are preventable through smoking cessation and avoidance of obesity. However, additional research is needed to determine the role of other factors and to develop appropriate screening, early detection, and treatment programs to reduce pain and suffering from these cancers.

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Tobacco Use

Smoking-related diseases remain the world's most preventable cause of death. Since the first US Surgeon General's report on smoking and health in 1964, there have been more than 15 million premature deaths attributable to smoking in the US alone.[1,2] Globally, the World Health Organization (WHO) estimates that there are 6 million smoking-related premature deaths each year.[3]

Health Consequences of Smoking

Half of all those who continue to smoke will die from smoking-related diseases.[4] In the US, tobacco use is responsible for nearly 1 in 5 deaths, or about 443,000 premature deaths each year.[5,6] In addition, an estimated 8.6 million people suffer from chronic conditions related to smoking, such as chronic bronchitis, emphysema, and cardiovascular diseases.[7]

- Smoking accounts for at least 30% of all cancer deaths and 80% of lung cancer deaths.[6,8,9]
- The risk of developing lung cancer is about 23 times higher in male smokers and 13 times higher in female smokers, compared to lifelong nonsmokers.[1]
- Smoking increases the risk of the following types of cancer: nasopharynx, nasal cavity and paranasal sinuses, lip, oral cavity, pharynx, larynx, lung, esophagus, pancreas, uterine cervix, ovary (mucinous), kidney, bladder, stomach, colorectum, and acute myeloid leukemia.[1,10]
- The International Agency for Research on Cancer recently concluded that there is limited evidence that tobacco smoking causes female breast cancer.[10]
- Smoking is a major cause of heart disease, cerebrovascular disease, chronic bronchitis, and emphysema, and is associated with gastric ulcers.[1,9]
- The risk of lung cancer is just as high in smokers of "light" or "low-tar" yield cigarettes as in those who smoke "regular" or "full-flavored" products.[11]

Reducing Tobacco Use and Exposure

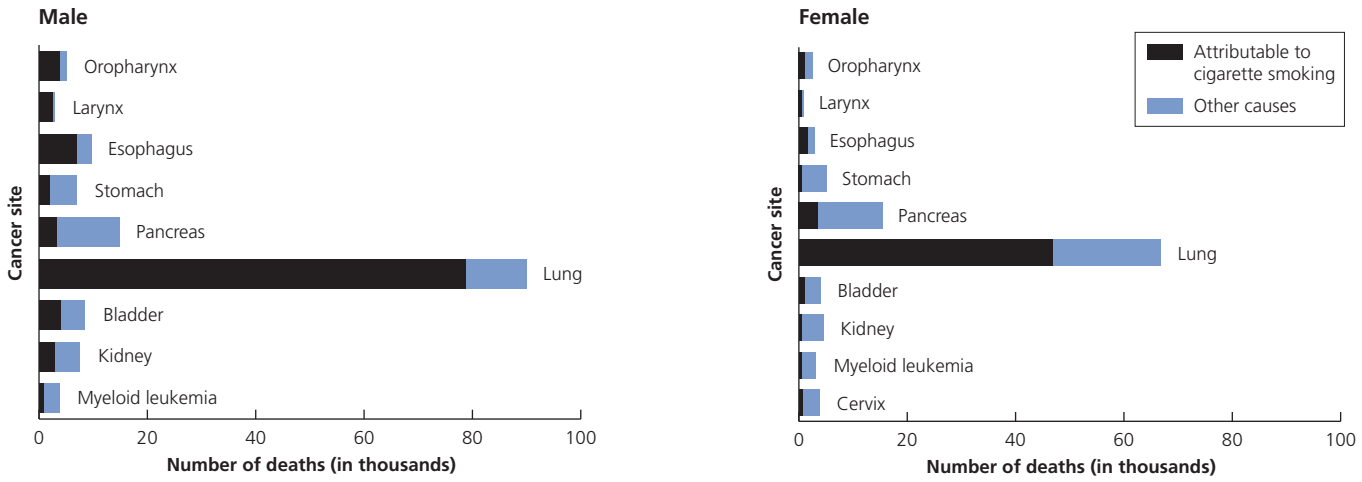
In 2000, the US Surgeon General outlined the goals and components of comprehensive statewide tobacco control programs.[12] These programs seek to prevent the initiation of tobacco use among youth; promote quitting at all ages; eliminate nonsmokers' exposure to secondhand smoke; and identify and eliminate the disparities related to tobacco use and its effects among different population groups.[13] The Centers for Disease Control and Prevention (CDC) recommends funding levels for comprehensive tobacco use prevention and cessation programs for all 50 states and the District of Columbia. In fiscal year 2012, 6 states allocated 50% or more of CDC-recommended funding levels for tobacco control programs.[14] States that have invested in comprehensive tobacco control programs, such as California, Massachusetts, and Florida, have reduced smoking rates and saved millions of dollars in tobacco-related health care costs.[12,15] Recent federal initiatives in tobacco control, including national legislation ensuring coverage of clinical cessation services, regulation of tobacco products, tax increases, and increased tobacco control funding, hold promise for reducing tobacco use. Provisions in the Affordable Care Act signed into law on March 23, 2010, ensure at least minimum coverage of evidence-based cessation treatments, including pharmacotherapy and cessation counseling, to previously uninsured tobacco users, pregnant Medicaid recipients, and eligible Medicare recipients. The Centers for Medicare and Medicaid subsequently issued a decision memo changing the eligibility requirement for Medicare recipients so that they no longer have to be diagnosed with a smoking-related disease in order to access cessation treatments. Starting in 2014, state Medicaid programs can no longer exempt cessation pharmacotherapy from prescription drug coverage. Several provisions of the Family Smoking Prevention and Tobacco Control Act, which for the first time grants the US Food and Drug Administration the authority to regulate the manufacturing, selling, and marketing of tobacco products, have already gone into effect.

For more information about tobacco control, see the American Cancer Society's *Cancer Prevention & Early Detection Facts & Figures 2011*, available online at cancer.org/statistics.

Trends in Smoking

- Between 1965 and 2004, cigarette smoking among adults 18 years of age and older declined by half from 42% to 21%. Between 2005 (20.9%) and 2010 (19.3%), there was a modest, but statistically significant, decline in smoking prevalence. However, declines were not consistent from year-to-year and were not observed in all population subgroups. In 2010, approximately 45.3 million adults were current smokers, about 3 million fewer than there were in 2005.[16,17]
- Importantly, the proportion of daily smokers reporting light or intermittent smoking (less than 10 cigarettes a day) increased significantly between 2005 (16%) and 2010 (22%), whereas heavy smoking declined from 13% to 8%.[17]
- Although cigarette smoking became prevalent among men before women, the gender gap narrowed in the mid-1980s and has remained constant since.[18] As of 2010, there was a 3% absolute difference in smoking prevalence between white men (23%) and women (20%), an 8% difference between African American men (25%) and women (17%), a 7% difference between Hispanic men (16%) and women (9%), and a 10% difference between Asian men (15%) and women (4%).[17]
- Smoking is most common among the least educated. While the percentage of smokers has decreased at every level of educational attainment since 1983, college graduates had the

Annual Number of Cancer Deaths Attributable to Smoking by Sex and Site, US, 2000-2004



Source: Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses – United States, 2000-2004. *MMWR Morb Mortal Wkly Rep*. 2008;57(45):1226-1228.

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greatest decline, from 21% to 8% in 2010. In contrast, among those with a high school diploma, prevalence decreased modestly from 34% to 27% during the same time period.[19] Adults with a GED certificate (high school equivalency diploma) had the highest smoking rate (45%) in 2010.[17] Groups with a high school degree or less quit smoking at lower rates than higher educated groups between 1998 and 2008.[20]

- The decrease in smoking prevalence among high school students between the late 1970s and early 1990s was more rapid among African Americans than whites; consequently, lung cancer rates among adults younger than 40 years of age, which historically has been substantially higher in African Americans, have converged in these two groups. [21]
- Although cigarette smoking among US high school students increased significantly from 28% in 1991 to 36% in 1997, the rate had declined to 21% (male: 22%, female: 22%) by 2003.[22,23] Between 2003 and 2009, there was no significant change in the smoking rate among high school males (20%) and females (19%).[24]

Smokeless Tobacco Products

Smokeless tobacco products include moist snuff, chewing tobacco, snus (a "spitless," moist powder tobacco pouch), dissolvable nicotine products (Orbs, Strips, and Sticks), and a variety of other tobacco-containing products that are not smoked. Recently, the smokeless market in high-income countries, including the US, has been increasingly consolidated from smaller tobacco companies into the control of the multinational cigarette corporations.[25] As part of their marketing strategy, the industry is actively promoting smokeless tobacco products both for use in settings where smoking is prohibited and as a way to quit smoking; however, there is no evidence that these products are as effective as proven cessation therapies. When smokeless tobacco was aggressively marketed in the US in the 1970s, use of these products increased among adolescent males, not among older smokers trying to quit.[26,27] Use of any smokeless tobacco product is not considered a safe substitute for quitting. These products cause oral, esophageal, and pancreatic cancers, precancerous lesions of the mouth, gum recession, bone loss around the teeth, and tooth staining; they can also lead to nicotine addiction.[28]

- Smokers who use smokeless products as a supplemental source of nicotine to postpone or avoid quitting will increase rather than decrease their risk of lung cancer.[29]
- Long-term use of snuff substantially increases the risk of cancers of the oral cavity, particularly cancers of the cheek and gum.[28]
- According to the US Department of Agriculture, manufactured output of moist snuff has increased more than 83% in the past two decades, from 48 million pounds in 1991 to an estimated 88 million pounds in 2007. [30,31]
- Sales of smokeless tobacco products are growing at a more rapid pace than cigarettes. Between 1990 and 2006, per capita sales of smokeless products in the US increased by nearly 100%, while sales of cigarettes declined by 42%.[32,33]
- According to the 2010 National Health Interview Survey, 2.7% of adults 18 years of age and older – 5% of men and 0.2% of women – were current users of smokeless products.[34]

- According to the 2010 National Survey on Drug Use and Health (NSDUH), whites were more likely to use smokeless tobacco than African Americans, Hispanics/Latinos, or Asians.[35]
- Adult smokeless tobacco use (including snus use) varied from 0.9% to 8.2% across states in 2010, with higher rates observed in the South and North-Central states.[36]
- Nationwide, 9% of high school students – 15% of males and 2% of females – used chewing tobacco, snuff, or dip in 2009.[24] Data from the NSDUH indicate that initiation of smokeless tobacco products and past month use among youth 12-17 years of age increased between 2000 and 2009, primarily among boys.[37]

Cigars

Cigar smoking has health consequences similar to those of cigarette smoking and smokeless tobacco.[38]

- Regular cigar smoking is associated with an increased risk of cancers of the lung, oral cavity, larynx, esophagus, and probably pancreas. Cigar smokers have 4 to 10 times the risk of dying from laryngeal, oral, or esophageal cancer compared to nonsmokers.[38]
- In 2010, 2.5% of adults 18 years of age and older – 4.7% of men and 0.5% of women – were current users of cigars (had smoked at least 50 cigars in their lifetime and now smoked some days or every day).[34]
- According to the 2010 NSDUH, African Americans and American Indians/Alaska Natives had the highest prevalence of past month cigar use, followed by, whites, Hispanics, and Asians.[35]
- Among states, cigar smoking prevalence among adults ranges from between 2.2% to 5.4%.[36]
- In 2009, 14% of US high school students had smoked cigars, cigarillos, or little cigars at least once in the past 30 days.[24]
- Between 1997 and 2007, while sales of little cigars increased by 240%, large cigar sales decreased by 6%.[39] Small cigars are similar in shape and size to cigarettes, but are not regulated or taxed like cigarettes, making them more affordable to youth.

Smoking Cessation

A US Surgeon General's Report outlined the benefits of smoking cessation: [40]

- People who quit, regardless of age, live longer than people who continue to smoke.
- Smokers who quit before 50 years of age cut their risk of dying in the next 15 years in half, compared to those who continue to smoke.
- Quitting smoking substantially decreases the risk of lung, laryngeal, esophageal, oral, pancreatic, bladder, and cervical cancers.
- Quitting lowers the risk for other major diseases, including heart disease, chronic lung disease, and stroke.

While the majority of ever-smokers in the US have quit smoking, rates of adult smoking cessation remained stable between 1998 and 2008. [20]

- In 2010, an estimated 49.5 million adults were former smokers, representing 53% of living persons who ever smoked.[34]
- Smokers with an undergraduate or graduate degree are more likely to quit than less educated smokers.[20] Among those who smoked in 2010, an estimated 20.6 million (or 47%) had stopped smoking at least one day during the preceding 12 months because they were trying to quit.[34]
- In 47 states and the District of Columbia, the majority of adults (50% or more) who ever smoked have quit smoking.[41]
- In 2009, among high school students who were current cigarette smokers, national data showed that one-half (51%) had tried to quit smoking cigarettes during the 12 months preceding the survey; female students (54%) were more likely to have made a quit attempt than male students (48%).[24]

Tobacco dependence is a chronic disease and should be treated with effective treatments that may double or triple smokers' chances of long-term abstinence.[42] Certain racial and ethnic groups (Hispanics and non-Hispanic African Americans) and those with low socioeconomic status are significantly less likely to receive cessation services.[36] Improving access to these services by promoting coverage for these treatments through government health programs, including Medicaid and Medicare, and private health insurance mandates can help reduce these disparities.

Secondhand Smoke

Secondhand smoke (SHS), or environmental tobacco smoke, contains numerous human carcinogens for which there is no safe level of exposure. It is estimated that more than 88 million nonsmoking Americans 3 years of age and older were exposed to SHS in 2007-2008.[43] Numerous scientific consensus groups have reviewed data on the health effects of SHS.[44-49] In 2006, the US Surgeon General published a comprehensive report titled *The Health Consequences of Involuntary Exposure to Tobacco Smoke*.[44] Public policies to protect people from SHS are based on the following detrimental effects:

- SHS contains more than 7,000 chemicals, at least 69 of which cause cancer.[2]
- Each year, about 3,400 nonsmoking adults die of lung cancer as a result of breathing SHS.[6]
- SHS causes an estimated 46,000 deaths from heart disease in people who are not current smokers.[6]
- SHS may cause coughing, wheezing, chest tightness, and reduced lung function in adult nonsmokers.[44]

- Some studies have reported an association between SHS exposure and breast cancer. The US Surgeon General has designated this evidence suggestive rather than conclusive.[44] In any case, women should be aware that there are many health reasons to avoid exposure to tobacco smoke.

Laws that prohibit smoking in public places and create smoke-free environments are an extremely effective approach to prevent exposure to and harm from SHS.[50] In addition to providing protection against harmful exposure to secondhand smoke, there is strong evidence that smoke-free policies decrease the prevalence of both adult and youth smoking.[51] Momentum to regulate public smoking began to increase in 1990, and these laws have become increasingly common and comprehensive.[52]

- In the past decade, the largest decline in SHS exposure among nonsmokers occurred between 1999-2000 (52.5%) and 2001-2002 (41.7%); current exposure estimates (2007-2008) remain stable at 40.1%.[43]
- In the US, as of October 2011, 3,397 municipalities have passed smoke-free legislation, and 35 states, along with the District of Columbia, the Northern Mariana islands, Puerto Rico, American Samoa, and the US Virgin Islands, have either implemented or enacted statewide smoking bans that prohibit smoking in workplaces and/or restaurants and/or bars.[53]
- Currently, approximately 80% of the US population is covered by a smoke-free policy or provision in workplaces and/or restaurants and/or bars.[53]
- Nationally, coverage of all indoor workers by smoke-free policies increased substantially from 1992-1993 (46%) to 2006-2007 (75%).[54]

Workplace smoking restrictions vary by geographic area; 72% of Southern residents reported working under a smoke-free policy, compared to 81% of workers in the Northeast.[55]

Costs of Tobacco

The number of people who die prematurely or suffer illness from tobacco use imposes substantial health-related economic costs to society. It is estimated that in the US, between 2000 and 2004, smoking accounted for 3.1 million years of potential life lost in men and 2.0 million years of potential life lost in women. Smoking, on average, reduces life expectancy by approximately 14 years.[6]

In addition:

- Between 2000 and 2004, smoking, on average, resulted in more than $193 billion in annual health-related economic costs, including medical costs and productivity losses.[6]
- Smoking-attributable health care expenditures totaled an estimated $99.5 billion annually between 2000 and 2004, up $24 billion from $75.5 billion during 1997-2001.[6]
- Smoking-attributable productivity losses in the US amounted to $96.8 billion annually during 2000-2004, up about $4.3 billion from the $92 billion annually during 1997-2001.[6, 56]

Worldwide Tobacco Use

During the past 25 years, while the prevalence of smoking has been slowly declining in the US and many other high-income countries, smoking rates have been increasing in many low- and middle-income nations, where about 85% of the world population resides.

- In 2011, tobacco use killed almost 6 million people, with 80% of these deaths occurring in low- and middle-income countries.[25] If current trends continue, by 2030 tobacco will kill more than 8 million people worldwide each year and, without further intervention, could kill 1 billion people over the course of the 21st century.[3,25]
- Between 2002 and 2030, tobacco-attributable deaths are projected to decline by 9% in high-income countries, but are expected to double from 3.4 million to 6.8 million in low- and middle-income countries.[57] For example, tobacco use is currently the number one killer in China, responsible for 1.2 million deaths annually. This number is expected to rise to 3.5 million deaths annually by the year 2030.[58]
- Approximately 18% of the world's population – more than 1 billion men and 250 million women – smoke. In 32 countries male smoking prevalence is greater than or equal to 45%: all but 5 of these are low- and middle-income countries.[3,25]
- In many low- and middle-income countries, smoking prevalence is increasing among females, while rates in most high-income countries have peaked or are decreasing.[25]
- Data from the Global Youth Tobacco Survey conducted during 2000-2007 found that among youth 13 to 15 years of age, 12% of boys and 7% of girls reported smoking cigarettes, and 12% of boys and 8% of girls reported using other tobacco products.[59] In every region of the world, the ratio of male-to-female smoking among youth was smaller than the ratio reported among adults, reflecting a global trend of increased smoking among female youth.[60]
- It has been estimated that in 2004, more than 600,000 nonsmokers worldwide died as a result of exposure to secondhand smoke, and 40% of children were exposed to secondhand smoke.[61]
- The use of smokeless tobacco accounts for a significant and growing portion of tobacco use throughout the world. The majority of smokeless tobacco is consumed in South Asia.[25] However, consistent with trends in the US, the sales of smokeless tobacco products are growing at a rapid pace in high-income countries, even as smoking rates decline.[25]

- As emerging and developing economies come to prominence and their health systems develop further, the medical costs of tobacco-related disease will continue to grow. In China, for example, the direct costs of smoking were $6.2 billion in 2008 (an increase of 154% compared to 2000), while the indirect costs of smoking were $22.7 billion in 2008 (an increase of 376% compared to 2000).[62]
- Spending on tobacco products diverts resources from essential goods and services. For example, in India tobacco consumption impoverishes roughly 15 million people, and in Cambodia, the amount of money spent on one pack of premium cigarettes can buy as much as 3,500 food calories comprising a typical daily diet in that country.[63,64]
- About 55% of the world's population was covered by one or more evidence-based tobacco control measure in 2010, up from less than 10% in 2008.[3] The WHO estimates that 11% of the world's population lives in smoke-free environments – 14% is covered by cessation programs, 15% is exposed to health warnings on tobacco products, 28% to mass media campaigns, 6% to tobacco advertising bans, and 8% is subject to the recommended tobacco tax level.[3]

The first global public health treaty, the Framework Convention on Tobacco Control (FCTC), was unanimously adopted by the World Health Assembly on May 21, 2003, and subsequently entered into force as a legally binding accord for all ratifying states on February 27, 2005.[65] The FCTC features specific provisions to control both the global supply and demand for tobacco, including regulation of tobacco product contents, packaging, labeling, advertising, promotion, sponsorship, taxation, smuggling, youth access, exposure to secondhand tobacco smoke, and environmental and agricultural impacts.[65] Parties to the treaty are expected to strengthen national legislation, enact effective tobacco control policies, and cooperate internationally to reduce global tobacco consumption.[66,67] As of September 2011, out of 195 eligible countries, 174 have ratified or acceded to the treaty representing approximately 87% of the world's population.[65] A number of major tobacco-producing nations, including Argentina, Indonesia, Malawi, the US, and Zimbabwe, have either not signed or have signed but not ratified the treaty.[65]

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Cancer Disparities

An overarching objective of the American Cancer Society's 2015 challenge goals is to eliminate disparities in the cancer burden among different segments of the US population defined in terms of socioeconomic status (income, education, insurance status, etc.), race/ethnicity, residence, sex, and sexual orientation. The causes of health disparities within each of these groups are complex and include interrelated social, economic, cultural, and health system factors. However, disparities predominantly arise from inequities in work, wealth, income, education, housing, and overall standard of living, as well as social barriers to high-quality cancer prevention, early detection, and treatment services.

Socioeconomic Status

Persons with lower socioeconomic status (SES) have disproportionately higher cancer death rates than those with higher SES, regardless of demographic factors such as race/ethnicity. For example, cancer mortality rates among both African American and non-Hispanic white men with 12 or fewer years of education are almost 3 times higher than those of college graduates for all cancers combined, and 4-5 times higher for lung cancer. Furthermore, progress in reducing cancer death rates has been slower in persons with lower SES. These disparities occur largely because persons with lower SES are at higher risk for cancer and have less favorable outcomes after diagnosis. People with lower SES are more likely to engage in behaviors that increase cancer risk, such as tobacco use, physical inactivity, and poor diet, in part because of marketing strategies that target these populations and in part because of environmental or community factors that provide fewer opportunities for physical activity and less access to fresh fruits and vegetables. Lower SES is also associated with financial, structural, and personal barriers to health care, including inadequate health insurance, reduced access to recommended preventive care and treatment services, and lower literacy rates. Individuals with no health insurance are more likely to be diagnosed with advanced cancer and less likely to receive standard treatment and survive their disease. For more information about the relationship between SES and cancer, see *Cancer Facts & Figures 2011*, Special Section and *Cancer Facts & Figures 2008*, Special Section, available online at cancer.org.

Racial and Ethnic Minorities

Disparities in the cancer burden among racial and ethnic minorities largely reflect obstacles to receiving health care services related to cancer prevention, early detection, and high-quality treatment, with poverty (low SES) as the overriding factor. According to the US Census Bureau, in 2010, more than 1 in 4 African Americans and Hispanics/Latinos lived below the poverty line, compared to 1 in 10 non-Hispanic whites. Moreover, 1 in 5 African Americans and 1 in 3 Hispanics/Latinos were uninsured, while only 1 in 10 non-Hispanic whites lacked health insurance.

Discrimination is another factor that contributes to racial/ethnic disparities in cancer mortality. Racial and ethnic minorities tend to receive lower quality health care than whites even when insurance status, age, severity of disease, and health status are comparable. Social inequalities, including discrimination, communication barriers, and provider assumptions, can affect interactions between patient and physician and contribute to miscommunication or delivery of substandard care.

In addition to poverty and social discrimination, cancer occurrence in a population may also be influenced by cultural and/or inherited factors that decrease or increase risk. For example, Hispanic women have a lower risk of breast cancer probably in part because they tend to begin having children at a younger age, which decreases breast cancer risk. Individuals who maintain a primarily plant-based diet or do not use tobacco because of cultural or religious beliefs have a lower risk of many cancers. Higher rates of cancers related to infectious agents (e.g., stomach, liver, uterine cervix) in populations that include a large number of recent immigrants, such as Hispanics and Asians, may reflect a higher prevalence of infection in the country of origin. Genetic factors may also explain some differences in cancer incidence. For example, women from population groups with an increased frequency of mutations in the breast cancer susceptibility genes (BRCA1 and BRCA2), such as women of Ashkenazi Jewish descent, have an increased risk of breast and ovarian cancer. Genetic factors may also play a role in the elevated risk of prostate cancer among African American men and the incidence of more aggressive forms of breast cancer in African American women. However, genetic differences associated with race are thought to make a minor contribution to the disparate cancer burden between populations. Following is a brief overview of the cancer burden for each of the four major nonwhite racial/ethnic groups.

African Americans: African Americans are more likely to develop and die from cancer than any other racial or ethnic group. The death rate for cancer among African American males is 33% higher than among white males; for African American females, it is 16% higher than among white females. African American men have higher incidence and mortality rates than whites for each of the cancer sites listed on page 44 with the exception of kidney cancer, for which rates are the same. For more information on cancer in African Americans, see *Cancer Facts & Figures for African Americans 2011-2012*, available online at cancer.org/statistics.

Cancer Incidence and Death Rates* by Site, Race, and Ethnicity†, US, 2004-2008

Incidence	White	African American	Asian American or Pacific Islander	American Indian or Alaska Native‡	Hispanic/ Latino
All sites					
Male	545.0	626.2	332.4	427.8	423.4
Female	420.8	394.2	284.0	362.1	333.5
Breast (female)	122.3	116.1	84.9	89.2	92.3
Colon & rectum					
Male	54.6	66.9	42.4	51.5	48.6
Female	40.3	49.7	32.7	41.5	34.2
Kidney & renal pelvis					
Male	20.8	22.6	9.9	27.4	19.4
Female	10.9	11.7	4.9	16.8	11.2
Liver & intrahepatic bile duct					
Male	8.6	14.1	21.7	15.8	17.0
Female	2.9	4.0	8.2	7.6	6.4
Lung & bronchus					
Male	83.7	102.7	49.8	71.0	46.8
Female	57.2	51.4	28.1	51.7	27.0
Prostate	142.8	230.8	79.7	101.2	126.7
Stomach					
Male	8.5	16.4	16.8	13.9	13.8
Female	4.0	8.2	9.4	6.8	8.4
Uterine cervix	7.7	10.6	7.4	9.8	12.2

Mortality	White	African American	Asian American and Pacific Islander	American Indian and Alaska Native‡	Hispanic/ Latino
All sites					
Male	222.0	295.3	134.7	190.0	149.1
Female	152.8	177.7	94.1	138.4	101.5
Breast (female)	22.8	32.0	12.2	17.2	15.1
Colon & rectum					
Male	20.1	30.5	13.3	19.8	15.5
Female	14.0	20.4	9.9	14.0	10.3
Kidney & renal pelvis					
Male	6.0	6.0	2.6	8.9	5.2
Female	2.7	2.6	1.2	4.1	2.3
Liver & intrahepatic bile duct					
Male	7.2	11.5	14.7	11.9	11.6
Female	3.0	3.9	6.3	6.7	5.2
Lung & bronchus					
Male	66.9	85.4	36.7	50.5	31.9
Female	41.2	38.8	18.5	33.9	14.3
Prostate	22.4	54.9	10.5	20.7	18.5
Stomach					
Male	4.5	10.7	9.2	8.5	7.7
Female	2.3	5.0	5.4	3.9	4.5
Uterine cervix	2.2	4.3	2.1	3.4	3.1

*Per 100,000, age adjusted to the 2000 US standard population.

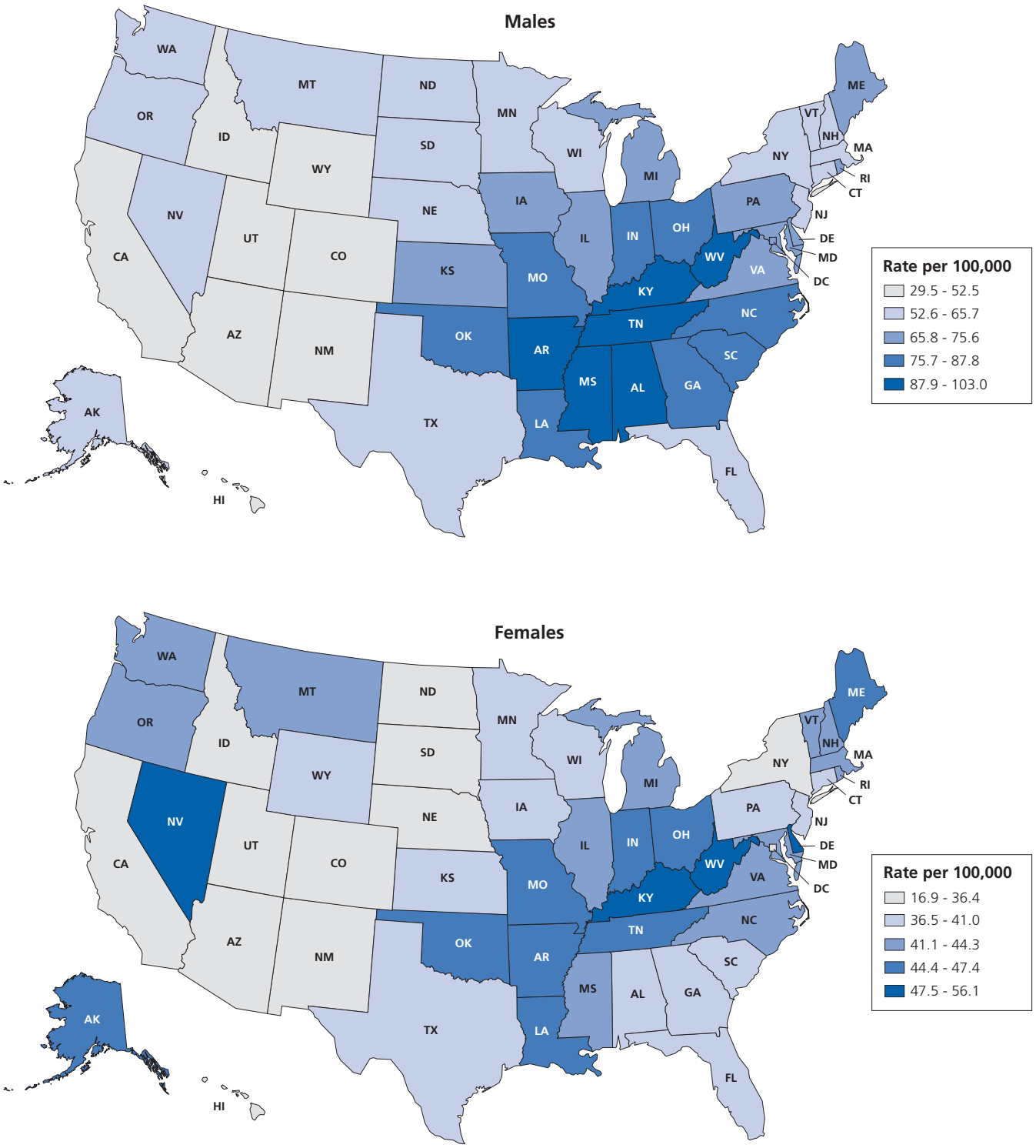
†Race and ethnicity categories are not mutually exclusive; persons of Hispanic origin may be of any race.

‡Data based on Contract Health Service Delivery Areas, comprising about 55% of the US American Indian/Alaska Native population; for more information, please see: Espey DK, Wu XC, Swan J, et al. Annual report to the nation on the status of cancer, 1975-2004, featuring cancer in American Indians and Alaska Natives.

Source: Incidence: NAACCR, 2011. Data are collected by cancer registries participating in the National Cancer Institute's SEER program and the Centers for Disease Control and Prevention's National Program of Cancer Registries. Mortality: National Center for Health Statistics 2011.

American Cancer Society, Surveillance Research, 2012

Geographic Patterns in Lung Cancer Death Rates* by State, US, 2004-2008



*Age adjusted to the 2000 US standard population.

Source: US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention.

American Cancer Society, Surveillance Research, 2012

Hispanics: Hispanics have lower incidence rates for all cancers combined and for most common types of cancer compared to whites, but have higher rates of cancers associated with infection, such as liver, stomach, and uterine cervix. For example, Hispanic women have the highest incidence rate for cervical cancer, and rates of liver cancer are about twice as high in Hispanics as in whites. For more information on cancer in Hispanics, see *Cancer Facts & Figures for Hispanics/Latinos 2009-2011*, available online at cancer.org/statistics.

Asian Americans and Pacific Islanders: Compared to other racial/ethnic groups, Asian Americans and Pacific Islanders have the lowest overall cancer incidence rates, as well as the lowest rates for most common cancer types. However, similar to Hispanics, this population has higher rates for many of the cancers related to infection. As shown in the table on page 44, they have the highest incidence rates for liver and stomach cancers of all racial and ethnic groups in both men and women, and among the highest death rates for these cancer sites. Liver cancer incidence among Asian American and Pacific Islander men and women is almost 30% higher than that among Hispanics, who have the second-highest rates. (For more information on cancers related to infection, see *Cancer Facts & Figures 2005*, Special Section, available online at cancer.org.)

American Indians and Alaska Natives: Mortality rates for kidney cancer in American Indian and Alaska Native men and women are higher than in any other racial or ethnic population. Cancer information for American Indians and Alaska Natives is known to be incomplete because the racial/ethnic status of many of these individuals is not correctly identified in medical and death records. Although efforts have been made to collect more accurate information through linkage with the Indian Health Service records, available statistics probably do not represent the true cancer burden in this population.

Note: It is important to recognize that although cancer data in the US are primarily reported for broad racial and ethnic minority groups, these populations are not homogenous. There are significant variations in the cancer burden within each racial/ethnic group. For example, among Asian Americans, incidence rates for cervical cancer are almost three times as high in Vietnamese women as in Chinese and Japanese women, partly because the Vietnamese, in general, immigrated more recently, are poorer, and have less access to cervical cancer screening.

Geographic Variability

Cancer rates in the US vary widely by geographic area. The figure on page 45 depicts geographic variability in lung cancer mortality by state and sex in the US. Among both men and women, lung cancer death rates are more than 3-fold higher in Kentucky (103 and 56 per 100,000 in men and women, respectively), the state with the highest rates, than in Utah (30 and 17 per 100,000 in men and women, respectively), which has the lowest rates. These differences reflect the large and continuing differences in smoking prevalence among states, which is influenced to some extent by state tobacco control legislative policies. Geographic variations also reflect differences in environmental exposures and socioeconomic factors in population demographics. For more information about cancer disparities, see *Cancer Facts & Figures 2011*, Special Section, available online at cancer.org.

Public Policy

The American Cancer Society and the American Cancer Society Cancer Action Network[SM] (ACS CAN), the Society's nonprofit, nonpartisan advocacy affiliate, are dedicated to reducing cancer incidence and mortality rates among minority and medically underserved populations. This goal can be achieved by instituting effective policies and public health programs that promote overall wellness and help save lives. Listed below are some of the efforts at both the state and federal levels that the Society and ACS CAN have been involved with in the past few years:

- **Patient Protection and Affordable Care Act.** The Society and ACS CAN are working to ensure that key provisions of the Affordable Care Act (ACA) that benefit cancer patients and survivors are implemented as strongly as possible and are adequately funded. Some of the law's provisions that will directly help address disparities include:
  - Improving the affordability of coverage by increasing insurance subsidies and eliminating arbitrary annual and lifetime caps on coverage for all insurance plans so that families affected by cancer will face fewer financial barriers to care
  - Focusing on prevention and early detection by requiring all new insurance plans to provide coverage for essential, evidence-based preventive measures with no additional copays. As of January 2011, preventive services like colonoscopies were exempt from copayments and deductibles under the Medicare program.
  - Eliminating discrimination based on health status and preexisting conditions, which has been so detrimental to cancer patients over the years
  - Increasing funding for community health centers, which provide comprehensive health care for everyone, regardless of the ability to pay
  - Requiring qualified health plans to provide materials in appropriate languages

ACS CAN will continue to look for ways to strengthen the legislation throughout the implementation process both at the federal and state level.

- **National Breast and Cervical Cancer Early Detection Program.** A high priority for the Society and ACS CAN at both the state and federal level is fighting to increase funding for the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). This successful program, which began in 1991, provides community-based breast and cervical cancer screening to low-income, uninsured, and underinsured women, more than 50% of whom are from racial/ethnic minority groups. Due to a large cut in funding, screening rates within the program greatly declined in 2007; rates have been increasing slowly since, but still have not fully recovered. ACS CAN is asking Congress to increase funding to $275 million for fiscal year 2013 to support continued growth and to give women access to lifesaving screening services. While the Affordable Care Act will greatly improve access to screening, the NBCCEDP will remain an essential program for improving breast and cervical cancer screening and treatment in our nation's most vulnerable populations. It will be critical to use the program's infrastructure and community-outreach specialists to help women receive the lifesaving services they need.
- **Colorectal Cancer Prevention, Early Detection, and Treatment Act.** The Society and ACS CAN are advocating for the Colorectal Cancer Prevention, Early Detection, and Treatment Act, a national screening, treatment, and outreach program focused on increasing colorectal cancer screening rates in low-income, medically underserved populations.
- **Patient Navigation.** Patient navigation demonstration programs have shown navigation to be an important aspect of improving satisfaction and care among cancer patients, especially those in medically underserved and minority populations. In order to increase patient navigation services, ACS CAN is looking to expand the reach of patient navigators through the implementation of the Affordable Care Act.

The Society and ACS CAN also are leading efforts to increase federal investment in cutting-edge biomedical and cancer research and treatments, and ways to expand access to them.

To learn more, to get involved, and to make a difference in the fight against cancer, visit cancer.org/involved/advocate.

Nutrition and Physical Activity

It's been estimated that approximately one-third of the cancer deaths that occur in the US each year are due to poor nutrition, physical inactivity, and excess weight. Maintaining a healthy body weight, being physically active on a regular basis, and eating a healthy diet are as important as not using tobacco products in reducing cancer risk. The American Cancer Society's nutrition and physical activity guidelines emphasize the importance of weight control, physical activity, dietary patterns, and limited, if any, alcohol consumption in reducing cancer risk and helping people stay well; unfortunately, the majority of Americans are not meeting these recommendations. Increasing trends in unhealthy eating and physical inactivity – and resultant increases in overweight and obesity – have largely been influenced by the environments in which people live, learn, work, and play. As a result, the guidelines include an explicit Recommendation for Community Action to promote the availability of healthy food choices and opportunities for physical activity in communities, schools, and workplaces.

The following recommendations reflect the best nutrition and physical activity evidence available to help Americans reduce their risk of cancer, as well as lower their risk of heart disease and diabetes.

Recommendations for Individual Choices

1. Achieve and maintain a healthy weight throughout life.

- Be as lean as possible throughout life without being underweight.
- Avoid excess weight gain at all ages. For those who are currently overweight or obese, losing even a small amount of weight has health benefits and is a good place to start.
- Engage in regular physical activity and limit consumption of high-calorie foods and beverages as key strategies for maintaining a healthy weight.

In the United States, it has been estimated that overweight and obesity contribute to 14% to 20% of all cancer-related mortality. Overweight and obesity are clearly associated with increased risk for developing many cancers, including cancers of the breast in postmenopausal women, colon and rectum, endometrium, adenocarcinoma of the esophagus, kidney, and pancreas. Overweight and obesity may also be associated with increased risk of cancers of the liver, non-Hodgkin lymphoma, multiple myeloma, cervix, ovary, and aggressive prostate cancer, and obesity also likely increases the risk of cancer of the gallbladder. In addition, abdominal fatness is convincingly associated with colorectal cancer, and probably related to higher risk of pancreatic, endometrial, and postmenopausal breast cancers.

Increasing evidence also suggests that being overweight increases the risk for cancer recurrence and decreases the likelihood of survival for many cancers. Some studies have shown that surgery to treat morbid obesity reduces mortality from major chronic diseases, including cancer. Although knowledge about the relationship between weight loss and cancer risk is incomplete, individuals who are overweight should be encouraged and supported in their efforts to reduce weight.

At the same time that evidence connecting excess weight to increased cancer risk has been accumulating, trends in overweight and obesity have been increasing dramatically. The prevalence of obesity in the US more than doubled between 1976-1980 and 2003-2006. Although rates appear to have stabilized in the most recent time period (2007-2008), more than one-third of adults – more than 72 million people – are currently obese. More than likely, these trends are already impacting cancer trends: in the midpoint assessment of its 2015 Challenge Goals, American Cancer Society researchers reported that while the incidence of both colorectal cancer and postmenopausal breast cancer had been declining, it is likely that the declines in both would have started earlier and would have been steeper had it not been for the increasing prevalence of obesity.

Similar to adults, obesity among adolescents has tripled over the past several decades. Increases occurred across race, ethnicity, and gender. As in adults, obesity prevalence stabilized between 2003-2006 and 2007-2008. Because overweight in youth tends to continue throughout life, efforts to establish healthy body weight patterns should begin in childhood. The increasing prevalence of overweight and obesity in preadolescents and adolescents may increase incidence of cancer in the future.

2. Adopt a physically active lifestyle.

- Adults should engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity activity each week, or an equivalent combination, preferably spread throughout the week.
- Children and adolescents should engage in at least 1 hour of moderate- or vigorous- intensity activity each day, with vigorous-intensity activity at least three days each week.
- Limit sedentary behavior such as sitting, lying down, and watching television and other forms of screen-based entertainment.
- Doing any intentional physical activity above usual activities, even if currently inactive, can have many health benefits.

Living a physically active lifestyle is important to reduce the risk of a variety of types of cancer, as well as heart disease and diabetes. Scientific evidence indicates that physical activity may reduce the risk of several types of cancer, including cancers of the breast, colon, and endometrium, as well as advanced prostate cancer. Physical activity also indirectly reduces the risk of

developing the many types of obesity-related cancers because of its role in helping to maintain a healthy weight. Being active is thought to reduce cancer risk largely by improving energy metabolism and reducing circulating concentrations of estrogen, insulin, and insulin-like growth factors. Physical activity also improves the quality of life of cancer patients and is associated with a reduction in the risk of cancer recurrences and improved overall mortality in multiple cancer survivor groups, including breast, colorectal, prostate, and ovarian cancer.

Despite the wide variety of health benefits from being active, 25% of adults report no leisure-time activity, and only 49% meet minimum recommendations for moderate activity. Similarly, only 37% of youth meet recommendations.

3. Consume a healthy diet, with an emphasis on plant foods.

- Choose foods and beverages in amounts that help achieve and maintain a healthy weight.
- Limit consumption of processed meat and red meat.
- Eat at least two and a half or more cups of vegetables and fruits each day.
- Choose whole grains instead of refined grain products.

There is strong scientific evidence that healthy dietary patterns, in combination with regular physical activity, are needed to maintain a healthy body weight and to reduce cancer risk. Studies have shown that individuals who eat more processed and red meat, potatoes, refined grains, and sugar-sweetened beverages and foods are at a higher risk of developing or dying from a variety of cancers, and that consuming a diet that contains a variety of fruits and vegetables, whole grains, and fish or poultry and fewer red and processed meats is associated with lower risk. A recent study found that greater adherence to the American Cancer Society nutrition and physical activity guidelines was associated with lower mortality rates for all causes of death combined, and for cancer and cardiovascular diseases, specifically. Despite the known benefits of a healthy diet, Americans are not following those recommendations. According to the US Department of Agriculture, the majority of Americans would need to substantially lower their intake of added sugars, added fats, refined grains, and sodium, and increase their consumption of fruits, vegetables, whole grains, and low-fat dairy products in order to meet the 2010 Dietary Guidelines for Americans.

Currrently, the overall evidence related to dietary supplements does not support their use in cancer prevention. The results of recently completed randomized clinical trials of antioxidant supplements and selenium showed no reduction in risk for cancer, at least in generally well-nourished populations.

The scientific study of nutrition and cancer is highly complex, and many important questions remain unanswered. It is not presently clear how single nutrients, combinations of nutrients, over-nutrition, and energy imbalance, or the amount and distribution of body fat at particular stages of life affect a person's risk of specific cancers. Until more is known about the specific components of diet that influence cancer risk, the best advice is to consume a mostly plant-based diet that limits red and processed meats and emphasizes a variety of vegetables, fruits, and whole grains. A special emphasis should be placed on controlling total caloric intake to help achieve and maintain a healthy weight.

4. If you drink alcoholic beverages, limit consumption.

People who drink alcohol should limit their intake to no more than two drinks per day for men and one drink per day for women. Alcohol consumption is an established cause of cancers of the mouth, pharynx, larynx, esophagus, liver, colorectum, and breast. For each of these cancers, risk increases substantially with the intake of more than two drinks per day. Even a few drinks per week may be associated with a slightly increased risk of breast cancer in women. The mechanism for how alcohol can affect breast cancer is not known with certainty, but it may be due to alcohol-induced increases in circulating estrogen or other hormones in the blood, reduction of folic acid levels, or a direct effect of alcohol or its metabolites on breast tissue. Alcohol consumption combined with tobacco use increases the risk of cancers of the mouth, larynx, and esophagus far more than either drinking or smoking alone.

The American Cancer Society's Recommendation for Community Action

While many Americans would like to adopt a healthy lifestyle, many encounter substantial barriers to consuming healthy food and engaging in physical activity. Increased portion sizes, especially of restaurant meals; marketing and advertising of foods and beverages high in calories, fat, and added sugar, particularly to kids; schools and worksites that are not conducive to good health; community design that hinders physical activity; economic and time constraints, as well as other influences, have collectively contributed to increasing trends in obesity.

The Society's nutrition and physical activity guidelines include a Recommendation for Community Action because of the tremendous influence that the surrounding environment has on individual food and activity choices. Acknowledging that turning obesity trends around will require extensive policy and environmental changes, the Society calls for public, private, and community organizations to create social and physical environments that support the adoption and maintenance of healthy nutrition and physical activity behaviors to help people stay well. This includes implementing strategies that increase access to affordable, healthy foods in communities, worksites, and schools; that decrease access to and marketing of foods and beverages of low nutritional value, particularly to youth; and that provide safe, enjoyable, and accessible environments for physical activity in worksites and schools, and for transportation and recreation in communities.

Achieving this Recommendation for Community Action will require multiple strategies and bold action, ranging from the implementation of community and workplace health promotion programs to policies that affect community planning, transportation, school-based physical education, and food services. The Centers for Disease Control and Prevention (CDC), the Institute of Medicine, the World Health Organization (WHO), and others have outlined a variety of evidenced-based approaches in communities, worksites, and schools to halt and ultimately turn around the obesity trends. Following are some specific approaches that are currently under way:

- Limit the availability, advertising, and marketing of foods and beverages of low nutritional value, particularly in schools.
- Strengthen nutrition standards in schools for foods and beverages served as part of the school meals program and for competitive foods and beverages served outside of the program.
- Increase and enforce physical education requirements in grades K-12.
- Ensure that worksites have healthy food and beverage options and that physical environments are designed or adapted and maintained to facilitate physical activity and weight control.
- Provide calorie information on chain restaurant menus.
- Invest in community design that supports development of sidewalks, bike lanes, and access to parks and green space.

The tobacco control experience has shown that policy and environmental changes at the national, state, and local levels are critical to achieving changes in individual behavior. Measures such as clean indoor air laws and increases in cigarette excise taxes are highly effective in deterring tobacco use. To avert an epidemic of obesity-related disease, similar purposeful changes in public policy and in the community environment will be required to help individuals maintain a healthy body weight and remain physically active.

Environmental Cancer Risks

Two major classes of factors influence the incidence of cancer: hereditary factors and acquired (environmental) factors. Hereditary factors come from our parents and cannot be modified. Environmental factors, which include behavioral choices, are potentially modifiable. These include tobacco use, poor nutrition, physical inactivity, obesity, certain infectious agents, certain medical treatments, excessive sun exposure, and exposures to carcinogens (cancer-causing agents) that exist as pollutants in our air, food, water, and soil. Some carcinogens occur naturally, and some are created or concentrated by human activity. For example, radon is a naturally occurring carcinogen present in soil and rock; however, occupational radon exposure occurs in underground mines, and substantial exposures also occur in poorly ventilated basements in regions where radon soil emissions are high.

Environmental factors (as opposed to hereditary factors) account for an estimated 75%-80% of cancer cases and deaths in the US. Exposure to carcinogenic agents in occupational, community, and other settings is thought to account for a relatively small percentage of cancer deaths – about 4% from occupational exposures and 2% from environmental pollutants (man-made and naturally occurring). Although the estimated percentage of cancers related to occupational and environmental carcinogens is small compared to the cancer burden from tobacco smoking (30%) and the combination of poor nutrition, physical inactivity, and obesity (35%), the relationship between such agents and cancer is important for several reasons. First, even a small percentage of cancers can represent many deaths: 6% of cancer deaths in the US in 2011 correspond to approximately 34,320 deaths. Second, the burden of exposure to occupational and environmental carcinogens is borne disproportionately by lower-income workers and communities, contributing to disparities in the cancer burden across the US population. Third, although much is known about the relationship between occupational and environmental exposure and cancer, some important research questions remain. These include the role of exposures to certain classes of chemicals (such as hormonally active agents) during critical periods of human development and the potential for pollutants to interact with each other, as well as with genetic and acquired factors.

How Environmental Carcinogens Are Identified

The term carcinogen refers to exposures that can increase the incidence of malignant tumors (cancer). The term can apply to a single chemical such as benzene; fibrous minerals such as asbestos; metals and physical agents such as x-rays or ultraviolet light; or exposures linked to specific occupations or industries (e.g., nickel refining). Carcinogens are usually identified on the basis of epidemiological studies or by testing in animals. Studies of occupational groups (cohorts) have played an important role in understanding many chemical carcinogens – as well as radiation – because exposures are often higher among workers, who can be followed for long periods of time. Some information has also come from studies of persons exposed to carcinogens during medical treatments (such as radiation and estrogen), as well as from studies conducted among individuals who experienced high levels of short-term exposure to a chemical or physical agent due to an accidental or intentional release (such as survivors of the atomic bomb explosions of Hiroshima and Nagasaki). It is more difficult to study the relationship between exposure to potentially carcinogenic substances and cancer risk in the general population because of uncertainties about exposure and the challenge of long-term follow up. Moreover, relying upon epidemiological information to determine cancer risk does not fulfill the public health goal of prevention since by the time the increased risk is detected, a large number of people may have been exposed.

Thus, for the past 40 years, the US and many other countries have developed methods for identifying carcinogens through animal testing using the "gold standard" of a 2-year or lifetime bioassay in rodents. This test is expensive and time-consuming, but it can provide information about potential carcinogens so that human exposure can be reduced or eliminated. Many substances that are carcinogenic in rodent bioassays have not been adequately studied in humans, usually because an acceptable study population has not been identified. Among the substances that have proven carcinogenic in humans, all have shown positive results in animals when tested in well-conducted 2-year bioassays.[1] Between 25%-30% of established human carcinogens were first identified through animal bioassays. Since animal tests necessarily use high-dose exposures, human risk assessment usually requires extrapolation of the exposure-response relationship observed in rodent bioassays to predict effects in humans at lower doses. Typically, regulatory agencies in the US and abroad have adopted the default assumption that no threshold level (level below which there is no increase in risk) of exposure exists for carcinogenesis.

Evaluation of Carcinogens

The National Toxicology Program (NTP) plays an important role in the identification and evaluation of carcinogens in the US, and the International Agency for Research on Cancer (IARC) plays a similar role internationally. The NTP was established in 1978 to coordinate toxicology testing programs within the federal government, including tests for carcinogenicity. The NTP is also responsible for producing the *Report on Carcinogens*, an informational scientific and public health document that identifies agents, substances, mixtures, or exposure circumstances that

may increase the risk of developing cancer.[2] There are currently 107 agents classified by IARC as Group 1, i.e., carcinogenic to humans. For a list of substances included in the *11th Report on Carcinogens* as known or reasonably anticipated to be human carcinogens, see ntp.niehs.nih.gov/ntp/roc/toc11.html. The IARC is a branch of the World Health Organization that regularly convenes scientific consensus groups to evaluate potential carcinogens. After reviewing published data from laboratory, animal, and human research, these committees reach consensus about whether the evidence should be designated "sufficient," "limited," or "inadequate" to conclude that the substance is a carcinogen. For a list of substances that have been reviewed by the IARC monograph program, visit monographs.iarc.fr/ENG/Classification/index.pdf. The American Cancer Society does not have a formal program to systematically review and evaluate carcinogens. However, information on selected topics can be found at cancer.org.

Although the relatively small risks associated with low-level exposure to carcinogens in air, food, or water are difficult to detect in epidemiological studies, scientific and regulatory bodies worldwide have accepted the principle that it is reasonable and prudent to reduce human exposure to substances shown to be carcinogenic at higher levels of exposure. Although much public concern about the influence of manmade pesticides and industrial chemicals has focused on cancer, pollution may adversely affect the health of humans and ecosystems in many other ways. Research to understand the short- and long-term impact of environmental pollutants on a broad range of outcomes, as well as regulatory actions to reduce exposure to recognized hazards, has contributed to the protection of the public and the preservation of the environment for future generations. It is important that this progress be recognized and sustained. For more information on environmental cancer risks, see the article published by Fontham et al. in *CA: A Cancer Journal for Clinicians*.[3]

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The Global Fight against Cancer

The ultimate mission of the American Cancer Society is to eliminate cancer as a major health problem. Because cancer knows no boundaries, this mission extends around the world.

Cancer is an enormous global health burden, touching every region and socioeconomic level. Today, cancer accounts for one in every eight deaths worldwide – more than HIV/AIDS, tuberculosis, and malaria combined. In 2008, there were an estimated 12.7 million cases of cancer diagnosed and 7.6 million deaths from cancer around the world. More than 60 percent of all cancer deaths occur in low- and middle-income countries, many of which lack the medical resources and health systems to support the disease burden. Moreover, the global cancer burden is growing at an alarming pace; in 2030 alone, about 21.4 million new cancer cases and 13.2 million cancer deaths are expected to occur, simply due to the growth and aging of the population. The future burden may be further increased by the adoption of behaviors and lifestyles associated with economic development and urbanization (e.g., smoking, poor diet, physical inactivity, and reproductive patterns) in low- and middle-income countries.

Tobacco use is the most preventable cause of death worldwide, and is responsible for the deaths of approximately half of long-term users. Tobacco use killed 100 million people in the 20th century and will kill 1 billion people in the 21st century if current trends continue. Each year, tobacco use is responsible for approximately 5 million premature deaths, and by 2030 this number is expected to increase to 8 million, 70% of whom will reside in low- and middle-income countries.

With nearly a century of experience in cancer control, the American Cancer Society is uniquely positioned to help in leading the global fight against cancer and tobacco, assisting and empowering the world's cancer societies and anti-tobacco advocates. The Society's Global Health and Intramural Research departments are raising awareness about the growing global cancer burden and promoting evidence-based cancer and tobacco control programs.

The American Cancer Society has established three integrated goals to reduce the global burden of cancer:

- **Make cancer control a political and public health priority.** According to the World Health Organization, noncommunicable diseases (NCDs) – such as cancer, heart disease and diabetes – claim more lives each year and account for about 60% of the world's deaths. About 28 million (80%) of the people who die live in low- and middle-income countries, yet less than 1% of private and public funding for health is allocated to preventing and controlling cancer in these areas. The Society has become actively involved in working with global partners, including the Union for International Cancer Control (UICC), the International Diabetes Federation, the World Heart Federation, Livestrong Foundation, and others to prioritize cancer and NCDs on the global health agenda.
- **Reduce tobacco use, with a particular focus on sub-Saharan Africa.** Through a $7 million (US) grant received from the Bill & Melinda Gates Foundation in 2010, the Society and its partners, including the Africa Tobacco Control Regional Initiative, the Africa Tobacco Control Alliance, the Framework Convention Alliance, the Campaign for Tobacco-Free Kids, and the International Union Against Tuberculosis and Lung Disease, support and assist national governments and civil societies in Africa to implement tobacco control policies such as advertising bans, tobacco tax increases, graphic warning labels, and the promotion of smoke-free environments. The partners on this project actively advocate for further tobacco control resources in sub-Saharan Africa and help establish mechanisms to protect existing laws from tobacco industry efforts to overturn them.
- **Increase awareness about the burden of cancer and its leading risk factor, tobacco use.** The Society continues to work with global partners to increase awareness about the growing global cancer and tobacco burdens and their impact on low- and middle-income countries. In addition to print publications, the American Cancer Society provides cancer information to millions of individuals throughout the world on its Web site, cancer.org. More than 20% of the visitors to the Web site come from outside the US. Information is currently available in English, Spanish, Mandarin, and several other Asian languages, with plans to include more languages in the near future. For more information on the global cancer burden, visit the Society's Global Health program Web site at cancer.org/international and see the following intramural research program publications available on cancer.org:
  - *Global Cancer Facts & Figures 2nd Edition*
  - *The Tobacco Atlas, Third Edition*
  - *The Cancer Atlas*

The American Cancer Society

In 1913, 10 physicians and five laypeople founded the American Society for the Control of Cancer. Its purpose was to raise awareness about cancer symptoms, treatment, and prevention; to investigate what causes cancer; and to compile cancer statistics. Later renamed the American Cancer Society, Inc., the organization now works with its more than 3 million volunteers to save lives and create a world with less cancer and more birthdays by helping people stay well, helping people get well, by working to find cures, and by fighting back against the disease. By working relentlessly to bring cancer under control, the Society is making remarkable progress in cancer prevention, early detection, treatment, and patient quality of life. The overall cancer death rate has steadily declined since the early 1990s, and the 5-year survival rate is now 67%, up from 49% in the 1970s. Thanks to this progress, nearly 12 million cancer survivors in the US will celebrate another birthday this year.

How the American Cancer Society Is Organized

The American Cancer Society consists of a National Home Office with 12 chartered Divisions and a local presence in nearly every community nationwide.

The National American Cancer Society

A National Assembly of volunteer representatives from each of the American Cancer Society's 12 Divisions elects a national volunteer Board of Directors and the nominating committee. In addition, the Assembly approves corporate bylaw changes and the organization's division of funds policy. The Board of Directors sets and approves strategic goals for the Society, ensures management accountability, approves Division charters and charter requirements, and provides stewardship of donated funds. The National Home Office is responsible for overall planning and coordination of the Society's programs, provides technical support and materials to Divisions and local offices, and administers the Society's research program.

American Cancer Society Divisions

The Society's 12 Divisions are responsible for program delivery and fundraising in their regions. They are governed by Division Boards of Directors composed of both medical and lay volunteers in their regions.

Local Offices

The Society has a presence in nearly every community nationwide, with local offices responsible for raising funds at the community level and delivering programs that help people stay well and get well from cancer, as well as rally communities to fight back against the disease.

Volunteers

More than 3 million volunteers carry out the Society's work in communities across the country. These dedicated people donate their time and talents in many ways to help bring cancer under control as early as possible. Some volunteers choose to educate people about things they can do to prevent cancer or find it early to stay well. Some choose to offer direct support to patients, like driving them to treatment or providing guidance and emotional support. Others work to make cancer a top priority for lawmakers and participate in local community events to raise funds and awareness to fight cancer. No matter how volunteers choose to fight back, they are all saving lives while fulfilling their own.

How the American Cancer Society Saves Lives

The American Cancer Society is working relentlessly to saves lives from cancer by helping people stay well and get well, by finding cures, and by fighting back against the disease.

Helping People Stay Well

The American Cancer Society provides information that empowers people to take steps that help them prevent cancer or find it early, when it is most treatable.

Prevention

The Society helps people quit tobacco through the American Cancer Society Quit For Life® Program, managed and operated by Alere Wellbeing. The two organizations have 35 years of combined experience in tobacco cessation coaching and have helped more than 1 million tobacco users.

The American Cancer Society Choose You® movement encourages women nationwide to put their own health first in the fight against cancer. The movement challenges women to make healthier choices and supports them in their commitment to eat right, get active, quit smoking, and get regular health checks.

The Society offers many programs to companies to help their employees stay well and reduce their cancer risk, too. These include FreshStart®, a group-based tobacco cessation counseling program designed to help employees plan a successful quit attempt by providing essential information, skills for coping with cravings, and group support; content subscription service, a free electronic tool kit subscription offered by the Society to employers that support the health and wellness needs of employees with information about cancer prevention and early detection, and support services and resources for those facing cancer; *Healthy Living*, a monthly electronic newsletter produced by the American Cancer Society that teaches the importance of making healthy lifestyle choices; the American Cancer Society Workplace Solutions Assessment, which surveys a company's health and

wellness policies and practices and recommends evidence-based strategies that help improve employee health behaviors, control health care costs, and increase productivity; and Active For Life℠, a 10-week online program that uses individual and group strategies to help employees become more physically active.

Across the nation, the Society works with its nonprofit, nonpartisan advocacy affiliate, the American Cancer Society Cancer Action Network℠ (ACS CAN), to create healthier communities by protecting people from the dangers of secondhand smoke so they can stay well. As of July 1, 2011, 48% of the US population was covered by comprehensive smoke-free workplace, restaurant, and bar laws, and 80% was covered by a smoke-free law in one or more or these categories. In 2009, the Family Smoking Prevention and Tobacco Control Act was signed into law. A decade in the making, the law, grants the US Food and Drug Administration the authority to regulate the manufacturing, selling, and marketing of tobacco products. Strong implementation of the law is vital to reducing death and disease from tobacco products.

For the majority of Americans who do not smoke, the most important ways to reduce cancer risk are to maintain a healthy weight, be physically active on a regular basis, and eat a mostly plant-based diet, consisting of a variety of vegetables and fruit, whole grains, and limited amounts of red and processed meats. The Society publishes guidelines on nutrition and physical activity for cancer prevention in order to review the accumulating scientific evidence on diet and cancer; to synthesize this evidence into clear, informative recommendations for the general public; to promote healthy individual behaviors, as well as environments that support healthy eating and physical activity habits; and, ultimately, to reduce cancer risk. These guidelines form the foundation for the Society's communication, worksite, school, and community strategies designed to encourage and support people in making healthy lifestyle behavior changes.

Early Detection

Finding cancer at its earliest, most treatable stage gives patients the greatest chance of survival. To help the public and health care providers make informed decisions about cancer screening, the American Cancer Society publishes a variety of early detection guidelines. These guidelines are assessed regularly to ensure that recommendations are based on the most current scientific evidence.

The Society currently provides screening guidelines for cancers of the breast, cervix, colorectum, prostate, and endometrium, and general recommendations for a cancer-related component of a periodic checkup to examine the thyroid, mouth, skin, lymph nodes, testicles, and ovaries.

Throughout its history, the American Cancer Society has implemented a number of aggressive awareness campaigns targeting the public and health care professionals. Campaigns to increase usage of Pap testing and mammography have contributed to a 70% decrease in cervical cancer incidence rates since the introduction of the Pap test in the 1950s and a steady decline in breast cancer mortality rates since 1990. More recently, the Society launched ambitious multimedia campaigns to encourage adults 50 years of age and older to get tested for colorectal cancer. The Society also continues to encourage the early detection of breast cancer through public awareness and other efforts targeting poor and underserved communities.

Helping People Get Well

For the 1.6 million cancer patients diagnosed this year and nearly 12 million US cancer survivors, the American Cancer Society is available anytime, day and night, to offer free information, programs, services, and community referrals to patients, survivors, and caregivers to help them make decisions through every step of a cancer experience. These resources are designed to help people facing cancer on their journey to getting well.

Information, 24 Hours a Day, Seven Days a Week

The American Cancer Society is available 24 hours a day, seven days a week online at cancer.org and by calling 1-800-227-2345. Callers are connected with a Cancer Information Specialist who can help them locate a hospital, understand cancer and treatment options, learn what to expect and how to plan, help address insurance concerns, find financial resources, find a local support group, and more. The Society can also help people who speak languages other than English or Spanish find the assistance they need, offering services in 170 languages in total.

Information on every aspect of the cancer experience, from prevention to survivorship, is also available through the Society's Web site, cancer.org. The site includes an interactive cancer resource center containing in-depth information on every major cancer type.

The Society also publishes a wide variety of pamphlets and books that cover a multitude of topics, from patient education, quality-of-life, and caregiving issues to healthy living. A complete list of Society books is available for order at cancer.org/bookstore.

The Society publishes a variety of information sources for health care providers, including three clinical journals: *Cancer*, *Cancer Cytopathology*, and *CA: A Cancer Journal for Clinicians*. More information about free subscriptions and online access to *CA* and *Cancer Cytopathology* articles is available at cancer.org/journals. The American Cancer Society also collaborates with numerous community groups, nationwide health organizations, and large employers to deliver health information and encourage Americans to adopt healthy lifestyle habits through the Society's science-based worksite programs.

Day-to-day Help and Emotional Support

The American Cancer Society can help cancer patients and their families find the resources they need to make decisions about the

day-to-day challenges that can come from a cancer diagnosis, such as transportation to and from treatment, financial and insurance needs, and lodging when having to travel away from home for treatment. The Society also connects people with others who have been through similar experiences to offer emotional support.

Help with the health care system: Learning how to navigate the cancer journey and the health care system can be overwhelming for anyone, but it is particularly difficult for those who are medically underserved, those who experience language or health literacy barriers, or those with limited resources. The American Cancer Society Patient Navigator Program was designed to reach those most in need. As the largest oncology-focused patient navigator program in the country, the Society has specially trained patient navigators at 135 cancer treatment facilities across the nation. Patient navigators work in cooperation with patients, family members, caregivers, and these facilities' staff to connect patients with information, resources, and support to decrease barriers and ultimately to improve health outcomes. In 2010, more than 83,000 people relied on the Patient Navigator Program to help them through their diagnosis and treatment. The Society collaborates with a variety of organizations, including the National Cancer Institute's Center to Reduce Cancer Health Disparities, the Center for Medicare and Medicaid Services, numerous cancer treatment centers, and others to implement and evaluate this program.

Transportation to treatment: Cancer patients cite transportation to and from treatment as a critical need, second only to direct financial assistance. The American Cancer Society Road To Recovery® program matches these patients with specially trained volunteer drivers. This program offers patients an additional key benefit of companionship and moral support during the drive to medical appointments. The Society's transportation grants program allows hospitals and community organizations to apply for resources to administer their own transportation programs. In some areas, primarily where transportation assistance programs are difficult to sustain, the Society helps patients or their drivers via prepaid gas cards to help defray costs associated with transportation to treatment. In 2010, the American Cancer Society provided more than 1.3 million transportation services to more than 63,000 cancer patients. Our service requests for transportation assistance increased by 11% in 2010 over the previous year, and the number of rides that we provided in 2010 increased by 35%.

Lodging during treatment: When someone diagnosed with cancer must travel away from home for the best treatment, where to stay and how to afford accommodations are immediate concerns and can sometimes affect treatment decisions. American Cancer Society Hope Lodge® facilities provide free, homelike, temporary lodging for patients and their caregivers close to treatment centers, thereby easing the emotional and financial burden of finding affordable lodging. In 2010, the 31 Hope Lodge locations provided 240,000 nights of free lodging to more than 32,000 patients and caregivers – saving them $23 million in lodging expenses.

Breast cancer support: Breast cancer survivors provide one-on-one support, information, and inspiration to help people facing the disease cope with breast cancer through the American Cancer Society Reach To Recovery® program. Volunteer survivors are trained to respond in person or by telephone to people facing breast cancer diagnosis, treatment, recurrence, or recovery.

Prostate cancer support: Men facing prostate cancer can find one-on-one or group support through the American Cancer Society Man To Man® program. The program also offers men the opportunity to educate their communities about prostate cancer and to advocate with lawmakers for stronger research and treatment policies.

Cancer education classes: People with cancer and their caregivers need help coping with the challenges of living with the disease. Doctors, nurses, social workers, and other health care professionals provide them with that help by conducting the American Cancer Society I Can Cope® educational classes to guide patients and their families through their cancer journey.

Hair-loss and mastectomy products: Some women wear wigs, hats, breast forms, and bras to help cope with the effects of mastectomy and hair loss. The American Cancer Society *"tlc" Tender Loving Care®*, which is a magazine and catalog in one, offers helpful articles and a line of products to help women battling cancer restore their appearance and dignity at a difficult time. All proceeds from product sales go back into the Society's programs and services for patients and survivors.

Help with appearance-related side effects of treatment: When women are in active cancer treatment, they want to look their best, and Look Good…Feel Better® helps them do just that. The free program, which is a collaboration of the American Cancer Society, the Personal Care Products Council Foundation, and the Professional Beauty Association | National Cosmetology Association, helps women learn beauty techniques to restore their self-image and cope with appearance-related side effects of cancer treatment. Certified beauty professionals, trained as Look Good…Feel Better volunteers, provide tips on makeup, skin care, nail care, and head coverings. Additional information and materials are available for men and teens.

Finding hope and inspiration: People with cancer and their loved ones do not have to face their cancer experience alone. They can connect with others who have "been there" through the American Cancer Society Cancer Survivors Network®. The online community is a welcoming and safe place that was created by and for cancer survivors and their families.

Finding Cures

Research is at the heart of the American Cancer Society's mission. For more than 60 years, the Society has been finding answers that save lives – from changes in lifestyle to new approaches in therapies to improving cancer patients' quality-of-life. No single nongovernmental, not-for-profit organization in the US has invested more to find the causes and cures of cancer than the American Cancer Society. We relentlessly pursue the answers that help us understand how to prevent, detect, and treat all cancer types. We combine the world's best and brightest researchers with the world's largest, oldest, and most effective community-based anti-cancer organization to put answers into action.

The Society's comprehensive research program consists of extramural grants, as well as intramural programs in epidemiology, surveillance and health policy research, behavioral research, international tobacco control research, and statistics and evaluation. Intramural research programs are led by the Society's own staff scientists.

Extramural Grants

The American Cancer Society's extramural grants program supports research in a wide range of cancer-related disciplines at more than 200 US medical schools and universities. Grant applications are solicited through a nationwide competition and are subjected to a rigorous external peer-review process, ensuring that only the most promising research is funded. The Society primarily funds investigators early in their research careers, a time when they are less likely to receive funding from the federal government, thus giving the best and the brightest a chance to explore cutting-edge ideas at a time when they might not find funding elsewhere. In addition to funding research across the continuum of cancer research, from basic science to clinical and quality-of-life research, the Society also focuses on needs that are unmet by other funding organizations. For instance, for 10 years, the Society supported a targeted research program to address the causes of the higher cancer mortality in the poor and medically underserved and has recently become a priority area for funding.

To date, 46 Nobel Prize winners have received grant support from the Society early in their careers, a number unmatched in the nonprofit sector, and proof that the organization's approach to funding young researchers truly helps launch high-quality scientific careers.

Intramural Research

For more than 60 years, the Society's intramural research program has conducted and published high-quality epidemiologic research to advance understanding of the causes and prevention of cancer and monitored and disseminated surveillance information on cancer occurrence, risk factors, and screening.

Epidemiology

As a leader in cancer research, the Society's Epidemiology Research program has been conducting studies to identify factors that cause or prevent cancer since 1951. The first of these, the Hammond-Horn Study, helped to establish cigarette smoking as a cause of death from lung cancer and coronary heart disease, and also demonstrated the Society's ability to conduct very large prospective cohort studies. The Cancer Prevention Study I (CPS-I) was launched in 1959 and included more than 1 million men and women recruited by 68,000 volunteers. Results from CPS-I clearly demonstrated that the sharp increase in lung cancer death rates among US women between 1959-1972 occurred only in smokers, and was the first to show a relationship between obesity and risk of mortality.

In 1982, Cancer Prevention Study II (CPS-II) was established through the recruitment of 1.2 million men and women by 77,000 volunteers. The more than 480,000 lifelong nonsmokers in CPS-II provide the most stable estimates of lung cancer risk in the absence of active smoking. CPS-II data are used extensively by the Centers for Disease Control and Prevention (CDC) to estimate deaths attributable to smoking. The CPS-II study also made important contributions in establishing the link between obesity and cancer. A subgroup of CPS-II participants, the CPS-II Nutrition Cohort has been particularly valuable for clarifying associations between cancer risk and obesity, physical activity, diet, aspirin use, and hormone use. Blood samples from this group allow Society investigators and their collaborators at other institutions to study how genetic, hormonal, nutritional, and other blood markers are related to cancer risk and/or progression.

The Cancer Prevention Studies have resulted in more than 400 scientific publications and have provided unique contributions both within the Society and the global scientific community. In addition to key contributions to the effects of the tobacco epidemic over the past half-century, other important findings from these studies include:

- The association of obesity with increased death rates for at least 10 cancer sites, including colon and postmenopausal breast cancer
- The link between aspirin use and lower risk of colon cancer, opening the door to research on chronic inflammation and cancer
- The relationships between other potentially modifiable factors, such as physical inactivity, prolonged hormone use, and certain dietary factors, with cancer risk
- The association between air pollution, especially small particulates and ozone, with increased death rates from heart and lung conditions, which helped to motivate the Environmental Protection Agency to propose more stringent limits on air pollution

While landmark findings from the CPS-II Nutrition Cohort have informed multiple areas of public health policy and clinical practice, the cohort is aging. A new cohort is needed to explore the effects of changing exposures and to provide greater opportunity to integrate biological measurements into studies of genetic and environmental risk factors. In 2006, Society epidemiologists began the enrollment of a new cohort, CPS-3, with the goal of recruiting and following approximately 300,000 men and women. All participants are providing blood samples at the time of enrollment. Following on the long history of partnering with Society volunteers and supporters for establishing a cohort, the Society's community-based Relay For Life® events are the primary venues for recruiting and enrolling participants. Although similar large cohorts are being established in some European and Asian countries, there are currently no nationwide studies of this magnitude; therefore, the data collected from CPS-3 participants will provide unique opportunities for research in the US.

Surveillance Research

Through the Surveillance Research program, the Society disseminates the most current cancer statistics in *CA: A Cancer Journal for Clinicians* (caonline.amcancersoc.org), as well as a variety of *Cancer Facts & Figures* publications. These publications are the most widely cited sources for cancer statistics and are available in hard copy from Division offices and online through the Society's Web site at cancer.org/statistics. Society scientists also monitor trends in cancer risk factors and screening and publish these results annually – along with Society recommendations, policy initiatives, and evidence-based programs – in *Cancer Prevention & Early Detection Facts & Figures*. Surveillance Research also collaborates with the International Agency for Research on Cancer (IARC) to publish *Global Cancer Facts & Figures*, an international companion to *Cancer Facts & Figures*.

Since 1998, the Society has collaborated with the National Cancer Institute, the Centers for Disease Control and Prevention, the National Center for Health Statistics, and the North American Association of Central Cancer Registries to produce the Annual Report to the Nation on the Status of Cancer, a peer-reviewed journal article that reports current information related to cancer rates and trends in the US.

Epidemiologists in Surveillance Research also conduct and publish high-quality epidemiologic research in order to advance the understanding of the disease. Research topics include exploring differences in the burden of cancer by socioeconomic status in the US, describing global cancer trends, and demonstrating the association between public health interventions, such as tobacco control, and cancer incidence and mortality. Recent studies have focused on state differences in colorectal cancer mortality, temporal trends in breast cancer incidence rates, and use of sunless tanning products by adolescents in the US.

Health Services Research

Interest in developing a Health Services Research (HSR) program within the American Cancer Society National Home Office began in the late 1990s, motivated by several factors, including increasing disparities in the quality and outcomes of cancer care. These factors indicated the need to develop methods and systems to monitor quality of cancer care, as well as interventions to improve cancer care and patient outcomes, issues of great importance to Society stakeholders. The HSR program was founded in 2006, and since that time the group has developed into a highly productive multidisciplinary research team consisting of five full-time and one part-time staff members, including both clinician and non-clinician staff.

The primary objective of the HSR program is to perform high-quality, high-impact research that supports the Society's mission and program initiatives. Additional, related objectives include identifying critical gaps in evaluating and improving quality of cancer patient care, and taking leadership in policy and technical initiatives to address these gaps. The HSR program is uniquely positioned to respond rapidly to critical information needs by Society personnel, as well as national and international policy makers. The HSR program analyzes cancer treatment patterns and outcomes and has examined the role of health insurance in explaining disparities in access to care, quality of care among patients with access, and outcomes such as morbidity and mortality.

To accomplish its objectives, HSR's work has primarily involved the use of secondary data sources. The National Cancer Data Base (NCDB), jointly sponsored by the American Cancer Society and the American College of Surgeons, has been key to HSR's research on the impact of insurance on cancer status, treatments, and outcomes, as well as for broader surveillance of cancer incidence/prevalence and treatment patterns. Other databases used to support HSR's objectives include linked SEER-Medicare data, linked state registry and Medicaid enrollment data, and Medical Expenditure Panel Survey Data linked with National Health Interview Survey Data.

International Tobacco Control Research

The predecessor of the International Tobacco Control Research Program (ITCRP), the International Tobacco Surveillance unit, was created in 1998 to support collaborative international tobacco surveillance efforts involving the Society, the WHO Tobacco Free Initiative, the World Bank, and the Centers for Disease Control and Prevention's (CDC) Office of Smoking and Health. Its special publications, the *Tobacco Control Country Profiles*, 1st and 2nd editions, were distributed during the 11th and 12th World Conference on Tobacco or Health in 2000 and in 2003, respectively.

Since 2006, ITCRP has begun to focus on economic research in tobacco control, taking advantage of established partnerships with numerous academic and nonprofit organizations. In addition to original research, the program helps build capacity for the collection and analysis of economic data to provide the evidence base for tobacco control in low- and middle- income countries. To that end, ITCRP received funding from the Bloomberg Global Initiative to Reduce Tobacco Use, the Bill & Melinda Gates Foundation, and a grant from the National Institutes of Health Fogarty International Center.

The most important service publication of the ITCRP is *The Tobacco Atlas*, which is produced in collaboration with the Society's Global Health department, Georgia State University, and the World Lung Foundation. *The Tobacco Atlas, Fourth Edition* will be released at the 15th World Conference on Tobacco or Health in 2012 in Singapore.

Behavioral Research Center

The American Cancer Society was one of the first organizations to recognize the importance of behavioral and psychosocial factors in the prevention and control of cancer and to fund extramural research in this area. In 1995, the Society established the Behavioral Research Center (BRC) as an intramural department. The BRC's work currently focuses on cancer survivorship, quality of life, and tobacco research. It also addresses the issues of special populations, including minorities, the poor, rural populations, and other underserved groups. The BRC's ongoing projects include:

- Studies of the quality of life of cancer survivors, which include a nationwide longitudinal study and a cross-sectional study, that explore the physical and psychosocial adjustment to cancer and identify factors affecting quality of life
- Studies to identify and prioritize gaps in information and resources for cancer survivors as they transition from active treatment back to the community care setting
- Contributions to the development of a National Cancer Survivorship Resource Center meant to advance survivorship as a distinct phase of cancer care, promote healthy behaviors to reduce late and long-term effects of cancer and its treatment, and improve surveillance and screening practices to detect the return of cancer
- Studies of family caregivers that explore the impact of the family's involvement in cancer care on the quality of life of the cancer survivor and the caregiver
- Efforts to establish and implement a process to measure the effective control of pain, other symptoms, and side effects for those who have been affected by cancer
- Studies of African American-white disparities in cancer-related behaviors among Georgians, focusing on the role of sociocultural factors and neighborhood barriers in disparities in smoking, poor diet, lack of exercise, and cancer screening among a statewide sample of more than 1,000 African Americans
- Studies investigating how social, psychological, and other factors impact smokers' motivation and ability to quit in order to improve existing Society programs for smoking cessation (e.g., FreshStart, Great American Smokeout®) or to develop new technology-based interventions for smokers who seek cessation assistance.

Statistics and Evaluation Center

The Statistics & Evaluation Center (SEC) provides expert statistical, survey, study design, and evaluative consultation services to the American Cancer Society National Home Office and its Divisions. The SEC has two groups – Statistics and Survey Research – that work independently or in tandem depending upon the nature of the project, the service to be rendered, or the problem to be solved. The SEC's mission is to improve the Society's programs and processes based on good science. The center always seeks to capture data systematically, and objectively deliver valid, reliable, accurate, and timely information to its stakeholders for evidence-based decision making.

SEC staff designs and conducts process and outcome evaluations of Society programs, projects, and initiatives, and conducts focus groups, structured/semi-structured interviews, and needs assessments. All evaluations are logic model driven. The SEC continues to be engaged in evaluations of the Society's national survivorship, quality-of-life, early detection, prevention, global health, and extramural grants funding programs. The center's professional staff is involved in multiple projects across the Society, where their extensive statistical, study design, survey research skills, and experience are applied to evaluation and quantitative problem solving. The results of these studies improve Society mission and income delivery.

In the past year, the SEC has worked with staff in the Society's National Home Office and Divisions on strategic planning for the next generation of the Society's services to cancer patients and caregivers. Findings from recent program evaluations play a large role in these discussions. The SEC has supported the evaluation of the Society's patient service (call) centers by the Integrated Evaluation Team and has worked with the extramural grants program to evaluate grant programs in palliative care and health services research. The SEC staff is designing and implementing projects that will facilitate evaluation of internally and externally funded programs using community health advisors and focused media events to increase cancer screening in communities that have high cancer mortality rates and screening rates that lag national averages. Statisticians in the SEC continue to work with staff in the surveillance research program and the National Cancer Institute on improving cancer mortality and incidence projection models.

Fighting Back

Conquering cancer is as much a matter of public policy as scientific discovery. Whether it's advocating for quality, affordable health care for all Americans, increasing funding for cancer research and programs, or enacting laws and policies that help decrease tobacco use, government action is constantly required. The American Cancer Society and its nonprofit, nonpartisan advocacy affiliate, the American Cancer Society Cancer Action Network (ACS CAN), use applied policy analysis, direct lobbying, grassroots action, and media outreach to ensure elected officials nationwide pass laws furthering the organizations' shared mission to create a world with less cancer.

Created in 2001, ACS CAN is the force behind a new movement uniting and empowering cancer patients, survivors, caregivers, and their families. ACS CAN is a community-based grassroots movement that unites cancer survivors and caregivers, volunteers and staff, health care professionals, researchers, public health organizations, and other partners. ACS CAN gives ordinary people extraordinary power to fight back against cancer. In recent years, the Society and ACS CAN have successfully partnered to pass a number of laws at the federal, state, and local levels focused on preventing cancer and detecting it early, increasing research on ways to prevent and treat cancer, improving access to lifesaving screenings and treatment, and improving quality of life for cancer patients. Some of our recent advocacy accomplishments impacting cancer patients include:

- Passage and implementation of the Affordable Care Act (ACA) of 2010, comprehensive legislation that:
  - Prohibits insurance companies from denying insurance coverage based on a preexisting conditions (children starting in 2010, adults in 2014)
  - Prohibits insurance coverage from being rescinded when a patient gets sick
  - Removes lifetime limits from all insurance plans
  - Allows children and young adults to be covered under their parents' insurance plans until they turn 26
  - Makes coverage for routine care costs available to patients who take part in clinical trials
  - Establishes a National Institutes of Health Interagency Pain Research Advisory Committee to coordinate pain management research initiatives and an Institute of Medicine Pain Conference series that will be important to relieving cancer-related pain and other chronic pain conditions
  - Establishes a National Prevention and Health Promotion Strategy; a National Prevention, Health Promotion and Public Health Council; and a Prevention and Public Health Fund with mandatory funding to prioritize, coordinate, oversee, and fund prevention-related activities nationwide
  - Requires all new health insurance plans and Medicare to cover preventive services rated "A" or "B" by the US Preventive Services Task Force (USPTF) at no cost to patients (including breast, cervical, and colorectal cancer screening and smoking cessation treatment)
  - Requires state Medicaid programs to provide pregnant women with tobacco cessation treatment at no cost
  - Protects children and families against states rules that limit program eligibility or increase premiums or enrollment fees in Medicaid
  - Provides new funding to states to make expansions or improvements to Medicaid
  - Saves states money in uncompensated care by replacing local dollars with new federal subsidies
  - Expands coverage to all low-income adults below 133% of the federal poverty level eligible for Medicaid beginning in 2014
  - Prioritizes health disparities at the National Institutes of Health, establishes a network of federal-specific offices of minority health, and creates an Office of Women's Health
  - Enhances data collection and reporting to ensure racial and ethnic minorities are receiving appropriate, timely, and quality health care
  - Authorizes grants to help states and local jurisdictions address health workforce needs
  - Secures coverage for a new annual wellness visit with a personalized prevention plan and gradually reduces out-of-pocket costs for prescription drugs for Medicare beneficiaries
  - Creates incentives for health care providers to deliver more coordinated and integrated care to beneficiaries enrolled in Medicare and Medicaid
  - Requires chain restaurants to provide calorie information on menus and have other nutrition information available to consumers upon request and requires chain vending machine owners or operators to display calorie information for all products available for sale

Please refer to *The Affordable Care Act: How It Helps People with Cancer and their Families* for more information (http://action.acscan.org/site/DocServer/Affordable_Care_Act_Through_the_Cancer_Lens_Final.pdf?docID=18421).

- Supporting legislation that focuses on preventing cancer by reducing tobacco use, obesity, and sun exposure, improving nutrition, and increasing physical activity. By successfully working with partners, the Society and ACS CAN have:
  - Empowered the FDA with authority over tobacco products, including support for new graphic warning labels to be on cigarette packs by September 2012

- Passed comprehensive smoke-free laws in 23 states and the District of Columbia that require all workplaces, restaurants, and bars to be smoke free, covering nearly half of the US population, and defended these laws in court
- Increased taxes on tobacco products to an average state cigarette tax of $1.46 per pack and defended against tax rollbacks
- Continued our role as interveners in the US government's lawsuit against the tobacco industry, in which manufacturers have been convicted as racketeers for decades of fraud associated with marketing of tobacco products
- Began implementing the Healthy, Hunger-Free Kids Act of 2010, strong legislation to reauthorize the federal child nutrition programs and strengthen school nutrition. The law improves nutrition standards and increases funding for school meals, establishes nutrition standards for foods sold in schools outside of meal programs, and strengthens local wellness policies by providing resources and technical assistance for their implementation and requiring them to be publicly available and periodically reviewed.
- Advocated for state requirements for increased, quality physical education in all schools
- Supported the federal government's development of voluntary nutrition standards for foods marketed to children
- Worked with state governments to implement laws prohibiting tanning bed use for everyone under the age of 18
- Worked to improve access to essential cancer screening services, especially among low-income, uninsured, and underinsured populations
- Advocated for full funding for the National Breast and Cervical Cancer Early Detection Program (NBCCEDP), which provides free breast and cervical cancer screenings and treatment to low-income, uninsured, and medically underserved women
- Advocated for legislation to create a new nationwide colorectal screening and treatment program modeled after NBCCEDP

- Improving quality of life for cancer patients by ensuring that patients and survivors receive the best cancer care that matches treatments to patient and family goals across their life course. The Society and ACS CAN have:
  - Advocated for balanced pain policies in multiple states and at the federal level to ensure patients and survivors have continued access to the treatments that promote better pain management and improved quality of life
  - Passed federal legislation to promote patient- and family-centered quality cancer care, survivorship care planning, pain and symptom management, and care coordination to improve quality of life for patients, survivors, and their families
  - Advanced a new quality-of-life legislative platform to include and implement palliative care as a patient-centered and quality-of-life improvement for people facing serious illnesses such as cancer
  - Increased public awareness of the increasingly urgent cancer drug shortage problem and advocated for solutions to the complex, multiple causes of cancer drug shortages

Some efforts in the fight against cancer are more visible than others, but each successful battle is an important contribution to what will ultimately be victory over the disease. The Society, working together with ACS CAN and its grassroots movement, is making sure the voice of the cancer community is heard in the halls of government and is empowering communities everywhere to fight back.

The Society is also rallying people to fight back against the disease through our Relay For Life, Making Strides Against Breast Cancer®, DetermiNation®, and Choose You programs. The American Cancer Society Relay For Life is a life-changing event that gives everyone in communities across the globe a chance to celebrate the lives of people who have battled cancer, remember loved ones lost, and fight back against the disease, making it the world's largest movement to end cancer. At Relay events, teams of people camp out at a local high school, park, or fairground and take turns walking or running around track or path for up to 24 hours. Making Strides Against Breast Cancer events are powerful and inspiring walks that unite communities to celebrate people who have battled breast cancer, to raise awareness about the steps people can take to help prevent the disease, and to raise money to help find cures and support programs and services for people facing the disease. The DetermiNation program offers people an opportunity to do the unthinkable, achieve what seems impossible, and change the course of cancer forever. Every step participants take and every mile they conquer in a half-marathon, marathon, or triathlon is a triumph over cancer. The Choose You movement encourages women to put their own health first in the fight against cancer by challenging them to make healthier choices and supporting them in their commitment to take the necessary steps to stay well.

Sources of Statistics

New cancer cases. The numbers of new US cancer cases in 2012 are projected using a two-step process. First, the total number of cases in each state is estimated using a spatiotemporal model based on incidence data from 47 states and the District of Columbia for the years 1995-2008 that met the North American Association of Central Cancer Registries' (NAACCR) high-quality data standard for incidence, which covers about 95% of the US population. This method considers geographic variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence, as well as accounting for expected delays in case reporting. Then, the number of new cases nationally and in each state is projected four years ahead using a temporal projection method. (For more information on the estimation of new cases, see "A" in Additional Information on page 63.)

Incidence rates. Incidence rates are defined as the number of people per 100,000 who are diagnosed with cancer during a given time period. Incidence rates in this publication are age adjusted to the 2000 US standard population to allow comparisons across populations with different age distributions. State incidence rates were published in NAACCR's publication *Cancer Incidence in North America, 2004-2008*. (See "B" in Additional Information, page 63, for full reference.) Trends in cancer incidence provided for selected cancer sites are based on incidence rates that have been adjusted for delays in reporting and were originally published in the Surveillance, *Epidemiology, and End Results (SEER) Cancer Statistics Review (CSR) 1975-2008*. (See "C" in Additional Information, page 63, for full reference). Incidence rates that are not adjusted for delays in reporting may underestimate the number of cancer cases in the most recent time period. Cancer rates most affected by reporting delays are melanoma of the skin, leukemia, and prostate because these cancers are frequently diagnosed in nonhospital settings. Cancer incidence rates by race/ethnicity were obtained from NAACCR.

Cancer deaths. The estimated numbers of US cancer deaths are calculated by fitting the numbers of cancer deaths for 1994-2008 to a statistical model that forecasts the numbers of deaths expected to occur in 2012. The estimated numbers of cancer deaths for each state are calculated similarly, using state-level data. For both US and state estimates, data on the numbers of deaths are obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention. (For more information on this method, see "D" in Additional Information on page 63.)

Mortality rates. Mortality rates, or death rates, are defined as the number of people per 100,000 dying of a disease during a given year. In this publication, mortality rates are based on counts of cancer deaths compiled by NCHS and population data from the US Census Bureau. Death rates in this publication are age adjusted to the 2000 US standard population to allow comparisons across populations with different age distributions. These rates should be compared only to other statistics that are age adjusted to the US 2000 standard population. Trends in cancer mortality rates provided for selected cancer sites were first published in the *CSR 1975-2008*. (See "C" in Additional Information, page 63, for full reference.)

Important note about estimated cancer cases and deaths for the current year. The estimated numbers of new cancer cases and deaths in the current year are model-based and may produce numbers that vary considerably from year to year for reasons other than changes in cancer occurrence. For this reason, the use of our estimates to track year-to-year changes in cancer occurrence or deaths is strongly discouraged. Incidence and mortality rates reported by the SEER program and NCHS are more informative statistics to use when tracking cancer incidence and mortality trends for the US. Rates from state cancer registries are useful for tracking local trends.

Survival. This report presents relative survival rates to describe cancer survival. Relative survival adjusts for normal life expectancy (and events such as death from heart disease, accidents, and diseases of old age) by comparing survival among cancer patients to that of people not diagnosed with cancer who are of the same age, race, and sex. Five-year survival statistics presented in this publication were originally published in *CSR 1975-2008* and are for diagnosis years 2001 to 2007, with all patients followed through 2008. In addition to 5-year relative survival rates, 1-, 10-, and 15-year survival rates are presented for selected cancer sites. These survival statistics are generated using the National Cancer Institute's SEER 17 database and SEER*Stat software version 7.0.4. (See "E" in Additional Information, page 63, for full references.) One-year survival rates are based on cancer patients diagnosed from 2004 and 2007, 10-year survival rates are based on diagnoses from 1995 and 2007, and 15-year survival rates are based on diagnoses from 1990 and 2007; all patients were followed through 2008.

Probability of developing cancer. Probabilities of developing cancer are calculated using DevCan (Probability of Developing Cancer) software version 6.6.0, developed by the National Cancer Institute. (See "F" in Additional Information, page 63, for full reference.) These probabilities reflect the average experience of people in the US and do not take into account individual behaviors and risk factors. For example, the estimate of 1 man in 13 developing lung cancer in a lifetime underestimates the risk for smokers and overestimates the risk for nonsmokers.

Additional information. More information on the methods used to generate the statistics for this report can be found in the following publications:

A. Zhu L, Pickle LW, Naishadham D, et al. Predicting US and state-level cancer counts for the current calendar year: part II – evaluation of spatio-temporal projection methods for incidence. *Cancer*. 2011; in press.

B. Copeland G, Lake A, Firth R, et al. (eds). *Cancer in North America: 2004-2008. Volume Two: Registry-specific Cancer Incidence in the United States and Canada*. Springfield, IL: North American Association of Central Cancer Registries, Inc. May 2011. Available at naaccr.org/DataandPublications/CINAPubs.aspx.

C. Howlader N, Noone AM, Krapcho M, et al. (eds). *SEER Cancer Statistics Review, 1975-2008*. National Cancer Institute. Bethesda, MD, 2011. Available at seer.cancer.gov.

D. Chen HS, Portier K, Ghosh K, et al. Predicting US and State-level counts for the current calendar year: part I – evaluation of temporal projection methods for mortality. *Cancer*. 2011; in press.

E. SEER 17 database: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 17 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2010 Sub (1973-2008 varying) - Linked To County Attributes - Total U.S., 1969-2009 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2011, based on the November 2010 submission.

SEER*Stat software: Surveillance Research Program, National Cancer Institute SEER*Stat software (www.seer.cancer.gov/seerstat) version 7.0.4.

F. DevCan: Probability of Developing or Dying of Cancer Software, Version 6.6.0; Statistical Research and Applications Branch, National Cancer Institute, 2005. http://srab.cancer.gov/devcan

Screening Guidelines for the Early Detection of Cancer in Average-risk Asymptomatic People

Cancer Site	Population	Test or Procedure	Frequency
Breast	Women, age 20+	Breast self-examination (BSE)	It is acceptable for women to choose not to do BSE or to do BSE regularly (monthly) or irregularly. Beginning in their early 20s, women should be told about the benefits and limitations of breast self-examination (BSE). Whether a woman ever performs BSE, the importance of prompt reporting of any new breast symptoms to a health professional should be emphasized. Women who choose to do BSE should receive instruction and have their technique reviewed on the occasion of a periodic health examination.
		Clinical breast examination (CBE)	For women in their 20s and 30s, it is recommended that clinical breast examination (CBE) be part of a periodic health examination, preferably at least every three years. Asymptomatic women age 40 and older should continue to receive a clinical breast examination as part of a periodic health examination, preferably annually.
		Mammography	Begin annual mammography at age 40.*
Cervix†	Women, age 21+	Pap test Pap test HPV DNA test	Cervical cancer screening should begin approximately three years after a woman begins having vaginal intercourse, but no later than 21 years of age. Screening should be done every year with conventional Pap tests or every two years using liquid-based Pap tests. At or after age 30, women who have had three normal test results in a row may undergo screening every two to three years with cervical cytology (either conventional or liquid-based Pap test) alone, or every three years with an HPV DNA test plus cervical cytology. Women 70 years of age and older who have had three or more normal Pap tests and no abnormal Pap tests in the past 10 years and women who have had a total hysterectomy may choose to stop cervical cancer screening.
Colorectal	Men and women, age 50+	Fecal occult blood test (FOBT) with at least 50% test sensitivity for cancer, or fecal immunochemical test (FIT) with at least 50% test sensitivity for cancer, **or**	Annual, starting at age 50. Testing at home with adherence to manufacturer's recommendation for collection techniques and number of samples is recommended. FOBT with the single stool sample collected on the clinician's a fingertip during a digital rectal examination in the health care setting is not recommended. Guaiac based toilet bowl FOBT tests also are not recommended. In comparison with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly, and are likely to be equal or better in sensitivity and specificity. There is no justification for repeating FOBT in response to an initial positive finding.
		Stool DNA test, **or**	Interval uncertain, starting at age 50
		Flexible sigmoidoscopy (FSIG), **or**	Every 5 years, starting at age 50. FSIG can be performed alone, or consideration can be given to combining FSIG performed every 5 years with a highly sensitive gFOBT or FIT performed annually.
		Double contrast barium enema (DCBE), **or**	Every 5 years, starting at age 50
		Colonoscopy	Every 10 years, starting at age 50
		CT Colonography	Every 5 years, starting at age 50
Endometrial	Women, at menopause	At the time of menopause, women at average risk should be informed about risks and symptoms of endometrial cancer and strongly encouraged to report any unexpected bleeding or spotting to their physicians.	
Prostate	Men, ages 50+	Digital rectal examination (DRE) and prostate-specific antigen test (PSA)	Men who have at least a 10-year life expectancy should have an opportunity to make an informed decision with their health care provider about whether to be screened for prostate cancer, after receiving information about the potential benefits, risks, and uncertainties associated with prostate cancer screening. Prostate cancer screening should not occur without an informed decision- making process.
Cancer-related checkup	Men and women, age 20+	On the occasion of a periodic health examination, the cancer-related checkup should include examination for cancers of the thyroid, testicles, ovaries, lymph nodes, oral cavity, and skin, as well as health counseling about tobacco, sun exposure, diet and nutrition, risk factors, sexual practices, and environmental and occupational exposures.	

*Beginning at age 40, annual clinical breast examination should be performed prior to mammography.

†New recommendations will be released in early 2012; please refer to cancer.org for the most current guidelines.

Note: Screening recommendations for lung cancer will be released in 2012; please refer to cancer.org for the most current information.

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Acknowledgments

The production of this report would not have been possible without the efforts of: Terri Ades, MS; Rick Alteri, MD; Priti Bandi, MS; Durado Brooks, MD, MPH; Melissa Center, MPH; Amy Chen, MD, MPH; Vilma Cokkinides, PhD, MSPH; Carol DeSantis, MPH; Coleen Doyle, MS, RD; Ted Gansler, MD, MBA; Sue Gapstur, PhD; Mia Gaudet, PhD; Tom Glynn, PhD; Keona Graves; Eric Jacobs, PhD; Joan Kramer, MD; Martha Linet, MD, MPH; Marj McCullough, ScD, RD; Brenda McNeal; Adriane Magro; Deepa Naishadham, MS; Ken Portier, PhD; David Ringer, PhD, MPH; Hana Ross, PhD; Debbie Saslow, PhD; Edgar Simard, PhD, MPH; Scott Simpson; Robert Smith, PhD; Michal Stoklosa, MA; Kristen Sullivan, MS, MPH; Dana Wagner; Sophia Wang, PhD; Elizabeth Ward, PhD; Marty Weinstock, MD, PhD; Jiaquan Xu, MD; and Joe Zou.

Cancer Facts & Figures is an annual publication of the American Cancer Society, Atlanta, Georgia.

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