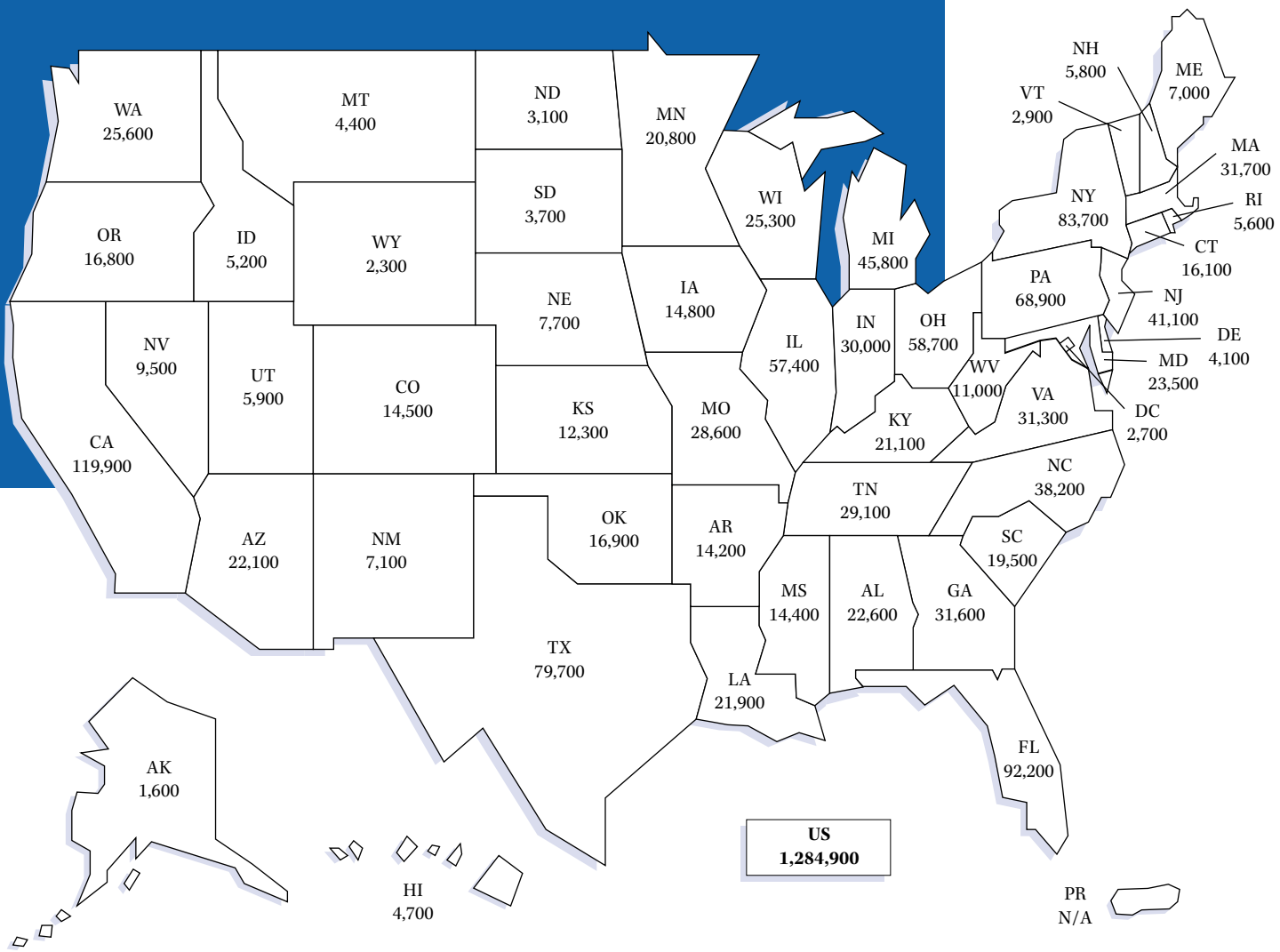
Cancer Facts & Figures 2002



Estimated number of new cancer cases for 2002, excluding basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.
Note: These estimates are offered as a rough guide and should be interpreted with caution. They are calculated according to the distribution of estimated cancer deaths in 2002 by state. State estimates may not add to US total due to rounding.

American Cancer Society®

Special Section:
Colorectal Cancer and Early Detection
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Cancer: Basic 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, chemicals, radiation, and infectious organisms) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). Causal factors may act together or in sequence to initiate or promote carcinogenesis. Ten or more years often pass between exposures or mutations and detectable cancer. Cancer is treated by surgery, radiation, chemotherapy, hormones, and immunotherapy.

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 2002 about 170,000 cancer deaths are expected to be caused by tobacco use, and about 19,000 cancer deaths may be related to excessive alcohol use, frequently in combination with tobacco use.

Scientific evidence suggests that about one-third of the 555,500 cancer deaths expected to occur in 2002 will be related to nutrition, physical inactivity, obesity, and other lifestyle factors and could also be prevented. Certain cancers are related to infectious exposures, e.g., hepatitis B virus (HBV), human papillomavirus (HPV), human immunodeficiency virus (HIV), helicobacter, and others, and could be prevented through behavioral changes, vaccines, or antibiotics. In addition, many of the more than 1 million skin cancers that are expected to be diagnosed in 2002 could have been prevented by protection from the sun's rays.

Regular screening examinations by a health care professional can result in the detection of cancers of the breast, colon, rectum, cervix, prostate, testis, oral cavity, and skin at earlier stages, when treatment is more likely to be successful. Self-examinations for cancers of the breast and skin may also result in detection of tumors at earlier stages. Cancers that can be detected by screening account for about half of all new cancer cases. The 5-year relative survival rate for these cancers is about 82%. If all of these cancers were diagnosed at a localized stage through regular cancer screenings, 5-year survival would increase to 95%.

Who Is at Risk of Developing Cancer?

Anyone. Since the occurrence of cancer increases as individuals age, most cases affect adults beginning in middle age. About 77% of all cancers are diagnosed at ages 55 and older. Cancer researchers use the word *risk* in different ways. *Lifetime risk* refers to the probability that an individual, over the course of a lifetime, will develop cancer or die from it. In the US, men have a little less than 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 the 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 exposure or trait. For example, male smokers have a 20-fold relative risk of developing lung cancer compared with nonsmokers. This means that they are about 20 times more likely to develop lung cancer than nonsmokers. Most relative risks are not this large. For example, women who have a first-degree (mother, sister, or daughter) family history of breast cancer have about a 2-fold increased risk of developing breast cancer compared with women who do not have a family history. This means that women with a first-degree family history are about two times more likely to develop breast cancer than women who do not have a family history of the disease.

All cancers involve the malfunction of genes that control cell growth and division. About 5% to 10% of cancers are clearly hereditary, in that an inherited faulty gene predisposes the person to a very high risk of particular cancers. The remainder of cancers are not hereditary, but result from damage to genes (mutations) that occurs throughout our lifetime, either due to internal factors, such as hormones or the digestion of nutrients within cells, or external factors, such as tobacco, chemicals, and sunlight.

How Many People Alive Today Have Ever Had Cancer?

The National Cancer Institute estimates that approximately 8.9 million Americans with a history of cancer were alive in 1997. Some of these individuals were considered cured, while others still had evidence of cancer and may have been undergoing treatment.

How Many New Cases Are Expected to Occur This Year?

About 1,284,900 new cancer cases are expected to be diagnosed in 2002. Since 1990, about 16 million new

cancer cases have been diagnosed. These estimates do not include carcinoma in situ (noninvasive cancer) of any site except urinary bladder, and do not include basal and squamous cell skin cancers. More than 1 million cases of basal and squamous cell skin cancers are expected to be diagnosed this year.

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

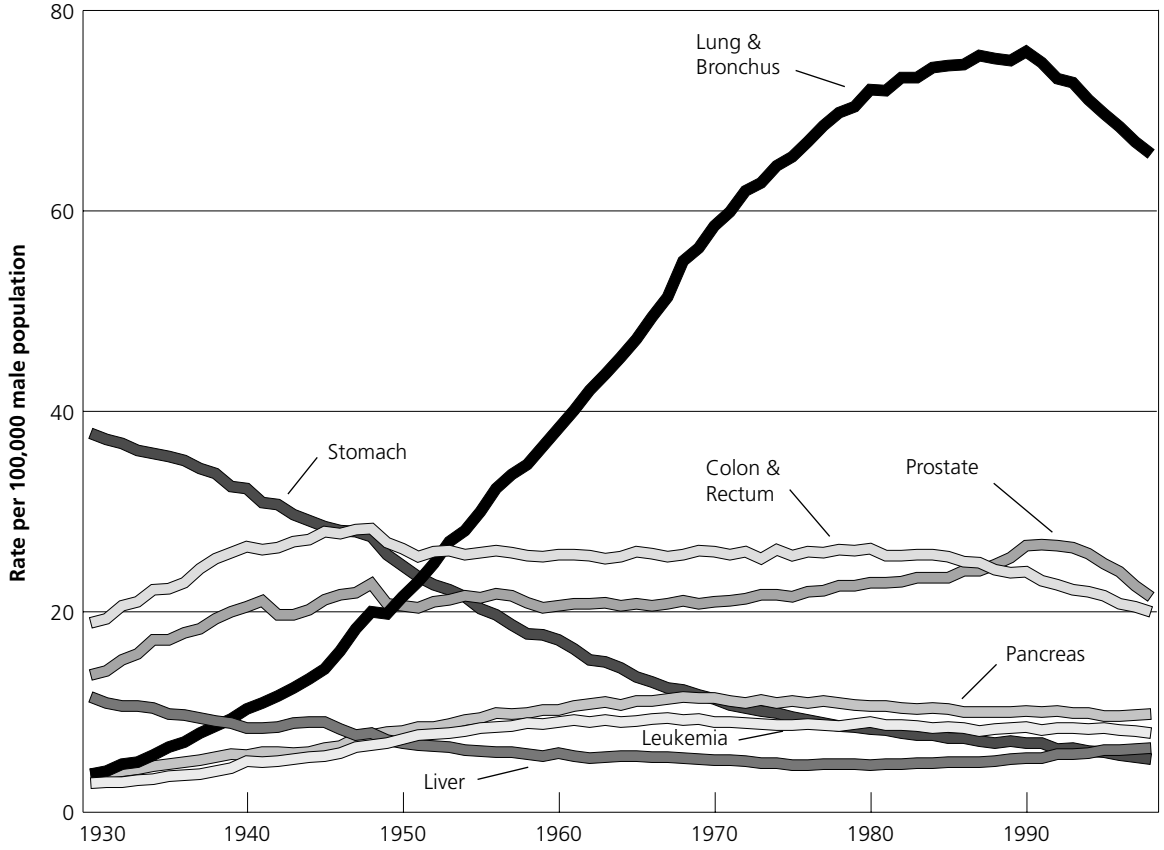
This year about 555,500 Americans are expected to die of cancer, more than 1,500 people a day. Cancer is the second leading cause of death in the US, exceeded only by heart disease. In the US, 1 of every 4 deaths is from cancer.

What Percentage of People Survive Cancer?

The 5-year relative survival rate for all cancers combined is 62%. After adjusting for normal life expectancy (factors such as dying of heart disease, accidents, and diseases of old age), the 5-year relative survival rate represents persons who are living five years after diagnosis, whether disease-free, in remission, or under treatment with evidence of cancer. While 5-year relative survival rates are useful in monitoring progress in the early detection and treatment of cancer, they do not represent the proportion of people who are cured permanently, since cancer can affect survival beyond five years after diagnosis.

Although these rates provide some indication about the average survival experience of cancer patients in a given population, they are less informative when used to predict individual prognosis and should be interpreted with caution. First, 5-year relative survival rates are based on patients who were diagnosed and treated at least eight years ago and do not reflect recent advances in treatment. Second, information about detection methods, treatment protocols, additional illnesses, and behaviors that influence survival are not taken into account in the estimation of survival rates. (For more information about survival rates, see Sources of Statistics on page 43.)

Age-Adjusted Cancer Death Rates,* Males by Site, US, 1930-1998



*Per 100,000, age-adjusted to the 1970 US standard population. **Note:** Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung & bronchus, and colon & rectum are affected by these coding changes.

Source: US Mortality Public Use Data Tapes 1960-1998, US Mortality Volumes 1930-1959, National Center for Health Statistics, Centers for Disease Control and Prevention, 2001.

American Cancer Society, Surveillance Research, 2002

How is Cancer Staged?

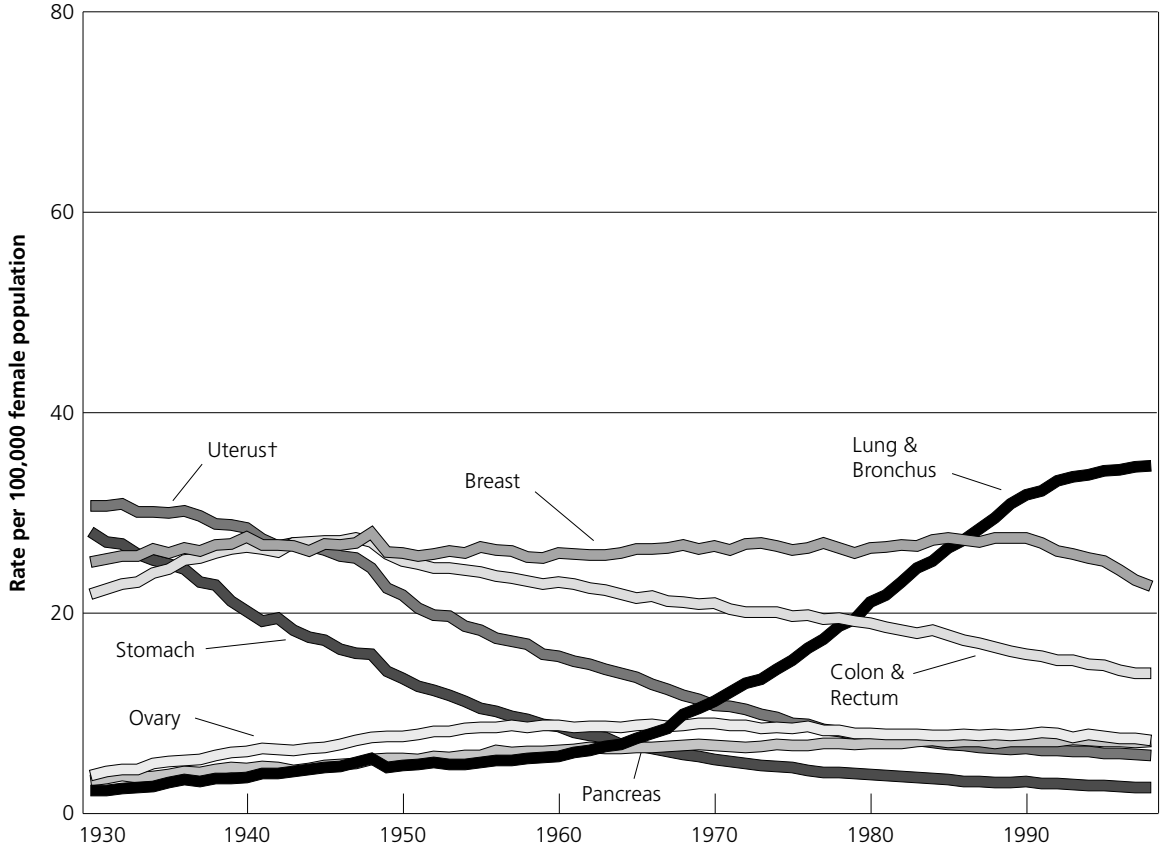
Staging is the process of describing the extent or spread of the disease from the site of origin. It is essential in determining the choice of therapy and assessing prognosis. A cancer's stage is based on the primary tumor's size and location in the body and whether it has spread to other areas of the 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 stage and IV being advanced. Summary staging (in situ, local, regional, and distant) is useful for descriptive and statistical analysis of tumor registry data. If cancer cells are present only in the layer of cells where they developed and they have not spread, the stage is in situ. If cancer cells have spread beyond the original layer of tissue, the cancer is invasive. See Five-Year Relative Survival Rates* by Stage at Diagnosis, 1992-1997, page 17, for a description of the other summary stage categories.

What Are the Costs of Cancer?

The National Institutes of Health estimate overall costs for cancer in the year 2001 at $156.7 billion: $56.4 billion for direct medical costs (total of all health expenditures); $15.6 billion for indirect morbidity costs (cost of lost productivity due to illness); and, $84.7 billion for indirect mortality costs (cost of lost productivity due to premature death). Lack of health insurance and other barriers to health care prevent many Americans from receiving optimal health care.

According to 1999 data, about 16% of Americans under age 65 have no health insurance, and about 26% of older persons have only Medicare coverage. During 1998 and 1999, almost 18% of Americans aged 18 to 64 years reported not having a regular source of health care. Also, 5.7% of 18- to 64-year-old adults say cost is a barrier to obtaining needed health care in the previous year.

Age-Adjusted Cancer Death Rates,* Females by Site, US, 1930-1998



*Per 100,000, age-adjusted to the 1970 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 cancers of the liver, lung & bronchus, and colon & rectum are affected by these coding changes.
Source: US Mortality Public Use Data Tapes 1960-1998, US Mortality Volumes 1930-1959, National Center for Health Statistics, Centers for Disease Control and Prevention, 2001.

American Cancer Society, Surveillance Research, 2002

Estimated New Cancer Cases and Deaths by Gender, US, 2002*

	Estimated New Cases			Estimated New Deaths		
	Both Sexes	**Male**	**Female**	**Both sexes**	**Male**	**Female**
All Sites	1,284,900	637,500	647,400	555,500	288,200	267,300
Oral cavity & pharynx	28,900	18,900	10,000	7,400	4,900	2,500
Tongue	7,100	4,700	2,400	1,700	1,100	600
Mouth	9,800	5,200	4,600	2,000	1,100	900
Pharynx	8,600	6,500	2,100	2,100	1,500	600
Other oral cavity	3,400	2,500	900	1,600	1,200	400
Digestive system	250,600	130,300	120,300	132,300	70,800	61,500
Esophagus	13,100	9,800	3,300	12,600	9,600	3,000
Stomach	21,600	13,300	8,300	12,400	7,200	5,200
Small intestine	5,300	2,500	2,800	1,100	600	500
Colon	107,300	50,000	57,300	48,100	23,100	25,000
Rectum	41,000	22,600	18,400	8,500	4,700	3,800
Anus, anal canal, & anorectum	3,900	1,700	2,200	500	200	300
Liver & intrahepatic bile duct	16,600	11,000	5,600	14,100	8,900	5,200
Gallbladder & other biliary	7,100	3,400	3,700	3,500	1,300	2,200
Pancreas	30,300	14,700	15,600	29,700	14,500	15,200
Other digestive organs	4,400	1,300	3,100	1,800	700	1,100
Respiratory system	183,200	100,700	82,500	161,400	94,100	67,300
Larynx	8,900	6,900	2,000	3,700	2,900	800
Lung & bronchus	169,400	90,200	79,200	154,900	89,200	65,700
Other respiratory organs	4,900	3,600	1,300	2,800	2,000	800
Bones & joints	2,400	1,300	1,100	1,300	700	600
Soft tissue (including heart)	8,300	4,400	3,900	3,900	2,000	1,900
Skin (excluding basal & squamous)	58,300	32,500	25,800	9,600	6,200	3,400
Melanoma-skin	53,600	30,100	23,500	7,400	4,700	2,700
Other non-epithelial skin	4,700	2,400	2,300	2,200	1,500	700
Breast	205,000	1,500	203,500	40,000	400	39,600
Genital system	279,100	197,700	81,400	57,100	30,900	26,200
Uterine cervix	13,000		13,000	4,100		4,100
Uterine corpus	39,300		39,300	6,600		6,600
Ovary	23,300		23,300	13,900		13,900
Vulva	3,800		3,800	800		800
Vagina & other genital, female	2,000		2,000	800		800
Prostate	189,000	189,000		30,200	30,200	
Testis	7,500	7,500		400	400	
Penis & other genital, male	1,200	1,200		200	200	
Urinary system	90,700	62,200	28,500	24,900	16,200	8,700
Urinary bladder	56,500	41,500	15,000	12,600	8,600	4,000
Kidney & renal pelvis	31,800	19,100	12,700	11,600	7,200	4,400
Ureter & other urinary organs	2,400	1,600	800	700	400	300
Eye & orbit	2,200	1,100	1,100	200	100	100
Brain & other nervous system	17,000	9,600	7,400	13,100	7,200	5,900
Endocrine system	22,700	6,000	16,700	2,300	1,000	1,300
Thyroid	20,700	4,900	15,800	1,300	500	800
Other endocrine	2,000	1,100	900	1,000	500	500
Lymphoma	60,900	31,900	29,000	25,800	13,500	12,300
Hodgkin's disease	7,000	3,700	3,300	1,400	800	600
Non-Hodgkin's lymphoma	53,900	28,200	25,700	24,400	12,700	11,700
Multiple myeloma	14,600	7,800	6,800	10,800	5,500	5,300
Leukemia	30,800	17,600	13,200	21,700	12,100	9,600
Acute lymphocytic leukemia	3,800	2,200	1,600	1,400	800	600
Chronic lymphocytic leukemia	7,000	4,100	2,900	4,500	2,600	1,900
Acute myeloid leukemia	10,600	5,900	4,700	7,400	4,000	3,400
Chronic myeloid leukemia	4,400	2,500	1,900	2,000	1,100	900
Other leukemia	5,000	2,900	2,100	6,400	3,600	2,800
Other & unspecified primary sites	30,200	14,000	16,200	43,700	22,600	21,100

*Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. Carcinoma in situ of the breast accounts for about 54,300 new cases annually, and melanoma in situ accounts for about 34,300 new cases annually.

Estimates of new cases are based on incidence rates from the NCI SEER program 1979-1998.

Estimated New Cancer Cases by Site and State, US, 2002*

State	All sites	Female Breast	Uterine Cervix	Colon & Rectum	Uterine Corpus	Leukemia	Lung & Bronchus	Melanoma	Non-Hodgkin's Lymphoma	Prostate	Urinary Bladder
Alabama	22,600	3,100	200	2,200	600	500	3,200	900	800	3,900	800
Alaska	1,600	300	10	200	†	†	200	100	100	100	100
Arizona	22,100	3,500	200	2,400	600	500	2,900	1,200	1,000	3,300	1,000
Arkansas	14,200	2,000	200	1,500	400	300	2,200	500	600	2,300	500
California	119,900	19,900	1,400	12,900	3,700	3,000	14,300	5,300	5,100	17,300	5,600
Colorado	14,500	2,400	100	1,600	400	400	1,600	800	700	2,200	600
Connecticut	16,100	2,600	100	1,800	500	400	2,000	600	700	2,400	800
Delaware	4,100	600	100	400	100	100	600	200	100	600	300
Dist. of Columbia	2,700	600	40	300	100	†	300	†	†	500	100
Florida	92,200	13,100	900	10,400	2,600	2,200	13,000	4,100	3,900	13,600	4,300
Georgia	31,600	5,200	400	3,200	1,000	700	4,400	1,300	1,100	4,800	1,100
Hawaii	4,700	700	30	500	100	100	600	100	200	700	100
Idaho	5,200	900	40	600	100	100	600	300	200	900	300
Illinois	57,400	9,700	700	6,800	1,800	1,400	7,400	2,200	2,400	8,500	2,500
Indiana	30,000	4,600	300	3,600	900	700	4,300	1,300	1,200	4,400	1,300
Iowa	14,800	2,400	100	2,000	500	400	1,900	600	600	2,400	600
Kansas	12,300	1,800	100	1,400	300	300	1,700	600	500	1,900	500
Kentucky	21,100	3,100	300	2,300	500	400	3,400	900	800	2,700	800
Louisiana	21,900	3,500	200	2,600	600	500	2,900	700	800	3,400	700
Maine	7,000	1,000	100	800	200	100	1,000	300	300	800	400
Maryland	23,500	4,100	300	2,900	700	500	3,200	800	900	3,400	1,100
Massachusetts	31,700	4,700	200	3,800	900	700	4,000	1,400	1,400	4,600	1,700
Michigan	45,800	7,300	400	5,300	1,500	1,000	6,100	1,700	2,100	6,700	2,100
Minnesota	20,800	3,200	200	2,300	700	600	2,500	900	1,100	3,400	1,000
Mississippi	14,400	2,200	200	1,500	300	300	2,100	500	500	2,500	500
Missouri	28,600	4,000	300	3,300	900	700	4,200	1,300	1,100	3,900	1,100
Montana	4,400	600	40	500	100	100	600	200	200	800	200
Nebraska	7,700	1,200	100	1,100	200	200	1,000	300	300	1,000	300
Nevada	9,500	1,300	100	1,200	200	200	1,400	500	300	1,400	400
New Hampshire	5,800	800	40	700	200	100	800	300	200	700	300
New Jersey	41,100	6,900	400	4,900	1,600	1,100	4,900	1,800	1,900	5,700	2,100
New Mexico	7,100	1,200	100	800	200	200	800	400	200	1,200	300
New York	83,700	14,700	1,000	10,400	3,400	2,000	10,000	2,800	3,400	11,800	4,300
North Carolina	38,200	5,900	400	4,200	1,200	900	5,500	1,500	1,400	5,600	1,500
North Dakota	3,100	500	30	400	100	100	300	100	100	400	200
Ohio	58,700	9,500	600	7,200	1,900	1,400	7,900	2,300	2,600	8,100	2,700
Oklahoma	16,900	2,700	200	2,000	400	400	2,500	900	700	2,100	700
Oregon	16,800	2,600	100	1,800	500	400	2,200	800	700	2,800	800
Pennsylvania	68,900	11,000	600	8,700	2,300	1,600	8,700	2,700	3,000	10,300	3,300
Rhode Island	5,600	800	100	700	200	100	800	200	200	800	300
South Carolina	19,500	3,100	200	2,200	600	400	2,600	700	700	3,100	800
South Dakota	3,700	500	20	500	100	100	400	200	200	600	100
Tennessee	29,100	4,400	400	3,100	700	700	4,400	1,400	1,200	3,900	1,000
Texas	79,700	13,100	1,000	9,500	2,500	1,900	10,800	3,600	3,400	11,700	3,000
Utah	5,900	1,100	40	700	200	200	500	400	300	1,300	300
Vermont	2,900	400	40	400	100	100	400	200	100	400	100
Virginia	31,300	5,000	300	3,500	1,000	700	4,200	1,300	1,200	4,700	1,200
Washington	25,600	3,700	200	2,700	700	700	3,400	1,300	1,100	3,300	1,100
West Virginia	11,000	1,500	100	1,300	400	300	1,700	400	400	1,400	500
Wisconsin	25,300	3,900	200	2,900	800	700	3,000	1,100	1,300	4,000	1,200
Wyoming	2,300	300	20	300	100	100	300	100	100	400	100
United States	1,284,900	203,500	13,000	148,300	39,300	30,800	169,400	53,600	53,900	189,000	56,500

*Rounded to nearest 100. Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. †Estimate is 50 or fewer cases.

Note: These estimates are offered as a rough guide and should be interpreted with caution. They are calculated according to the distribution of estimated cancer deaths in 2002 by state. State estimates may not add to US total due to rounding.

Estimated Cancer Deaths for Selected Cancer Sites by State, US, 2002*

State	All sites	Brain/ Nervous System	Female Breast	Colon & Rectum	Leukemia	Liver	Lung & Bronchus	Non-Hodgkin's Lymphoma	Ovary	Pancreas	Prostate
Alabama	9,800	200	600	800	400	300	2,900	400	200	500	600
Alaska	700	†	100	100	†	†	200	†	†	†	†
Arizona	9,600	200	700	900	400	200	2,700	500	200	500	500
Arkansas	6,200	200	400	600	200	200	2,000	300	100	300	400
California	51,800	1,500	3,900	4,900	2,100	1,800	13,100	2,300	1,400	2,800	2,800
Colorado	6,300	200	500	600	300	100	1,500	300	200	400	400
Connecticut	7,000	100	500	700	300	200	1,800	300	200	400	400
Delaware	1,800	†	100	200	100	†	500	100	†	100	100
Dist. of Columbia	1,200	†	100	100	†	†	300	†	†	100	100
Florida	39,900	900	2,600	4,000	1,600	1,000	11,900	1,800	1,000	2,100	2,200
Georgia	13,700	300	1,000	1,200	500	300	4,000	500	400	700	800
Hawaii	2,000	†	100	200	100	100	500	100	†	100	100
Idaho	2,300	100	200	200	100	†	600	100	100	100	100
Illinois	24,800	500	1,900	2,600	1,000	600	6,700	1,100	600	1,300	1,400
Indiana	13,000	300	900	1,400	500	300	4,000	600	300	600	700
Iowa	6,400	200	500	800	300	100	1,700	300	200	300	400
Kansas	5,300	100	400	500	200	100	1,500	200	100	300	300
Kentucky	9,100	200	600	900	300	200	3,100	400	200	400	400
Louisiana	9,500	200	700	1,000	300	300	2,700	400	200	500	500
Maine	3,000	100	200	300	100	100	900	100	100	200	100
Maryland	10,200	200	800	1,100	400	200	2,900	400	200	600	500
Massachusetts	13,700	300	900	1,500	500	300	3,600	600	300	800	700
Michigan	19,800	400	1,400	2,000	700	500	5,500	900	500	1,100	1,100
Minnesota	9,000	200	600	900	400	200	2,300	500	200	500	500
Mississippi	6,200	200	400	600	200	200	1,900	200	100	300	400
Missouri	12,300	300	800	1,300	500	300	3,800	500	300	600	600
Montana	1,900	†	100	200	100	†	500	100	100	100	100
Nebraska	3,300	100	200	400	200	100	900	200	100	200	200
Nevada	4,100	100	300	500	100	100	1,300	100	100	200	200
New Hampshire	2,500	100	200	300	100	100	700	100	100	100	100
New Jersey	17,800	400	1,400	1,900	800	500	4,500	800	500	1,000	900
New Mexico	3,000	100	200	300	100	100	700	100	100	200	200
New York	36,200	800	2,900	4,000	1,400	1,000	9,100	1,500	900	2,200	1,900
North Carolina	16,500	400	1,200	1,600	600	300	5,000	600	400	800	900
North Dakota	1,300	†	100	100	100	†	300	100	†	100	100
Ohio	25,400	600	1,900	2,700	1,000	500	7,300	1,200	600	1,300	1,300
Oklahoma	7,300	100	500	700	300	200	2,300	300	100	300	300
Oregon	7,300	200	500	700	300	100	2,000	300	200	400	500
Pennsylvania	29,800	600	2,200	3,300	1,100	700	8,000	1,400	700	1,600	1,600
Rhode Island	2,400	100	200	300	100	100	700	100	100	100	100
South Carolina	8,400	200	600	800	300	200	2,400	300	200	500	500
South Dakota	1,600	100	100	200	100	†	400	100	100	100	100
Tennessee	12,600	300	900	1,200	500	300	4,000	500	300	600	600
Texas	34,500	900	2,600	3,600	1,300	1,200	9,900	1,500	800	1,800	1,900
Utah	2,500	100	200	300	100	100	400	100	100	100	200
Vermont	1,300	†	100	200	†	†	400	100	†	100	100
Virginia	13,500	300	1,000	1,400	500	300	3,800	600	300	700	800
Washington	11,100	300	700	1,000	500	300	3,100	500	300	600	500
West Virginia	4,700	100	300	500	200	100	1,500	200	100	200	200
Wisconsin	11,000	300	800	1,100	500	200	2,800	600	300	600	600
Wyoming	1,000	†	100	100	†	†	200	†	†	†	100
United States	555,500	13,100	39,600	56,600	21,700	14,100	154,900	24,400	13,900	29,700	30,200

*Rounded to nearest 100. Excludes in situ carcinomas except urinary bladder. †Estimate is 50 or fewer deaths.
Note: State estimates may not add up to US total due to rounding.
Source: US Mortality Public Use Data Tapes, 1960-1999, National Center for Health Statistics.

Cancer Incidence Rates by Site and State, US, 1994-1998*

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin's Lymphoma		Prostate	Urinary Bladder	
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Male**	**Female**
Alabama	334.7	246.8	79.7	29.0	21.0	84.5	35.8	11.8	8.2	69.2	17	3.8
Alaska	419.2	362.8	114.1	32.3	36.8	74.9	52.6	18.5	13.1	120.2	30.2	8.6
Arizona†	406.5	313.9	103.4	45.0	31.6	66.8	41.8	15.9	11.4	117.3	29.5	8
Arkansas‡	—	—	—	—	—	—	—	—	—	—	—	—
California†	441.9	343.2	111.5	48.2	34.1	65.8	43.0	19.2	12.2	131.2	27.2	6.9
Colorado†	423.6	324.8	108.8	44.5	32.7	56.9	35.0	17.2	12.3	133.1	27.8	7.4
Connecticut†	492.9	379.9	121.6	57.3	41.3	75.4	48.5	20.6	14.4	141.3	35.6	10.1
Delaware†	500.4	375.6	117.3	57.9	41.3	95.4	57.4	17.8	13.7	146.6	32	8.9
Dist. of Columbia	606.9	374.1	121.7	57.4	44.4	98.1	45.5	20.5	11.3	221.3	20.6	6.8
Florida†	494.6	366.1	105.9	58.7	42.0	91.0	53.0	19	12.5	131.1	31.8	8.7
Georgia	365.1	261.2	86.0	37.3	27.1	72.8	33.5	12.8	8.7	107.5	19.6	5
Hawaii†	391.4	315.8	107.4	55.5	35.1	59.5	30.6	15.7	11.1	99.2	17	4.9
Idaho†	418	323.4	105.1	43.5	32.4	60.8	36.4	17.4	13.5	128.1	29.4	6.8
Illinois†	469.1	353.2	110.3	56.0	40.8	85.3	46.2	18.1	12.8	129.4	29.6	8.0
Indiana	410.3	323	102.1	52.1	37.5	85.8	44.1	16.2	12.2	99.9	27.9	7.6
Iowa†	459	349	108.7	59.1	43.0	80.8	40.3	18.5	14.2	127.7	29.8	6.7
Kansas‡	—	—	—	—	—	—	—	—	—	—	—	—
Kentucky†	487.1	354.8	101.9	56.1	40.7	121.7	58.5	18.1	12.7	112.4	28.3	7.5
Louisiana†	495.2	319.9	98.1	55.7	37.6	101.3	45.3	17	12	143.1	26	6.7
Maine	—	—	—	—	—	—	—	—	—	—	—	—
Maryland	519.2	374.2	119.6	57.0	42.2	88.7	51.2	18.2	12.2	163.2	30.8	9
Massachusetts	488.5	365.7	120.5	59.0	40.2	76.4	47.9	18.5	12.9	146.4	35.4	10.4
Michigan	499.4	358.7	109.9	53.6	37.7	86.4	48.6	18.6	13.6	154.8	32.2	8.4
Minnesota†	453.5	336.5	111.3	51.0	36.9	62.8	37.0	20.6	14.1	149.5	29.3	7.5
Mississippi	383.2	253.7	82.4	47.1	31.4	84.1	33.5	12.7	10.2	109.9	19.3	3.9
Missouri‡	464.3	352.7	108.7	57.0	39.8	95.6	51.6	18.8	12.6	118.2	28.2	7.1
Montana†	419.6	323.9	106.3	46.5	34.5	71.3	45.5	16.4	12.9	132.7	28.1	7.1
Nebraska†	446	334.5	108.5	56.2	38.2	73.9	36.8	18.5	12.8	133.6	26.3	6.7
Nevada	360.3	307.2	86.6	44.7	32.8	80.1	58.3	13	9.1	76.1	27.6	7.1
New Hampshire†	467.5	359.3	115.7	57.5	40.4	77.0	49.5	17.1	12.1	128.8	37	10
New Jersey†	513.4	377.3	116.4	62.7	43.6	78.7	46.4	21.1	14.8	155.9	34.7	9.4
New Mexico†	392.7	301.4	99.7	41.2	29.7	52.8	31.4	15.0	10.2	124.1	21.7	6.4
New York	461.7	360.4	110.7	57.8	41.7	75.7	44.9	19.9	13	113.0	31.1	8.8
North Carolina†	441.8	308.8	101.8	47.1	33.5	93.9	41.0	15.3	10.9	124.3	25.7	6.4
North Dakota	447.8	311.4	100.4	57.0	38.2	64.1	35.2	18.6	10.2	144.0	32.1	7.1
Ohio	431.2	341.0	107.8	53.1	38.7	83.8	47.1	18	12.5	111.5	30.4	7.9
Oklahoma‡	—	—	—	—	—	—	—	—	—	—	—	—
Oregon	436.3	354.2	119.0	45.7	32.7	72.7	49.7	17	12.5	126.8	31.7	8.6
Pennsylvania†	485.4	352.6	108.4	61.1	42.4	82.6	43.1	19.2	13.4	138.8	35.0	9.1
Rhode Island†	526.3	388.3	114.9	61.8	43.6	91.4	53.3	21	15.4	142.9	40.8	10.7
South Carolina	469.7	321	103.0	52.6	35.5	87.0	40.4	14.6	10.7	143.4	25.8	6.2
South Dakota‡	—	—	—	—	—	—	—	—	—	—	—	—
Tennessee	—	—	—	—	—	—	—	—	—	—	—	—
Texas	445.2	316.6	98.2	49.0	33.5	87.1	43.4	17.3	11.9	123.2	23.3	5.8
Utah†	385.8	286.1	97.8	38.9	29.3	35.6	19.0	17.9	11.9	145.4	23.7	5.5
Vermont‡	—	—	—	—	—	—	—	—	—	—	—	—
Virginia	404.8	297.9	99.5	46.1	34.3	75.9	38.6	14.6	10.5	119.3	23.7	6.6
Washington	463.7	371.7	120.4	48.7	35.6	73.5	50.3	20.5	13.8	136.0	32.2	7.9
West Virginia†	458.3	346.1	96.3	53.7	40.1	104.4	54.6	16.7	12.8	111.0	31	8.9
Wisconsin†	468.4	351.5	110.1	58.7	42.1	74.3	42.9	19	13.5	138.0	30.2	8.2
Wyoming†	423.8	316.5	97.5	44.8	33.3	61.3	39.5	14.4	12.6	146.0	27.6	7.7
United States	468.5	352.8	114.3	52.2	37.5	72.6	43.5	19.8	13	142.0	28.8	7.6

*Per 100,000 persons, age-adjusted to the 1970 U.S. standard population. Not all states submitted data for all years. †This state's registry has been recognized by NAACCR to meet the following data quality standards: data for all years 1994-1998; a NAACCR estimate of 0.1% duplicate records or fewer; resolution of errors detected using an EDITS software program; and a NAACCR estimate of at least 90% completeness. ‡ This state's registry did not submit incidence data to the North American Association of Central Cancer Registries (NAACCR) for 1994-1998.

Sources: Cancer in North America, 1994-98, Volume One: Incidence, North American Association of Central Cancer Registries. US Incidence: SEER Cancer Statistics Review, 1973-1998, Surveillance, Epidemiology, and End Results Program, Division of Cancer Control and Population Sciences, National Cancer Insititute, 2001.

American Cancer Society, Surveillance Research, 2002

Cancer Death Rates by Site and State, US, 1994-1998*

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin's Lymphoma		Pancreas		Prostate
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Alabama	237.5	138.1	22.1	18.7	12.7	84.4	32.2	8.3	5.0	10.4	7.1	28.2
Alaska	185.7	138.4	20.7	18.3	14.7	61.2	39.6	7.4	4.6	9.8	6.9	17.3
Arizona	181.8	125.8	21.4	17.4	11.9	57.1	31.9	8.1	5.4	8.9	6.6	21.2
Arkansas	232.2	138.9	22.1	19.7	14.1	93.0	36.8	9.0	5.3	10.2	7.6	25.5
California	179.2	132.3	23.3	17.6	12.3	53.0	32.9	7.9	5.2	9.0	7.1	20.8
Colorado	169.3	118.5	20.0	17.1	11.9	46.6	25.9	7.7	5.7	9.1	6.5	21.4
Connecticut	193.8	137.9	25.1	19.9	13.4	57.9	33.9	8.5	6.0	10.3	7.8	21.3
Delaware	231.4	158.6	26.7	21.6	16.8	79.4	42.8	8.3	5.7	9.5	7.8	26.9
Dist. of Columbia	268.2	165.2	33.2	23.9	17.5	76.1	35.8	7.9	3.8	11.7	8.6	40.1
Florida	200.1	134.2	23.2	19.1	13.2	67.9	36.2	8.7	5.3	9.6	6.9	21.5
Georgia	227.8	136.0	23.7	18.4	13.0	83.2	33.1	7.5	4.9	9.3	6.9	29.4
Hawaii	157.5	105.2	17.1	16.9	10.1	46.2	23.1	7.1	5.1	8.9	6.7	15.2
Idaho	175.9	122.7	22.0	17.0	11.7	51.2	27.8	8.4	5.7	8.6	5.7	24.3
Illinois	214.1	144.0	26.0	22.8	15.1	69.8	34.8	8.9	5.7	10.2	7.3	24.1
Indiana	218.9	145.2	24.7	21.7	15.6	79.1	37.5	9.0	6.0	10.2	7.1	24.1
Iowa	193.4	130.6	23.1	21.4	15.3	64.5	30.5	8.7	6.3	9.0	6.8	23.1
Kansas	192.0	130.1	22.7	19.2	12.9	65.3	31.8	8.3	5.8	9.6	7.0	22.0
Kentucky	245.3	150.1	23.8	22.9	15.6	99.4	44.2	8.9	5.8	10.0	6.8	24.1
Louisiana	248.7	150.4	25.6	23.1	15.1	87.6	37.0	9.1	5.8	12.1	8.0	29.2
Maine	222.5	150.8	23.8	22.2	16.0	73.8	41.5	9.5	6.1	10.4	7.4	23.6
Maryland	222.1	150.6	26.4	23.5	16.0	72.4	38.6	8.2	5.2	10.5	7.8	26.9
Massachusetts	211.5	145.5	25.8	23.1	15.5	63.8	36.7	9.1	5.8	10.1	7.6	22.7
Michigan	207.1	141.1	24.8	21.2	13.9	68.9	35.5	8.8	6.3	9.8	7.3	24.0
Minnesota	186.9	130.4	23.2	19.1	12.7	53.1	29.8	9.5	6.4	9.9	7.0	24.7
Mississippi	247.4	137.9	23.3	20.4	13.5	91.9	32.8	7.6	5.2	11.3	7.6	30.8
Missouri	216.0	143.0	23.9	21.1	14.7	79.0	38.1	8.9	5.7	9.0	7.2	22.4
Montana	188.9	129.8	22.1	18.8	11.7	56.6	33.5	8.5	5.6	9.6	6.6	24.5
Nebraska	188.0	125.4	23.2	22.3	14.3	61.2	28.3	8.0	5.1	9.6	6.1	20.2
Nevada	209.6	153.2	22.7	21.5	14.2	68.3	46.7	8.1	5.2	9.9	7.7	23.0
New Hampshire	213.2	152.1	24.6	21.7	16.6	65.7	40.0	9.8	6.0	10.4	7.7	22.8
New Jersey	210.8	150.6	27.2	23.9	16.1	62.9	35.2	9.4	6.1	10.1	8.1	24.1
New Mexico	172.8	122.1	21.7	17.5	11.6	45.8	25.8	6.7	4.8	8.6	7.1	23.3
New York	199.1	141.4	26.7	22.6	15.5	59.6	31.9	9.1	5.7	10.3	7.7	23.0
North Carolina	226.1	135.1	23.8	20.0	14.1	83.4	32.4	7.7	5.2	10.2	7.2	28.1
North Dakota	187.1	124.5	22.5	21.5	13.4	55.4	26.7	7.7	5.8	9.0	5.9	25.5
Ohio	218.3	147.4	25.6	22.8	15.5	75.1	37.5	9.3	6.3	9.4	7.3	24.4
Oklahoma	211.7	137.6	23.7	19.4	13.4	81.2	37.0	8.6	5.7	9.0	6.6	21.3
Oregon	192.8	141.1	23.2	18.5	12.6	62.8	39.0	8.8	5.8	8.7	7.6	23.8
Pennsylvania	215.5	143.8	25.8	23.3	15.9	69.2	33.2	8.9	6.0	9.8	7.1	24.1
Rhode Island	221.9	147.5	26.2	24.4	14.7	74.2	37.9	9.9	6.2	11.1	7.9	23.8
South Carolina	229.5	137.0	23.7	21.3	13.9	79.7	31.6	7.7	4.9	10.3	8.2	30.4
South Dakota	190.8	125.0	20.9	20.8	14.7	59.2	26.6	9.4	5.6	8.6	6.3	24.4
Tennessee	237.0	142.8	24.3	21.2	14.5	92.7	36.2	8.9	5.8	10.7	7.2	25.1
Texas	207.8	133.1	22.4	19.7	13.0	71.1	33.3	8.4	5.5	9.6	6.9	24.1
Utah	143.7	102.3	20.6	14.5	11.2	28.6	14.0	8.1	5.4	7.4	5.0	25.2
Vermont	206.5	143.5	23.4	22.1	16.4	65.9	35.6	10.1	5.2	10.3	6.1	23.7
Virginia	220.2	141.4	24.9	20.5	14.8	76.0	35.2	8.0	5.4	9.9	6.9	27.3
Washington	187.2	137.6	22.8	17.8	12.6	59.2	37.8	8.2	5.8	9.4	7.4	21.2
West Virginia	229.4	150.1	22.9	21.4	15.7	86.7	41.7	8.7	5.8	9.1	6.4	22.5
Wisconsin	196.0	133.9	23.0	20.2	13.5	57.0	30.0	9.1	5.9	9.8	7.1	24.8
Wyoming	182.6	136.1	23.2	18.5	15.6	53.3	31.4	6.6	6.3	8.1	6.5	25.9
United States	206.0	138.6	24.2	20.5	14.1	68.0	34.3	8.6	5.6	9.7	7.2	23.7

*Per 100,000, age-adjusted to the 1970 US standard population.

Source: US Mortality Public Use Data Tapes 1960-1999, National Center for Health Statistics, Centers for Disease Control and Prevention, 2001.

American Cancer Society, Surveillance Research, 2002

Selected Cancers

Breast

New Cases: An estimated 203,500 new invasive cases of breast cancer are expected to occur among women in the United States during 2002. After increasing about 4.5% per year in the 1980s, breast cancer incidence rates among white women continued to increase more slowly through 1998. About 1,500 new cases of breast cancer are expected in men in 2002.

In addition to invasive breast cancer, 54,300 new cases of in situ breast cancer are expected to occur among women during 2002. Of these, approximately 88% will be ductal carcinoma in situ (DCIS). The increase in detection of DCIS cases is a direct result of increased use of mammography screening, which is also responsible for detection of invasive cancers, at a less advanced stage than might have occurred otherwise.

Deaths: An estimated 40,000 deaths (39,600 women, 400 men) are anticipated from breast cancer in 2002. Breast cancer ranks second among cancer deaths in women. According to the most recent data, mortality rates declined significantly during 1992-1998, with the largest decreases in younger women, both white and black. These decreases are probably the results of both earlier detection and improved treatment.

Signs and Symptoms: The earliest sign of breast cancer is an abnormality that shows up on a mammogram before it can be felt by the woman or her health care provider. When breast cancer has grown to the point where physical signs and symptoms exist, these may include a breast lump, thickening, swelling, distortion, or tenderness; skin irritation or dimpling; and nipple pain, scaliness, ulceration, or retraction. Breast pain is commonly due to benign conditions and is not usually the first symptom of breast cancer.

Risk Factors: The risk of breast cancer increases with age. Risk is higher in women who have a personal or family history of breast cancer, biopsy-confirmed atypical hyperplasia, increased breast density, a long menstrual history (menstrual periods that started early and ended late in life), obesity after menopause, recent use of oral contraceptives or postmenopausal estrogens and progestin, who have never had children or had their first child after age 30, or who consume alcoholic beverages. Worldwide, breast cancer incidence rates appear to correlate with variations in diet, especially fat intake, although the specific dietary factors that affect breast cancer have not been firmly established. Vigorous physical activity and maintenance of a healthy body weight are associated with lower risk. Most data indicate tamoxifen decreases breast cancer risk and preliminary data suggest another selective estrogen-receptor modulator, raloxifene, does also. The inherited susceptibility genes, BRCA1 and BRCA2, account for approximately 5% of all cases. General screening of the population for mutations of these genes is not recommended.

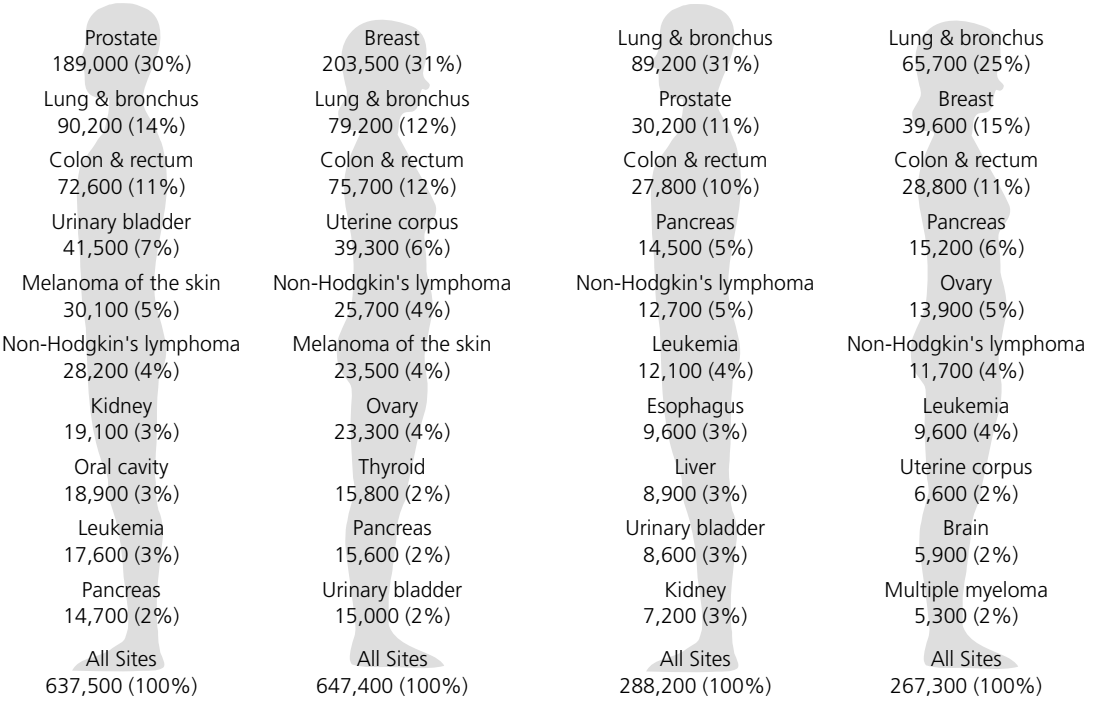
Early Detection: Mammography is especially valuable as an early detection tool because it can identify breast cancer at an early stage before physical symptoms develop. Numerous studies have shown that early detection saves lives and increases treatment options. The declines in breast cancer mortality have been attributed, in large part, to the regular use of screening mammography. The American Cancer Society recommends that women age 40 and older have an annual mammogram, an annual clinical breast examination by a health care professional (close to and preferably before the scheduled mammogram), and perform monthly breast self-examination. Women ages 20-39 should have a clinical breast examination by a health care professional every three years and should perform breast self-examination monthly.

When a woman has a suspicious lump or other abnormality on an initial mammogram, further mammographic testing can help determine whether additional tests are needed. Mammography alone does not provide a sufficient assessment. All suspicious lumps should be biopsied for a definitive diagnosis.

Treatment: Taking into account the medical circumstances and the patient's preferences, treatment may involve lumpectomy (local removal of the tumor) and removal of the lymph nodes under the arm; mastectomy (surgical removal of the breast) and removal of the lymph nodes under the arm; radiation therapy; chemotherapy; or hormone therapy. Often, two or more methods are used in combination. Numerous studies have shown that, for early-stage disease, long-term survival rates after lumpectomy plus radiotherapy are similar to survival rates after modified radical mastectomy. Patients should discuss possible options for the best management of their breast cancer with their physicians. Significant advances in reconstruction techniques provide several options for breast reconstruction immediately after mastectomy.

Treatment of ductal carcinoma in situ (DCIS) includes local excision, radiation, and/or tamoxifen. Treatment of DCIS is important to prevent tumor progression.

Leading Sites of New Cancer Cases and Deaths—2002 Estimates*



Cancer Cases by Site and Sex		Cancer Deaths by Site and Sex	
Male	**Female**	**Male**	**Female**
Prostate 189,000 (30%)	Breast 203,500 (31%)	Lung & bronchus 89,200 (31%)	Lung & bronchus 65,700 (25%)
Lung & bronchus 90,200 (14%)	Lung & bronchus 79,200 (12%)	Prostate 30,200 (11%)	Breast 39,600 (15%)
Colon & rectum 72,600 (11%)	Colon & rectum 75,700 (12%)	Colon & rectum 27,800 (10%)	Colon & rectum 28,800 (11%)
Urinary bladder 41,500 (7%)	Uterine corpus 39,300 (6%)	Pancreas 14,500 (5%)	Pancreas 15,200 (6%)
Melanoma of the skin 30,100 (5%)	Non-Hodgkin's lymphoma 25,700 (4%)	Non-Hodgkin's lymphoma 12,700 (5%)	Ovary 13,900 (5%)
Non-Hodgkin's lymphoma 28,200 (4%)	Melanoma of the skin 23,500 (4%)	Leukemia 12,100 (4%)	Non-Hodgkin's lymphoma 11,700 (4%)
Kidney 19,100 (3%)	Ovary 23,300 (4%)	Esophagus 9,600 (3%)	Leukemia 9,600 (4%)
Oral cavity 18,900 (3%)	Thyroid 15,800 (2%)	Liver 8,900 (3%)	Uterine corpus 6,600 (2%)
Leukemia 17,600 (3%)	Pancreas 15,600 (2%)	Urinary bladder 8,600 (3%)	Brain 5,900 (2%)
Pancreas 14,700 (2%)	Urinary bladder 15,000 (2%)	Kidney 7,200 (3%)	Multiple myeloma 5,300 (2%)
All Sites 637,500 (100%)	All Sites 647,400 (100%)	All Sites 288,200 (100%)	All Sites 267,300 (100%)

*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.
Percentages may not total 100% due to rounding.

Survival: The 5-year relative survival rate for localized breast cancer has increased from 72% in the 1940s to 96% today. If the cancer has spread regionally, however, the rate is 78%, and for women with distant metastases the rate is 21%. Survival after a diagnosis of breast cancer continues to decline beyond five years. Survival at 10 years or more is also stage dependent, with the best survival observed in women diagnosed with early stage disease.

For more information about breast cancer, please inquire about the American Cancer Society publication and Web site posting of *Breast Cancer Facts & Figures 2001-2002* (8610.01).

Childhood Cancer

New Cases: An estimated 9,100 new cases are expected to occur among children aged 0-14 in 2002. Childhood cancers are rare.

Deaths: An estimated 1,400 deaths are expected to occur among children aged 0-14 in 2002, about one-third of them from leukemia. Despite its rarity, cancer is the chief cause of death by disease in children between ages 1 and 14. Mortality rates have declined 50% since 1973.

Early Detection: Cancers in children often are difficult to recognize. Parents should see that their children have regular medical checkups and should be alert to any unusual symptoms that persist. These include: an unusual mass or swelling; unexplained paleness and loss of energy; sudden tendency to bruise; a persistent, localized pain or limping; prolonged, unexplained fever or illness; frequent headaches, often with vomiting; sudden eye or vision changes; and excessive, rapid weight loss. Childhood cancers include:

- Leukemia which accounts for about 30% of cases in children ages 0-14 (see Leukemia).
- Osteosarcoma (2.7%), a bone cancer which may cause no pain at first; swelling in the area of the tumor is often the first sign.
- Ewing's sarcoma (1.8%), another type of cancer that arises in bone.
- Neuroblastoma (7.3%), a cancer of the sympathetic nervous system which can appear anywhere but usually occurs in the abdomen as a swelling.

- Rhabdomyosarcoma (3.4%), the most common soft tissue sarcoma, can occur in the head and neck area, genitourinary area, trunk, and extremities.
- Brain and intraspinal cancers (21%) which in early stages may cause headaches, nausea, vomiting; blurred or double vision, dizziness, and difficulty in walking or handling objects.
- Non-Hodgkin's lymphomas (4.0%) and Hodgkin's disease (4.4%), cancers that involve the lymph nodes, but also may invade bone marrow and other organs. They may cause swelling of lymph nodes in the neck, armpit, or groin. Other symptoms may include general weakness and fever.
- Retinoblastoma (2.8%), an eye cancer, usually occurs in children under age 4. When detected early, cure is possible with appropriate treatment.
- Wilms' tumor (5.9%), a kidney cancer, may be recognized by a swelling or lump in the abdomen.

Treatment: Childhood cancers can be treated by a combination of therapies chosen based on the specific type and stage of the cancer. Treatment is coordinated by a team of experts including oncologic physicians, pediatric nurses, social workers, psychologists, and others who assist children and their families.

Survival: Five-year survival rates vary considerably, depending on the site: all sites, 77%; bone cancer, 73%; neuroblastoma, 71%; brain and central nervous system, 69%; Wilms' tumor (kidney), 92%; Hodgkin's disease, 92%; and acute lymphocytic leukemia, 85%.

Colon and Rectum

See special section, pages 20-27.

Leukemia

New Cases: An estimated 30,800 new cases are expected in 2002, approximately evenly divided between acute leukemia and chronic leukemia. Although often thought of as primarily a childhood disease, leukemia is diagnosed ten times more often in adults than in children. Acute lymphocytic leukemia accounts for approximately 2,000 of the leukemia cases among children. In adults, the most common types are acute myeloid leukemia (approximately 10,600 cases) and chronic lymphocytic leukemia (approximately 7,000 cases). Incidence of acute myeloid leukemia increased by 1.8% per year among males during 1992-1998, with most of the increase occurring in the elderly, possibly attributable to cigarette smoking.

Deaths: An estimated 21,700 deaths in 2002.

Signs and Symptoms: Fatigue, paleness, weight loss, repeated infections, bruising easily, and nosebleeds or other hemorrhages. In children, these signs can appear suddenly. Chronic leukemia can progress slowly with few symptoms.

Risk Factors: Leukemia affects both sexes and all ages. Causes of most leukemias are unknown. Persons with Down syndrome and certain other genetic abnormalities have higher incidence rates of leukemia. Leukemia is caused by excessive exposure to ionizing radiation and to certain chemicals such as benzene, a commercially used toxic liquid that is present in gasoline and cigarette smoke. Leukemia also may occur as a side effect of cancer treatment. Certain leukemias and lymphomas are caused by a retrovirus, human T-cell leukemia/lymphoma virus-I (HTLV-I).

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

Treatment: Chemotherapy is the most effective method of treating leukemia. Various anticancer drugs are used, either in combinations or as single agents. Transfusions of blood components and antibiotics are used as supportive treatments. Under appropriate conditions, bone marrow transplantation may be useful in treating certain leukemias.

Survival: The 1-year relative survival rate for patients with leukemia is 64%. Survival decreases to 46% five years after diagnosis, primarily due to the poor survival of patients with certain types of leukemia, such as acute myeloid leukemia. There has been a dramatic improvement in survival for patients with acute lymphocytic leukemia from a 5-year relative survival rate of 38% in the mid-1970s to 63% in the mid-1990s. Survival rates for children with acute lymphocytic leukemia have increased from 53% to 85% over the same time period.

Lung and Bronchus

New Cases: An estimated 169,400 new cases in 2002, accounting for about 13% of cancer diagnoses. The incidence rate is declining significantly in men, from a high of 86.5 per 100,000 in 1984 to 69.8 in 1998. In the 1990s, the increase among women reached a plateau, with incidence in 1998 at 43.4 per 100,000.

Deaths: An estimated 154,900 deaths in 2002, accounting for 28% of all cancer deaths. During 1992-1998, mortality from lung cancer declined significantly (1.9%

per year) among men, while rates for women continued to increase, but at a much slower pace (0.8% per year). Since 1987, more women have died each year of lung cancer than breast cancer, which, for over 40 years, had been the major cause of cancer death in women. Decreasing lung cancer incidence and mortality rates most likely result from decreased smoking rates over the past 30 years. However, decreasing smoking patterns among women lag behind those of men. Declines in adult tobacco use have slowed, as have declines in mortality under 45 years old; tobacco use among youth increased considerably during the 1990s except in states with vigorous tobacco control programs.

Signs and Symptoms: Persistent cough, sputum streaked with blood, chest pain, and recurring pneumonia or bronchitis.

Risk Factors: Cigarette smoking is by far the most important risk factor in the development of lung cancer. Other risk factors include exposure to certain industrial substances, such as arsenic; some organic chemicals; occupational or environmental exposures to radon and asbestos, particularly among smokers; radiation exposure from occupational, medical, and environmental sources; air pollution; tuberculosis; and for nonsmokers, environmental tobacco smoke.

Early Detection: Early detection has not yet been proven to improve survival. Chest x-ray, analysis of cells contained in sputum, and fiberoptic examination of the bronchial passages have shown limited effectiveness in early lung cancer detection. Newer tests such as low-dose helical CT scans and molecular markers in sputum can detect lung cancer earlier, and the effect of this on survival is being evaluated.

Treatment: Treatment options are determined by the type and stage of the cancer and include surgery, radiation therapy, and chemotherapy. For many localized cancers, surgery is usually the treatment of choice. Because the disease has usually spread by the time it is discovered, radiation therapy and chemotherapy are often needed in combination with surgery. Chemotherapy alone or combined with radiation is the treatment of choice for small cell lung cancer; on this regimen, a large percentage of patients experience remission, which in some cases is long lasting.

Survival: The 1-year relative survival rate for lung cancer has increased from 34% in 1975 to 41% in 1997, largely due to improvements in surgical techniques. However, the 5-year relative survival rate for all stages combined is only 15%. The survival rate is 48% for cases detected when the disease is still localized. Only 15% of lung cancers are diagnosed at this early stage.

Lymphoma

New Cases: An estimated 60,900 new cases in 2002, including 7,000 cases of Hodgkin's disease and 53,900 cases of non-Hodgkin's lymphoma. Since the early 1970s, incidence rates for non-Hodgkin's lymphoma (NHL) have nearly doubled. However, during 1992-98, incidence rates have stabilized, except among black females. Overall, incidence rates for Hodgkin's disease have declined since the late 1980s.

Deaths: An estimated 25,800 deaths in 2002 (non-Hodgkin's lymphoma, 24,400; Hodgkin's disease, 1,400).

Signs and Symptoms: Enlarged lymph nodes, itching, fever, night sweats, fatigue, and weight loss. Intermittent fever can last for several days or weeks.

Risk Factors: Risk factors are largely unknown but in part involve reduced immune function and exposure to certain infectious agents. Persons with organ transplants are at higher risk due to altered immune function. Human immunodeficiency virus (HIV) and human T-cell leukemia/lymphoma virus-I (HTLV-I) are associated with increased risk of non-Hodgkin's lymphoma. Burkitt's lymphoma in Africa is partly caused by the Epstein-Barr virus. Other possible risk factors include occupational exposures to herbicides and perhaps other chemicals.

Treatment: Hodgkin's disease: chemotherapy alone or with radiotherapy is useful for most patients. Non-Hodgkin's lymphoma: in the early stage, localized lymph node disease can be treated with radiotherapy. Patients with later-stage disease are treated with chemotherapy or with chemotherapy plus radiation depending on the specific type of non-Hodgkin's lymphoma. New treatment programs using highly specific monoclonal antibodies directed at lymphoma cells, and high-dose chemotherapy with bone marrow transplantation, are being tested in selected patients who relapsed after standard treatment.

Survival: Survival rates vary widely by cell type and stage of disease. The 1-year relative survival rates for Hodgkin's disease and non-Hodgkin's lymphoma are 93% and 75%, respectively; the 5-year rates are 83% and 53%. Ten years after diagnosis, the relative survival rates for Hodgkin's and non-Hodgkin's disease decline to 74% and 43%; and the 15-year survival rates are 66% and 37%, respectively.

How to Estimate Cancer Statistics Locally, 2002

To obtain the estimated number of...	Multiply community population by: All Sites	Female Breast*	Colon & Rectum	Lung	Prostate*
New cancer cases	0.0046	0.0014	0.0005	0.0006	0.0014
Cancer deaths	0.0020	0.0003	0.0002	0.0006	0.0002
People who will eventually develop cancer	0.4059	0.1324	0.0578	0.0673	0.1603
People who will eventually die of cancer	0.2132	0.0320	0.0234	0.0546	0.0328

*For female breast cancer, multiply by female population and for prostate cancer, multiply by male population.

Note: These calculations provide only a rough approximation of the number of people in a specific community who may develop or die of cancer. These estimates should be used with caution because they do not reflect the age or racial characteristics of the population, access to detection and treatment, or exposure to risk factors. Many states have cancer registries which count the number of cancers that occur in localities throughout the state. The American Cancer Society recommends using data from these registries, when it is available, to more accurately estimate local cancer statistics.

Source: DevCan Software, Version 4.1; NCI, Surveillance, Epidemiology, and End Results Program, 1973-1998. Division of Cancer Control and Population Sciences, National Cancer Institute, 2001.

American Cancer Society, Surveillance Research, 2002

Oral Cavity and Pharynx

New Cases: An estimated 28,900 new cases in 2002. Incidence rates are more than twice as high in men as in women and are greatest in men who are over age 40. During 1984-1998, the incidence rate of oral cancers declined by about 1.3% per year.

Deaths: An estimated 7,400 deaths in 2002. Mortality rates have been decreasing since the late 1970s.

Signs and Symptoms: A sore that bleeds easily and does not heal; a lump or thickening; a red or white patch that persists. Difficulties in chewing, swallowing, or moving tongue or jaws are often late symptoms.

Risk Factors: Cigarette, cigar, or pipe smoking; use of smokeless tobacco; excessive consumption of alcohol.

Early Detection: Cancer can affect any part of the oral cavity, including the lip, tongue, mouth, and throat. Dentists and primary care physicians can identify abnormal changes in oral tissues and detect cancer at an early, curable stage.

Treatment: Radiation therapy and surgery are standard treatments. In advanced disease, chemotherapy may be useful as an adjunct to surgery.

Survival: For all stages combined, about 84% of oral cavity and pharynx cancer patients survive 1 year after diagnosis. The 5-year and 10-year relative survival rates are 54% and 39%, respectively.

Ovary

New Cases: An estimated 23,300 new cases in the United States in 2002. It accounts for nearly 4% of all cancers among women and ranks second among gynecologic cancers, following cancer of the uterine corpus. During 1992-1998, ovarian cancer incidence declined at a rate of 1.3% per year.

Deaths: An estimated 13,900 deaths in 2002. Ovarian cancer causes more deaths than any other cancer of the female reproductive system.

Signs and Symptoms: The most common sign is enlargement of the abdomen, which is caused by accumulation of fluid. Abnormal vaginal bleeding is rarely a symptom. In women over 40, vague digestive disturbances (stomach discomfort, gas, distention) that persist and cannot be explained by any other cause may indicate the need for an evaluation for ovarian cancer, including a thorough pelvic examination.

Risk Factors: Risk for ovarian cancer increases with age and peaks in the late 70s. Women who have never had children are more likely to develop ovarian cancer than those who have. Pregnancy and the use of oral contraceptives appear to reduce the risk of developing ovarian cancer. Women who have had breast cancer or have a family history of breast or ovarian cancer are at increased risk. Mutations in BRCA1 or BRCA2 have been observed in these families. Another genetic syndrome, hereditary non-polyposis colon cancer, also has been associated with endometrial and ovarian cancer. Incidence rates are highest in industrialized countries other than Japan.

Early Detection: Periodic, thorough pelvic exams are important. The Pap test, useful in detecting cervical cancer, rarely uncovers early ovarian cancer. Transvaginal ultrasound and a tumor marker, CA125, may help in diagnosis but are not used for routine screening.

Treatment: Surgery, radiation therapy, and chemotherapy are treatment options. Surgery usually includes the removal of the uterus (hysterectomy), and one or both ovaries and fallopian tubes (salpingo-oophorectomy). In some very early tumors, only the involved ovary will be removed, especially in young women who wish to have

Probability of Developing Invasive Cancers Over Selected Age Intervals, by Sex, US, 1996-1998*

		Birth-39	40-59	60-79	Birth to Death
All Sites†	Male	1.45 (1 in 69)	8.33 (1 in 12)	32.3 (1 in 3)	43.48 (1 in 2)
	Female	1.92 (1 in 52)	9.09 (1 in 11)	20.0 (1 in 5)	38.25 (1 in 3)
Bladder‡	Male	0.024 (1 in 4234)	0.42 (1 in 236)	2.38 (1 in 42)	3.45 (1 in 29)
	Female	Less than 1 in 10,000	0.13 (1 in 760)	0.64 (1 in 156)	1.12 (1 in 89)
Breast	Female	0.44 (1 in 229)	4.17 (1 in 24)	7.14 (1 in 14)	12.5 (1 in 8)
Colon &	Male	0.07 (1 in 1508)	0.87 (1 in 115)	4.00 (1 in 25)	5.88 (1 in 17)
Rectum	Female	0.06 (1 in 1719)	0.69 (1 in 145)	3.03 (1 in 33)	5.55 (1 in 18)
Leukemia	Male	0.16 (1 in 627)	0.21 (1 in 483)	0.81 (1 in 124)	1.43 (1 in 70)
	Female	0.12 (1 in 810)	0.15 (1 in 671)	0.47 (1 in 212)	1.04 (1 in 96)
Lung &	Male	0.03 (1 in 3060)	1.12 (1 in 89)	5.88 (1 in 17)	7.69 (1 in 13)
Bronchus	Female	0.03 (1 in 3099)	0.86 (1 in 116)	4.00 (1 in 25)	5.88 (1 in 17)
Melanoma	Male	0.13 (1in 769)	0.50 (1 in 199)	0.97 (1 in 103)	1.72 (1 in 58)
of Skin	Female	0.19 (1 in 508)	0.38 (1 in 261)	0.49 (1 in 201)	1.22 (1 in 82)
Non-Hodgkin's	Male	0.17 (1 in 591)	0.48 (1 in 208)	1.23 (1 in 81)	2.08 (1 in 48)
Lymphoma	Female	0.08 (1 in 1311)	0.32 (1 in 317)	0.98 (1 in 102)	1.75 (1 in 57)
Prostate	Male	Less than 1 in 10,000	2.08 (1 in 48)	12.5 (1 in 8)	16.67 (1 in 6)
Uterine Cervix	Female	0.18 (1 in 567)	0.35 (1 in 288)	0.28 (1 in 354)	0.85 (1 in 117)
Uterine Corpus	Female	0.05 (1 in 2097)	0.72 (1 in 138)	1.64 (1 in 61)	2.70 (1 in 37)

*For those free of cancer at beginning of age interval. Based on cancer cases diagnosed during 1996-1998. The 1 in statistic and the inverse of the percentage may not be equivalent due to rounding. †Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. ‡Includes invasive and in situ cancer cases.

Source: DevCan, Probability of Developing or Dying of Cancer Software, Version 4.1. Feuer EJ, Wun LM, National Cancer Institute, 2001.

American Cancer Society, Surveillance Research, 2002

children. In advanced disease, an attempt is made to remove all intra-abdominal disease to enhance the effect of chemotherapy.

Survival: Eighty percent of new ovarian cancer patients survive 1 year after diagnosis; the 5-year relative survival rate for all stages is 52%. If diagnosed and treated while the disease is localized, the 5-year survival rate is 95%; however, only about 26% of all cases are detected at the localized stage. Five-year relative survival rates for women with regional and distant disease are 81% and 29%, respectively.

Pancreas

New Cases: An estimated 30,300 new cases in the United States in 2002. Over the past 15 to 25 years, rates of pancreatic cancer have declined slowly in men and women.

Deaths: An estimated 29,700 deaths in 2002. Among men the death rate increased from 1930 to 1972, then declined by 0.8% per year from 1973-1986, and by 0.4% per year through 1998. In contrast, rates among women increased by 0.6% per year from 1973-1984, and remained relatively stable thereafter.

Signs and Symptoms: Cancer of the pancreas generally develops without early symptoms. If a cancer develops in an area of the pancreas near the common bile duct, its blockage may lead to jaundice (a noticeable yellowing of the skin due to pigment accumulation). Sometimes this symptom allows the tumor to be diagnosed at an early stage.

Risk Factors: Cigarette and cigar smoking increase the risk of pancreatic cancer; incidence rates are more than twice as high for smokers as for nonsmokers. Risk also appears to increase with obesity, physical inactivity, chronic pancreatitis, diabetes, and cirrhosis. Pancreatic cancer rates are higher in countries whose populations eat a diet high in fat.

Early Detection: At present, only biopsy yields a certain diagnosis. Because of the "silent" course of the disease, the need for biopsy may become obvious only with advanced disease. Researchers are focusing on ways to diagnose pancreatic cancer before symptoms occur.

Treatment: Surgery, radiation therapy, and chemotherapy are treatment options that can extend survival and/or relieve symptoms in many patients, but seldom produce a cure. Clinical trials with several new agents may offer improved survival and should be considered an option.

Survival: For all stages combined, the 1-year relative survival rate is only 21%, and the 5-year rate is about 5%.

Prostate

New Cases: An estimated 189,000 new cases in the US during 2002. Prostate cancer incidence rates remain significantly higher in black men than in white men. Between 1988 and 1992, prostate cancer incidence rates increased dramatically, due to earlier diagnosis in men without symptoms, using the prostate-specific antigen (PSA) blood test. Prostate cancer incidence rates subsequently declined and have leveled off, especially in the elderly. Rates peaked in 1992 among white men and in 1993 among black men.

Deaths: An estimated 30,200 deaths in 2002, the second leading cause of cancer death in men. Although mortality rates are declining among white and black men, rates in black men remain more than twice as high as rates in white men.

Signs and Symptoms: 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; pain or burning on urination; continual pain in lower back, pelvis, or upper thighs. Most of these symptoms are nonspecific and are similar to those caused by benign conditions.

Risk Factors: The incidence of prostate cancer increases with age; more than 70% of all prostate cancers are diagnosed in men over age 65. Black Americans have the highest prostate cancer incidence rates in the world; the disease is common in North America and Northwestern Europe and is rare in Asia, Africa, and South America. Recent genetic studies suggest that strong familial predisposition may be responsible for 5%-10% of prostate cancers. International studies suggest that dietary fat may also be a risk factor.

Early Detection: The prostate-specific antigen (PSA) test and the digital rectal examination should be offered annually beginning at age 50 to men who have a life expectancy of at least 10 years. Men at high risk (African-American men and men who have a first-degree relative diagnosed with prostate cancer at a young age) should begin testing at age 45. Patients should be given information about the benefits and limitations of testing.

Treatment: Depending on age, stage of the cancer, and other medical conditions of the patient, surgery and radiation should be discussed with the patient's physician. Hormonal therapy and chemotherapy or combinations of these options might be considered for metastatic disease. Hormone treatment may control prostate cancer for long periods by shrinking the size of the tumor, thus relieving pain and other symptoms. Careful observation without immediate active treatment ("watchful waiting") may be appropriate, particularly for older individuals with low-grade and/or early-stage tumors.

Survival: Eighty-three percent of all prostate cancers are discovered in the local and regional stages; the 5-year relative survival rate for patients whose tumors are diagnosed at these stages is 100%. Over the past 20 years, the survival rate for all stages combined has increased from 67% to 96%. Relative survival after a diagnosis of prostate cancer continues to decline with longer follow-up. According to the most recent data, relative 10-year survival is 75%, and 15-year survival is 54%.

Skin

New Cases: More than 1 million cases of highly curable basal cell or squamous cell cancers occur annually. The most serious form of skin cancer is melanoma, which is expected to be diagnosed in about 53,600 persons in 2002. During the 1970s, incidence rate of melanoma increased rapidly at about 6% per year. Since 1981, however, the rate of increase slowed to about 3% per year. Melanoma is a disease of whites, and rates are more than 10 times higher in whites than in blacks. Other important forms of skin cancer include Kaposi's sarcoma, which commonly occurs among homosexual patients with AIDS, and cutaneous T-cell lymphoma.

Deaths: An estimated 9,600 deaths this year, 7,400 from melanoma and 2,200 from other skin cancers. Melanoma mortality for the more recent period is increasing slightly in white men, while it has stabilized among white women.

Signs and Symptoms: Any change on the skin, especially in the size or color of a mole or other darkly pigmented growth or spot. Scaliness, oozing, bleeding, or change in the appearance of a bump or nodule; the spread of pigmentation beyond its border; a change in sensation, itchiness, tenderness, or pain.

Risk Factors: Excessive exposure to ultraviolet radiation; fair complexion; occupational exposure to coal tar, pitch, creosote, arsenic compounds, or radium; family history; and multiple or atypical nevi (moles).

Prevention: Limit or avoid exposure to the sun during the midday hours (10 a.m.-4 p.m.). When outdoors, cover as much skin as possible. Wear a hat that shades the face, neck, and ears, and a long-sleeved shirt and long pants. Wear sunglasses to protect the skin around the eyes. Use a sunscreen with a solar protection factor

(SPF) of 15 or higher. Because of the possible link between severe sunburns in childhood and greatly increased risk of melanoma in later life, children, in particular, should be protected from the sun.

Early Detection: Recognition of changes in skin growths or the appearance of new growths is the best way to find early skin cancer. Adults should practice skin self-exam regularly. Suspicious lesions should be evaluated promptly by a physician. Basal and squamous cell skin cancers often take the form of a pale, waxlike, pearly nodule, or a red, scaly, sharply outlined patch. A sudden or progressive change in a mole's appearance should be checked by a physician. Melanomas often start as small, mole-like growths that increase in size and change color. A simple ABCD rule outlines the warning signals 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: Any sudden or progressive increase in size should be of concern.

Treatment: Treatment for basal cell cancer and squamous cell cancer includes surgery in 90% of cases, radiation therapy, electrodessication (tissue destruction by heat), cryosurgery (tissue destruction by freezing), and laser therapy for early skin cancer. For malignant melanoma, the primary growth must be adequately excised, and it may be necessary to remove nearby lymph nodes. Removal and microscopic examination of all suspicious moles is essential. Advanced cases of melanoma are treated with radiation therapy, immunotherapy, or chemotherapy.

Survival: For basal cell or squamous cell cancers, cure is highly likely if detected and treated early. Melanoma can spread to other parts of the body quickly. When detected in its earliest stages and treated properly, however, it is highly curable. The 5-year relative survival rate for patients with melanoma is 89%. For localized melanoma, the 5-year relative survival rate is 96%; survival rates for regional and distant stage diseases are 61% and 12%, respectively. About 82% of melanomas are diagnosed at a localized stage.

Urinary Bladder

New Cases: An estimated 56,500 new cases in 2002. During 1992-1998, bladder cancer incidence rates declined slightly but significantly in both men and women. Overall, bladder cancer incidence is about four times higher in men than in women, and about two times higher in whites than in blacks.

Deaths: An estimated 12,600 deaths in 2002. Between the early 1970s and the late 1980s, mortality rates for bladder cancer decreased significantly in both whites and blacks; during the 1990s, mortality rates continued to decline among blacks, but remained fairly constant among whites.

Signs and Symptoms: Blood in the urine; usually associated with increased frequency of urination.

Risk Factors: Smoking is the greatest risk factor for bladder cancer. Smokers experience twice the risk of nonsmokers. Smoking is estimated to be responsible for about 47% of bladder cancer deaths among men and 37% among women. People living in urban areas and workers in dye, rubber, or leather industries also have a higher risk.

Early Detection: Bladder cancer is diagnosed by examination of cells in the urine 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.

Treatment: Surgery, alone or in combination with other treatments, is used in more than 90% of cases. Superficial, localized cancers may be treated by administering immunotherapy or chemotherapy directly into the bladder. Chemotherapy alone or with radiation before cystectomy (bladder removal) has improved some treatment results.

Survival: When diagnosed at a localized stage, the 5-year relative survival rate is 94%; 74% of cancers are detected this early. For regional and distant stages, 5-year relative survival rates are 48% and 6%, respectively. Beyond five years, survival continues to decline with 76% of patients surviving 10 years after diagnosis, and 66% surviving 15 years.

Uterine Cervix

New Cases: An estimated 13,000 cases of invasive cervical cancer are expected to be diagnosed in 2002. Incidence rates have decreased steadily over the past several decades. In 1994-1998, the incidence rate in black women (11.3 per 100,000) was higher than the rate in white women (7.0 per 100,000). As Pap screening has become more prevalent, preinvasive lesions of the cervix are detected far more frequently than invasive cancer.

Deaths: An estimated 4,100 cervical cancer deaths in 2002. Mortality rates have also declined sharply over the

Five-Year Relative Survival Rates* by Stage at Diagnosis, 1992-1997

Site	All Stages %	Local %	Regional %	Distant %	Site	All Stages %	Local %	Regional %	Distant %
Breast (female)	86	96	78	21	Ovary	52	95	81	29
Colon & rectum	61	90	64	8	Pancreas	4	16	7	2
Esophagus	14	27	13	2	Prostate†	96	100	—	34
Kidney	62	89	61	9	Stomach	22	59	22	2
Larynx	65	83	50	38	Testis	95	99	95	76
Liver	6	14	6	2	Thyroid	95	99	94	42
Lung & bronchus	15	48	21	3	Urinary bladder	81	94	48	6
Melanoma	89	96	61	12	Uterine cervix	70	92	49	15
Oral cavity	56	82	46	21	Uterine corpus	84	96	63	26

*Rates are adjusted for normal life expectancy and are based on cases diagnosed from 1992-1997, followed through 1997. †The rate for local stage represents local and regional stages combined.

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: Surveillance, Epidemiology, and End Results Program, 1973-1998, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, MD 2001.

American Cancer Society Surveillance Research, 2002

past several decades. Since 1982, cervical cancer mortality rates have declined on average by about 1.6% per year.

Signs and Symptoms: Abnormal vaginal bleeding or spotting; abnormal vaginal discharge. Pain and systemic symptoms are late symptoms of the disease.

Risk Factors: Cervical cancer risk is closely linked to sexual behavior and to sexually transmitted infections with certain types of human papilloma virus. Women who have sex at an early age, many sexual partners, or have partners who have had many sexual partners are at higher risk of developing the disease. Cigarette smoking is another factor associated with cervical cancer.

Early Detection: The Pap test is a simple procedure that can be performed by a health care professional as part of a pelvic exam. A small sample of cells is collected from the cervix, transferred to a slide, and examined under a microscope. This test should be performed annually with a pelvic exam in women who are, or have been, sexually active or who have reached age 18. After three or more consecutive annual exams with normal findings, the Pap test may be performed less frequently at the discretion of the physician.

Treatment: For preinvasive lesions, changes in the cervix may be treated by cryotherapy (the destruction of cells by extreme cold), by electrocoagulation (the destruction of tissue through intense heat by electric current), by laser ablation, or by local surgery. Invasive cervical cancers generally are treated by surgery or radiation, or both, as well as chemotherapy in some cases.

Survival: Survival for patients with preinvasive lesions is nearly 100%. Eighty-nine percent of cervical cancer patients survive 1 year after diagnosis, and 70% survive 5 years. When detected at an early stage, invasive cervical cancer is one of the most successfully treatable cancers with a 5-year relative survival rate of 92% for localized cancers. Whites are more likely than blacks to have their cancers diagnosed at this early stage. Fifty-six percent of invasive cervical cancers among white women and 44% of cancers among black women are diagnosed at a localized stage.

Uterine Corpus (Endometrium)

New Cases: An estimated 39,300 cases of cancer of the uterine corpus (body of the uterus), usually of the endometrium or lining of the uterus, are expected to be diagnosed in 2002. Incidence rates are higher among white women (22.9 per 100,000) than among black women (15.7 per 100,000).

Deaths: An estimated 6,600 deaths in 2002. Although incidence rates are higher among white women than black women, the relationship is reversed for mortality rates. Black women have mortality rates that are nearly twice as high as rates among white women (5.7 per 100,000 compared to 3.1 per 100,000).

Signs and Symptoms: Abnormal uterine bleeding or spotting. Pain and systemic symptoms are late symptoms.

Trends in Five-Year Relative Survival Rates* by Race and Year of Diagnosis, US, 1974-1997

Site	White			Black			All Races		
	Relative 5-Year Survival Rate (%)			Relative 5-Year Survival Rate (%)			Relative 5-Year Survival Rate (%)		
	1974-76	1983-85	1992-97	1974-76	1983-85	1992-97	1974-76	1983-85	1992-97
All Sites	51	54	63†	39	40	52†	50	52	62†
Brain	22	26	31†	27	32	39†	22	27	32†
Breast (female)	75	79	87†	63	63	72†	75	78	86†
Colon	51	58	62†	46	49	51†	50	58	61†
Esophagus	5	9	15†	4	6	9†	5	8	14†
Hodgkin's disease	72	79	84†	69	78	78†	71	79	83†
Kidney	52	56	62†	49	55	60†	52	56	62†
Larynx	66	69	66	60	55	53	66	67	65
Leukemia	35	42	46†	31	33	38	34	41	45†
Liver	4	6	6†	1	4	4	4	6	6†
Lung & bronchus	13	14	15†	12	11	12	12	14	15†
Melanoma	80	85	89†	67‡	74§	61‡	80	85	89†
Multiple myeloma	24	27	28†	27	31	31	24	28	29†
Non-Hodgkin's lymphoma	48	54	54†	49	45	43†	47	54	53†
Oral cavity	55	55	58†	36	35	34	53	53	56†
Ovary	37	40	52†	41	41	51†	37	41	52†
Pancreas	3	3	4†	3	5	4	3	3	4†
Prostate	68	76	97†	58	64	92†	67	75	96†
Rectum	49	56	62†	42	44	52†	49	55	61†
Stomach	15	16	21†	17	19	20	15	17	22†
Testis	79	91	95†	76‡	88‡	88	79	91	95†
Thyroid	92	93	95†	88	92	94	92	93	95†
Urinary bladder	74	78	82†	48	59	65†	73	78	81†
Uterine cervix	70	71	72†	64	60	58	69	69	70
Uterine corpus	89	85	86†	61	54	59	88	83	84†

*Rates are adjusted for normal life expectancy and are based on cases diagnosed from 1974-76, 1983-85, and in 1992. †The difference in rates between 1974-76 and 1992-97 is statistically significant ($p < 0.05$). ‡The standard error of the survival rate is between 5 and 10 percentage points. § The standard error of the survival rate is greater than 10 percentage points.

Source: Surveillance, Epidemiology, and End Results Program, 1973-1998, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, MD 2001.

American Cancer Society Surveillance Research, 2002

Risk Factors: High cumulative exposure to estrogen is the major risk factor for the most common type of cancer of the uterine corpus. Estrogen-related exposures including estrogen replacement therapy, tamoxifen, early menarche, late menopause, never having children, and a history of failure to ovulate have all been shown to increase risk. Progesterone plus estrogen replacement therapy (called hormone replacement therapy, or HRT) is believed to largely offset the increased risk related to HRT using only estrogen. Research has not implicated estrogen exposures in the development of the other types of uterine corpus cancer, which are more aggressive and have a poorer prognosis. Other risk factors for uterine corpus cancer include infertility, diabetes, gallbladder disease, hypertension, and obesity. Pregnancy and the use of oral contraceptives appear to provide protection against endometrial cancer. Hereditary non-polyposis colon cancer, a genetic syndrome, also has been associated with endometrial and ovarian cancer.

Early Detection: Most endometrial cancer is diagnosed at an early stage because of post-menopausal bleeding. Beginning at age 35, women with or at risk for hereditary non-polyposis colon cancer (HNPCC) should be offered endometrial biopsy annually to screen for endometrial cancer.

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

Survival: The 1-year relative survival rate for endometrial cancer is 93%. The 5-year relative survival rate is 96%, 63%, and 26%, if the cancer is diagnosed at local, regional, and distant stages, respectively. Relative survival rates for whites exceed those for blacks by about 15 percentage points at every stage.

Summary of American Cancer Society Recommendations for Early Detection of Cancer in Asymptomatic People

Site	Recommendation
Breast	Women 40 and older should have an annual mammogram, an annual clinical breast examination (CBE) by a health care professional, and should perform monthly breast self-examination (BSE). Ideally, the CBE should occur before the scheduled mammogram. Women ages 20-39 should have a CBE by a health care professional every three years and should perform BSE monthly.
Colon & Rectum	Beginning at age 50, men and women should follow one of the examination schedules below: • A fecal occult blood (FOBT) test every year, or • A flexible sigmoidoscopy (FSIG) every five years, or • Annual fecal occult blood test and flexible sigmoidoscopy every five years.* • A double-contrast barium enema every five to 10 years. • A colonoscopy every 10 years. *Combined testing is preferred over either annual FOBT or FSIG every 5 years, alone. People who are at moderate or high risk for colorectal cancer should talk with a doctor about a different testing schedule.
Prostate	The PSA test and the digital rectal examination should be offered annually, beginning at age 50, to men who have a life expectancy of at least 10 years. Men at high risk (African-American men and men with a strong family history of one or more first-degree relatives diagnosed with prostate cancer at an early age) should begin testing at age 45. Information should be provided to patients about what is known and what is uncertain about the benefits and limitations of early detection and treatment of prostate cancer, so that they can make an informed decision.
Uterus	**Cervix:** All women who are or have been sexually active or who are 18 and older should have an annual Pap test and pelvic examination. After three or more consecutive satisfactory examinations with normal findings, the Pap test may be performed less frequently. Discuss the matter with your physician. **Endometrium:** The American Cancer Society recommends that all women should be informed about the risks and symptoms of endometrial cancer, and strongly encouraged to report any unexpected bleeding or spotting to their physicians. Annual screening for endometrial cancer with endometrial biopsy beginning at age 35 should be offered to women with or at risk for hereditary nonpolyposis colon cancer (HNPCC).
Cancer-related Checkup	A cancer-related checkup is recommended every 3 years for people aged 20 to 39 years and every year for people age 40 and older. This exam should include health counseling and, depending on a person's age, might include examinations for cancers of the thyroid, oral cavity, skin, lymph nodes, testes, and ovaries, as well as for some nonmalignant diseases.

ACS guidelines for early cancer detection are assessed annually in order to identify whether there is new scientific evidence sufficient to warrant a re-evaluation of current recommendations. If new evidence is sufficiently compelling to consider a change or clarification in a current guideline, or the development of a new guideline, a formal procedure is initiated. Guidelines are formally evaluated every 5 years regardless of whether or not new evidence suggests a change in the existing recommendation. There are nine steps in this procedure, and these "guidelines for guideline development" were formally established to provide a specific methodology for science and expert judgment to form the underpinnings of specific statements and recommendations from the ACS. These procedures constitute a deliberate process to insure that all ACS recommendations have the same methodological and evidence-based process at their core. This process also employs a system for rating strength and consistency of evidence that is similar to that employed by the Agency for Health Care Research and Quality (AHCRQ) and US Preventive Services Task Force (USPSTF).

Special Section:
Colorectal Cancer and Early Detection

In the United States, cancers of the colon and rectum combined (colorectal) are the third most common site of new cases and deaths in both men and women. There will be an estimated 148,300 new cases and 56,600 deaths from the disease in 2002. An individual's lifetime risk of developing colorectal cancer in the United States is nearly 6%, with over 90% of cases occurring after age 50.[1] Colorectal cancer death rates decreased by 1.8% per year from 1992-1998.[6]

Many of the new cases and deaths from colorectal cancer are preventable by improvements in nutrition and physical activity and by timely use of existing colorectal cancer screening tests.[3] Screening can prevent the occurrence of colorectal cancer by detecting and removing pre-cancerous polyps[4] or can diagnose early disease at a stage when it can be effectively cured. Despite the effectiveness and cost-effectiveness of several existing screening tests,[3] the use of these tests for prevention remains extremely low.

This special section provides an overview of colorectal cancer and the strategies presently available to combat it.

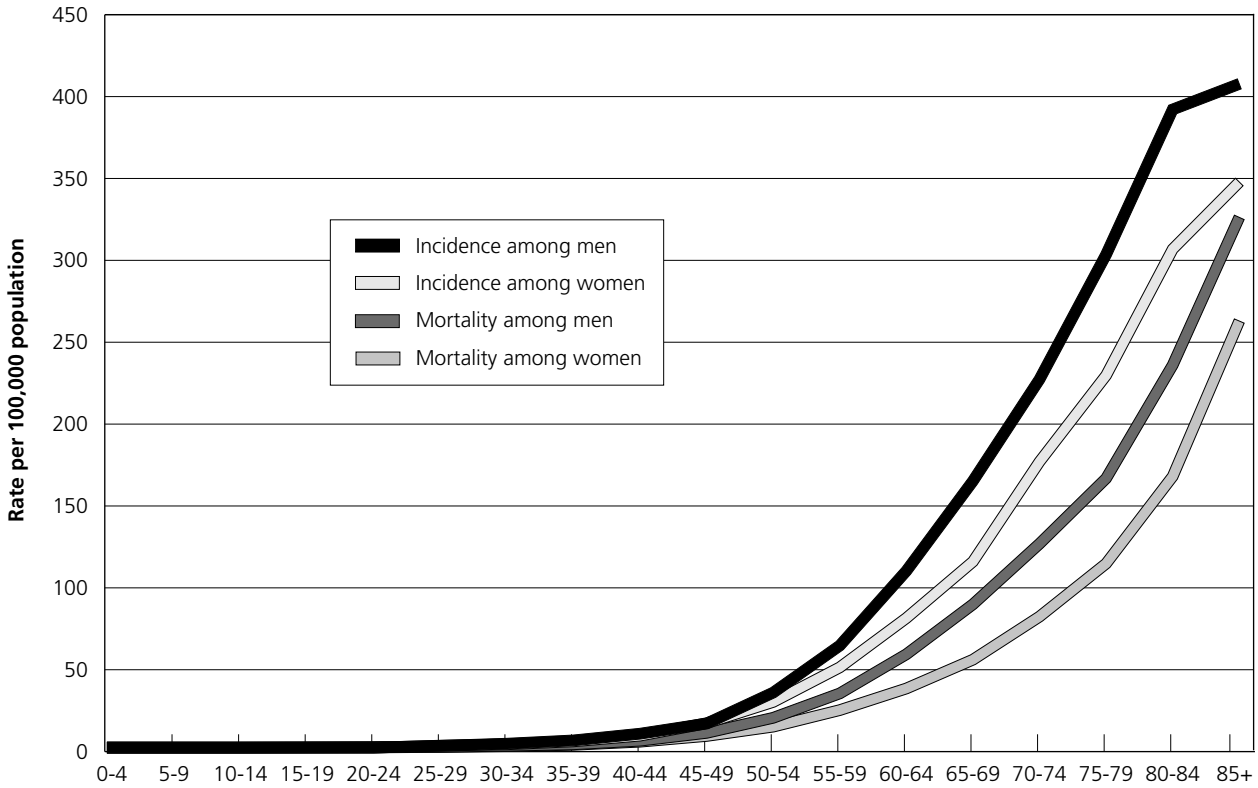
Incidence and Mortality

Age: Anyone can get colorectal cancer, but it usually strikes men and women over the age of 50 (Figure 1).

Sex: The incidence rate of colorectal cancer is similar among men and women of equivalent age until age 50; it then becomes higher in men than in women (Figure 1).[2] Because women live longer than men, the total number of cases and deaths is higher in women than men.

Race/Ethnicity: Colorectal cancer incidence and mortality rates vary substantially by race and ethnicity (Table 1). Both incidence and death rates are highest

Figure 1. Cancers of the Colon and Rectum: Incidence and Mortality Rates by Sex, US, 1994-1998



*Incidence and mortality rates are age-adjusted to the 1970 US standard.

Source: SEER Cancer Statistics Review, 1973-1998, Surveillance, Epidemiology, and End Results Program, Division of Cancer Control and Population Sciences, National Cancer Institute, 2001.

American Cancer Society, Surveillance Research, 2002

Table 1. Incidence and Mortality Rates* from Colorectal Cancer by Race and Ethnicity, 1992-1998, Men and Women Combined

Race/ethnic group	Incidence	Mortality
Black	50.1	22.8
White	42.9	16.8
Asian/Pacific Islander	38.2	10.7
American Indian/Alaska Native	28.6	10.3
Hispanic	28.4	10.2

*Rate per 100,000, age-adjusted to the 1970 US standard population.
Source: NCI Surveillance, Epidemiology, and End Results Program, 2001.

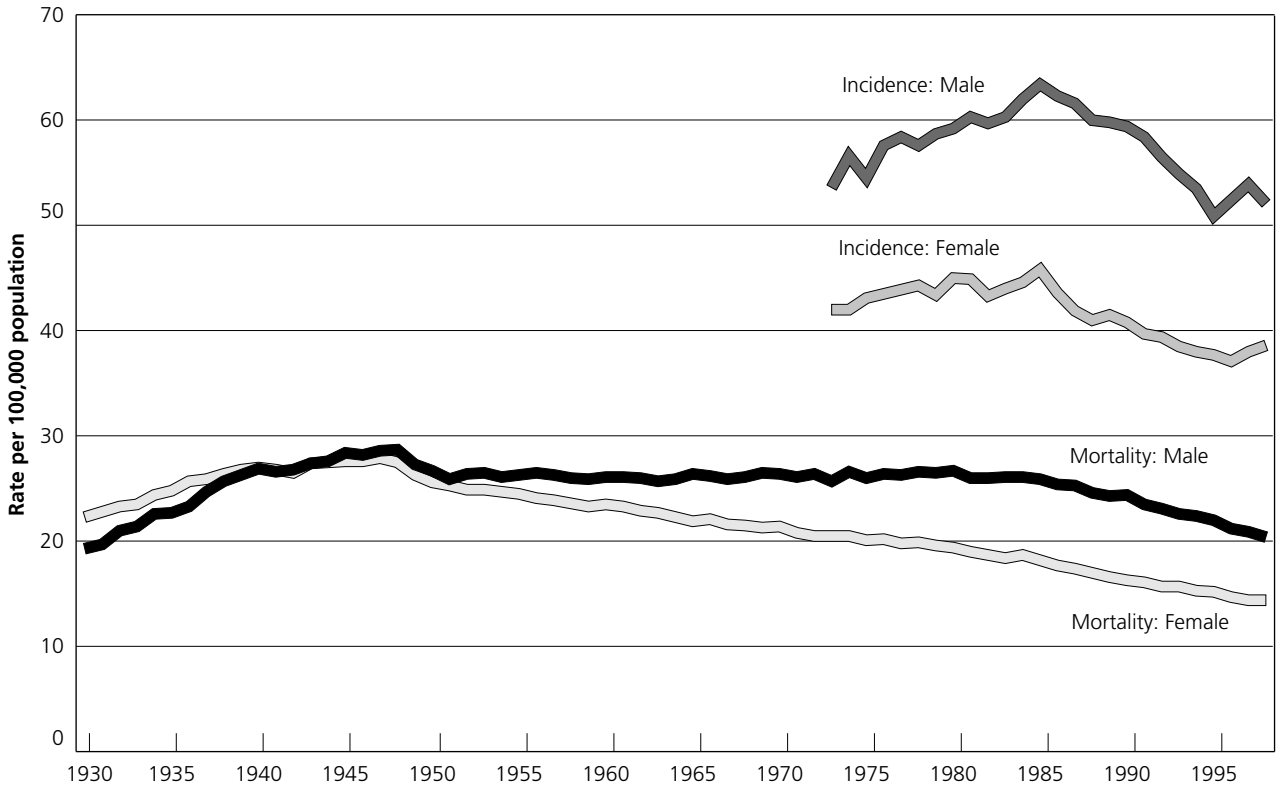
in blacks, intermediate in whites and Asian/Pacific Islanders, and lowest in American Indian/Alaska Natives and Hispanics. In 1998, the death rate from colorectal cancer in blacks was more than twice the rate in Hispanics and American Indian/Alaska Natives.

Trends over Time: Colorectal cancer incidence rates increased from 1973-1985 (particularly in men), decreased through 1995, and then remained level or increased slightly (in women) through 1998 (Figure 2). The recent flattening trends or upturn in incidence may reflect increased screening. Mortality rates from colorectal cancer have steadily declined among women since about 1950, and among men since approximately 1985 (Figure 2). From 1992-1998, the decrease in death rates was larger in white males (2.1% per year) and white females (1.9%) than in black males (0.9%) or black females (0.6%).[6]

Risk Factors and Prevention

Approximately 90% of all colorectal cancer cases and deaths are thought to be preventable, based on temporal and international variations[7] and existing approaches to prevention and early detection.[8] Screening tests that detect occult blood in the stool or identify adenomatous polyps can prevent the occurrence of colorectal cancers by allowing the detection and removal of pre-cancerous lesions before they undergo malignant transformation.

Figure 2. Colorectal Cancer Incidence (1973-1998) and Mortality (1930-1998) Rates* by Gender, US



*Per 100,000 age-adjusted to the 1970 US standard population.
Source: NCI, Surveillance, Epidemiology, and End Results Program, 2001. US Mortality Public Use Data Tapes 1960-1998, National Center for Health Statistics, Centers for Disease Control and Prevention, 2001.
American Cancer Society, Surveillance Research, 2002

Table 2. Risk Factors for Colorectal Cancer

	Relative Risk
Family history (first degree relative)	1.8
Physical inactivity (less than 3 hours per week)	1.7
Inflammatory bowel disease (physician diagnosed Crohn's disease, ulcerative colitis or pancolitis)	1.5
Obesity	1.5
Red meat	1.5
Smoking	1.5
Alcohol (more than 1 drink/day)	1.4
High vegetable consumption (5 or more servings per day)	0.7
Oral contraceptive use (5 or more years of use)	0.7
Estrogen replacement (5 or more years of use)	0.8
Multivitamins containing folic acid	0.5

Modifiable factors are in **bold** text.

Adapted, with permission from Colditz et al (2000).[12]

The following are internet resources of interest on colorectal cancer risk: http://www.yourcancerrisk.harvard.edu/ and http://www.cancer.org

Other factors thought to influence the development of colorectal cancer are listed in Table 2. Potentially modifiable factors include healthy dietary patterns, regular physical activity, and avoidance of obesity and smoking. Accumulating research also suggests that aspirin-like drugs, post-menopausal hormones, folic acid, calcium supplements, selenium, and vitamin E may ultimately help to prevent colorectal cancer. At present, the American Cancer Society does not recommend any supplements to prevent colorectal cancer because of uncertainties about their effectiveness, appropriate dose, and potential toxicity.

Other non-modifiable risk factors for colorectal cancer include a strong family history of colorectal cancer or adenomatous polyps in a first-degree relative (in a parent or sibling before age 60 or in two first-degree relatives of any age), a personal history of colorectal cancer, polyps, or chronic inflammatory bowel disease, or a family history of hereditary colorectal cancer syndrome (e.g., familial adenomatous polyposis or hereditary non-polyposis colorectal cancer).[9] For persons with any of these known risk factors, screening should be considered earlier than age 50. However, almost 75% of all colon cancer cases occur in people with no known predisposing factors,[10-11] mostly after age 50.[1]

Current Recommendations for Prevention

The current American Cancer Society recommendations for nutrition and physical activity are relevant to colorectal cancer prevention.

1. Eat a variety of healthful foods, with an emphasis on plant sources.

2. Adopt a physically active lifestyle.

3. Maintain a healthful weight throughout life.

4. If you drink alcoholic beverages, limit consumption.

Colorectal Cancer Screening

Several existing screening regimens have been proven to be effective in reducing mortality from colorectal cancer. These allow detection and removal of adenomatous polyps before they become cancerous and the removal of early-stage colorectal cancer when the disease is still highly curable. Tumors detected because of bleeding or pain have usually progressed beyond localized stage.[1]

Current tests include:

Fecal Occult Blood Test (FOBT): Cancers and some large polyps bleed intermittently into the intestine. The FOBT detects hidden or 'occult' blood in a stool sample. Individuals receive a test kit to take home along with dietary instructions. FOBT consists of six small stool samples, with two samples each taken from three consecutive bowel movements.[13] Upon completing the test, patients return the kit to the physician for evaluation. Studies have proven that regular use of this screening method saves lives and can reduce the incidence of colorectal cancer.[14]

Flexible sigmoidoscopy: A slender, flexible, hollow, lighted tube is inserted through the rectum into the colon to search for cancer or polyps. The sigmoidoscope is around 2 feet long and, at its maximum insertion, can only reach about half of the colon.[13] If there is a polyp or tumor present, the patient must be referred for colonoscopy so that the entire colon can be examined.

Colonoscopy: Like the sigmoidoscopy, this procedure allows for direct visual examination of the colon and rectum. A colonoscope is similar to the sigmoidoscope, but its greater length allows the doctor to view the entire colon.[13] If a polyp is found, the physician may remove it by passing a wire loop through the colonoscope to cut the polyp from the wall of the colon using an electric current.

Things to Consider When Deciding with Your Doctor Which Test Is Right for You:

Test	Advantages	Performance & Complexity*	Characteristics/ Limitations	Cost Range†
Fecal Occult Blood Test	• No bowel preparation • Sampling is done at home • Low cost • Proven effective in clinical trials • No risk of bowel tears or infections	Intermediate for cancer *Lowest complexity*	• Will miss most polyps and some cancers • May produce false-positive test results • Pre-test dietary limitations needed • Must be done every year • More effective when combined with a flexible sigmoidoscopy every five years • Additional procedures necessary if abnormalities are detected	Lowest cost: under $20
Flexible Sigmoidoscopy	• Fairly quick, few complications • Minimal bowel preparation • Done every five years • Minimal discomfort • Does not require a specialist	High for up to half of the colon *Intermediate complexity*	• Usually views only about a third of the colon • Cannot remove all polyps • Very small risk of infection or bowel tear • More effective when combined with annual fecal occult blood testing • Additional procedures needed if abnormalities are detected	Mid low cost: between $150 to $200
Double contrast Barium Enema	• Can usually view entire colon • Few complications • Done every five years • No sedation needed	High *High complexity*	• Can miss some small polyps and cancers • Full bowel preparation needed • Some false-positive test results • Additional procedures necessary if abnormalities are detected	Mid to high cost: between $300 to $400
Colonoscopy	• Can usually view entire colon • Can biopsy and remove polyps • Done every 10 years • Can diagnose other disease	Highest *Highest complexity*	• Can miss small polyps • Full bowel preparation needed • Can be expensive • Sedation of some kind usually needed • You may miss a day of work • Potential risk of bowel tears or infections	High cost: at least $1,000

*Complexity involves patient preparation, inconvenience, facilities and equipment needed, and patient discomfort.[9]
†Costs for tests are 'conservative' estimates only and will vary greatly by state and health insurance.

Barium enema with air contrast: This procedure, which allows complete radiological examination of the colon, is also called a double-contrast barium enema.[13] Barium sulfate is introduced into the colon and allowed to spread throughout the colon to partially fill and open up the colon. The colon is then filled with air so that it can expand and increase the quality of x-rays that are taken.

Digital Rectal Exam: A physician inserts a gloved finger into the rectum to feel for anything that is irregular or abnormal. Often, a single stool sample is also collected and placed on an FOBT card for further examination.[13] This method of FOBT is not recommended.

Other screening tests still under development: The sensitivity of colorectal cancer screening is expected to increase with improved methods of FOBT testing in combination with immunochemical testing. Newer screening methods, such as genetic-based fecal screening and virtual colonoscopy, are still under development.[1]

American Cancer Society Guidelines on Screening and Surveillance for the Early Detection of Colorectal Adenomas and Cancer[13]

Beginning at age 50, both men and women should follow one of these five screening options:

- Yearly fecal occult blood test (FOBT) plus flexible sigmoidoscopy every 5 years*
- Flexible sigmoidoscopy every 5 years
- Yearly fecal occult blood test (FOBT)†
- Colonoscopy every 10 years
- Double-contrast barium enema every 5 years

*The combination of FOBT and flexible sigmoidoscopy is preferred over either test alone.

†A digital rectal exam (DRE) test can detect cancers of the rectum but not colon.

Any of these five options can be useful in screening for colorectal cancer in average-risk adults. Each of these tests has strengths and limitations related to accuracy, potential for prevention, costs, and risks. A colonoscopy is considered the gold standard because of its ability to visualize, sample, and/or remove lesions from the entire colon. Positive results from any of the other four options should be followed with a colonoscopy for more complete diagnostic evaluation. If a screening colonoscopy test is not available or feasible, or is not acceptable to the patient, any of the other alternative options can be used. Individual patients should be given information to make an informed decision when choosing a screening test.

For high-risk people, colorectal cancer screening should begin before age 50 and be repeated more often. People are considered at increased risk if they have any of the following colorectal cancer risk factors:

- A strong family history of colorectal cancer or polyps (cancer or polyps in a first-degree relative occurring before age 60 or in two first-degree relatives at any age). Note: a first-degree relative is defined as a parent, sibling, or child.
- Families with hereditary colorectal cancer syndromes (familial adenomatous polyposis and hereditary nonpolyposis colon cancer)
- A personal history of colorectal cancer or adenomatous polyps, or
- A personal history of chronic inflammatory bowel disease.

Approximately 15% to 20% of colorectal cancers occur among people at "increased risk" (approximately twice average risk).[9]

Awareness and Utilization of Screening for Colorectal Cancer

Despite the proven effectiveness and availability of various colorectal cancer screening tests, many adults, ages 50 and older, are not regularly screened.[15] Only 44% of BRFSS respondents ages 50 and older reported receiving FOBT and/or sigmoidoscopy or colonoscopy within the previous one or five years respectively in 1999 compared with approximately 41% reporting these tests within the corresponding periods in 1997.[15] Prevalence rates are especially low among individuals who are 50-64 years old, have lower incomes, little or no health care coverage, and fewer years of education.[16] Table 3 (below) shows the most current prevalence rates of colorectal cancer screening exams by gender, age, and race/ethnicity.

Table 3. Colon and Rectum Cancer Screening, Adults 50 and Older, US*, 1999

	Recent Fecal Occult Blood Test†			% Recent Sigmoidoscopy/ Colonoscopy‡		
%	Total%	Male%	Female %	Total %	Male %	Female
Age						
50-59	15.6	13.4	17.6	26.2	28.8	23.8
60-69	23.3	21.4	24.8	37.2	41.9	33.4
70-79	26.0	25.1	26.6	40.9	45.7	37.5
80-84	24.0	22.8	24.7	39.1	47.8	34.5
85+	17.3	16.0	17.9	30.6	33.9	29.2
Race/Ethnicity						
White	21.2	19.4	22.7	33.9	37.3	31.1
Black	20.5	17.7	22.6	32.8	38.3	28.9
Asian/Pacific Islander	8.8	7.5	10.4	31.4	38.8	21.9
American Indian/Alaska Native	17.6	13.6	21.2	34.0	31.7	36.3
Hispanic	11.7	10.9	12.3	29.5	31.4	27.9
Non-Hispanic	21.5	19.4	23.1	34.0	37.7	31.0

*Includes the 50 states and District of Columbia. †A fecal occult blood test within the last year. ‡A sigmoidoscopy or colonoscopy within the preceding five years.

Source: Behavioral Risk Factor Surveillance System CD-ROM 1999, National Center for Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 2000.

American Cancer Society, Surveillance Research, 2002

A consequence of the low level of colorectal screening is that only 37% of cases are diagnosed when the disease is still localized (Figure 3). Later diagnosis results in a substantially lower 5-year relative survival rate than would occur if patients were diagnosed when disease was still localized (Figure 4).

There are several factors contributing to the low prevalence of colorectal cancer screening.[17] First is the limited communication between physicians and their patients about colorectal cancer.[18] Second, patients may be unaware of the benefits of screening unless their health provider discusses it with them; however doctors may be unlikely to suggest screening unless the patient asks about it.[19] Third, while some colorectal cancer screening tests may be covered by some private health insurance, benefits are highly variable, depending on the tests involved. Medicare now ensures that all beneficiaries aged 50 and older can receive colorectal screening as part of their benefit package, including a screening colonoscopy.[2]

The Signs of Colorectal Cancer

Most colorectal cancers begin as a polyp, a small, non-cancerous growth in the wall of the colon. Over time, however, some polyps grow larger and become malignant. As polyps grow, they can bleed or obstruct the intestine. Early colon cancer often has no symptoms.

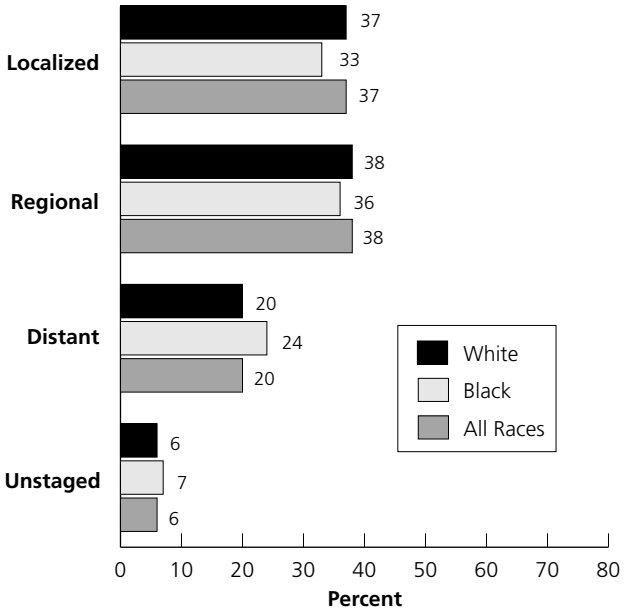
See your doctor if you have any of these warning signs:

- Bleeding from your rectum
- Blood in your stool or in the toilet after you have a bowel movement
- A change in the shape of your stool
- Cramping pain in your lower stomach
- A feeling of discomfort or an urge to have a bowel movement when there is no need to have one

Other conditions can cause these same symptoms. You should be checked by your doctor to find the reason for your symptoms.

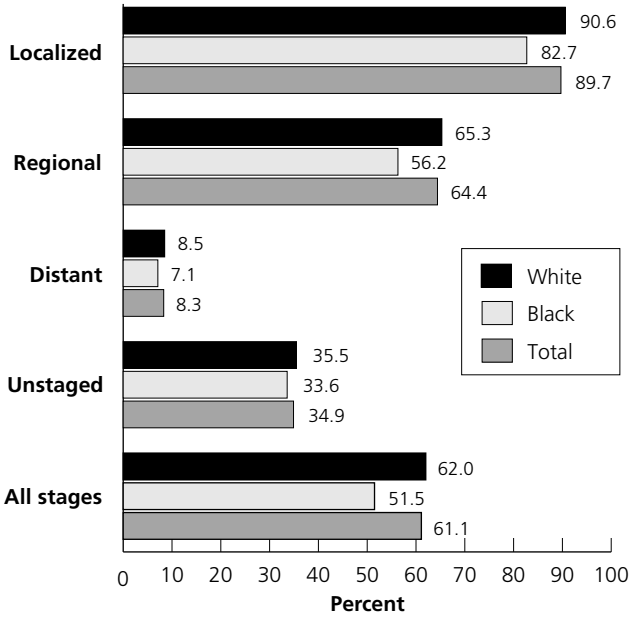
Source: Screening for Colorectal Cancer — March 15, 2000 — American Academy of Family Physicians; accessed http://www.aafp.org/afp/20000315/1773ph.html

Figure 3. Percent of Colorectal Cancer Cases Diagnosed by Stage and Race, US, 1992-1997



*Rates are based on the follow-up of patients through 1997.
Source: SEER Cancer Statistics Review, 1973-1998, Surveillance, Epidemiology, and End Results Program, Division of Cancer Control and Population Sciences, National Cancer Institute, 2001.

Figure 4. 5-Year Relative Survival Rates by Stage at Diagnosis and Race, 1992-1997



*Rates are based on data from the population-based registries in Connecticut, New Mexico, Utah, Iowa, Hawaii, Atlanta, Detroit, Seattle-Puget Sound, and San Francisco-Oakland. Rates are based on follow-up of patients through 1997.
Source: SEER Cancer Statistics Review, 1973-1998, Surveillance, Epidemiology, and End Results Program, Division of Cancer Control and Population Sciences, National Cancer Institute, 2001.

Treatment and Survival

The survival of patients with colorectal cancer is best when the disease is diagnosed early. Treatment is readily available, but when the cancer is not found at a localized stage, treatment is less effective. The 1- and 5-year survival rates for patients with colon and rectum cancer are 81% and 61%, respectively, for all races combined.[5] If the cancer is detected early, however, the 5-year survival is approximately 90%. Only 37% of cancers are found at this stage. When the cancer has spread regionally to involve adjacent organs or lymph nodes, survival drops to 64%, and it is drastically lower after the cancer has metastasized (8%) (Figure 4). Currently, colorectal cancer treatment options include surgery, radiation, and chemotherapy. Surgery is the most common form of treatment.[20] Radiation and chemotherapy are forms of adjuvant therapy (drugs or radiation used after surgery to destroy cancer cells that were left behind or that have spread to other parts of the body).

Surgery: If colon cancer is detected at an early stage, the patient can undergo a polypectomy (removal of the polyps containing the cancer) or a local excision (removal of the cancer and a small margin of tissue). In instances where the cancer is large or invades surrounding tissue or lymph nodes, the individual will most likely have a segmental resection (removal of the cancer, some colon tissue, and the lymph nodes). A colostomy (an opening in the abdomen to allow the elimination of body wastes) is performed if the physician is unable to reconnect the parts of the colon after surgery.[20]

Rectal cancers that have not reached advanced stages and are located near the anus can be treated with polypectomy or local excision.[20] Local excision is used to remove invasive cancers, as well as some surrounding tissue, by cutting through all the layers of the rectum. Stage II and III cancers can be removed by a bowel resection to remove the tumor, as well as the colon, rectum, prostate or bladder, depending on where the cancer has spread.[20]

Radiation: Radiation therapy is used primarily to treat rectal rather than colon cancer.[21] The goal of this treatment is to prevent metastatic disease caused by the rapid spread of cancer cells that are often missed during surgery. This form of therapy also is used to control the symptoms and pain associated with locally advanced cancers, but it has not been shown to successfully improve survival rates.

Chemotherapy: Even though the majority of patients (nearly 80%) with colon cancer experience complete clearance of their disease after surgery, about 40% will develop recurrence. Chemotherapy is administered to eradicate any remaining cancer cells and to prevent recurrent disease.[22] Fluorouracil (5-FU) is the most common drug used to treat colorectal cancers, and is used in conjunction with medicines such as levamisole and leucovorin.[21] A new drug, irinotecan (CPT-II), has been approved for the adjuvant treatment of colon cancer, and may be an effective second-line therapy for patients whose metastatic tumors do not respond to 5-FU.[23]

Organizations such as the American Cancer Society continue to support efforts to increase awareness among individuals (aged 50 and older) to take advantage of available colorectal cancer screening tests. March is now recognized as Colorectal Cancer Awareness Month. No matter how widespread mass education efforts are, physicians must stress to their patients the importance of early detection for colorectal cancer. The ACS and CDC are involved in efforts to promote colon cancer screening nationwide by educating providers and the public about the benefits and availability of current screening procedures. In 1997, the ACS, together with CDC and other partners, formed a collaborative group called the National Colorectal Cancer Roundtable to discuss strategies for educating health care providers and the public about the importance of colorectal screening. The organization seeks to involve state health departments, professional organizations, medical societies, federal agencies, consumers, cancer survivors, managed care organizations, private industry, health educators, and the medical media.

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Cancer in Minorities

Overall, black Americans are more likely to develop and die from cancer than persons of any other racial and ethnic group. During 1992-1998, the average annual incidence rate for all cancer sites was 445.3 per 100,000 persons among blacks, 401.4 per 100,000 for whites, 283.4 per 100,000 for Asian/Pacific Islanders, 270.0 per 100,000 in Hispanics, and 202.7 per 100,000 in American Indians/Native Alaskans. The death rate for all cancers combined is also about 33% higher in black than white Americans. Average annual cancer mortality rate from 1992-1998 for all sites combined was 218.2 per 100,000 for blacks, 164.5 per 100,000 among whites, 105.4 per 100,000 among American Indians/Native Alaskans, 102.6 per 100,000 among Hispanics, and 101.2 per 100,000 among Asian/Pacific Islanders.

Despite these high rates, both incidence and mortality from all cancers combined decreased more among black men than other racial and ethnic groups between 1992-1998. During these same years, cancer incidence rates decreased by 2% per year among Hispanics, by 1.7% among blacks, and by 1.2% among whites, while it remained relatively stable among American Indians/Native Alaskans and Asian/Pacific Islanders. Similarly, the mortality rate for all cancer sites decreased annually by 1.3% among blacks, 1.2% among Asian/Pacific Islanders, 1.1% among whites, and 0.9% among Hispanics; and it leveled off among American Indian/Native Alaskans.

Comparisons of cancer rates between racial and ethnic groups, particularly those involving groups other than whites or blacks, should be interpreted with caution because misclassification of race on medical records, death certificates, and the census can reduce the accuracy of reported rates. For more information about cancer in minority populations, ask about the American Cancer Society publication and Web site posting of *Cancer Facts & Figures for African Americans* (8614.01).

Incidence and Mortality Rates* by Site, Race, and Ethnicity, US, 1992-1998

Incidence	White	Black	Asian/ Pacific Islander	American Indian/ Alaskan Native	Hispanic†
All Sites					
Males	470.4	596.8	327.7	227.7	319.7
Females	354.4	337.6	252.1	186.3	237.7
Total	401.4	445.3	283.4	202.7	270.0
Breast (female)	115.5	101.5	78.1	50.5	68.5
Colon & rectum					
Males	51.4	57.7	47.3	33.5	35.2
Females	36.3	44.7	31.0	24.6	23.2
Total	42.9	50.1	38.2	28.6	28.4
Lung & bronchus					
Males	69.6	107.2	51.9	44.3	36.0
Females	43.6	45.7	22.7	20.6	18.7
Total	54.7	71.6	35.5	31.0	26.0
Prostate	144.6	234.2	82.8	47.8	103.4

Mortality	White	Black	Asian/ Pacific Islander	American Indian/ Alaskan Native	Hispanic†
All Sites					
Males	203.2	297.7	125.6	125.3	128.8
Females	138.0	166.6	82.4	90.8	84.3
Total	164.5	218.2	101.2	105.4	102.6
Breast (female)	24.3	31.0	11.0	12.4	14.8
Colon & rectum					
Males	20.6	27.3	12.9	11.9	13.0
Females	13.9	19.6	8.9	8.9	8.0
Total	16.8	22.8	10.7	10.3	10.2
Lung & bronchus					
Males	67.8	96.2	33.8	41.8	30.5
Females	34.6	33.6	15.1	20.9	10.9
Total	48.8	59.1	23.3	30.1	19.3
Prostate	22.4	53.1	9.8	14.0	15.9

*Per 100,000, age-adjusted to the 1970 US standard population. †Hispanics are not mutually exclusive from whites, blacks, Asian/Pacific Islanders, and American Indian/Alaskan Natives. **Note:** Incidence data are from the 11 SEER areas; mortality data are from all states except data for Hispanics; data for Hispanics include deaths that occurred in all states except Connecticut, Louisiana, New Hampshire, and Oklahoma.

Source: Surveillance, Epidemiology, and End Results Program, 1973-98, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, MD, 2001. Mortality derived from data originating from the National Center for Health Statistics, Centers for Disease Control and Prevention, 2001.

American Cancer Society, Surveillance Research, 2002

Tobacco Use

Smoking is the most preventable cause of death in our society. During 1995, approximately two million people in developed countries died prematurely because of smoking.[1] Tobacco use is responsible for nearly one in five deaths in the United States.[2] Based on data from the American Cancer Society's Cancer Prevention Study II, it is estimated that 430,700 US deaths per year were attributable to smoking during 1990-1994.[3] Approximately half of all continuing smokers die from diseases caused by smoking.[1] Of these, approximately half die in middle age (35-69), losing an average of 20 to 25 years of life expectancy.[1]

Lung cancer mortality rates are about 22 times higher for current male smokers and 12 times higher for current female smokers compared with lifelong never-smokers.[4] In addition to being responsible for 87% of lung cancers, smoking is also associated with cancers of the mouth, pharynx, larynx, esophagus, pancreas, uterine cervix, kidney, and bladder.[4] Smoking accounts for at least 30% of all cancer deaths, is a major cause of heart disease, cerebrovascular disease, chronic bronchitis, and emphysema, and is associated with gastric ulcers.[4]

Trends in Smoking

- Cigarette smoking among adults aged 18 and over declined 40% between 1965 and 1990—from 42% to 25%. Smoking prevalence among adults showed modest declines between 1990 and 1999.[5]
- Between 1978 and 1995, cigarette smoking prevalence declined for whites (34% to 26%), blacks (37% to 27%), Hispanics (30% to 19%), and Asian and Pacific Islanders (24% to 15%). Among American Indians and Alaska Natives, smoking prevalence did not change for men from 1983 to 1995 or for women from 1978 to 1995.[6]
- Although cigarette smoking became prevalent among men before women, the gender gap narrowed in the mid-1980s and has remained constant.[7]
- Between 1983 and 1999, smoking among college graduates decreased almost 50% from 21% to 11%, but among adults without a high school education the percentage decreased only 22% from 41% to 32%.[5]
- Per capita consumption of cigarettes continues to decline. After peaking at 4,345 cigarettes per capita in 1963, consumption among Americans 18 years and older decreased 52% to an estimated 2,103 cigarettes per capita in 2000. [8,9]
- From 1991 to 1999, current cigarette smoking among US high school students increased significantly from 28% in 1991 to 35% in 1999. However, a recent study suggests this increasing trend may have leveled or possibly begun to decline.[10]
- In 1997, nearly one-half (48%) of male students and more than one-third (36%) of female students reported using some form of tobacco—cigarettes, cigars, or smokeless tobacco—in the past month. The percentages for male students declined slightly to 44% and remained nearly the same (37%) for female students in 1999.[11,12]

Profile of Smokers

Over 80% of adult smokers surveyed in 1991 had begun smoking by age 18. In addition, 35% had become daily smokers by age 18.[13] Among adults in 1999, national data showed:[14]

- An estimated 47 million US adults were current smokers.
- Men were more likely to smoke (26%) than women (22%).
- Cigarette smoking was highest among American Indians and Alaska Natives (41%) and lowest among Asians and Pacific Islanders (15%).
- Adults who earned a General Education Development Diploma (44%) and high school dropouts (38%) have high percentages of cigarette smoking.

Among US high school students in 1999, national data showed:[12]

- One quarter (25%) of high school students smoked a whole cigarette before age 13.
- More than one-third (35%) of high school students were current cigarette smokers (smoked at least one cigarette in the past month); white (39%) and Hispanic (33%) students were more likely to smoke cigarettes currently than black (20%) students.
- Seventeen percent of high school students smoked cigarettes on at least 20 of the 30 days preceding the survey; white (20%) students were more likely to smoke cigarettes frequently than Hispanic (10%) and black (7%) students.

Smokeless Tobacco

In 1986, the US Surgeon General concluded that the use of smokeless tobacco is not a safe substitute for smoking cigarettes or cigars, as these products cause various

cancers and non-cancerous oral conditions, and can lead to nicotine addiction.[15]

- Oral cancer occurs several times more frequently among snuff dippers compared with non-tobacco users.[15]
- The risk of cancer of the cheek and gums may increase nearly 50-fold among long-term snuff users.[15]
- According to the US Department of Agriculture, US output of moist snuff has risen over 40% in the past decade from 46 million pounds in 1989 to an estimated 66 million pounds in 1999.[9,16]
- Nationwide, 14% of US male high school students were currently using chewing tobacco or snuff in 1999. In 1999, white male students (19%) were more likely to use smokeless tobacco than Hispanic (6%) and black (3%) male students.[12]
- Among adults aged 18 and older, national data showed 6% of men and 1% of women were current users of chewing tobacco or snuff. Among men, American Indian and Alaska Natives (8%) and whites (7%) were more likely to use smokeless tobacco than blacks (3%), Hispanics (2%), and Asian and Pacific Islanders (1%).[6]

Cigars

The consumption of large cigars and cigarillos has been increasing since 1993. An estimated 3.7 billion large cigars and cigarillos were expected to be consumed in 2000. Small cigar production increased from 1.5 billion pounds in 1997 to an estimated 2.6 billion pounds in 2000.[9]

- In 1998, the median percentage of adults aged 18 years and older who have smoked cigars in the past month was 5%. More men than women smoked cigars in the past month in all 50 states.[17]
- Nationwide, 18% of US high school students (Grades 9 to 12) had smoked cigars, cigarillos, or little cigars on at least one of the past 30 days. Male students (25%) were more likely than female students (10%) to smoke cigars currently. White male students (28%) were significantly more likely than black male students (16%) to report current cigar use.[12]
- Nationwide, 6% of US middle school students (Grades 6 to 8) had smoked cigars on at least one of the past 30 days; male students (8%) were more likely than female students (4%) to smoke cigars currently.[18]

Beginning in 2001, seven major cigar manufacturers will provide five health warnings, which will rotate on labels on cigars sold in the US. The companies agreed to the warnings in June 2000 to settle a lawsuit brought by the Federal Trade Commission for failure to warn consumers of the dangers of cigar smoking. Cigar smoking has health consequences and hazards similar to those of cigarettes and smokeless tobacco such as:[19]

- Cancer of the lung, oral cavity, larynx, and esophagus with risk of dying 2 to 10 times higher in smokers compared with nonsmokers.
- Cancer of the pancreas (probably).

Smoking Cessation

In 1990, the US Surgeon General outlined the benefits of smoking cessation:[20]

- People who quit, regardless of age, live longer than people who continue to smoke.
- Smokers who quit before age 50 halve their risk of dying in the next 15 years compared with 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 coronary heart disease and cardiovascular disease.

Among adults 18 and older in 1999, national data showed:[14]

- About 41% of current smokers had stopped smoking for at least one day during the preceding 12 months because they were trying to quit.
- About 23% of US adults (approximately 46 million adults: 26 million men and 20 million women) were former smokers.

Among adolescent smokers aged 12 to 19 years in 1989, approximately 16% had successfully quit smoking for 30 days in 1993.[21] In this study, successful quit attempts did not vary by age, gender, or ethnicity. Predictors of successful quitting among adolescents include less frequent smoking, longer past quit attempts, personal beliefs about future smoking patterns, mother's smoking status, and lower depression score.[21]

A recent US Surgeon General's report on reducing tobacco use outlines the components of comprehensive tobacco control. Health education combined with social, economic, and regulatory approaches is essential to counterbalance the tobacco industry's advertising and promotion and to foster non-smoking environments.[22]

Secondhand Smoke

Secondhand smoke, or environmental tobacco smoke (ETS), contains numerous human carcinogens for which there is no safe level of exposure. Scientific consensus groups have repeatedly reviewed the data on ETS. These include the US Environmental Protection Agency,[23] California Environmental Protection Agency,[24] and the National Institute of Environmental Sciences' National Toxicology Program.[25] Public policies to protect people from secondhand smoke are based on the following detrimental effects of ETS:

- Each year, about 3,000 nonsmoking adults die of lung cancer as a result of breathing secondhand smoke.[23]
- ETS causes an estimated 35,000 to 40,000 deaths from heart disease in people who are not current smokers.[26]
- ETS causes coughing, phlegm, chest discomfort, and reduced lung function in nonsmokers.[23]
- Each year, exposure to secondhand smoke causes 150,000 to 300,000 lower respiratory tract infections (such as pneumonia and bronchitis) in US infants and children younger than 18 months of age. These infections result in 7,500 to 15,000 hospitalizations every year.[23]
- Secondhand smoke increases the number of asthma attacks and the severity of asthma in about 200,000 to 1 million asthmatic children.[23]
- Secondhand smoke contains over 4,000 substances, more than 40 of which are known or suspected to cause cancer in humans and animals and many of which are strong irritants.[23]

Worldwide Tobacco Use

While smoking rates are slowly declining in the United States and most other high-income countries, they have been steadily growing in developing nations. According to the World Health Organization:[27]

- Based on current smoking patterns, smoking eventually will kill about 500 million people alive in the world today.
- Tobacco-caused deaths are expected to increase from about 4 million per year today to about 10 million per year by the 2030s, with 70% of those deaths occurring in developing nations. This is a higher death toll than is expected from malaria, maternal and major childhood conditions, and tuberculosis combined.
- Smoking rates are increasing in developing nations at a rate of about 3.4% per year.
- Prevalence rates among men in developing countries are about 48%; rates among women are substantially lower, but increasing.
- The estimated 1.2 billion smokers in the world today consume an average 14 cigarettes per day.

Costs of Tobacco

Tobacco costs to our society are best measured by the number of people who die or suffer illness each year because of its use. Annual medical costs of smoking constitute 6% to 8% of American personal health expenses, but may be as high as 12%.[28] One study showed direct health care expenditures caused directly by smoking totaled $50 billion, and 43% of these costs were paid by government funds, including Medicaid and Medicare in 1993.[29] These estimates of medical and other costs from tobacco may be low since costs associated with diseases caused by environmental tobacco smoke, burns from tobacco-related fires, or perinatal care for low-birthweight infants of mothers who smoke and indirect costs, such as work loss, bed-disability days, and loss in productivity, were not included.[29] As a result, the total economic burden of cigarette smoking may be more than $100 billion.[29] A recent study showed total US medical expenditures attributable to smoking may be as high as an estimated $54 billion in 1993 with $12 billion in ambulatory care, $3 billion in prescription drugs, $16 billion in hospital care, $15 billion in nursing homes, which translates to $279 in health care costs per adult.[30] The impact of cigarette smoking on state Medicaid and Medicare budgets varies among states, ranging from $1.9 billion in New York to $11.4 million in Wyoming for Medicaid and $1.5 billion in California to $8 million in Alaska for Medicare.[31,32]

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Nutrition and Physical Activity

Scientific evidence suggests that about one-third of the cancer deaths that occur in the US each year are due to nutrition and physical activity factors, including obesity. For the majority of Americans who do not use tobacco, dietary choices and physical activity are the most important modifiable determinants of cancer risk.

Evidence also indicates that although inherited genes do influence cancer risk, heredity alone explains only a fraction of all cancers. The majority of the variation in cancer risk among populations and among individuals is due to factors that are *not* inherited; behavioral factors such as cigarette smoking, certain dietary patterns, and physical activity can substantially affect one's risk of developing cancer. These factors modify the risk of cancer at all stages of its development. The introduction of a healthy diet and regular physical activity at any time from childhood to old age can promote health and impact cancer risk.

Based on its review of the scientific evidence, the American Cancer Society updated its nutrition and physical activity guidelines in 2001. Changes from the Society's 1996 guidelines include increased emphasis on the role of physical activity and weight control in reducing cancer risk. Because healthful individual behaviors are most likely to occur when there is social and environmental support in communities, these 2001 guidelines include, for the first time, an explicit *Recommendation for Community Action* to facilitate healthful food choices and opportunities for physical activity in schools, worksites, and communities.

The Society's recommendations are consistent in principle with the 2000 Dietary Guidelines for Americans, and recommendations of other agencies for general health promotion and for the prevention of coronary heart disease, diabetes, and other diet-related chronic conditions. Although no diet can guarantee full protection against any disease, the Society believes that the following recommendations offer the best nutrition and physical activity information currently available to help Americans reduce their risk of cancer.

Recommendations for Individual Choices

1. Eat a variety of healthful foods, with an emphasis on plant sources.

- Eat five or more servings of vegetables and fruit each day.
- Choose whole grains in preference to processed (refined) grains and sugar.
- Limit consumption of red meats, especially high fat and processed meats.
- Choose foods that help maintain a healthful weight.

There is strong scientific evidence that healthful dietary patterns, in combination with regular physical activity, are needed to maintain a healthful body weight and to reduce cancer risk. Many epidemiologic studies have shown that populations that eat a diet high in vegetables and fruit and low in animal fat, meat, and/or calories have reduced risk of some of the most common cancers. 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, overnutrition and energy imbalance, or the amount and distribution of body fat at particular stages of life affect one's risk of specific cancers. Until more is known about the specific components of diet that influence cancer risk, the best advice is to emphasize whole foods and the consumption of a mostly plant-based diet.

2. Adopt a physically active lifestyle.

- **Adults:** Engage in at least moderate activity for 30 minutes or more on 5 or more days of the week; 45 minutes or more of moderate to vigorous activity on 5 or more days per week may further enhance reductions in the risk of breast and colon cancer.
- **Children and adolescents:** Engage in at least 60 minutes per day of moderate-to-vigorous physical activity at least 5 days per week.

Scientific evidence indicates that physical activity may reduce the risk of certain cancers as well as provide other important health benefits. Regular physical activity contributes to the maintenance of a healthy body weight by balancing caloric intake with energy expenditure. Other mechanisms by which physical activity may help to prevent certain cancers may involve both direct

and indirect effects. For colon cancer, physical activity accelerates the movement of food through the intestine, thereby reducing the length of time that the bowel lining is exposed to potential carcinogens. For breast cancer, vigorous physical activity may decrease the exposure of breast tissue to circulating estrogen. Physical activity may also affect cancers of the colon, breast, and other sites by improving energy metabolism and reducing circulating concentrations of insulin and related growth factors. Physical activity helps to prevent Type II diabetes, which is associated with increased risk of cancers of the colon, pancreas, and possibly other sites. The benefits of physical activity go far beyond reducing the risk of cancer. They include prevention of heart disease, high blood pressure, diabetes, falls, osteoporosis, stress, and depression.

3. Maintain a healthful weight throughout life.

- Balance caloric intake with physical activity.
- Lose weight if currently overweight or obese.

Overweight and obesity are associated with increased risk for cancers at several sites: breast (among postmenopausal women, and especially those who gain weight through adulthood), colon, endometrium, adenocarcinoma of the esophagus, and kidney. The best way to achieve a healthful body weight is to balance energy intake (food intake) with energy expended (physical activity). Excess body fat can be reduced by restricting caloric intake and increasing physical activity. Caloric intake can be reduced by decreasing the sizes of food portions and limiting the intake of calorie-dense foods (e.g., those high in fat and refined sugars such as fried foods, cookies, cakes, candy, ice cream, and soft drinks). Such foods should be replaced with more healthful vegetables and fruit, whole grains, and beans. Because overweight in youth tends to continue throughout life, the increasing prevalence of overweight and obesity in pre-adolescents and adolescents may increase incidence of cancer in the future. For these reasons, efforts to establish a healthful weight and healthful patterns of weight gain should begin in childhood.

4. If you drink alcoholic beverages, limit consumption.

People who drink alcohol should limit their intake to no more than 2 drinks per day for men and 1 drink a day for women. Alcohol consumption is an established cause of cancers of the mouth, pharynx, larynx, esophagus, liver, and breast. For each of these cancers, risk increases substantially with intake of more than 2 drinks per day. Alcohol consumption combined with tobacco increases the risk of cancers of the mouth, larynx, and esophagus far more than the independent effect of either drinking or smoking. Regular consumption of even a few drinks per week has been associated with an increased risk of breast cancer in women. The mechanism for an effect of alcohol on breast cancer is not known with certainty, but may be due to alcohol-induced increases in circulating estrogens or other hormones in the blood, reduction of folic acid levels, or to a direct effect of alcohol or its metabolites on breast tissue.

Some groups of people should not drink alcoholic beverages at all. These include children and adolescents; individuals of any age who can not restrict their drinking to moderate levels; women who are or may become pregnant; individuals who plan to drive or operate machinery or who take part in other activities that require attention, skill, or coordination; and individuals taking prescriptions or over-the-counter medications that can interact with alcohol.

ACS Recommendation for Community Action

Public, private, and community organizations should work to create social and physical environments that support the adoption and maintenance of healthful nutrition and physical activity behaviors.

- Increase access to healthful foods in schools, worksites, and communities.
- Provide safe, enjoyable, and accessible environments for physical activity in schools, and for transportation and recreation in communities.

The American Cancer Society guidelines relate to individual choices regarding diet and physical activity patterns, but those choices occur within a community context that either facilitates or interferes with healthy behaviors. Therefore, this key recommendation for community action accompanies the four guidelines for individual choices for nutrition and physical activity to reduce cancer risk. This recommendation for community action underscores the importance of community measures to support healthy behaviors by increasing access to healthful food choices and opportunities to be physically active.

Environmental Cancer Risks

Environmental factors, defined broadly to include smoking, diet, and infectious diseases as well as chemicals and radiation, cause an estimated three-quarters of all cancer deaths in the United States. Among these factors, tobacco use, unhealthy diet, and physical inactivity have a greater affect on individual cancer risk than do trace levels of pollutants in food, drinking water, and air. However, the degree of risk from pollutants depends on the concentration, intensity, and duration of exposure. Substantial increases in risk have been shown in settings where workers have been exposed to high concentrations of ionizing radiation, certain chemicals, metals, and other substances, as well as among radiation victims, and patients treated with drugs or therapies later found to be carcinogenic.

Even low-dose exposures that pose only small risk to individuals can still cause substantial ill health across an entire population if the exposures are widespread. For example, secondhand tobacco smoke increases risk in large numbers of people who do not smoke but are exposed to others' smoke. Strong regulatory control and attention to safe occupational practices, drug testing, and consumer product safety play an important role in reducing risk of cancer from environmental exposures. Additional information on environmental factors associated with cancer risks can be found at several Web sites, including www.atsdr.cdc.gov, www.epa.gov, www.niehs.nih.gov, www.osha.gov, and www.who.int.

Risk Assessment

The risk assessment process evaluates both the cancer-causing potential of a substance as well as the levels of the substance in the environment and the extent to which people are actually exposed. However, the process is not perfect. For most potential carcinogens, data are only available from high-dose experiments in animals or highly exposed occupational groups. To use such information to set human safety standards, regulators must extrapolate from animals to humans and from high-dose to low-dose conditions. Because both extrapolations involve much uncertainty, as does the effect of mixtures of chemicals and of especially susceptible subgroups of the population, risk assessment generally makes conservative assumptions to err on the side of safety. For cancer safety standards, acceptable risks are usually limited to those that increase risk by no more than one case per million persons over a lifetime.

Safety standards developed in this way for chemical or radiation exposures are the basis for federal regulatory activities at the Food and Drug Administration, the Environmental Protection Agency, and the Occupational Safety and Health Administration. The application of laws and procedures by which standards are implemented and risks are controlled is called risk management.

Chemicals

Various chemicals (for example, benzene, asbestos, vinyl chloride, arsenic, aflatoxin) show definite evidence of causing cancer in humans; others are considered probable human carcinogens based on evidence from animal experiments (for example, chloroform, dichlorodiphenyl-trichloroethane [DDT], formaldehyde, polychlorinated biphenyls [PCBs], polycyclic aromatic hydrocarbons). Often in the past, direct evidence of human carcinogenicity has come from studies of workplace conditions involving sustained, high-dose exposures. For some exposures (asbestos and radon), the risks are greatly increased when combined with tobacco smoking.

Radiation

The only types of radiation proven to cause human cancer are high-frequency ionizing radiation (IR) and ultraviolet (UV) radiation. Exposure to sunlight (UV radiation) causes almost all cases of basal and squamous cell skin cancer and is a major cause of skin melanoma. Disruption of the earth's ozone layer by pollution (the "ozone hole") may cause rising levels of UV radiation.

Evidence that high-dose IR (x-rays, radon, etc.) causes cancer comes from studies of atomic bomb survivors, patients receiving radiotherapy, and certain occupational groups, such as uranium miners. Virtually any part of the body can be affected by IR, but especially bone marrow and the thyroid gland. Diagnostic medical and dental x-rays are set at the lowest dose levels possible to minimize risk without losing image quality and medical usefulness. Radon exposures in homes can increase lung cancer risk, and cigarette smoking greatly increases the effect of radon exposure in lung cancer risk. Fortunately, there are tests which can be used to detect high levels of radon. Remedial actions may be needed if radon levels are too high.

Unproven Risks

Public concern about cancer risks in the environment often focuses on unproven risks or on situations in which known carcinogen exposures are at such low levels that risks are negligible, for example:

Pesticides. Many kinds of pesticides (insecticides, herbicides, etc.) are widely used in agriculture in the production of the food supply. High doses of some of these chemicals have been shown to cause cancer in animals, but the very low concentrations found in some foods have not been associated with increased cancer risk. In fact, people who eat more fruits and vegetables, which may be contaminated with trace amount of pesticides, generally have lower cancer risks than people who eat few fruits and vegetables. Workers exposed to higher levels of pesticides, in industry or farming, may be at higher risk of certain cancers. Environmental pollution by pesticides such as DDT, which is now banned but was used in agriculture in the past, degrade slowly and can lead to accumulation in body fat. These residues have been suggested as a possible risk factor for breast cancer, although study results have been largely negative.

Continued research regarding pesticide use is essential for maximum food safety, improved food production through alternative pest control methods, and reduced pollution of the environment. In the meantime, pesticides play a major role in sustaining our food supply. When properly controlled, the minimal risks they pose are greatly overshadowed by the health benefits of a diverse diet rich in foods from plant sources.

Non-ionizing radiation. Electromagnetic radiation at frequencies below ionizing and ultraviolet levels has not been proven to cause cancer. Some studies suggest an association with cancer, but most of the now-extensive research in this area does not. Low-frequency radiation includes radiowaves, microwaves, and radar, as well as power frequency radiation arising from the electric and magnetic fields associated with electric currents, cellular phones, and household appliances.

Toxic wastes. Toxic wastes in dump sites can threaten human health through air, water, and soil pollution. Many toxic chemicals contained in such wastes can be carcinogenic at high doses, but most community exposures appear to involve very low or negligible dose levels. Clean-up of existing dump sites and close control of toxic materials in the future are essential to ensure healthy living conditions.

Nuclear power plants. Ionizing radiation emissions from nuclear facilities are closely controlled and involve negligible levels of exposure for communities near the plants. Reports about cancer case clusters in such communities have raised public concern, but studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere.

The American Cancer Society

In 1913, ten physicians and five laymen founded the American Society for the Control of Cancer. Its stated purpose was to disseminate knowledge about the symptoms, treatment, and prevention of cancer; to investigate conditions under which cancer was found; and to compile statistics about cancer. Later renamed the American Cancer Society, Inc., the organization now includes more than three million friends and volunteers working to conquer cancer.

Organization: The American Cancer Society, Inc., consists of a National Society with 17 chartered Divisions throughout the country, and a local presence in most communities.

The National Society: A National Assembly provides basic representation from the Divisions and additional representation on the basis of population. The Assembly elects a volunteer Board of Directors, which sets strategic goals for the Society, ensures management accountability, and provides stewardship of donated funds. The National Society is responsible for overall planning and coordination of the Society's programs for cancer information delivery, cancer control and prevention, advocacy, and resource development. The National Society also provides technical help and materials for Divisions and local offices and administers its research program.

The Divisions: These are governed by Division Boards of Directors comprised of both medical and lay volunteers throughout the US and Puerto Rico. The Society's 17 Divisions are responsible for program delivery in their regions.

Local offices: Local offices are organized to deliver cancer control programs at the community level. Descriptions of some of the Society's major programs follow.

Advocacy and Public Policy

Cancer is a political, as well as a medical, social, psychological, and economic issue. Every day legislators make decisions that impact the lives of millions of Americans who have been touched by cancer. To affect those decisions positively, the Society has identified advocacy as part of its mission and as one of its top corporate priorities and works nationwide to promote beneficial policies, laws, and regulations for those affected by cancer.

Advocacy priorities

Cancer is a personal, tangible, and powerful issue for millions of Americans. They want our political leaders to implement public policies that will combat this disease and improve the lives of cancer patients, survivors, and families. For this reason, the American Cancer Society is dedicated to working with policymakers to enact laws and policies that will advance our fight against cancer. Together with its research, education, prevention, and cancer control initiatives, the Society strives to advocate for and strengthen our nation's laws and regulations in a way that will:

- Increase investments for cancer research, prevention, early detection, and care;
- Increase access to quality cancer care, screening, prevention, and awareness efforts;
- Reduce health disparities among minorities and the medically underserved; and,
- Reduce and prevent suffering from tobacco-related illness.

The American Cancer Society has identified areas where federal, state, and local government leaders can allocate additional resources to help reduce the number of individuals being diagnosed with and dying from cancer. These steps begin with cancer research, prevention, early detection, treatment, and care. Additional investments in research are needed to answer the public's call to propel today's knowledge toward the next level of cancer breakthroughs. By increasing the resources we dedicate to cancer research, our scientific knowledge will advance and we can increase our nation's capacity to prevent this disease. Complementing this, policymakers should also fund efforts to apply research findings so that what is learned at the laboratory bench reaches the bedside. Urging legislative bodies to fund these efforts moves everyone that much closer to our ultimate goal — to defeat cancer.

The American Cancer Society also calls on policymakers to increase access to quality cancer care, screening, prevention, and awareness programs. Results from a January 2001 poll by the Henry J. Kaiser Family Foundation indicate that Americans understand the importance of these efforts and want their public leaders to increase access to health care for the uninsured and provide more public health programs to prevent disease. Local, state, and federal government leaders must act to help remove administrative, financial, and other barriers that impede access to important cancer fighting tools-such as cancer screenings and clinical trials. In addition, the Society seeks to limit the negative impact the illness or its treatment can have on a patient's physical, psychological, and social state, including efforts to protect quality of life and ensure a patient's life is not overcome by pain. As part of meeting this critical goal, the Society supports and encourages national, state, and local efforts to prevent and ameliorate pain and suffering in people with cancer and to improve their quality of life.

Reducing health disparities among minorities and the medically underserved remains a major priority for the American Cancer Society. Individuals who are poor, have no health insurance, have lower levels of education, or are members of racial or ethnic minority groups are more likely to develop and die of cancer than members of other groups. We cannot begin to reduce overall cancer incidence and mortality until we make substantial inroads into improving access to cancer care for these groups. Creative interventions are needed to overcome the numerous barriers — including socioeconomic, cultural, linguistic, geographic — to care that threaten our ability to effectively reach and serve these populations. Policymakers at the local, state, and federal levels must provide adequate resources for culturally competent programs that work to reduce and eliminate the unequal burden of cancer, remove barriers that impede access to cancer care and prevention, and improve general access to health care for those communities at greatest risk for cancer.

The American Cancer Society is firmly committed to reducing and preventing suffering from tobacco-related illness. The Society will continue our efforts to hold the tobacco industry accountable for its actions and to press for policies that will reduce the enormous cancer burden tobacco use causes. Policymakers at all levels of government can take steps to help smokers while also

reaching out to our children so they never start. A comprehensive approach, in which a number of anti-tobacco efforts work simultaneously, is proving to be the most effective way to bring smoking rates down. First and foremost, the Society believes the FDA must have strong oversight of the tobacco industry. The Society is also urging lawmakers to adopt public policies that can help smokers quit by offering, Medicare, Medicaid, and Maternal and Child Health coverage for smoking cessation programs. Properly implemented cessation programs will save substantial numbers of lives and dollars by reducing the burden of smoking-related illnesses. In addition, the Society supports efforts to increase the federal tobacco tax. Increasing taxes on tobacco products is a proven means of reducing consumption. Finally, the Society supports increased funding for effective local, state, and federal tobacco control programs. Our society is filled with a steady stream of tobacco industry advertising and promotional efforts touting tobacco as glamorous, socially acceptable, and normal. A successful anti-tobacco campaign must have the breadth and the funding available to counter the industry's messages and change the image of smoking as an accepted social norm.

Advocacy successes

American Cancer Society advocacy initiatives rely on the combined efforts of a community-based grassroots network of Society volunteers, health care professionals, cancer survivors, and other partners. In the past year, the American Cancer Society-through its local, state, and federal efforts-has successfully influenced or supported policies, laws, and regulations to:

- Increase investments in cancer research at the National Institutes of Health (NIH) and the National Cancer Institute (NCI), including maintaining the critical effort now underway to fulfill Congress's pledge to double NIH funding by 2003 and fully fund the NCI Director's bypass budget;
- Improve our ability to apply the knowledge gained from research by increasing funding for critical, cancer-related programs provided through the Centers for Disease Control and Prevention (CDC), including tripling the funding for the CDC's colorectal cancer awareness program and securing the first-ever significant increase for the cancer registries program;
- Ensure access to clinical trials through Medicare and private health insurance at the state level;
- Advance state and federal legislation that eliminates barriers to effective cancer screening tests, including extending Medicare coverage of colonoscopy benefits to average-risk beneficiaries;
- Guarantee the inclusion of strong patient protections and access to clinical trials in the versions of the Patients' Bill of Rights passed by the House and the Senate;
- Support and expand local, state, and federal programs that increase awareness and prevention of cancer, including securing the enactment of the Breast and Cervical Cancer Treatment Act, prompting states to participate fully in order to ensure underserved women receive treatment upon diagnosis;
- Ensure resources for culturally effective programs that address the unequal burden of cancer and improve access to cancer prevention, early detection, and treatment for medically underserved communities, including securing enactment of legislation to create a Center for Research on Minority Health and Health Disparities at NIH;
- Advance state and local measures that reduce tobacco consumption, ensure minors cannot access tobacco products, and restrict smoking in public places;
- Secure funding through the state tobacco settlement agreement for comprehensive tobacco control programs at the local and state level.

Cancer Information

Providing the public with accurate, up-to-date information on cancer is a priority for the American Cancer Society. The Society provides information on all aspects of cancer through a variety of channels including printed materials, a toll-free national cancer information center, and a Web site.

National Cancer Information Center—1-800-ACS-2345

People facing cancer need clear, reliable information in order to understand their disease and make informed decisions about their health. Trained cancer information specialists are available 24 hours a day, seven days a week to answer questions about cancer, link callers with resources in their communities, and provide information on local events. Cancer information specialists answer calls in both English and Spanish, and callers who speak languages other than English and Spanish can also be assisted through translation services provided. The National Cancer Information Center includes

an email response center staffed by cancer information specialists who respond to questions and comments submitted through the Society's Web site.

American Cancer Society Web Site — www.cancer.org

The American Cancer Society's Web site is an important extension of the Society's mission to provide lifesaving information to the public. The user-friendly site includes an interactive cancer resource center containing in-depth information on every major cancer type. Information is also available in Spanish. Through the Web site, visitors can order American Cancer Society publications, gain access to daily cancer-related articles, and find additional online and offline resources. Other useful sections on the Web site include a directory of medical resources, links to other sites organized by cancer type or topic, resources for media representatives, and information on the Society's research grants program, advocacy efforts, and special events.

Publications

The Society publishes a large number of patient education brochures and pamphlets, consumer and clinical books, and professional journals for patients, families, and health care professionals. These include books on specific cancer types, psychosocial, quality-of-life and caregiving issues, and prevention; cookbooks; and textbooks and other specialized cancer-related topics for health care professionals. Four clinical journals (*Cancer, Cancer Cytopathology, CA-A Cancer Journal for Clinicians,* and *Cancer Practice*) are also available. For more information, call 1-800-ACS-2345, or visit our online bookstore at www.cancer.org.

Community Cancer Control

Community cancer control encompasses activities at the local, state, regional, or national level, which have a positive impact on the entire spectrum of prevention, early detection, effective treatment, survival, and quality of life related to cancer. Across the country, the Society seeks to fulfill its mission to save lives and diminish suffering from cancer through community-based programs aimed at reducing the risk of cancer, detecting cancer as early as possible, ensuring proper treatment, and empowering people facing cancer to cope with the disease and maintain the highest possible quality of life.

Prevention

Primary cancer prevention means taking the necessary precautions to prevent the occurrence of cancer in the first place. The Society's prevention programs focus primarily on tobacco control, the relationship between diet and physical activity and cancer, promoting coordinated school health, and reducing the risk of skin cancer. Programs are designed to help adults and children make health-enhancing decisions and act on them.

The Society has joined other health, education, and social service agencies to promote comprehensive school health education and National School Health Education Standards. Comprehensive school health education is a planned health education curriculum for pre-school to Grade 12. The Standards describe for schools, parents, and communities how to create an instructional program that will enable students to become healthy and capable of academic success.

The Society's school health education programs emphasize the importance of developing good health habits and can be an integral part of a comprehensive school health education curriculum.

Specific programs that the Society has developed to strengthen schools' ability to teach cancer prevention include conducting a National School Health Coordinator Leadership Institute, creation of a series of social marketing campaigns on the benefits of school health, and coordinating the development of a Healthy Kids Network of parents and community members in support of school health and cancer prevention.

The American Cancer Society works collaboratively with our national partners to implement comprehensive tobacco control programs. The Society advocates for social environmental change at the national, state, and community levels that prevents youth from starting to use tobacco and provides support for those who wish to stop smoking.

Tobacco control efforts include:

- Strong, meaningful FDA regulation of all tobacco products
- Reducing tobacco advertising and promotion directed at youth
- Increased funding to support comprehensive tobacco control programs
- Reducing environmental tobacco smoke exposure
- Support for coordinated school-based education programs
- Accessible cessation programs for those who wish to quit

- Tobacco tax increases to offset health care costs associated with tobacco use
- Support for a global partnership to reduce tobacco-related death and disease

The Society promotes its skin protection message through a variety of media and education activities, as well as through the 33 member organizations of the American Cancer Society Skin Protection Federation. This coalition includes nonprofit organizations, government agencies, and corporations that have a combined constituency of over 100 million adults and children. The purpose of the coalition is to accelerate promotion of the American Cancer Society's guidelines for skin cancer prevention, and to provide a forum for member organizations to share information and strategies that increase awareness about skin protection and encourage more people to adopt skin protection behaviors.

With possibly over 60% of cancers preventable and due to lifestyle behaviors like smoking, sun exposure, and poor diet that often begin in childhood, children and youth are an important audience for cancer prevention. The Society, together with the Centers for Disease Control and Prevention (CDC) and a host of other education, health, and social service agencies, has identified schools as a key system for impacting cancer prevention. By strengthening the 15,000 school districts in the US and helping them to deliver strong, coordinated school health programs and effective school health education, the American Cancer Society has the ability to impact over 45 million school children.

Detection and Treatment

The Society also seeks, through the dissemination of its early cancer detection guidelines and its cancer detection and advocacy programs, to ensure that cancer is diagnosed at the earliest possible stage when there is the greatest chance of successful treatment. American Cancer Society guidelines for early cancer detection are reviewed annually to ensure that recommendations to the public and health care providers are based on the most current scientific evidence. Currently, the Society has early detection recommendations for cancers of the breast, cervix, colon and rectum, prostate, and endometrium, and general recommendations for a cancer-related checkup (for more information, see Summary of American Cancer Society Recommendations for the Early Detection of Cancer in Asymptomatic People). The Society works in partnership with many public and private organizations in diverse settings to increase awareness about breast cancer, and the importance of early detection, and to overcome the barriers to regular mammography use.

The Society, in partnership with the CDC, is leading a national initiative to increase colorectal cancer screening, which is currently underutilized by adults. In addition to public outreach campaigns and initiatives targeting health care providers, the ACS and CDC have established the National Colorectal Cancer Roundtable, bringing leading government agencies, professional and medical organizations, and advocacy and patient groups together to identify collective strategies and opportunities to increase screening for colorectal cancer. The availability of genetic testing for inherited risk for cancer has raised a complex set of questions about the medical, psychosocial, ethical, legal, policy, and quality-of-life implications about the use of genetic information. The Society is working with other national organizations to address these issues through advocacy and educational initiatives. As the delivery of health care continues to change, the Society is working with partners in all sectors of the health care system to ensure that all individuals are offered a full range of preventive services to enable them to reduce their risk of getting cancer or to find their cancer at an early, treatable stage, and that persons with cancer receive the highest quality care.

Patient Services

The Society offers a range of practical and emotional support for patients, their families, their caregivers, and their community from the time of diagnosis throughout life.

Cancer Survivors Network: The Cancer Survivors Network (CSN) is a new, interactive electronic support service created by and for cancer survivors and their families. In the privacy of their own homes, they can access the free service either by telephone or the Internet 24 hours a day, 7 days a week. Both the telephone and the Web site contain approximately 150 hours of prerecorded personal stories and discussions among survivors or family caregivers. Additionally, the Web community has many interactive features designed to help users find and connect with one another to share experiences and support. Login at www.cancer.org or call toll free 1-877-333-4673 (HOPE).

Reach to Recovery: Reach to Recovery is an American Cancer Society program designed to help people cope with their breast cancer experience. This program has

provided more than 30 years of service, in the fight against breast cancer. Reach to Recovery volunteers are breast cancer survivors who are trained to offer support at various points along the breast cancer continuum: diagnosis; decisionmaking about treatment; dealing with treatment and its side effects; returning to a full, active life; or confronting any long-term effects-including a possible recurrence of the disease.

"tlc": A service offering of the Society, "tlc" is a "magalog" designed to provide needed medical information and special products for women newly diagnosed with breast cancer and breast cancer survivors. The magalog features articles that focus on medical questions specific to breast cancer, and also has a Question & Answer section. "Tlc" features a variety of hats, honeys, caps, turbans, hairpieces, swimwear, bras, prostheses, and breast forms. Many products are also appropriate for any woman experiencing treatment-related hair loss. Free copies are available by calling 1-800-850-9445.

Look Good...Feel Better: In partnership with the Cosmetic, Toiletry and Fragrance Association Foundation and the National Cosmetology Association, this free program is designed to teach women cancer patients beauty techniques to help restore their appearance and self-image during chemotherapy and radiation treatments.

Man to Man: This group program provides information about prostate cancer and related issues for men and their partners in a supportive atmosphere. Some areas offer Side by Side, a group program for the partners of men with prostate cancer, and/or a visitation program in which a trained prostate cancer survivor provides support to a man newly diagnosed with prostate cancer.

Children's Camps: In some areas, the Society sponsors camps for children who have, or have had, cancer. These camps are equipped to handle the special needs of children undergoing treatment.

Hope Lodge: Housing is provided in some areas through funds raised specifically to purchase a dwelling to house patients during their treatment; 17 lodges are in operation.

I Can Cope: This patient and family cancer education program consists of a series of classes, often held at a local hospital. Doctors, nurses, social workers, and community representatives provide information about cancer diagnosis and treatment, as well as assistance in coping with the challenges of a cancer diagnosis.

Pain control

Cancer pain management is a serious public health problem and a major priority for the Society. Approximately 50%-70% of people with cancer experience some degree of pain. Less than half of them get adequate relief of their pain; and this negatively impacts their quality of life. Through service, collaboration, education, advocacy, and research, the Society is working aggressively to eliminate barriers to cancer-related pain relief across the survivorship continuum. Tools are being enhanced and expanded that educate the public, patients, families, and health care providers about the availability of treatments that effectively manage most cancer pain.

Research

The research program consists of three components: extramural grants, intramural epidemiology and surveillance research, and the intramural behavioral research center. As the largest source of private, not-for-profit cancer research funds in the US, the Society dedicated more than $119 million to research and health professional training in 2000, with less than 5% of that amount going toward the operating expenses of the research program. Since 1946, when the Society awarded its first research grants, we have invested more than $2.3 billion in research. The investment has paid rich dividends: the 5-year survival rate has almost tripled since 1946, and the new case rates and death rates from cancer have declined each year since 1990. Indeed, Society-supported researchers have contributed to most of the advances that, for the first time, make the conquest of cancer a feasible goal.

Extramural Grants

The American Cancer Society's extramural grants program supports the best research at more than 150 of the top US medical schools and universities across a wide range of health care disciplines critically important to the control of cancer. Grant applications solicited through a nationwide competition are subjected to a rigorous external peer review, ensuring that only the best research is funded, wherever it may be. The lion's share of our research budget is dedicated to funding investigators at the beginning of their research careers, a time when they are less likely to receive funding from the federal government. Strong emphasis is placed on research needs that are unmet by other funding organizations, such as our current targeted research area of cancer in the poor and underserved. The success of the

Society's research program is exemplified by the fact that 32 Nobel Prize winners received grant support from the Society early in their careers.

Epidemiology and Surveillance Research

Intramural epidemiologic research at the Society evaluates trends in cancer incidence and mortality, cancer risk factors, and cancer patient care, and studies the causes and prevention of cancer in large prospective studies. In addition to *Cancer Facts & Figures,* the department provides descriptive cancer statistics in several other publications including *Cancer Statistics, Breast Cancer Facts & Figures,* and *Cancer Facts & Figures for African Americans.* Trends and patterns in cancer risk factors such as tobacco use, nutrition, and physical activity are presented in Cancer Prevention and Early Detection Facts & Figures. This publication serves as a resource for ACS Divisions to assess progress toward the Society's goals. For the past four years, the department has collaborated with the National Cancer Institute, the Centers for Disease Control and Prevention, including the National Center for Health Statistics, and the North American Association of Central Cancer Registries to produce the annual Report to the Nation on progress related to cancer prevention and control in the United States.

The department also analyzes patterns of cancer causation in large prospective studies. Three such studies have been undertaken over the past 50 years:

- Hammond-Horn (188,000 men studied from 1952-1955)
- Cancer Prevention Study I (1 million people studied from 1959-1972 in 25 states)
- Cancer Prevention Study II (CPS II, a continuing study of 1.2 million people enrolled in 1982 by 77,000 volunteers in 50 states)

About 102 scientific publications based on CPS-II have examined the contribution of lifestyle (smoking, nutrition, weight, etc.,) family history, illnesses, medications, and environmental exposures to various cancers. Mortality follow-up of all CPS II cohort members remains active. In addition, cancer incidence follow-up and periodic updating of exposure information occurs in the CPS II Nutrition Cohort, a subgroup of 184,000 men and women.

In 1998, the CPS II LifeLink Cohort was established to obtain blood samples from 40,000 to 50,000 surviving members of the CPS II Nutrition Cohort residing in urban and suburban areas. These blood samples are being stored in liquid nitrogen for future epidemiologic investigations, including the role of nutritional, hormonal, and genetic factors in the development of cancer and other diseases. Additional information about the Cancer Prevention Studies is available at www.cancer.org, including copies of questionnaires and publication citations.

Behavioral Research Center

The Center was established in 1995 to conduct original behavioral and psychosocial cancer research, provide consultation to other parts of the Society, and facilitate the transfer of behavioral and psychosocial research and theory to improve cancer control policies. Among the ongoing research projects of the Center are:

- A nationwide, longitudinal study of 100,000 adult cancer survivors to determine the unmet psychosocial needs of survivors and their significant others, to identify factors that affect their quality of life, to evaluate programs intended to meet their needs, and to examine late effects, including second cancers.
- A cross-sectional study of 30,000 cancer survivors two, five, and 10 years after initial diagnosis and treatment. This study will evaluate the psychological needs, adjustment, and quality of life of longer-term cancer survivors.
- A study of the knowledge, attitudes, and behaviors of a managed-care population regarding colorectal cancer screening.
- A longitudinal study of the use of stage-based smoking cessation materials implemented in conjunction with the Society's Cancer Control Department and the National Cancer Information Center.
- A study to examine health care professionals' awareness, referral patterns, and attitudes toward various cancer information and support services.
- Data from the health-related quality-of-life surveys that are conducted by the Department of Health and Human Services' Health Care Financing Administration (HCFA) are being provided to the BRC for statistical analysis on those cancer survivors who receive Medicare-managed care.
- A directory of professionals involved in the behavioral, psychosocial, and policy research aspects of cancer is being revised. This directory allows users to locate professionals with a particular expertise or interest.

Sources of Statistics

Cancer Deaths. The estimated numbers of US cancer deaths are calculated by fitting the numbers of cancer deaths for 1979 through 1999 to a statistical model which forecasts the numbers of deaths that are expected to occur in 2002. The estimated numbers of cancer deaths for each state are calculated similarly, using state level data. For both the 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.

We discourage the use of our estimates to track year-to-year changes in cancer deaths because the numbers can vary considerably from year to year, particularly for less common cancers and for smaller states. Mortality rates reported by NCHS are generally more informative statistics to use when tracking cancer mortality trends.

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 for 1930 through 1998 and population data from the US Bureau of the Census. Unless otherwise indicated, death rates in this publication are age-adjusted to the 1970 US standard population, to allow comparisons across populations with different age distributions.

New Cancer Cases. The estimated numbers of new US cancer cases are calculated by estimating the numbers of cancer cases that occurred each year from 1979 through 1998 and fitting these estimates to a statistical model which forecasts the numbers of cases that are expected to occur in 2002. Estimates of the numbers of cancer cases for 1979 through 1998 are used rather than actual case counts because case data are not available for all 50 states. The estimated numbers of cases for 1979 through 1998 are calculated using cancer incidence rates from the regions of the United States included in the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program and population data collected by the US Bureau of the Census.

State case estimates are calculated by apportioning the total US case estimates for 2002 by state, based on the state distribution of estimated cancer deaths for 2002.

Like the method used to calculate cancer deaths, the methods used to estimate new US and state cases for the upcoming year can produce numbers that vary considerably from year to year, particularly for less common cancers and for smaller states. For this reason, we discourage the use of our estimates to track year-to-year changes in cancer occurrence. Incidence rates reported by SEER are generally more informative statistics to use when tracking cancer incidence trends for the United States, and rates from state cancer registries are useful for tracking local trends.

Incidence Rates. Incidence rates are defined as the number of people per 100,000 who develop disease during a given time period. For this publication, incidence rates were calculated using data on cancer cases collected by the SEER program and population data collected by the US Bureau of the Census. State incidence rates presented in this publication are published in the North American Association of Central Cancer Registries' publication *Cancer Incidence in North America, 1994-1998.* Incidence rates for the United States were originally published in *SEER Cancer Statistics Review, 1973-1998.* Unless otherwise indicated, incidence rates in this publication are age-adjusted to the 1970 US standard population, to allow comparisons across populations that have different age distributions.

Survival. Five-year relative survival rates are presented in this report for cancer patients diagnosed between 1992 and 1997, followed through 1997. Relative survival rates are used to adjust for normal life expectancy (and events such as death from heart disease, accidents, and diseases of old age). These rates are calculated by dividing observed 5-year survival rates for cancer patients by 5-year survival rates expected for people in the general population who are similar to the patient group with respect to age, gender, race, and calendar year of observation. All survival statistics presented in this publication were originally published in *SEER Cancer Statistics Review, 1973-1998.*

Probability of Developing Cancer. Probabilities of developing cancer are calculated using DevCan (Probability of Developing Cancer Software) developed by the National Cancer Institute. These probabilities reflect the average experience of people in the United States and do not take into account individual behaviors and risk factors. For example, the estimate of 1 man in 13 developing lung cancer in their lifetime is a low estimate for smokers and a high estimate 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. For information on data collection methods used by the National Center for Health Statistics: National Center for Health Statistics. *Vital Statistics of the United States, 2000, Vol II, Mortality, Part A.* Washington: Public Health Service. 2000, or visit the NCHS Web site at www.cdc.gov/nchs.

B. For information on data collection methods used by the National Cancer Institute's Surveillance, Epidemiology and End Results Program: Ries LAG, Eisner MP, Kosary CL, et al. (eds.). *SEER Cancer Statistic Review, 1973-1998.* National Cancer Institute. Bethesda, MD, 2001 or visit the SEER Web site at http://seer.cancer.gov.

C. For information on the methods used to estimate the numbers of new cancer cases and deaths: Wingo PA, Landis S, Parker S, Bolden S, Heath CW. Using cancer registry and vital statistics data to estimate the number of new cancer cases and deaths in the Unites States for the upcoming year. *J Reg Management* 1998;25(2):43-51.

D. For information on the methods used to calculate the probability of developing cancer: Feuer EJ, Wun L-M, Boring CC et al. The lifetime risk of developing breast cancer. *JNCI* 1993; 85:892-897.

Age Adjustment to the Year 2000 Standard

Epidemiologists use a statistical method called "age-adjustment" to compare groups of people with different age compositions. For example, without adjusting for age, it would be inaccurate to compare the cancer rates of the state of Florida, which has a large elderly population, to that of Alaska, which has a younger population. This is especially true when examining cancer rates, since cancer is generally a disease of older people. Without adjusting for age, it would appear that the cancer rates for Florida are much higher than Alaska. However, once the ages are adjusted, it appears their rates are similar.

Starting with *Cancer Facts & Figures 2003,* we will use the most recent US census (2000) as the baseline for our age-adjustment. This is a change from previous issues and other statistics we have published. Prior to this, most of our statistics were based on the 1970 census, although some were based on the 1940 census or the 1980 census. This change brings us into alignment with federal agencies that publish statistics. This new standard population will apply to data from calendar year 1999 and forward. The change will also require a recalculation of age-adjusted rates for previous years to allow valid comparisons between current and past years.

The purpose of shifting to the Year 2000 Standard is to more accurately reflect contemporary incidence and mortality rates, given the aging of the US population. On average, Americans are living longer because of the decline in infectious and cardiovascular diseases. Our longer life span is allowing us to reach the age where cancer and other chronic diseases become more common. Using the Year 2000 Standard in age-adjustment instead of the 1970 or 1940 standards allows age-adjusted rates to be closer to the actual, unadjusted rate in the population.

The impact on a particular cancer of changing to the Year 2000 Standard will vary depending on the ages at which that particular cancer generally occurs. For all cancers combined, average annual age-adjusted incidence rate for 1994-98 will increase approximately 20% when adjusted to the Year 2000 compared to the Year 1970 Standard. For cancers, such as colon cancer, that occur mostly at older age, the Year 2000 Standard will increase incidence by up to 25%, whereas for cancers such as acute lymphocytic leukemia, the new standard will decrease the incidence by about 7%. These changes are caused by the increased representation of older ages (for all cancer and prostate cancer) or by the decreased representation of younger ages (for acute lymphocytic leukemia) in the Year 2000 Standard compared to the Year 1970 Standard.

It is important to note that in no case will the actual number of cases/deaths or age-specific rates change; only the age-standardized rates which are weighted to the different age-distribution.

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