



Trends in cancer incidence and mortality rates in the United States from 1975 to 2016

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Background: Cancer is the second leading cause of death in the United States (US). The goal of this study was to characterize the trends in cancer incidence and mortality in the US from 1975 to 2016.

Methods: In this study, we analyzed 4,711,958 cancer cases and 21,489,462 cancer death cases from the Surveillance, Epidemiology and End Results (SEER) database. Cancer incidence and mortality were assessed according to sex, race, and age group. Cancer survival rates between 2010 and 2016 were also examined.

Results: The continuous decline in the overall cancer mortality rate from the early 1990s has resulted in overall decreases of 33.6% and 23.6% in the cancer mortality rates of males and females, respectively. In males, the top three leading cancers and causes of cancer death from 1975 to 2016 were prostate, lung and bronchial, and colon and rectal cancers, while in females, the top three leading cancers and causes of cancer death from 1979 to 2016 were breast, lung and bronchial, and colon and rectal cancers. The 5-year relative survival rates of males and females for all cancers combined, diagnosed from 2010–2016, were 68.5% and 70.1%, respectively. The overall cancer incidence and mortality were higher in males than females from 1975–2016. Also, black people had higher mortality and shorter survival rates for all cancers combined compared with white people (in both sexes).

Conclusions: This study presents a comprehensive overview of cancer incidence and mortality in the US over the past 42 years. Such information can provide a scientific basis for cancer prevention and control.

Keywords: Cancer incidence; cancer mortality; cancer survival rates; lung cancer; breast cancer; prostate cancer

Submitted Oct 30, 2020. Accepted for publication Dec 16, 2020.

doi: 10.21037/atm-20-7841

View this article at: <http://dx.doi.org/10.21037/atm-20-7841>

Introduction

Cancer is the second leading cause of death after heart disease in the United States (US) (1,2). In 2019, it was estimated that there were 1,762,450 new cancer cases and 606,880 cancer deaths in the US (2). Considerable progress in the prevention, detection, diagnosis, and treatment of cancer has been achieved over the past four decades. An understanding of the trends in cancer incidence and mortality rates is critical for continued advancement.

However, few studies have systematically documented these changes (1-3). In this article, we analysed age-adjusted cancer incidence and mortality rates between 1975 and 2016 in the US. In addition, we also analysed cancer survival rates between 2010 and 2016. This information will provide valuable insights into cancer prevention and control at the national level.

We present the following article in accordance with the STROBE reporting checklist (available at <http://dx.doi.org/10.21037/atm-20-7841>).

[org/10.21037/atm-20-7841](https://doi.org/10.21037/atm-20-7841)).

Methods

Cancer incidence, mortality, and survival data

The Surveillance, Epidemiology and End Results (SEER) database is an open-access resource for cancer-based epidemiology and survival analyses. Cancer incidence and survival data were obtained from the SEER database of Incidence-SEER 9 Regs Research Data, November 2018 Sub [1975–2016] <Katrina/Rita Population Adjustment>. A total of 4,711,958 cancer cases spanning 1975–2016 are registered within the nine oldest SEER areas (Connecticut, Hawaii, Iowa, New Mexico, Utah, and the metropolitan areas of Atlanta, Detroit, San Francisco-Oakland and Seattle-Puget Sound), representing approximately 9% of the US population.

The US mortality data, collected and maintained by the National Centre for Health Statistics (NCHS), can be analysed using the SEER*Stat software. The NCHS granted the SEER program limited permission to provide mortality data to the public. Cancer mortality data were collected from the SEER database of Mortality-All cause of death (COD), Aggregated Total US [1969–2016] <Katrina/Rita Population Adjustment>. The underlying mortality data were provided by the NCHS (www.cdc.gov/nchs). A total of 21,489,462 cancer death cases spanning 1975–2016 are registered in this database.

All cancer cases were classified according to the Site Recode ICD-O-3/World Health Organization (WHO) 2008 (2).

Ethical approval for this study was exempted by the Medical Ethics Committee of the First Affiliated Hospital, College of Medicine, Zhejiang University (Hangzhou, China), as SEER is a publicly available database, and the data extracted from SEER were identified as belonging to a non-human study. All patient data were anonymized.

Statistical analysis

All cancer incidence and mortality rates and 95% confidence intervals (CI) were age-adjusted using the 2000 US standard population and expressed per 100,000 person-years (2,4). Annual rates are shown graphically as trends. Temporal trends in cancer incidence and mortality rates were examined, and separate analyses were conducted for males and females. We also calculated the age-adjusted cancer incidence and mortality rates according to race/

ethnicity (white, black, other) and age group (birth–39, 40–49, 50–59, 60–69, and ≥ 70 years) (5,6). Cancer survival rates between 2010 and 2016 were also examined according to sex and race/ethnic group. All data analyses were performed using SEER*Stat software version 8.3.5 (2,4).

Results

Trends in cancer incidence

The age-adjusted incidence rate and percentage changes from 1975–2016 of the 20 leading cancers by sex in the US in 2016 are shown in *Table 1*. The overall cancer incidence rate in males decreased by 28.7%, from a maximal peak of 658.4 (per 100,000 population) in 1992 to 469.2 (per 100,000 population) in 2016, and this decline continues to date. In females, this number has been relatively stable since its maximal peak of 434.3 (per 100,000 population) in 1998 to 411.5 (per 100,000 population) in 2016 (*Figure 1*). From 1975–2016, the overall cancer incidence was higher for males than females (*Figure 1*). In males, the overall cancer incidence reached a distinct peak in 1992, mainly due to prostate cancer (*Figure 1*). The top five malignant cancers in males in 2016 were prostate, lung and bronchial, colon and rectal, and urinary bladder cancers, as well as melanoma of the skin (*Table 1; Figure 2A*). Similarly, the top five malignant cancers in females in 2016 were breast, lung and bronchial, colon and rectal, corpus and uterus, and thyroid cancers (*Table 1; Figure 2B*).

From 1975–2016 (for males) and 1979–2016 (for females), the top three leading malignancies were prostate (men), breast (women), lung and bronchial, and colon and rectal cancers (*Figure 2*). From 1975–2016, prostate and breast cancers were the main cancers in males and females, respectively (*Figure 2*). The incidence rate of prostate cancer (per 100,000 population) increased from 94.0 in 1975 to a maximal peak of 237.5 in 1992, and then declined to 108.4 in 2016 (*Figure 2A*). Similarly, the incidence rate (per 100,000 population) for breast cancer in females increased from 105.1 in 1975 to a maximal peak of 141.6 in 1999, and subsequently decreased to 126.5 in 2016 (*Figure 2B*).

Lung and bronchial cancers remained the second leading cancer in males from 1975 to 2016, and in females from 1992 to 2016, respectively. The incidence rate (per 100,000 population) of lung and bronchial cancers in males declined by 44.1%, from a maximal peak of 102.0 in 1984 to 57.0 in 2016 (*Figure 2A*). However, in females, it declined gradually after reaching a maximal peak of 53.8 in 2005, falling to 45.1 in 2016 (*Figure 2B*).

Table 1 Incidence rate changes from 1975–2016 of the 20 leading cancers by sex in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016	in incidence (2016 vs. 1975)	in incidence (2016 vs. 2000)
Male											
All malignant cancers				466.8 (461.5–472.2)	581.1 (576.5–585.7)	469.2 (465.8–472.6)	33,059	64,015	75,836	0.5%	-19.3%
Prostate	1	1	1	94.0 (91.5–96.6)	183.3 (180.8–185.9)	108.4 (106.8–110.0)	5,802	19,945	18,713	15.3%	-40.9%
Lung and bronchus	2	2	2	89.5 (87.3–91.8)	82.1 (80.4–83.9)	57.0 (55.8–58.3)	6,738	8,862	8,962	-36.3%	-30.6%
Colon and rectum	3	3	3	68.4 (66.4–70.6)	63.7 (62.2–65.3)	42.5 (41.4–43.5)	4,639	6,844	6,772	-37.9%	-33.3%
Urinary bladder	4	4	4	34.4 (32.9–35.9)	38.8 (37.6–40.0)	33.5 (32.6–34.5)	2,319	4,095	5,101	-2.6%	-13.7%
Melanoma of the skin	11	6	5	8.5 (7.9–9.2)	24.0 (23.1–24.9)	32.0 (31.1–32.9)	690	2,783	5,056	276.5%	33.3%
Lymphoma	7	5	6	16.8 (15.8–17.7)	27.6 (26.7–28.6)	26.4 (25.6–27.2)	1,363	3,191	4,121	57.1%	-4.3%
Kidney and renal pelvis	9	8	7	10.3 (9.6–11.1)	17.5 (16.8–18.3)	21.2 (20.5–22.0)	791	1,984	3,459	105.8%	21.1%
Leukaemia	6	7	8	16.9 (15.9–18.0)	17.9 (17.2–18.8)	17.9 (17.2–18.6)	1,210	1,995	2,782	5.9%	0.0%
Pancreas	8	9	9	15.6 (14.7–16.6)	13.3 (12.6–14.0)	14.3 (13.7–14.9)	1,085	1,444	2,269	-8.3%	7.5%
Liver	16	14	10	3.7 (3.2–4.2)	7.3 (6.8–7.8)	11.4 (10.9–11.9)	275	840	2,003	208.1%	56.2%
Myeloma	14	13	11	6.4 (5.8–7.1)	7.7 (7.1–8.2)	8.6 (8.2–9.1)	448	832	1,369	34.4%	11.7%
Stomach	5	10	12	17.1 (16.1–18.2)	11.7 (11.1–12.4)	8.5 (8.1–9.0)	1,156	1,253	1,334	-50.3%	-27.4%
Thyroid	19	17	13	3.1 (2.7–3.5)	4.0 (3.7–4.4)	7.5 (7.1–8.0)	262	505	1,200	141.9%	87.5%
Brain and other nervous system	12	11	14	6.8 (6.3–7.4)	8.2 (7.7–8.8)	7.4 (6.9–7.8)	603	991	1,165	8.8%	-9.8%
Oesophagus	12	12	14	6.8 (6.2–7.4)	8.0 (7.5–8.5)	7.4 (7.0–7.8)	512	893	1,210	8.8%	-7.5%
Testis	16	16	16	3.7 (3.3–4.1)	5.7 (5.4–6.2)	6.2 (5.8–6.6)	363	794	921	67.6%	8.8%
Tongue	18	18	17	3.4 (3.0–3.8)	3.8 (3.4–4.1)	5.6 (5.2–6.0)	265	451	970	64.7%	47.4%
Larynx	10	14	18	9.5 (8.8–10.2)	7.3 (6.8–7.8)	4.7 (4.3–5.0)	755	826	768	-50.5%	-35.6%
Soft tissue including heart	20	19	19	2.7 (2.3–3.1)	3.6 (3.3–4.0)	4.2 (3.9–4.6)	221	430	649	55.6%	16.7%
Tonsil	24	20	20	1.7 (1.4–2.1)	2.3 (2.0–2.6)	3.4 (3.1–3.7)	135	280	599	100.0%	47.8%

Table 1 (continued)

Table 1 (continued)

Cancer	Incidence rank		Age-adjusted incidence rate (95% CI)		Incidence count			Relative change in incidence		
	1975	2000	1975	2000	1975	2000	2016	in incidence (2016 vs. 1975)	in incidence (2016 vs. 2000)	
Female										
All malignant cancers			365.9 (362.0–369.8)	422.7 (419.3–426.1)	411.5 (408.4–414.5)	34,302	59,432	75,473	12.5%	-2.6%
Breast	1	1	105.1 (103.0–107.2)	136.6 (134.7–138.6)	129.8 (128.1–131.5)	9,657	18,970	23,596	23.5%	-5.0%
Lung and bronchus	4	2	24.5 (23.5–25.5)	51.2 (50.0–52.4)	45.1 (44.1–46.1)	2,349	7,170	8,616	84.1%	-11.9%
Colon and rectum	2	3	53.7 (52.2–55.2)	46.8 (45.7–47.9)	33.2 (32.4–34.1)	4,962	6,776	6,157	-38.2%	-29.1%
Corpus and uterus	3	4	35.5 (34.3–36.7)	24.8 (24.0–25.7)	27.9 (27.1–28.7)	3,493	3,436	5,372	-21.4%	12.5%
Thyroid	13	8	6.5 (5.9–7.0)	11.1 (10.6–11.7)	21.3 (20.6–22.0)	617	1,531	3,453	227.7%	91.9%
Melanoma of the skin	12	6	7.4 (6.9–8.0)	15.5 (14.9–16.2)	20.5 (19.8–21.2)	700	2,159	3,617	177.0%	32.3%
Lymphoma	7	5	12.0 (11.3–12.7)	18.5 (17.8–19.2)	18.2 (17.6–18.9)	1,161	2,618	3,325	51.7%	-1.6%
Pancreas	9	10	9.1 (8.5–9.8)	9.8 (9.3–10.4)	11.6 (11.2–12.2)	849	1,423	2,247	27.5%	18.4%
Leukaemia	8	9	10.0 (9.3–10.6)	10.7 (10.2–11.3)	10.4 (9.9–10.9)	940	1,527	1,871	4.0%	-2.8%
Kidney and renal pelvis	15	12	4.5 (4.1–5.0)	8.5 (8.1–9.0)	10.4 (9.9–10.9)	430	1,195	1,915	131.1%	22.4%
Ovary	5	7	16.3 (15.5–17.2)	14.4 (13.7–15.0)	10.1 (9.7–10.6)	1,537	2,003	1,851	-38.0%	-29.9%
Urinary bladder	10	11	8.9 (8.3–9.5)	9.6 (9.1–10.1)	8.3 (7.9–8.7)	824	1,383	1,587	-6.7%	-13.5%
Cervix uteri	6	13	14.8 (14.0–15.6)	7.7 (7.3–8.2)	6.4 (6.0–6.8)	1,364	1,073	1,029	-56.8%	-16.9%
Myeloma	16	14	3.9 (3.5–4.3)	5.0 (4.7–5.4)	5.7 (5.3–6.0)	361	719	1,080	46.2%	14.0%
Stomach	11	15	7.8 (7.3–8.4)	5.4 (5.0–5.8)	5.0 (4.7–5.4)	715	790	933	-35.9%	-7.4%
Brain and other nervous system	14	14	5.0 (4.6–5.5)	5.7 (5.3–6.1)	5.0 (4.7–5.3)	499	784	863	0.0%	-12.3%
Liver	22	18	1.5 (1.3–1.8)	2.5 (2.2–2.8)	3.4 (3.1–3.7)	141	355	664	126.7%	36.0%
Soft tissue including heart	20	17	1.8 (1.6–2.1)	2.6 (2.3–2.8)	2.9 (2.6–3.1)	176	353	491	61.1%	11.5%
Vulva	18	19	2.1 (1.8–2.4)	2.3 (2.0–2.5)	2.5 (2.2–2.7)	197	324	464	19.0%	8.7%
Tongue	25	21	1.2 (1.0–1.4)	1.5 (1.3–1.7)	2.2 (2.0–2.4)	115	212	414	83.3%	46.7%
Small intestine	27	24	0.9 (0.8–1.2)	1.4 (1.2–1.6)	2.2 (2.0–2.5)	89	192	414	144.4%	57.1%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

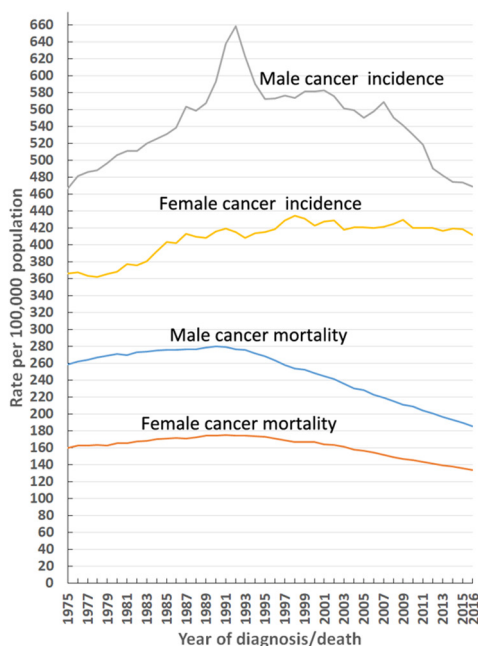


Figure 1 Trends in overall cancer incidence and mortality rates by sex in the United States [1975–2016]. Rates are age-adjusted to the 2000 United States standard population.

The incidence rate of the third leading cancer (colon and rectal) decreased in both males and females (*Figure 2*). In males, the incidence rate (per 100,000 population) for colon and rectal cancer decreased by 46.3%, from a maximal peak of 79.2 in 1985 to 42.5 in 2016, while in females, the incidence rate fell by 42.1%, from a maximal peak of 57.3 in 1985 to 33.2 in 2016 (*Figure 2*).

The changes in the age-adjusted incidence rate of different races and ethnicities from 1975–2016 were also analysed (*Tables S1 and S2; Figures S1–S3*). The overall cancer incidence rate was higher in black males compared to white males from 1975 to 2016, but exhibited the opposite trend in females over the same time period (*Figure S1*). The changes in the age-adjusted incidence rate of different age groups from 1975–2016 were also examined (*Tables S3–S7; Figures S4 and S5*).

Trends in cancer mortality

Age-adjusted mortality and percentage changes from 1975–2016 of the 20 leading causes of cancer death by sex in the US in 2016 are shown in *Table 2*. In males, the overall cancer mortality rate fell by 33.6%, from a maximal peak of 279.8 (per 100,000 population) in 1990 to 185.9

(per 100,000 population) in 2016. Similarly, this rate also decreased in females by 23.6%, from a maximal peak of 175.3 (per 100,000 population) in 1991 to 134.0 (per 100,000 population) in 2016 (*Figure 1*). Moreover, this downward trend continues to date, irrespective of sex. From 1975–2016, the overall cancer mortality rate was higher in males than females (*Figure 1*). In 2016, malignant cancers of the lung and bronchus, prostate, colon and rectum, and pancreas, as well as leukaemia were the five leading causes of cancer death in males (*Figure 3A; Table 2*), while in females, the same trend occurred, except that prostate cancer and leukaemia were replaced by breast and ovarian cancers, respectively (*Figure 3B; Table 2*).

From 1975–2016, the top three leading causes of cancer death were lung and bronchial, prostate (men), breast (women), and colon and rectal cancers (*Figure 3*). Although the mortality (per 100,000 population) for lung and bronchial cancer in males dropped by 48.2%, from a maximal peak of 90.6 in 1990 to 46.9 in 2016, and similarly decreased in females by 23.3%, from a maximal peak of 41.6 in 2002 to 31.9 in 2016, it remained the leading cause of cancer death in males from 1975 to 2016 and in females from 1987 to 2016 (*Figure 3*). Prostate cancer mortality (per 100,000 population) fell by 50.6%, from a maximal peak of 39.3 in 1991 to 19.4 in 2016, yet remained the second leading cause of cancer death in males from 1981 to 2016 (*Figure 3A*). Breast cancer mortality (per 100,000 population) declined by 39.8%, from a maximal peak of 33.2 in 1988 to 20.0 in 2016, but remained the second leading cause of cancer death in females from 1988 to 2016 (*Figure 3B*). For colon and rectal cancer, the mortality (per 100,000 population) dropped by 51.6% in males, from a maximal peak of 33.7 in 1978 to 16.3 in 2016, and by 54.7% in females, from a maximal peak of 25.4 in 1976 to 11.5 in 2016. Despite this decline, it remained the third leading cause of cancer death from 1981 to 2016 in both sexes (*Figure 3*).

Furthermore, the changes in the age-adjusted mortality rate of different races and ethnicities from 1975–2016 were analysed (*Figures S1,S6,S7; Tables S8 and S9*). From 1975–2016, the overall cancer mortality rate was higher for blacks compared to whites in both sexes (*Figure S1*). In addition, the changes in the age-adjusted mortality rate of different age groups from 1975–2016 were also analysed (*Figures S8 and S9; Tables S10–S14*).

Cancer survival

Table 3 shows the 5-year relative survival rates by sex and

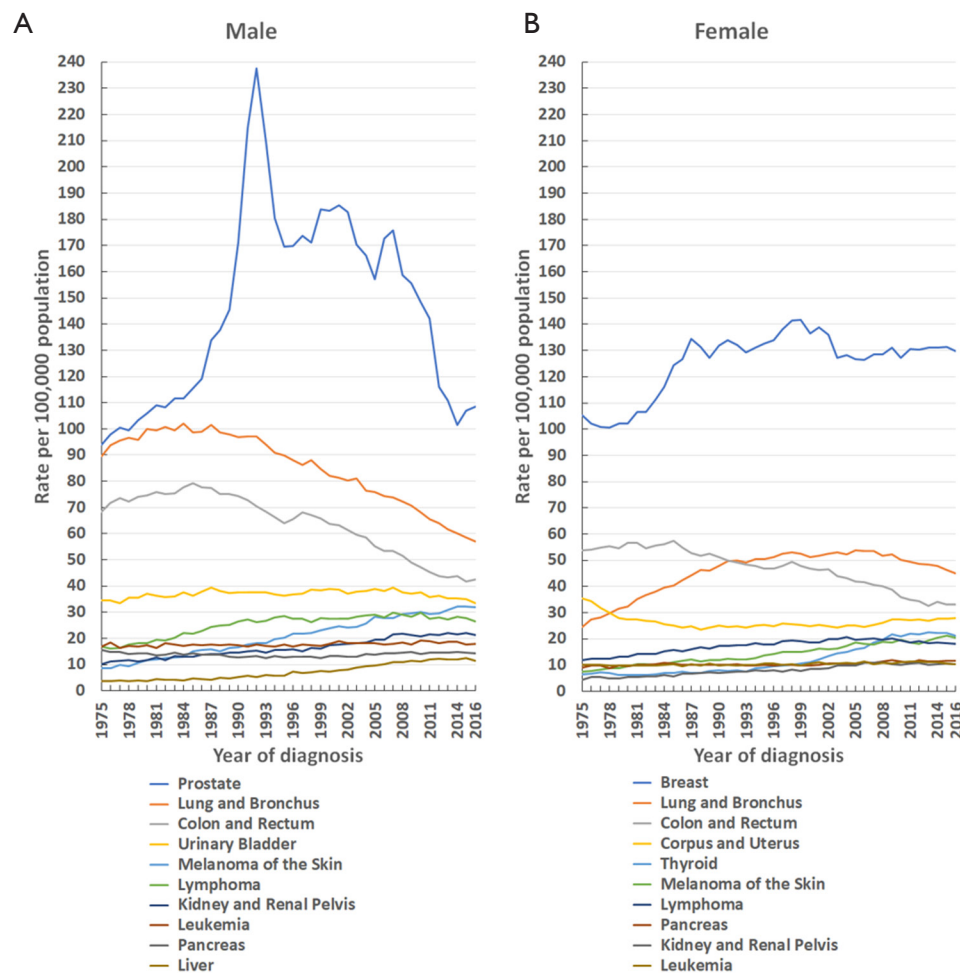


Figure 2 Trends in the incidence rate of the 10 leading cancers by sex in the United States [1975–2016]. Rates are age-adjusted to the 2000 United States standard population. (A) Male; (B) female.

race/ethnicity for the 20 leading cancers [2016] diagnosed between 2010 and 2016. Among these, cancers of the brain and other nervous system (31.8%), stomach (29.8%), liver (21.2%), oesophagus (20.8%), lung and bronchus (17.4%) and pancreas (10.5%) in males, and cancers of the ovary (48.5%), stomach (35.8%), brain and other nervous system (35.2%), lung and bronchus (24.6%), liver (23.3%) and pancreas (9.5%) in females, displayed 5-year relative survival rates of less than 50%. The 5-year relative survival rate for all cancers combined, diagnosed between 2010 and 2016, was higher in females (70.1%) than males (68.5%) (Table 3). Also, the 5-year relative survival rate for all cancers combined in males and females was 69.3% and 71.2% in whites, 65.6% and 61.3% in blacks, and 58.5% and 69.3% in other, respectively (Table 3). Black people had a lower 5-year survival rate than white people for 17 (in males) and

16 (in females) of the 20 leading cancers (Table 3).

In addition, the analysis of the 1- and 3-year relative survival rates by sex and race/ethnicity for the 20 leading cancers (2016) diagnosed between 2010 and 2016 is shown in Tables S15,S16.

Discussion

A total of 4,711,958 cancer cases spanning 1975–2016 are registered in the nine oldest SEER areas, representing approximately 9% of the US population. From 1975–2016, a total of 21,489,462 cancer death cases were recorded in the US. This vast amount of data provides an accurate reflection of the actual cancer incidence and mortality rates in the US. In males, the overall cancer incidence rate (per 100,000 population) declined by 28.7%, from a maximal

Table 2 Mortality rate changes from 1975–2016 of the 20 leading causes of cancer death by sex in the United States

All causes	Mortality rank		Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	1975	2000	2016	1975	2000	2016		
Male										
All malignant cancers			258.4 (257.2–259.6)	248.5 (247.5–249.4)	185.9 (185.2–186.6)	198,586	286,072	314,568	-28.1%	-25.2%
Lung and bronchus	1	1	76.4 (75.8–77.0)	76.5 (76.0–77.0)	46.9 (46.6–47.3)	63,297	90,410	80,775	-38.6%	-38.7%
Prostate	3	2	31.0 (30.5–31.4)	30.4 (30.1–30.7)	19.4 (19.2–19.6)	19,426	31,078	30,370	-37.4%	-36.2%
Colon and rectum	2	3	32.8 (32.4–33.3)	25.1 (24.8–25.4)	16.3 (16.1–16.5)	23,819	28,484	27,642	-50.3%	-35.1%
Pancreas	4	4	13.8 (13.5–14.1)	12.1 (11.9–12.3)	12.7 (12.5–12.8)	10,606	14,237	21,899	-8.0%	5.0%
Leukaemia	6	5	11.0 (10.7–11.2)	10.3 (10.1–10.5)	8.3 (8.1–8.4)	8,382	11,803	13,360	-24.5%	-19.4%
Liver	12	11	3.7 (3.6–3.8)	5.7 (5.5–5.8)	7.7 (7.6–7.9)	2,917	6,843	14,458	108.1%	35.1%
Urinary bladder	7	8	9.8 (9.5–10.0)	7.6 (7.4–7.8)	7.5 (7.4–7.7)	6,604	8,163	11,941	-23.5%	-1.3%
Lymphoma	8	5	8.6 (8.4–8.8)	10.8 (10.6–10.9)	7.3 (7.1–7.4)	7,082	12,498	11,879	-15.1%	-32.4%
Oesophagus	9	7	6.4 (6.2–6.5)	7.7 (7.5–7.9)	7.0 (6.8–7.1)	5,196	9,279	12,317	9.4%	-9.1%
Brain and other nervous system	11	12	5.0 (4.8–5.1)	5.6 (5.4–5.7)	5.5 (5.4–5.6)	4,543	7,011	9,510	10.0%	-1.8%
Kidney and renal pelvis	10	10	5.2 (5.0–5.3)	6.1 (6.0–6.3)	5.2 (5.1–5.4)	4,199	7,249	8,996	0.0%	-14.8%
Myeloma	12	13	3.7 (3.6–3.8)	4.7 (4.5–4.8)	4.1 (4.0–4.2)	2,830	5,321	6,734	10.8%	-12.8%
Stomach	5	9	12.3 (12.0–12.5)	6.4 (6.2–6.5)	4.0 (3.9–4.1)	8,954	7,328	6,845	-67.5%	-37.5%
Melanoma of the skin	15	14	2.6 (2.5–2.8)	3.8 (3.7–3.9)	3.2 (3.2–3.3)	2,193	4,592	5,425	23.1%	-15.8%
Intrahepatic bile duct	41	18	0.1 (0.1–0.2)	1.1 (1.1–1.2)	2.0 (1.9–2.0)	117	1,333	3,385	1900.0%	81.8%
Non-melanoma skin	17	17	1.3 (1.2–1.4)	1.4 (1.4–1.5)	1.8 (1.7–1.8)	868	1,597	2,871	38.5%	28.6%
Larynx	14	15	3.3 (3.2–3.5)	2.5 (2.5–2.6)	1.7 (1.6–1.8)	2,739	3,041	3,048	-48.5%	-32.0%
Soft tissue including heart	20	16	1.0 (0.9–1.1)	1.5 (1.4–1.6)	1.5 (1.4–1.6)	855	1,842	2,518	50.0%	0.0%
Tongue	16	19	1.6 (1.5–1.7)	0.9 (0.8–1.0)	1.0 (1.0–1.1)	1,321	1,115	1,858	-37.5%	11.1%
Bones and joints	20	21	1.0 (1.0–1.1)	0.5 (0.5–0.6)	0.6 (0.5–0.6)	908	682	914	-40.0%	20.0%

Table 2 (continued)

Table 2 (continued)

All causes	Mortality rank		Age-adjusted mortality rate (95% CI)				Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	1975	2000	2016	1975	2000	2016			
Female											
All malignant cancers			160.0 (159.2–160.8)	166.7 (166.1–167.3)	134.0 (133.4–134.5)	165,509	267,008	283,463	-16.3%	-19.6%	
Lung and bronchus	3	1	17.6 (17.3–17.8)	41.1 (40.8–41.4)	31.9 (31.7–32.2)	18,584	65,016	68,094	81.3%	-22.4%	
Breast	1	2	31.4 (31.1–31.8)	26.6 (26.4–26.9)	20.0 (19.8–20.2)	32,158	41,872	41,487	-36.3%	-24.8%	
Colon and rectum	2	3	25.0 (24.6–25.3)	17.5 (17.3–17.7)	11.5 (11.4–11.7)	25,553	28,950	24,644	-54.0%	-34.3%	
Pancreas	5	4	8.4 (8.2–8.6)	9.3 (9.1–9.4)	9.7 (9.6–9.8)	8,831	15,094	20,858	15.5%	4.3%	
Ovary	4	5	9.8 (9.6–10.0)	8.9 (8.7–9.0)	6.8 (6.6–6.9)	10,340	14,060	14,223	-30.6%	-23.6%	
Corpus and uterus	10	8	5.3 (5.1–5.4)	4.1 (4.0–4.2)	5.0 (4.9–5.1)	5,570	6,585	10,733	-5.7%	22.0%	
Leukaemia	6	7	6.2 (6.0–6.3)	5.9 (5.8–6.0)	4.7 (4.7–4.8)	6,372	9,594	9,927	-24.2%	-20.3%	
Lymphoma	8	6	5.6 (5.5–5.8)	7.1 (7.0–7.2)	4.4 (4.3–4.5)	5,907	11,518	9,389	-21.4%	-38.0%	
Brain and other nervous system	11	9	3.4 (3.3–3.5)	3.7 (3.6–3.8)	3.6 (3.5–3.7)	3,667	5,644	7,324	5.9%	-2.7%	
Myeloma	13	10	2.4 (2.3–2.5)	3.3 (3.2–3.4)	2.6 (2.5–2.6)	2,552	5,318	5,532	8.3%	-21.2%	
Liver	15	11	2.0 (1.9–2.0)	2.1 (2.0–2.1)	2.5 (2.4–2.6)	2,017	3,349	5,397	25.0%	19.0%	
Kidney and renal pelvis	13	12	2.4 (2.3–2.5)	2.8 (2.7–2.9)	2.3 (2.2–2.3)	2,547	4,487	4,846	-4.2%	-17.9%	
Stomach	7	11	5.9 (5.8–6.1)	3.2 (3.1–3.3)	2.2 (2.1–2.3)	6,025	5,317	4,588	-62.7%	-31.3%	
Cervix uteri	8	12	5.6 (5.4–5.7)	2.8 (2.7–2.9)	2.2 (2.2–2.3)	5,550	4,200	4,188	-60.7%	-21.4%	
Urinary bladder	12	14	2.8 (2.7–2.9)	2.3 (2.2–2.3)	2.1 (2.1–2.2)	2,765	3,839	4,705	-25.0%	-8.7%	
Intrahepatic bile duct	36	19	0.1 (0.1–0.1)	0.9 (0.8–0.9)	1.6 (1.5–1.6)	93	1,391	3,329	1500.0%	77.8%	
Oesophagus	16	16	1.7 (1.6–1.8)	1.8 (1.8–1.9)	1.5 (1.4–1.5)	1,801	2,953	3,142	-11.8%	-16.7%	
Melanoma of the skin	18	16	1.6 (1.5–1.7)	1.8 (1.7–1.9)	1.3 (1.3–1.4)	1,602	2,828	2,763	-18.8%	-27.8%	
Soft tissue including heart	20	18	0.8 (0.8–0.9)	1.2 (1.1–1.3)	1.2 (1.1–1.2)	858	1,854	2,301	50.0%	0.0%	
Gallbladder	16	19	1.7 (1.7–1.8)	0.9 (0.8–0.9)	0.7 (0.6–0.7)	1,798	1,385	1,463	-58.8%	-22.2%	

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

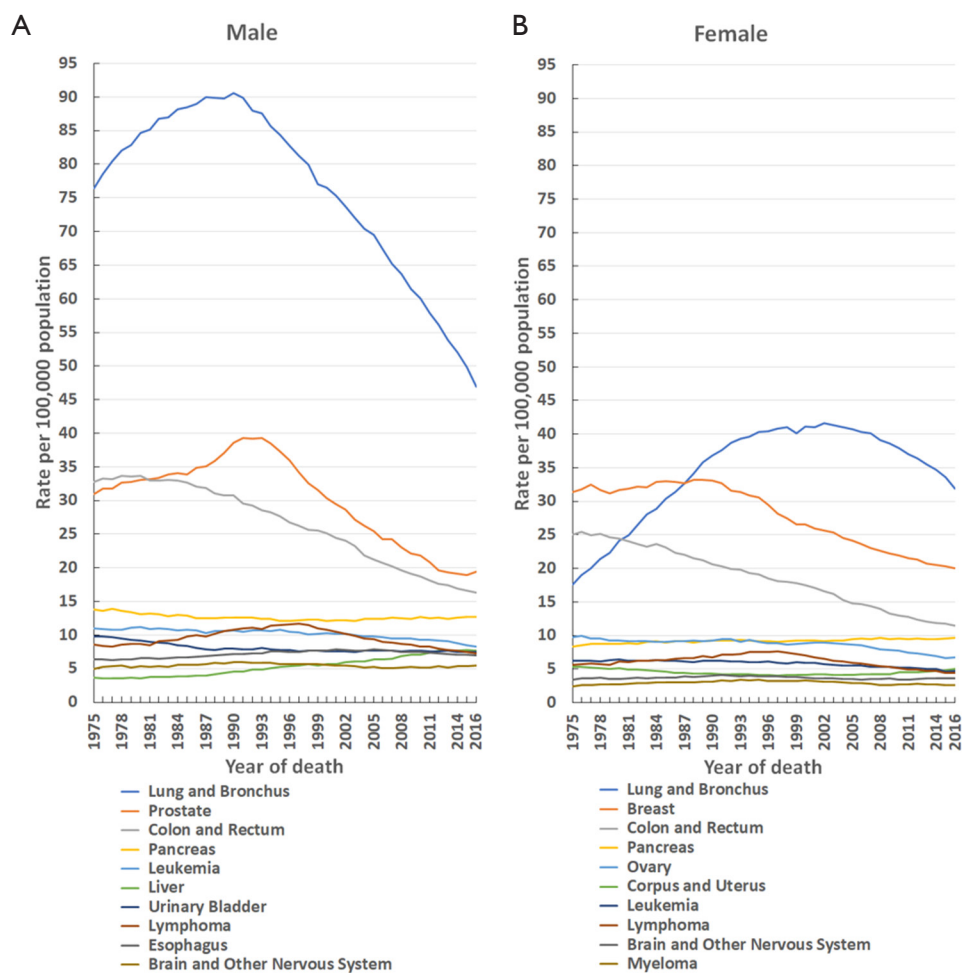


Figure 3 Trends in the mortality rate of the 10 leading causes of cancer death by sex in the United States [1975–2016]. Rates are age-adjusted to the 2000 United States standard population. (A) Male; (B) female.

peak of 658.4 in 1992 to 469.2 in 2016, and this trend continues to date (*Figure 1*). However, in females, this rate has been relatively stable since its maximal peak of 434.3 in 1998, only decreasing to 411.5 in 2016 (*Figure 1*). The overall cancer incidence in males showed a distinct peak in 1992, predominantly caused by prostate cancer (*Figure 1*).

Prostate cancer remained the leading cancer in males in the US from 1975–2016, and its incidence rate (per 100,000 population) rose from 94.0 in 1975 to a maximal peak of 237.5 in 1992, followed by a decline to 108.4 in 2016 (*Figure 2A*). The rapid uptake of prostate-specific antigen screening led to a dramatic spike in overall prostate cancer diagnoses during the early 1990s (7). Meanwhile, breast cancer remained the primary cancer in females in the US from 1975–2016, and showed an increased incidence rate (per 100,000 population) from 105.1 in 1975 to a maximal

peak of 141.6 in 1999, followed by a subsequent drop to 126.5 in 2016 (*Figure 2B*). The breast cancer incidence rate in females reduced by 10.7% from 1999–2016, likely due to the decreased use of menopausal hormones (8,9). The decrease in incidence may also reflect (in part) the small declines in mammography screening since 2000 (9).

Lung and bronchial cancer remained the second major malignancy in males from 1975–2016, and in females from 1992–2016 (*Figure 2*). In males, the incidence of lung and bronchial cancer has exhibited a continuously declining trend since the 1980s (*Figure 2*), which reflects changes in risk behaviours following the promulgation of information about the dangers of tobacco smoking in the 1950s and 1960s, as well as subsequent governmental tobacco control measures (10). However, in females, the incidence of lung and bronchial cancer showed an increasing trend from

Table 3 Five-year relative survival rates of the 20 leading cancers [2016] by sex in the United States, 2010–2016

Incidence rank [2016]	Cancer	Five-year relative survival rate (95% CI)				No.			
		All races	White	All races	White	All races	White	All races	
Male									
	All malignant cancers	68.5% (68.2–68.7%)	69.3% (69.1–69.6%)	65.6% (64.9–66.2%)	58.5% (57.8–59.2%)	404,243	318,681	44,713	34,724
1	Prostate	98.4% [#] (98.2%–98.7% [#])	98.8% [#] (98.5%–99.0% [#])	96.2% [#] (95.3%–96.9% [#])	94.0% (92.7–95.1%)	116,247	87,951	17,745	7,776
2	Lung and bronchus	17.4% (16.9–18.0%)	17.6% (17.0–18.1%)	15.7% (14.2–17.2%)	17.9% (16.2–19.6%)	44,679	34,733	5,207	4,587
3	Colon and rectum	66.0% (65.2–66.7%)	66.8% (65.8%–67.6%)	58.4% (56.1%–60.7%)	65.5% [#] (63.5%–67.5% [#])	35,887	26,882	4,064	4,581
4	Urinary bladder	79.0% (78.0–80.0%)	79.5% (78.5–80.6%)	68.5% (63.9–72.7%)	73.6% [#] (69.6%–77.2% [#])	24,674	21,781	1,200	1,401
5	Melanoma of the skin	92.7% (91.8–93.5%)	92.5% (91.6–93.3%)	65.4% [#] (44.6%–80.0% [#])	67.2% [#] (56.7%–75.7% [#])	21,934	20,853	61	243
6	Lymphoma	76.1% (75.3–77.0%)	76.9% (75.9–77.9%)	71.5% [#] (68.8%–74.0% [#])	69.9% [#] (67.0%–72.5% [#])	22,197	17,799	2,055	2,023
7	Kidney and renal pelvis	74.6% (73.5–75.6%)	74.3% (73.1–75.5%)	77.7% (74.8–80.4%)	69.7% (66.1–73.1%)	16,941	13,350	1,973	1,447
8	Leukaemia	67.6% (66.4–68.7%)	68.3% (67.0–69.6%)	62.0% (57.5–66.2%)	56.9% [#] (53.0%–60.5% [#])	13,558	11,211	1,030	1,064
9	Pancreas	10.5% (9.7–11.3%)	10.6% (9.7–11.5%)	9.3% [#] (7.0%–12.0% [#])	9.6% [#] (7.2%–12.4% [#])	11,392	8,915	1,287	1,145
10	Liver	21.2% (20.1–22.3%)	20.6% (19.3–21.9%)	17.0% [#] (14.4%–19.8% [#])	26.2% (23.6–28.8%)	11,439	7,423	1,785	2,163
11	Myeloma	54.9% (53.0–56.8%)	54.4% (52.2–56.7%)	55.0% [#] (50.4%–59.4% [#])	54.2% [#] (47.6%–60.4% [#])	6,800	4,947	1,209	581
12	Stomach	29.8% (28.3–31.3%)	29.1% (27.4–30.9%)	25.3% (21.0–29.8%)	33.7% [#] (30.1%–37.3% [#])	7,345	5,057	938	1,302
13	Thyroid	95.9% [#] (94.8%–96.8% [#])	96.4% [#] (95.1%–97.3% [#])	92.8% [#] (84.5%–96.7% [#])	92.7% [#] (88.8%–95.2% [#])	6,475	5,315	320	736
14	Brain and other nervous system	31.8% (30.4–33.2%)	30.6% (29.1%–32.2%)	36.7% (30.7–42.8%)	34.5% [#] (29.1%–40.0% [#])	6,817	5,766	453	531
14	Oesophagus	20.8% (19.4–22.3%)	22.2% (20.6–23.9%)	9.8% [#] (6.4%–14.1% [#])	13.4% [#] (9.1%–18.4% [#])	6,119	5,221	446	426
16	Testis	96.7% [#] (95.9%–97.4% [#])	97.0% [#] (96.1%–97.6% [#])	92.0% [#] (86.0%–95.6% [#])	94.3% [#] (90.8%–96.5% [#])	5,838	5,079	190	450
17	Tongue	69.9% (67.8–71.8%)	71.4% (69.2–73.4%)	51.0% (42.5–58.8%)	64.0% [#] (55.9%–71.1% [#])	4,698	4,097	275	296
18	Larynx	62.2% (60.0–64.4%)	63.7% (61.1–66.2%)	52.7% (46.6–58.6%)	62.0% [#] (52.5%–70.2% [#])	4,264	3,360	618	248
19	Soft tissue including heart	67.3% (64.9–69.6%)	68.5% (65.7–71.2%)	62.1% [#] (54.9%–68.5% [#])	59.8% [#] (52.6%–66.2% [#])	3,285	2,511	356	373
20	Tonsil	78.6% [#] (76.4%–80.6% [#])	80.6% [#] (78.3%–82.7% [#])	59.4% [#] (50.8%–67.0% [#])	74.4% [#] (63.0%–82.8% [#])	3,319	2,860	288	154

Table 3 (continued)

Table 3 (continued)

Incidence rank [2016]	Cancer	Five-year relative survival rate (95% CI)				No.			
		All races	White	All races	White	All races	White	All races	
Female									
	All malignant cancers	70.1% (69.9–70.3%)	71.2% (70.9–71.4%)	61.3% (60.7–62.0%)	69.3% (68.7–69.9%)	395,331	307,195	42,621	41,572
1	Breast	91.2% (90.9–91.6%)	92.3% (92.0–92.7%)	83.1% (82.1–84.1%)	91.4% (90.5–92.1%)	124,503	95,541	13,892	14,193
2	Lung and bronchus	24.6% (24.0–25.2%)	24.4% (23.8–25.1%)	23.5% (21.8–25.2%)	26.7% (24.7–28.7%)	41,772	33,182	4,766	3,705
3	Colon and rectum	66.2% (65.4–67.0%)	66.8% (65.8–67.7%)	59.9% (57.6–62.1%)	67.1% (64.9–69.2%)	32,815	24,431	4,209	3,855
4	Corpus and uterus	82.7% (82.0–83.4%)	85.5% (84.7–86.2%)	63.2% (60.7–65.6%)	81.2% [#] (79.2 [#] –83.0% [#])	29,573	22,801	3,160	3,353
5	Thyroid	99.0% [#] (98.8 [#] –99.2% [#])	99.2% [#] (99.0 [#] –99.4% [#])	97.4% (95.0–98.6%)	97.6% [#] (96.5 [#] –98.4% [#])	20,919	16,178	1,623	2,764
6	Melanoma of the skin	96.5% (95.8–97.1%)	96.5% (95.7–97.1%)	69.2% [#] (50.1 [#] –82.2% [#])	81.8% [#] (72.5 [#] –88.2% [#])	17,595	16,597	84	233
7	Lymphoma	77.6% (76.7–78.5%)	78.4% (77.3–79.4%)	76.4% (73.3–79.2%)	69.4% (66.2–72.3%)	17,620	14,033	1,693	1,664
8	Pancreas	9.5% (8.7–10.4%)	9.4% (8.5–10.4%)	9.4% [#] (7.4% [#] –11.7% [#])	10.0% (7.7–12.7%)	11,169	8,404	1,511	1,226
9	Leukaemia	64.4% (63.0–65.7%)	65.3% (63.8–66.8%)	58.6% (53.9–62.9%)	53.3% (48.7–57.7%)	9,712	7,852	914	788
9	Kidney and renal pelvis	76.6% (75.3–77.9%)	76.3% (74.8–77.8%)	77.7% [#] (74.1 [#] –80.9% [#])	74.7% [#] (70.4 [#] –78.5% [#])	9,596	7,374	1,245	861
11	Ovary	48.9% (47.6–50.1%)	48.5% (47.1–49.9%)	42.7% (38.4–46.9%)	55.8% (51.7–59.6%)	11,881	9,462	1,088	1,258
12	Urinary bladder	75.2% (73.6–76.8%)	76.9% [#] (75.2 [#] –78.5% [#])	56.2% (50.1–61.8%)	69.8% [#] (63.6 [#] –75.2% [#])	7,730	6,504	623	494
13	Cervix uteri	69.6% (68.0–71.0%)	71.6% (69.8–73.3%)	56.7% (52.2–61.1%)	69.6% [#] (65.4 [#] –73.4% [#])	6,576	4,706	909	870
14	Myeloma	53.0% (50.9–55.0%)	52.3% (49.7–54.8%)	54.8% (50.3–59.0%)	49.3% [#] (42.0 [#] –56.3% [#])	5,511	3,697	1,269	502
15	Stomach	35.8% (34.0–37.7%)	35.5% (33.1–37.8%)	41.1% (36.3–45.9%)	31.8% [#] (28.0 [#] –35.7% [#])	4,699	2,892	756	1,006
15	Brain and other nervous system	35.2% (33.5–36.9%)	33.7% (32.0–35.5%)	41.0% [#] (34.8 [#] –47.0% [#])	40.2% [#] (33.7 [#] –46.6% [#])	5,252	4,399	398	398
17	Liver	23.3% (21.4–25.4%)	22.4% (19.9–25.0%)	18.0% [#] (13.6 [#] –22.9% [#])	28.9% (24.5–33.4%)	3,542	2,117	559	842
18	Soft tissue including heart	67.0% (64.2–69.6%)	67.8% (64.5–70.8%)	66.9% [#] (59.5 [#] –73.2% [#])	60.8% [#] (52.4 [#] –68.2% [#])	2,522	1,839	358	294
19	Vulva	70.9% (67.6–74.0%)	71.0% (67.4–74.2%)	67.6% [#] (54.5% [#] –77.7% [#])	69.8% (53.7–81.2%)	2,088	1,791	163	113
20	Tongue	69.1% (65.7–72.2%)	70.4% (66.6–73.8%)	43.1% [#] (29.7 [#] –55.7% [#])	70.2% (58.4–79.2%)	1,714	1,363	106	225
20	Small intestine	69.2% (66.0–72.2%)	71.5% (67.8–74.9%)	66.9% [#] (59.0 [#] –73.6% [#])	47.4% (33.1–60.4%)	1,956	1,432	357	146

[#], the relative cumulative survival increased from a prior interval and has been adjusted. Other denotes other races and ethnicities, including American Indian/AK Native, Asian/Pacific Islander. Rank is based on age-adjusted cancer incidence rate in 2016. CI, confidence interval.

1975–2005, and slightly decreased after 2005 (*Figure 2*). Varying historical patterns in tobacco uptake and cessation, as well as upturns in the prevalence of female smoking in some birth cohorts account for the different trends between males and females (2,11).

Colon and rectal cancer were the third most common cancer in males from 1975–2016, and similarly, in females from 1992–2016 (*Figure 2*). The incidence patterns for colon and rectal cancer are generally similar in men and women and have continued to decline from 1985–2016 in both sexes (*Figure 2*). Some researchers have attributed the long-term decline to changes in risk factors (e.g., decreased smoking and red meat consumption, and increased use of aspirin), as well as the introduction and dissemination of screening tests (12,13). Colonoscopy procedures, which are the predominant screening tests, tripled among adults aged ≥ 50 years in the US, from 21% in 2000 to 60% in 2015 (2).

The overall cancer mortality rates in both males and females have continuously declined since the 1990s, falling by 33.6% in males from 1990–2016, and by 23.6% in females from 1991–2016 (*Figure 1*). This declining trend continues to date. The decrease in cancer mortality over the past three decades is primarily attributable to reductions in overall cancer incidence, advances in early detection, and improvements in treatment (1-3). Consistent with cancer incidence, from 1975–2016, the top three leading causes of cancer mortality were still lung and bronchial, prostate (men only), breast (women only), and colon and rectal cancers (*Figure 3*). The mortality rates for these cancers have continued to decline since approximately 1990, except for female lung cancer, which has declined since 2002. Specifically, the mortality of lung and bronchial cancer decreased by 48.2% in males from 1990–2016, and by 23.3% in females from 2002–2016 (*Figure 3*).

Furthermore, prostate cancer mortality in males fell by 50.6% from 1991–2016. Breast cancer mortality in females also declined by 39.8% from 1988–2016 (*Figure 3*). Moreover, colon and rectal cancer mortality decreased by 51.6% in males from 1978–2016, and in females by 54.7% from 1976–2016 (*Figure 3*). Some researchers have attributed the decline in mortality of these cancers to steady reductions in smoking and advances in early detection and treatment (11,13-16). Thus, it is important that efforts in tobacco control and smoking cessation continue so that further reductions in cancer incidence and mortality can be achieved, especially among women.

In terms of the cancer survival rate, the 5-year relative

survival rates for all cancers combined diagnosed from 2010–2016 were 68.5% in males and 70.1% in females (*Table 3*). Among the 10 leading cancers in 2016, those with a 5-year relative survival rate of less than 50% included lung and bronchial (17.4%), pancreatic (10.5%) and liver (21.2%) cancers in males, and lung and bronchial (24.6%) and pancreatic (9.5%) cancers in females (*Table 3*). The 5-year relative survival rate of these cancer types is low, partly because more than 50% of cases are diagnosed at a late stage (2). Due to early screening and treatment, the 5-year survival rates of prostate cancer and breast cancer are high (7,17-20), reaching 98.4% and 91.2%, respectively (*Table 3*). Greater attention should be given to cancers with a low survival rate, and knowledge and experience from the screening and treatment of prostate and breast cancers should be applied in order to strengthen early detection and treatment and prolong the survival time of patients with these types of cancer. Such issues are especially important for lung and bronchial cancer. Despite being the second most common cancer among both males and females in 2016, it was the leading cause of cancer death, primarily because the 5-year relative survival rate is extremely low (17.4% in males and 24.6% in females). There is a potential for earlier lung cancer diagnosis through screening with low-dose computed tomography (CT), which could significantly reduce lung cancer mortality (2,21-23). From 2010–2015, the percentage of eligible smokers who were reported to have undergone low-dose CT screening in the previous 12 months remained low and constant (3.3% in 2010 and 3.9% in 2015) (24). Therefore, the broad implementation of guideline-recommended lung cancer screening needs to be strengthened in the future to benefit more people.

In addition, there are noticeable differences in cancer incidence, mortality, and survival rates among sex and ethnicity categories. From 1975–2016, overall cancer incidence and mortality was higher in males than females (*Figure 1*). Biological, behavioural, and environmental factors all contribute the higher cancer incidence and mortality rates of men compared to women (25). Dunford *et al.* reported that biallelic expression of “escape from X-inactivation tumour-suppressor” genes in females explains a portion of the reduced cancer incidence in females as compared with males across a variety of tumour types (26). Also, black males have higher incidence and mortality, and shorter survival rates compared with white males for all cancers combined. However, black females have a lower incidence, higher mortality, and shorter

survival rates relative to white females for all cancers combined. In the US, black people are more likely to report not being able to see a doctor because of cost (27). In addition, they have notably lower educational attainment and homeownership, as well as approximately twice the proportion of households living below the poverty line and approximately twice the levels of unemployment compared to the white population (27). These socio-economic factors help to explain ethnic disparities in cancer incidence, mortality, and survival rates via cancer-related behaviours and health care utilisation, which constrain an individual's ability to engage in cancer prevention, early detection, or treatment (28). Finally, it is unsurprising that there are different high-incidence cancers among the different age groups. Cancer screening and prevention should focus on the high-incidence cancers of these different age groups.

Limitations

A strength of our study is the use of nationwide, high-quality, population-based data on cancer incidence, mortality and survival rates from the SEER database. However, our study has several limitations that should be noted. Firstly, due to the descriptive nature of this study, it is only possible to speculate about potential explanations for cancer incidence and mortality trends. Secondly, the rapid uptake of cancer screening led to a dramatic increase in the incidence of certain cancers, such as prostate cancer, and this increase in incidence does not necessarily reflect the actual change in cancer incidence. However, mortality, which we also analysed, is less affected by screening and can offer an accurate reflection the actual situation. Thirdly, the SEER database only contains data on patients within US regions and does not represent changes in the incidence, mortality, and survival rates of cancer worldwide. We anticipate the establishment of a record similar to the SEER database in China, which will represent a population of 1.4 billion.

Conclusions

The continuous decline in the overall cancer mortality rate in the US since the early 1990s has resulted in an overall decrease of 33.6% among males and 23.6% among females. The top three leading cancers and causes of cancer death in males from 1975–2016 were prostate, lung and bronchial, and colon and rectal cancers, while in females (from 1979–2016), they were breast, lung and bronchial, and

colon and rectal cancers. The 5-year relative survival rates for all cancers combined (diagnosed from 2010–2016) were 68.5% in males and 70.1% in females. From 1975–2016, the overall cancer incidence and mortality were higher in males than females. Black males have a higher incidence and mortality, and shorter survival rates compared with white males for all cancers combined. However, black females have a lower incidence, higher mortality, and shorter survival rates compared with white females for all cancers combined. Our work provides a comprehensive overview of cancer incidence and mortality in the US over the past 42 years. More research is needed to elucidate the causes of change in cancer incidence and mortality, and advance early detection and treatment of cancers with a low survival rate.

Acknowledgments

Funding: This work was supported by the National Natural Science Foundation of China, China [grant number 31700690] and the Natural Science Foundation of Zhejiang Province, China [grant number LQ18H180002].

Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist (available at <http://dx.doi.org/10.21037/atm-20-7841>).

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/atm-20-7841>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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(English Language Editor: A. Kassem)

Cite this article as: Yang R, Zhou Y, Wang Y, Du C, Wu Y. Trends in cancer incidence and mortality rates in the United States from 1975 to 2016. *Ann Transl Med* 2020;8(24):1671. doi: 10.21037/atm-20-7841

Table S1 Incidence rate changes from 1975–2016 of the 10 leading cancers in males by race and ethnicity in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male white											
All malignant cancers				468.6 (462.9–474.3)	585.1 (580.1–590.1)	474.1(470.2–478.0)	29,271	53,200	59,791	1.2%	–19.0%
Prostate	1	1	1	92.2 (89.5–94.9)	179.8 (177.1–182.6)	102.0 (100.3–103.8)	5,042	16,233	13,877	10.6%	–43.3%
Lung and bronchus	2	2	2	89.1 (86.8–91.6)	80.8 (78.9–82.7)	56.1 (54.8–57.5)	5,909	7,223	6,975	–37.0%	–30.6%
Colon and rectum	3	3	3	69.8 (67.6–72.0)	63.1 (61.5–64.8)	41.1 (39.9–42.2)	4,180	5,615	5,080	–41.1%	–34.9%
Melanoma of the skin	10	6	4	9.4 (8.7–10.2)	28.5 (27.5–29.7)	38.9 (37.7–40.0)	664	2,708	4,789	313.8%	36.5%
Urinary bladder	4	4	5	36.4 (34.8–38.1)	42.6 (41.2–44.0)	37.2 (36.0–38.3)	2,184	3,746	4,489	2.2%	–12.7%
Lymphoma	6	5	6	17.4 (16.4–18.5)	29.3 (28.2–30.4)	27.4 (26.5–28.4)	1,234	2,745	3,310	57.5%	–6.5%
Kidney and renal pelvis	9	8	7	10.8 (10.0–11.7)	18.1 (17.3–19.0)	21.6 (20.7–22.4)	725	1,689	2,732	100.0%	19.3%
Leukaemia	5	7	8	17.5 (16.4–18.6)	18.9 (18.0–19.8)	19.2 (18.4–20.0)	1,103	1,712	2,315	9.7%	1.6%
Pancreas	8	9	9	15.7 (14.6–16.7)	12.9 (12.2–13.7)	14.1 (13.4–14.8)	958	1,157	1,762	–10.2%	9.3%
Liver	18	16	10	3.0 (2.6–3.5)	5.9 (5.4–6.4)	9.7 (9.1–10.2)	193	547	1,318	223.3%	64.4%
Male black											
All malignant cancers				525.4 (502.5–549.0)	718.6 (699.9–737.7)	521.7 (509.6–534.0)	2,605	6,285	8,186	–0.7%	–27.4%
Prostate	1	1	1	141.2 (128.3–154.8)	296.6 (284.6–309.0)	172.8 (166.1–179.7)	577	2,486	2,853	22.4%	–41.7%
Lung and bronchus	2	2	2	114.7 (105.0–125.0)	115.1 (107.6–122.9)	73.0 (68.3–77.9)	629	982	1,047	–36.4%	–36.6%
Colon and rectum	3	3	3	59.3 (51.5–67.9)	74.4 (68.2–80.9)	51.0 (47.3–55.0)	272	612	783	–14.0%	–31.5%
Kidney and renal pelvis	12	7	4	8.2 (5.9–11.2)	19.2 (16.3–22.5)	25.6 (23.1–28.3)	49	176	423	212.2%	33.3%
Lymphoma	10	4	5	11.7 (9.1–14.9)	21.3 (18.4–24.4)	22.3 (20.0–24.9)	80	234	372	90.6%	4.7%
Urinary bladder	7	5	6	16.3 (12.5–20.9)	20.3 (17.1–24.0)	20.9 (18.2–23.7)	78	155	263	28.2%	3.0%
Liver	13	13	7	5.9 (4.0–8.3)	10.4 (8.3–12.7)	17.1 (15.2–19.2)	36	103	316	189.8%	64.4%
Pancreas	6	8	8	18.1 (14.2–22.6)	18.2 (15.4–21.3)	17.0 (14.8–19.4)	96	167	253	–6.1%	–6.6%
Myeloma	11	11	9	10.9 (8.0–14.4)	10.9 (8.8–13.4)	16.5 (14.4–18.8)	56	99	252	51.4%	51.4%
Leukaemia	7	9	10	16.3 (12.1–21.3)	14.1 (11.6–16.8)	15.3 (13.2–17.6)	75	137	227	–6.1%	8.5%
Male other race and ethnicity											
All malignant cancers				330.2 (309.4–352.0)	413.8 (401.2–426.6)	323.2 (315.1–331.4)	1,115	4,288	6,395	–2.1%	–21.9%
Prostate	1	1	1	61.9 (52.3–72.6)	114.2 (107.6–121.2)	64.3 (60.8–68.0)	170	1,125	1,282	3.9%	–43.7%
Lung and bronchus	2	2	2	58.5 (50.0–68.0)	64.5 (59.6–69.7)	48.3 (45.1–51.6)	198	649	903	–17.4%	–25.1%
Colon and rectum	3	3	3	49.4 (41.8–57.8)	58.3 (53.6–63.2)	40.8 (38.0–43.8)	176	602	820	–17.4%	–30.0%
Lymphoma	6	6	4	12.4 (8.9–16.7)	17.2 (14.8–19.8)	18.1 (16.3–20.1)	48	198	372	46.0%	5.2%
Liver	8	7	5	11.8 (8.5–15.9)	16.4 (14.1–18.9)	17.0 (15.3–19.0)	46	187	355	44.1%	3.7%
Urinary bladder	5	5	6	18.3 (13.3–24.3)	18.3 (15.7–21.3)	16.0 (14.2–18.0)	52	179	296	–12.6%	–12.6%
Kidney and renal pelvis	13	10	7	4.1 (2.2–6.8)	10.9 (9.0–13.0)	13.7 (12.1–15.5)	16	118	279	234.1%	25.7%
Pancreas	9	8	8	9.9 (6.5–14.3)	12.1 (10.0–14.5)	13.1 (11.5–14.9)	30	120	246	32.3%	8.3%
Stomach	4	4	9	28.1 (22.2–34.8)	21.5 (18.6–24.6)	11.3 (9.8–12.9)	95	212	214	–59.8%	–47.4%
Leukaemia	10	9	10	8.3 (5.3–12.3)	11.9 (10.0–14.2)	10.1 (8.8–11.7)	31	138	201	21.7%	–15.1%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. Other race and ethnicity includes American Indian/AK Native, Asian/Pacific Islander. CI, confidence interval.

Table S2 Incidence rate changes from 1975–2016 of the 10 leading cancers in females by race and ethnicity in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Female white											
All malignant cancers				369.7 (365.5–373.9)	438.2 (434.3–442.1)	424.7 (421.2–428.3)	30,823	49,974	58,632	14.9%	–3.1%
Breast	1	1	1	107.4 (105.1–109.7)	143.0 (140.8–145.3)	132.7 (130.7–134.7)	8,741	16,015	18,106	23.6%	–7.2%
Lung and bronchus	4	2	2	24.8 (23.8–25.9)	53.2 (51.9–54.6)	47.1 (46.0–48.3)	2,121	6,110	6,925	89.9%	–11.5%
Colon and rectum	2	3	3	54.1 (52.5–55.7)	46.6 (45.3–47.8)	32.6 (31.6–33.6)	4,504	5,608	4,560	–39.7%	–30.0%
Corpus and uterus	3	4	4	37.3 (36.1–38.7)	26.2 (25.3–27.2)	28.0 (27.1–28.9)	3,259	2,940	4,065	–24.9%	6.9%
Melanoma of the skin	11	6	5	8.3 (7.6–8.9)	19.1 (18.3–20.0)	26.2 (25.3–27.1)	674	2,092	3,390	215.7%	37.2%
Thyroid	13	8	6	6.4 (5.8–7.0)	11.8 (11.1–12.5)	22.7 (21.8–23.6)	526	1,251	2,627	254.7%	92.4%
Lymphoma	7	5	7	12.7 (12.0–13.5)	19.7 (18.9–20.6)	19.1 (18.4–19.9)	1,093	2,258	2,643	50.4%	–3.0%
Pancreas	10	11	8	8.9 (8.3–9.6)	9.6 (9.0–10.1)	11.4 (10.9–12.0)	744	1,147	1,698	28.1%	18.8%
Leukaemia	8	9	9	10.1 (9.4–10.8)	11.2 (10.6–11.9)	11.1 (10.5–11.7)	846	1,301	1,506	9.9%	–0.9%
Kidney and renal pelvis	15	12	10	4.6 (4.2–5.1)	8.4 (7.9–9.0)	10.6 (10.0–11.1)	392	960	1,462	130.4%	26.2%
Female black											
All malignant cancers				356.9 (341.7–372.6)	407.5 (396.3–418.9)	402.5 (393.6–411.6)	2,325	5,205	8,180	12.8%	–1.2%
Breast	1	1	1	93.6 (86.2–101.4)	119.3 (113.4–125.4)	128.2 (123.2–133.3)	637	1,596	2,642	37.0%	7.5%
Lung and bronchus	4	3	2	24.7 (20.8–29.0)	57.8 (53.6–62.3)	46.4 (43.3–49.6)	160	701	908	87.9%	–19.7%
Colon and rectum	2	2	3	54.7 (48.4–61.4)	58.1 (53.9–62.7)	41.6 (38.8–44.7)	314	692	831	–23.9%	–28.4%
Corpus and uterus	5	4	4	20.1 (16.6–24.0)	18.1 (15.8–20.7)	27.8 (25.5–30.2)	128	225	595	38.3%	53.6%
Lymphoma	11	6	5	6.4 (4.5–8.8)	12.6 (10.8–14.7)	16.4 (14.6–18.3)	45	179	329	156.3%	30.2%
Pancreas	6	5	6	13.9 (10.9–17.4)	13.4 (11.3–15.7)	14.7 (13.0–16.6)	84	156	294	5.8%	9.7%
Kidney and renal pelvis	13	7	7	4.3 (2.8–6.4)	12.0 (10.1–14.1)	13.9 (12.3–15.7)	28	154	278	223.3%	15.8%
Thyroid	14	14	8	4.2 (2.9–6.0)	6.6 (5.3–8.1)	12.9 (11.4–14.6)	35	98	273	207.1%	95.5%
Myeloma	9	8	9	8.6 (6.3–11.4)	11.1 (9.2–13.1)	12.5 (10.9–14.2)	51	133	242	45.3%	12.6%
Leukaemia	10	10	10	8.5 (6.3–11.2)	10.3 (8.6–12.3)	9.5 (8.2–11.0)	58	134	189	11.8%	–7.8%
Female other race and ethnicity											
All malignant cancers				271.3 (254.4–289.0)	299.3 (290.1–308.7)	308.8 (301.9–315.9)	1,063	4,073	7,733	13.8%	3.2%
Breast	1	1	1	59.8 (52.4–67.9)	93.5 (88.5–98.7)	105.1 (101.1–109.2)	251	1,308	2,635	75.8%	12.4%
Lung and bronchus	5	3	2	17.3 (13.2–22.3)	27.1 (24.3–30.0)	29.9 (27.7–32.1)	64	353	745	72.8%	10.3%
Colon and rectum	2	2	3	40.3 (33.5–47.9)	35.8 (32.6–39.2)	27.3 (25.2–29.4)	139	468	687	–32.3%	–23.7%
Corpus and uterus	4	4	4	21.2 (17.1–26.0)	18.2 (16.0–20.6)	24.7 (22.8–26.8)	95	254	639	16.5%	35.7%
Thyroid	8	7	5	11.7 (8.7–15.4)	11.2 (9.6–13.1)	19.8 (18.0–21.6)	54	168	486	69.2%	76.8%
Lymphoma	13	5	6	4.7 (2.8–7.4)	12.7 (10.9–14.8)	12.4 (11.0–13.9)	21	172	305	163.8%	–2.4%
Pancreas	10	9	7	6.1 (3.7–9.5)	9.4 (7.8–11.3)	9.9 (8.7–11.3)	21	118	250	62.3%	5.3%
Ovary	7	8	8	13.1 (9.7–17.2)	10.2 (8.6–12.0)	8.1 (7.0–9.4)	55	143	198	–38.2%	–20.6%
Stomach	3	6	9	21.7 (16.8–27.5)	11.8 (10.0–13.8)	7.3 (6.3–8.5)	72	149	184	–66.4%	–38.1%
Leukaemia	9	11	10	8.8 (5.9–12.6)	6.6 (5.3–8.1)	6.4 (5.4–7.5)	34	91	154	–27.3%	–3.0%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. Other race and ethnicity includes American Indian/AK Native, Asian/Pacific Islander. CI, confidence interval.

Table S3 Incidence rate changes from 1975–2016 of the 10 leading cancers by age group (birth – 39 years) in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (birth –39 years)											
All malignant cancers				32.7 (31.2–34.3)	41.2 (39.8–42.6)	44.0 (42.6–45.5)	1,937	3,290	3,662	34.6%	6.8%
Testis	2	2	1	4.0 (3.5–4.5)	6.5 (6.0–7.1)	7.3 (6.7–7.9)	252	528	633	82.5%	12.3%
Lymphoma	1	1	2	5.5 (4.9–6.1)	7.0 (6.4–7.6)	6.5 (5.9–7.0)	352	560	546	18.2%	–7.1%
Leukaemia	3	4	3	3.6 (3.1–4.1)	4.0 (3.6–4.5)	4.6 (4.1–5.1)	225	320	372	27.8%	15.0%
Melanoma of the skin	4	3	4	3.0 (2.5–3.5)	4.4 (3.9–4.9)	4.0 (3.5–4.4)	167	351	328	33.3%	–9.1%
Brain and other nervous system	5	5	5	2.7 (2.3–3.1)	3.6 (3.2–4.0)	3.4 (3.0–3.8)	169	283	284	25.9%	–5.6%
Colon and rectum	7	6	6	1.6 (1.3–2.0)	2.0 (1.7–2.3)	3.2 (2.8–3.6)	85	156	264	100.0%	60.0%
Thyroid	7	7	7	1.6 (1.2–1.9)	1.7 (1.4–2.0)	2.9 (2.6–3.3)	92	133	243	81.3%	70.6%
Kidney and renal pelvis	10	9	8	1.0 (0.7–1.3)	1.1 (0.9–1.4)	1.9 (1.6–2.3)	50	89	153	90.0%	72.7%
Soft tissue including heart	9	8	9	1.1 (0.8–1.4)	1.5 (1.3–1.8)	1.8 (1.5–2.1)	70	122	151	63.6%	20.0%
Bones and joints	12	10	10	0.8 (0.6–1.1)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	58	64	64	0.0%	0.0%
Female (birth –39 years)											
All malignant cancers				48.2 (46.3–50.1)	55.3 (53.7–57.0)	66.5 (64.8–68.4)	2,703	4,343	5,366	38.0%	20.3%
Breast	1	1	1	12.3 (11.3–13.3)	13.1 (12.3–14.0)	14.1 (13.3–14.9)	593	1,035	1,109	14.6%	7.6%
Thyroid	3	2	2	4.6 (4.0–5.2)	7.2 (6.7–7.9)	13.3 (12.5–14.1)	281	574	1,100	189.1%	84.7%
Melanoma of the skin	5	3	3	3.6 (3.1–4.2)	6.4 (5.9–7.0)	7.0 (6.4–7.5)	214	509	571	94.4%	9.4%
Lymphoma	4	4	4	3.7 (3.3–4.2)	4.9 (4.4–5.4)	4.8 (4.3–5.3)	247	381	394	29.7%	–2.0%
Leukaemia	6	6	5	2.4 (2.0–2.8)	3.4 (3.0–3.9)	3.8 (3.4–4.3)	150	260	303	58.3%	11.8%
Colon and rectum	9	9	5	1.8 (1.4–2.2)	1.6 (1.3–1.9)	3.8 (3.4–4.3)	91	126	307	111.1%	137.5%
Cervix uteri	2	5	7	6.1 (5.5–6.9)	3.8 (3.3–4.2)	3.5 (3.1–4.0)	337	301	288	–42.6%	–7.9%
Brain and other nervous system	7	7	8	2.3 (2.0–2.7)	3.0 (2.6–3.4)	2.5 (2.1–2.8)	147	227	197	8.7%	–16.7%
Corpus and uterus	10	10	9	1.7 (1.3–2.1)	1.5 (1.2–1.8)	2.1 (1.8–2.5)	80	118	170	23.5%	40.0%
Ovary	7	8	10	2.3 (1.9–2.8)	1.8 (1.5–2.2)	1.8 (1.5–2.1)	135	143	143	–21.7%	0.0%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

Table S4 Incidence rate changes from 1975–2016 of the 10 leading cancers by age group (40–49 years) in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (40–49 years)											
All malignant cancers				187.4 (179.5–195.7)	215.8 (209.5–222.3)	193.4 (187.3–199.6)	2,090	4,449	3,863	3.2%	–10.4%
Colon and rectum	2	2	1	20.4 (17.8–23.2)	22.2 (20.2–24.3)	28.1 (25.8–30.5)	229	457	564	37.7%	26.6%
Melanoma of the skin	3	4	2	12.5 (10.4–14.7)	21.2 (19.3–23.3)	19.4 (17.5–21.4)	136	437	382	55.2%	–8.5%
Kidney and renal pelvis	6	6	3	7.2 (5.7–8.9)	10.6 (9.2–12.1)	17.6 (15.8–19.5)	79	218	350	144.4%	66.0%
Prostate	16	3	4	3.0 (2.1–4.2)	22.0 (20.0–24.1)	16.1 (14.5–18.0)	35	454	333	436.7%	–26.8%
Lymphoma	4	1	5	12.2 (10.2–14.5)	22.5 (20.5–24.6)	15.8 (14.1–17.6)	134	463	313	29.5%	–29.8%
Thyroid	12	12	6	4.9 (3.6–6.4)	5.2 (4.2–6.2)	10.4 (9.0–11.9)	53	106	202	112.2%	100.0%
Lung and bronchus	1	5	7	44.2 (40.4–48.3)	20.1 (18.2–22.1)	9.3 (8.0–10.7)	500	415	190	–79.0%	–53.7%
Testis	11	7	8	5.1 (3.8–6.6)	9.5 (8.3–11.0)	9.0 (7.7–10.4)	54	196	173	76.5%	–5.3%
Leukaemia	10	9	9	5.4 (4.1–7.0)	7.7 (6.5–9.0)	8.7 (7.4–10.1)	60	158	171	61.1%	13.0%
Urinary bladder	5	8	10	10.4 (8.6–12.4)	9.4 (8.1–10.8)	6.0 (5.0–7.2)	116	194	121	–42.3%	–36.2%
Female (40–49 years)											
All malignant cancers				338.8 (328.2–349.7)	340.4 (332.6–348.4)	363.2 (354.9–371.6)	3,879	7,170	7,323	7.2%	6.7%
Breast	1	1	1	145.6 (138.7–152.8)	155.9 (150.6–161.3)	159.5 (154.0–165.1)	1,669	3,286	3,222	9.5%	2.3%
Thyroid	8	4	2	9.8 (8.0–11.9)	18.0 (16.2–19.9)	34.5 (32.0–37.2)	107	378	684	252.0%	91.7%
Colon and rectum	5	6	3	22.2 (19.5–25.1)	15.8 (14.1–17.6)	26.2 (24.1–28.6)	256	333	531	18.0%	65.8%
Melanoma of the skin	7	2	4	11.0 (9.1–13.1)	22.3 (20.3–24.4)	24.8 (22.6–27.0)	124	468	497	125.5%	11.2%
Corpus and uterus	2	3	5	24.4 (21.7–27.5)	19.1 (17.2–21.0)	20.8 (18.9–22.9)	285	402	423	–14.8%	8.9%
Cervix uteri	3	7	6	22.7 (20.0–25.6)	13.7 (12.1–15.4)	11.8 (10.3–13.4)	254	287	232	–48.0%	–13.9%
Lymphoma	9	9	7	8.6 (7.0–10.5)	12.6 (11.1–14.2)	11.1 (9.7–12.7)	98	264	226	29.1%	–11.9%
Lung and bronchus	4	5	8	22.4 (19.7–25.3)	17.4 (15.7–19.3)	10.6 (9.2–12.1)	259	367	218	–52.7%	–39.1%
Ovary	6	8	9	21.0 (18.4–23.8)	13.0 (11.5–14.7)	9.7 (8.4–11.1)	240	275	195	–53.8%	–25.4%
Kidney and renal pelvis	14	10	10	3.0 (2.1–4.2)	5.4 (4.4–6.5)	7.8 (6.6–9.1)	34	113	158	160.0%	44.4%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

Table S5 Incidence rate changes from 1975–2016 of the 10 leading cancers by age group (50–59 years) in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (50–59 years)											
All malignant cancers				559.9 (545.8–574.4)	737.9 (724.0–752.1)	646.1 (635.1–657.2)	5,972	10,705	13,426	15.4%	–12.4%
Prostate	3	1	1	44.4 (40.6–48.6)	236.4 (228.6–244.5)	168.6 (163.1–) 174.3	481	3,415	3,556	279.7%	–28.7%
Colon and rectum	2	3	2	71.0 (66.1–76.3)	73.9 (69.5–78.4)	77.1 (73.3–81.1)	760	1,074	1,557	8.6%	4.3%
Lung and bronchus	1	2	3	150.3 (143.0–157.9)	87.1 (82.3–92.0)	56.0 (52.8–59.3)	1,602	1,261	1,174	–62.7%	–35.7%
Melanoma of the skin	11	4	4	15.1 (12.9–17.7)	39.4 (36.2–42.7)	44.0 (41.2–47.0)	160	573	915	191.4%	11.7%
Kidney and renal pelvis	7	7	5	20.1 (17.5–23.0)	29.8 (27.0–32.7)	37.6 (35.0–40.4)	214	433	778	87.1%	26.2%
Lymphoma	5	6	6	23.8 (21.0–27.0)	32.7 (29.8–35.8)	31.4 (29.0–33.9)	252	476	650	31.9%	–4.0%
Urinary bladder	4	5	7	35.8 (32.3–39.5)	36.8 (33.7–40.1)	29.2 (26.9–31.7)	382	534	614	–18.4%	–20.7%
Liver	17	10	8	6.2 (4.8–7.9)	14.5 (12.6–16.6)	19.9 (18.1–22.0)	67	211	424	221.0%	37.2%
Leukaemia	10	8	9	15.5 (13.2–18.0)	18.9 (16.8–21.3)	18.5 (16.7–20.5)	165	275	384	19.4%	–2.1%
Pancreas	9	9	10	17.6 (15.2–20.4)	16.9 (14.8–19.1)	16.2 (14.5–18.1)	187	245	335	–8.0%	–4.1%
Female (50–59 years)											
All malignant cancers				674.7 (659.6–690.0)	703.7 (690.5–717.2)	683.8 (672.6–695.1)	7,637	10,685	14,541	1.3%	–2.8%
Breast	1	1	1	219.0 (210.4–227.8)	293.6 (285.1–302.4)	256.8 (249.9–263.8)	2,462	4,462	5,412	17.3%	–12.5%
Corpus and uterus	2	3	2	112.9 (106.8–119.2)	55.3 (51.6–59.2)	62.1 (58.8–65.6)	1,286	839	1,355	–45.0%	12.3%
Colon and rectum	3	4	3	63.9 (59.4–68.8)	54.3 (50.7–58.2)	55.2 (52.0–58.5)	729	825	1,143	–13.6%	1.7%
Lung and bronchus	4	2	4	57.6 (53.3–62.2)	70.9 (66.7–75.3)	55.0 (51.9–58.2)	655	1,072	1,205	–4.5%	–22.4%
Thyroid	15	8	5	7.5 (6.0–9.3)	16.9 (14.9–19.1)	36.3 (33.7–39.0)	85	258	754	384.0%	114.8%
Melanoma of the skin	8	6	6	12.3 (10.3–14.5)	26.4 (23.8–29.1)	34.0 (31.5–36.6)	137	401	720	176.4%	28.8%
Lymphoma	7	7	7	17.2 (14.9–19.8)	22.3 (20.0–24.8)	22.8 (20.8–24.9)	194	339	483	32.6%	2.2%
Ovary	5	5	8	34.1 (30.8–37.7)	29.0 (26.3–31.8)	18.2 (16.4–20.1)	385	440	387	–46.6%	–37.2%
Kidney and renal pelvis	14	9	9	8.1 (6.6–10.0)	13.9 (12.1–15.9)	17.1 (15.4–19.0)	92	211	366	111.1%	23.0%
Pancreas	11	11	10	10.2 (8.5–12.3)	10.8 (9.2–12.6)	13.2 (11.7–14.8)	117	164	285	29.4%	22.2%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

Table S6 Incidence rate changes from 1975–2016 of the 10 leading cancers by age group (60–69 years) in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (60–69 years)											
All malignant cancers				1,385.7 (1,358.1–1,413.6)	1,994.6 (1,964.3–2,025.2)	1,546.1 (1,526.8–1,565.6)	9,670	16,579	24,507	11.6%	–22.5%
Prostate	2	1	1	243.2 (231.6–255.1)	783.0 (764.0–802.2)	512.5 (501.5–523.8)	1,677	6,502	8,117	110.7%	–34.5%
Lung and bronchus	1	2	2	331.8 (318.4–345.7)	304.8 (293.1–316.9)	178.5 (171.9–185.2)	2,317	2,535	2,824	–46.2%	–41.4%
Colon and rectum	3	3	3	199.9 (189.5–210.7)	198.9 (189.5–208.8)	118.2 (112.9–123.7)	1,394	1,653	1,877	–40.9%	–40.6%
Melanoma of the skin	14	6	4	16.9 (14.0–20.2)	63.9 (58.5–69.5)	87.7 (83.2–92.4)	120	531	1,391	418.9%	37.2%
Urinary bladder	4	4	5	98.0 (90.8–105.7)	113.0 (105.9–120.5)	84.0 (79.5–88.6)	686	939	1,327	–14.3%	–25.7%
Kidney and renal pelvis	10	7	6	31.0 (27.0–35.4)	61.0 (55.8–66.6)	67.9 (64.0–72.1)	217	509	1,078	119.0%	11.3%
Lymphoma	7	5	7	44.6 (39.8–49.8)	68.1 (62.6–73.9)	64.3 (60.4–68.3)	313	566	1,020	44.2%	–5.6%
Liver	16	14	8	12.4 (9.9–15.3)	22.3 (19.2–25.7)	57.8 (54.1–61.6)	86	186	920	366.1%	159.2%
Pancreas	6	9	9	49.8 (44.7–55.3)	45.2 (40.7–50.0)	46.2 (42.9–49.6)	348	375	732	–7.2%	2.2%
Leukaemia	8	8	10	39.8 (35.3–44.8)	45.5 (41.0–50.3)	45.5 (42.2–48.9)	279	378	721	14.3%	0.0%
Female (60–69 years)											
All malignant cancers				1,051.8 (1,029.6–1,074.3)	1,246.7 (1,224.3–1,269.5)	1,143.9 (1,128.1–1,159.9)	8,540	11,730	20,058	8.8%	–8.2%
Breast	1	1	1	279.8 (268.5–291.6)	414.5 (401.6–427.7)	382.4 (373.3–391.7)	2,273	3,900	6,708	36.7%	–7.7%
Lung and bronchus	4	2	2	90.8 (84.3–97.5)	197.7 (188.8–206.9)	138.4 (133.0–144.1)	738	1,860	2,425	52.4%	–30.0%
Corpus and uterus	3	4	3	138.5 (130.5–146.8)	90.2 (84.3–96.5)	110.8 (105.9–115.8)	1,131	849	1,944	–20.0%	22.8%
Colon and rectum	2	3	4	155.3 (146.8–164.1)	136.6 (129.2–144.2)	81.4 (77.3–85.8)	1,256	1,285	1,427	–47.6%	–40.4%
Melanoma of the skin	13	8	5	14.0 (11.5–16.8)	28.8 (25.5–32.4)	46.5 (43.3–49.8)	113	271	816	232.1%	61.5%
Lymphoma	7	5	6	29.0 (25.4–32.9)	45.6 (41.4–50.1)	45.4 (42.3–48.7)	235	429	796	56.6%	–0.4%
Pancreas	8	8	7	28.7 (25.1–32.7)	28.8 (25.5–32.4)	34.5 (31.8–37.4)	232	271	604	20.2%	19.8%
Thyroid	16	13	8	8.4 (6.6–10.7)	15.4 (13.0–18.1)	33.4 (30.8–36.2)	69	145	587	297.6%	116.9%
Kidney and renal pelvis	14	7	9	13.9 (11.5–16.7)	28.9 (25.6–32.6)	31.6 (29.0–34.3)	113	272	554	127.3%	9.3%
Ovary	5	6	10	47.7 (43.1–52.7)	42.2 (38.1–46.6)	28.9 (26.5–31.5)	388	397	507	–39.4%	–31.5%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

Table S7 Incidence rate changes from 1975–2016 for the 10 leading cancers by age group (≥70 years) in the United States

Cancer	Incidence rank			Age-adjusted incidence rate (95% CI)			Incidence count			Relative change in incidence (2016 vs. 1975)	Relative change in incidence (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (≥70 years)											
All malignant cancers				2,777.0 (2,728.9–2825.7)	3,220.3 (3,183.1–3,257.9)	2,492.0 (2,463.9–2,520.4)	13,390	28,992	30,378	–10.3%	–22.6%
Prostate	1	1	1	768.7 (743.1–794.9)	1,046.5 (1,025.5–1,067.9)	539.4 (526.5–552.6)	3,608	9,564	6,703	–29.8%	–48.5%
Lung and bronchus	3	2	2	443.2 (424.6–462.4)	506.1 (491.5–521.1)	391.4 (380.3–402.8)	2,245	4,589	4,732	–11.7%	–22.7%
Urinary bladder	4	4	3	228.8 (215.1–243.2)	267.3 (256.6–278.4)	247.5 (238.6–256.6)	1,084	2,372	2,978	8.2%	–7.4%
Colon and rectum	2	3	4	454.6 (435.1–474.7)	395.4 (382.3–408.9)	207.5 (199.4–215.8)	2,171	3,504	2,510	–54.4%	–47.5%
Melanoma of the skin	14	6	5	22.1 (18.0–26.8)	99.8 (93.3–106.7)	167.4 (160.2–174.9)	107	891	2,040	657.5%	67.7%
Lymphoma	8	5	6	63.5 (56.4–71.1)	125.7 (118.4–133.4)	131.3 (124.9–138.0)	312	1,126	1,592	106.8%	4.5%
Leukaemia	6	7	7	102.5 (93.3–112.4)	98.1 (91.6–105.0)	93.2 (87.8–98.8)	481	864	1,134	–9.1%	–5.0%
Pancreas	7	9	8	98.4 (89.6–107.9)	77.5 (71.8–83.6)	90.2 (84.9–95.8)	477	687	1,093	–8.3%	16.4%
Kidney and renal pelvis	9	8	9	45.5 (39.7–51.9)	81.3 (75.5–87.5)	89.7 (84.4–95.1)	231	735	1,100	97.1%	10.3%
Stomach	5	10	10	111.8 (102.2–122.1)	76.6 (70.9–82.7)	52.4 (48.4–56.7)	525	676	632	–53.1%	–31.6%
Female (≥70 years)											
All malignant cancers				1,459.1 (1,432.5–1,486.0)	1,839.3 (1,816.7–1,862.1)	1,715.6 (1,695.4–1,736.1)	11,543	25,504	28,185	17.6%	–6.7%
Breast	1	1	1	335.2 (322.6–348.3)	458.2 (446.9–469.7)	442.4 (432.1–452.9)	2,660	6,287	7,145	32.0%	–3.4%
Lung and bronchus	4	3	2	79.5 (73.4–86.0)	278.9 (270.1–288.0)	291.6 (283.2–300.2)	635	3,800	4,714	266.8%	4.6%
Colon and rectum	2	2	3	334.3 (321.6–347.4)	297.7 (288.7–306.9)	162.3 (156.2–168.6)	2,630	4,207	2,749	–51.5%	–45.5%
Corpus and uterus	3	4	4	88.0 (81.7–94.8)	90.0 (85.0–) 95.2	92.0 (87.3–96.9)	711	1,228	1,480	4.5%	2.2%
Lymphoma	9	5	5	48.9 (44.1–54.0)	86.5 (81.7–91.6)	86.3 (81.8–91.0)	387	1,205	1,426	76.5%	–0.2%
Pancreas	5	6	6	57.8 (52.6–63.4)	65.4 (61.3–69.8)	72.8 (68.8–77.1)	457	919	1,229	26.0%	11.3%
Melanoma of the skin	15	12	7	14.1 (11.6–16.9)	37.0 (33.8–40.3)	60.5 (56.8–64.4)	112	510	1,013	329.1%	63.5%
Urinary bladder	6	7	8	53.4 (48.4–58.8)	61.7 (57.7–66.0)	59.6 (55.9–63.5)	419	869	1,005	11.6%	–3.4%
Leukaemia	7	8	9	51.7 (46.7–57.0)	54.4 (50.6–58.4)	48.4 (45.0–51.9)	405	769	809	–6.4%	–11.0%
Kidney and renal pelvis	13	10	10	20.0 (17.0–23.3)	37.5 (34.3–40.9)	43.9 (40.7–47.3)	161	518	707	119.5%	17.1%

Rank is based on age-adjusted incidence rate. Age-adjusted incidence rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Incidence count is the number of cancer occurrences. CI, confidence interval.

Table S8 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death in males by race and ethnicity in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male white											
All malignant cancers				254.0 (252.7–255.3)	243.4 (242.4–244.3)	186.3 (185.6–187.0)	175,299	247,396	267,894	–26.7%	–23.5%
Lung and bronchus	1	1	1	75.5 (74.8–76.1)	75.4 (74.9–75.9)	47.1 (46.7–47.4)	56,237	78,700	68,968	–37.6%	–37.5%
Prostate	3	2	2	29.1 (28.6–29.5)	27.8 (27.4–28.1)	18.2 (18.0–18.4)	16,340	25,340	24,555	–37.5%	–34.5%
Colon and rectum	2	3	3	33.2 (32.8–33.7)	24.5 (24.1–24.8)	15.9 (15.7–16.1)	21,737	24,549	22,805	–52.1%	–35.1%
Pancreas	4	4	4	13.6 (13.3–13.9)	12.0 (11.8–12.2)	12.7 (12.5–12.9)	9,381	12,391	18,618	–6.6%	5.8%
Leukaemia	6	6	5	11.3 (11.0–11.6)	10.5 (10.3–10.7)	8.6 (8.5–8.8)	7,691	10,639	11,871	–23.9%	–18.1%
Urinary bladder	7	7	6	10.1 (9.8–10.4)	7.9 (7.8–8.1)	8.0 (7.8–8.2)	6,159	7,620	10,958	–20.8%	1.3%
Lymphoma	8	5	7	8.9 (8.7–9.1)	11.2 (11.0–11.4)	7.6 (7.4–7.7)	6,546	11,454	10,577	–14.6%	–32.1%
Oesophagus	9	8	8	5.4 (5.2–5.6)	7.6 (7.4–7.7)	7.4 (7.3–7.6)	3,889	7,986	11,127	37.0%	–2.6%
Liver	13	12	9	3.4 (3.2–3.5)	5.0 (4.9–5.1)	7.1 (7.0–7.2)	2,358	5,273	11,160	108.8%	42.0%
Brain and other nervous system	11	10	10	5.2 (5.0–5.4)	6.0 (5.8–6.1)	6.0 (5.8–6.1)	4,237	6,486	8,645	15.4%	0.0%
Male black											
All malignant cancers				320.5 (315.9–325.1)	341.2 (337.3–345.1)	221.6 (219.2–224.1)	21,884	32,815	35,707	–30.9%	–35.1%
Lung and bronchus	1	1	1	91.0 (88.7–93.3)	100.9 (98.8–102.9)	55.3 (54.1–56.6)	6,716	10,143	9,129	–39.2%	–45.2%
Prostate	2	2	2	55.5 (53.4–57.7)	68.9 (67.0–70.8)	38.4 (37.3–39.5)	3,018	5,346	5,088	–30.8%	–44.3%
Colon and rectum	3	3	3	30.1 (28.6–31.6)	35.0 (33.7–36.3)	23.0 (22.2–23.8)	1,905	3,316	3,786	–23.6%	–34.3%
Pancreas	6	4	4	16.3 (15.3–17.4)	15.8 (15.0–16.6)	14.9 (14.2–15.5)	1,141	1,561	2,503	–8.6%	–5.7%
Liver	11	9	5	6.1 (5.6–6.8)	8.6 (8.1–9.2)	11.2 (10.7–11.7)	457	966	2,231	83.6%	30.2%
Stomach	4	5	6	21.0 (19.9–22.3)	12.8 (12.0–13.5)	7.9 (7.5–8.4)	1,379	1,218	1,280	–62.4%	–38.3%
Myeloma	9	8	7	6.4 (5.8–7.1)	8.8 (8.1–9.4)	7.3 (6.8–7.8)	433	823	1,109	14.1%	–17.0%
Leukaemia	7	7	8	8.6 (7.8–9.3)	9.1 (8.5–9.7)	6.9 (6.4–7.3)	631	933	1,083	–19.8%	–24.2%
Urinary bladder	8	12	9	6.9 (6.2–7.6)	5.7 (5.2–6.2)	5.3 (4.9–5.7)	421	466	733	–23.2%	–7.0%
Oesophagus	5	6	10	17.0 (16.0–18.0)	10.9 (10.3–11.6)	5.2 (4.8–5.6)	1,267	1,170	908	–69.4%	–52.3%
Kidney and renal pelvis	13	11	10	4.1 (3.7–4.7)	6.3 (5.8–6.8)	5.2 (4.8–5.6)	295	632	854	26.8%	–17.5%
Male other race and ethnicity											
All malignant cancers				145.2 (137.1–153.6)	150.9 (146.8–155.2)	116.1 (113.8–118.3)	1,403	5,861	10,967	–20.0%	–23.1%
Lung and bronchus	1	1	1	35.4 (31.5–39.6)	41.0 (38.8–43.2)	28.8 (27.7–30.0)	344	1,567	2,678	–18.6%	–29.8%
Colon and rectum	2	2	2	19.1 (16.2–22.3)	16.4 (15.0–17.8)	10.8 (10.1–11.5)	177	619	1,051	–43.5%	–34.1%
Liver	4	4	3	9.7 (7.8–11.9)	13.2 (12.1–14.4)	10.3 (9.7–11.0)	102	604	1,067	6.2%	–22.0%
Prostate	5	3	4	9.4 (7.2–12.0)	13.7 (12.3–15.2)	9.2 (8.5–9.9)	68	392	727	–2.1%	–32.8%
Pancreas	6	6	5	8.9 (7.0–11.1)	7.6 (6.7–8.6)	8.2 (7.6–8.8)	84	285	778	–7.9%	7.9%
Stomach	3	5	6	17.8 (14.9–21.0)	11.4 (10.2–12.6)	6.6 (6.1–7.2)	158	422	617	–62.9%	–42.1%
Lymphoma	8	7	7	4.8 (3.5–6.3)	6.5 (5.7–7.4)	4.7 (4.3–5.2)	52	259	439	–2.1%	–27.7%
Leukaemia	7	8	8	5.2 (3.8–6.9)	5.1 (4.4–5.9)	4.2 (3.8–4.7)	60	231	406	–19.2%	–17.6%
Urinary bladder	11	11	9	2.9 (1.8–4.4)	2.4 (1.9–3.0)	3.1 (2.7–3.5)	24	77	250	6.9%	29.2%
Kidney and renal pelvis	10	9	10	3.1 (2.1–) 4.5	3.3 (2.7–3.9)	3.0 (2.7–3.4)	31	142	296	–3.2%	–9.1%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. Other race and ethnicity includes American Indian/AK Native, Asian/Pacific Islander. CI, confidence interval.

Table S9 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death in females by race and ethnicity in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Female white											
All malignant cancers				159.0 (158.2–159.8)	166.0 (165.3–166.7)	134.7 (134.2–135.3)	148,711	232,608	238,072	–15.3%	–18.9%
Lung and bronchus	3	1	1	17.7 (17.4–17.9)	42.1 (41.7–42.4)	33.2 (32.9–33.5)	16,883	58,133	59,158	87.6%	–21.1%
Breast	1	2	2	31.8 (31.4–32.2)	26.2 (25.9–26.4)	19.6 (19.4–19.8)	29,313	35,767	33,749	–38.4%	–25.2%
Colon and rectum	2	3	3	25.1 (24.7–25.4)	17.0 (16.8–17.2)	11.3 (11.1–11.4)	23,333	24,913	20,155	–55.0%	–33.5%
Pancreas	5	5	4	8.3 (8.1–8.5)	9.0 (8.8–9.2)	9.5 (9.4–9.7)	7,876	12,909	17,262	14.5%	5.6%
Ovary	4	4	5	10.2 (10.0–10.4)	9.2 (9.1–9.4)	7.0 (6.9–7.2)	9,610	12,731	12,290	–31.4%	–23.9%
Leukaemia	6	7	6	6.3 (6.1–6.5)	6.0 (5.9–6.2)	4.9 (4.8–5.0)	5,836	8,599	8,608	–22.2%	–18.3%
Lymphoma	7	6	7	5.9 (5.7–6.0)	7.4 (7.3–7.6)	4.6 (4.5–4.7)	5,532	10,594	8,298	–22.0%	–37.8%
Corpus and uterus	9	9	7	5.1 (4.9–5.2)	3.8 (3.7–3.9)	4.6 (4.5–4.7)	4,832	5,397	8,229	–9.8%	21.1%
Brain and other nervous system	11	8	9	3.6 (3.5–3.7)	3.9 (3.8–4.0)	4.0 (3.9–4.1)	3,454	5,186	6,584	11.1%	2.6%
Myeloma	14	10	10	2.2 (2.1–2.3)	3.0 (2.9–3.1)	2.4 (2.3–2.4)	2,137	4,247	4,262	9.1%	–20.0%
Female black											
All malignant cancers				174.2 (171.4–177.0)	193.2 (191.0–195.5)	151.3 (149.7–153.0)	15,747	29,127	34,919	–13.1%	–21.7%
Lung and bronchus	3	1	1	17.3 (16.5–18.2)	39.6 (38.6–40.7)	29.8 (29.1–30.5)	1,602	5,910	6,880	72.3%	–24.7%
Breast	1	2	2	29.5 (28.4–30.7)	34.4 (33.4–35.3)	27.3 (26.6–28.0)	2,692	5,361	6,333	–7.5%	–20.6%
Colon and rectum	2	3	3	24.6 (23.5–25.7)	23.9 (23.1–24.7)	15.1 (14.6–15.6)	2,108	3,536	3,472	–38.6%	–36.8%
Pancreas	5	4	4	10.1 (9.5–10.8)	12.7 (12.1–13.3)	12.1 (11.7–12.6)	912	1,858	2,774	19.8%	–4.7%
Corpus and uterus	7	5	5	7.8 (7.2–8.4)	7.2 (6.8–7.7)	8.7 (8.3–9.1)	710	1,060	2,067	11.5%	20.8%
Ovary	8	6	6	7.2 (6.6–7.7)	7.1 (6.7–7.6)	5.6 (5.3–5.9)	681	1,073	1,328	–22.2%	–21.1%
Myeloma	10	7	7	4.4 (4.0–4.9)	6.7 (6.3–7.2)	5.1 (4.8–5.4)	396	989	1,126	15.9%	–23.9%
Leukaemia	9	10	8	5.1 (4.7–5.6)	5.3 (4.9–5.6)	4.5 (4.2–4.8)	496	820	1,008	–11.8%	–15.1%
Stomach	6	8	9	8.6 (8.0–9.3)	6.5 (6.1–6.9)	3.5 (3.3–3.8)	732	958	786	–59.3%	–46.2%
Liver	14	13	9	2.6 (2.3–3.0)	2.8 (2.6–3.1)	3.5 (3.3–3.8)	224	423	855	34.6%	25.0%
Female other race and ethnicity											
All malignant cancers				98.8 (92.6–105.4)	100.7 (97.9–103.6)	84.8 (83.2–86.5)	1,051	5,273	10,472	–14.2%	–15.8%
Lung and bronchus	4	1	1	9.6 (7.7–11.7)	19.1 (17.9–20.4)	17.0 (16.3–17.8)	99	973	2,056	77.1%	–11.0%
Breast	1	2	2	13.1 (11.0–15.4)	12.3 (11.4–13.3)	10.8 (10.2–11.4)	153	744	1,405	–17.6%	–12.2%
Colon and rectum	2	3	3	11.9 (9.7–14.3)	10.0 (9.2–11.0)	8.2 (7.7–8.7)	112	501	1,017	–31.1%	–18.0%
Pancreas	6	4	4	4.5 (3.2–6.1)	6.8 (6.1–7.6)	6.9 (6.4–7.3)	43	327	822	53.3%	1.5%
Ovary	7	8	5	4.1 (3.0–5.5)	4.5 (4.0–5.2)	4.7 (4.3–5.1)	49	256	605	14.6%	4.4%
Stomach	3	5	6	10.5 (8.5–12.8)	6.6 (5.9–7.4)	3.9 (3.5–4.2)	109	324	478	–62.9%	–40.9%
Liver	13	6	7	1.9 (1.2–2.9)	5.6 (4.9–6.3)	3.6 (3.2–4.0)	22	285	426	89.5%	–35.7%
Corpus and uterus	11	11	8	2.6 (1.7–3.7)	2.3 (1.9–2.8)	3.3 (3.0–3.7)	28	128	437	26.9%	43.5%
Lymphoma	10	7	9	3.0 (2.0–4.3)	4.6 (4.0–5.3)	3.0 (2.7–3.4)	32	230	356	0.0%	–34.8%
Leukaemia	8	9	10	3.4 (2.3–4.8)	3.2 (2.7–3.7)	2.5 (2.2–2.8)	40	175	311	–26.5%	–21.9%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval. Other race and ethnicity includes American Indian/AK Native, Asian/Pacific Islander.

Table S10 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death by age group (birth–39 years) in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (Birth–39 years)											
All malignant cancers				12.0 (11.7–12.3)	7.5 (7.3–7.7)	6.1 (5.9–6.3)	7,138	6,130	5,144	–49.2%	–18.7%
Brain and other nervous system	3	2	1	1.4 (1.3–1.4)	1.1 (1.1–1.2)	1.0 (0.9–1.1)	845	933	852	–28.6%	–9.1%
Leukaemia	1	1	2	2.2 (2.1–2.4)	1.3 (1.2–1.3)	0.9 (0.9–1.0)	1,529	1,041	806	–59.1%	–30.8%
Colon and rectum	5	5	3	0.8 (0.7–0.9)	0.5 (0.5–0.6)	0.6 (0.6–0.7)	395	442	494	–25.0%	20.0%
Lymphoma	2	3	4	1.7 (1.6–1.8)	0.8 (0.8–0.9)	0.4 (0.3–0.4)	1,097	683	337	–76.5%	–50.0%
Soft tissue including heart	9	6	4	0.3 (0.3–0.4)	0.4 (0.3–0.4)	0.4 (0.3–0.4)	196	301	319	33.3%	0.0%
Lung and bronchus	4	4	6	1.3 (1.2–1.4)	0.6 (0.6–0.7)	0.3 (0.2–0.3)	576	487	215	–76.9%	–50.0%
Bones and joints	8	7	6	0.4 (0.3–0.4)	0.3 (0.2–0.3)	0.3 (0.3–0.3)	263	234	270	–25.0%	0.0%
Testis	6	9	8	0.7 (0.7–0.8)	0.2 (0.2–0.3)	0.2 (0.2–0.2)	473	183	188	–71.4%	0.0%
Melanoma of the skin	6	7	8	0.7 (0.6–0.8)	0.3 (0.3–0.3)	0.2 (0.2–0.2)	369	250	162	–71.4%	–33.3%
Pancreas	9	9	8	0.3 (0.2–0.3)	0.2 (0.1–0.2)	0.2 (0.1–0.2)	129	125	127	–33.3%	0.0%
Kidney and renal pelvis	11	13	8	0.2 (0.2–0.3)	0.1 (0.1–0.2)	0.2 (0.2–0.2)	132	113	148	0.0%	100.0%
Liver	11	9	8	0.2 (0.2–0.2)	0.2 (0.2–0.2)	0.2 (0.1–0.2)	120	152	143	0.0%	0.0%
Stomach	11	9	8	0.2 (0.2–0.3)	0.2 (0.2–0.2)	0.2 (0.2–0.2)	119	175	174	0.0%	0.0%
Female (Birth–39 years)											
All malignant cancers				12.2 (11.9–12.5)	8.2 (8.0–8.4)	6.8 (6.6–6.9)	6,864	6,590	5,473	–44.3%	–17.1%
Breast	1	1	1	2.6 (2.5–2.8)	1.8 (1.7–1.9)	1.5 (1.4–1.6)	1,283	1,445	1,158	–42.3%	–16.7%
Leukaemia	2	2	2	1.7 (1.6–1.8)	0.9 (0.9–1.0)	0.7 (0.6–0.7)	1,155	754	561	–58.8%	–22.2%
Brain and other nervous system	3	3	2	1.0 (0.9–1.1)	0.7 (0.7–0.8)	0.7 (0.7–0.8)	644	592	609	–30.0%	0.0%
Cervix uteri	5	3	4	0.9 (0.9–1.0)	0.7 (0.6–0.7)	0.6 (0.5–0.6)	487	542	471	–33.3%	–14.3%
Colon and rectum	7	7	5	0.6 (0.5–0.7)	0.4 (0.4–0.5)	0.5 (0.5–0.6)	303	340	420	–16.7%	25.0%
Ovary	7	8	6	0.6 (0.5–0.7)	0.3 (0.3–0.4)	0.3 (0.2–0.3)	333	271	230	–50.0%	0.0%
Soft tissue including heart	11	8	6	0.2 (0.2–0.3)	0.3 (0.3–0.3)	0.3 (0.2–0.3)	158	240	229	50.0%	0.0%
Lymphoma	3	5	8	1.0 (0.9–1.0)	0.5 (0.5–0.6)	0.2 (0.2–0.2)	597	439	162	–80.0%	–60.0%
Lung and bronchus	6	5	8	0.7 (0.6–0.7)	0.5 (0.4–0.5)	0.2 (0.2–0.3)	303	399	190	–71.4%	–60.0%
Bones and joints	10	11	8	0.3 (0.2–0.3)	0.2 (0.2–0.2)	0.2 (0.2–0.2)	200	142	162	–33.3%	0.0%
Stomach	11	11	8	0.2 (0.2–0.2)	0.2 (0.1–0.2)	0.2 (0.2–0.2)	101	131	163	0.0%	0.0%
Corpus and uterus	14	13	8	0.1 (0.1–0.2)	0.1 (0.1–0.1)	0.2 (0.1–0.2)	60	71	121	100.0%	100.0%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

Table S11 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death by age group (40–49 years) in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (40–49 years)											
All malignant cancers				96.5 (94.7–98.3)	67.0 (65.9–68.1)	43.6 (42.7–44.5)	11,113	14,185	9,070	–54.8%	–34.9%
Colon and rectum	2	2	1	8.6 (8.1–9.1)	6.5 (6.1–6.8)	7.1 (6.8–7.5)	989	1,368	1,479	–17.4%	9.2%
Lung and bronchus	1	1	2	35.6 (34.5–36.7)	17.5 (16.9–18.1)	6.6 (6.3–7.0)	4,118	3,706	1,392	–81.5%	–62.3%
Brain and other nervous system	4	3	3	5.0 (4.6–5.4)	4.2 (3.9–4.5)	3.5 (3.3–3.8)	570	892	727	–30.0%	–16.7%
Pancreas	6	5	4	4.3 (3.9–4.6)	3.6 (3.4–3.9)	3.1 (2.9–3.3)	491	768	648	–27.9%	–13.9%
Oesophagus	8	7	5	3.1 (2.8–3.4)	2.9 (2.7–3.1)	2.2 (2.0–2.4)	358	611	450	–29.0%	–24.1%
Leukaemia	5	8	6	4.4 (4.0–4.8)	2.8 (2.6–3.1)	2.0 (1.8–2.2)	500	598	404	–54.5%	–28.6%
Lymphoma	3	4	7	5.4 (5.0–5.9)	4.0 (3.7–4.3)	1.9 (1.8–2.1)	615	842	400	–64.8%	–52.5%
Stomach	7	11	7	3.7 (3.3–4.0)	2.2 (2.0–2.5)	1.9 (1.7–2.1)	421	474	386	–48.6%	–13.6%
Kidney and renal pelvis	9	10	9	2.9 (2.6–3.3)	2.3 (2.1–2.5)	1.7 (1.5–1.9)	339	484	355	–41.4%	–26.1%
Melanoma of the skin	9	9	10	2.9 (2.6–3.2)	2.6 (2.4–2.9)	1.5 (1.3–1.7)	330	558	307	–48.3%	–42.3%
Liver	13	6	10	1.1 (0.9–1.3)	3.5 (3.2–3.7)	1.5 (1.4–1.7)	126	731	324	36.4%	–57.1%
Female (40–49 years)											
All malignant cancers				106.5 (104.7–108.4)	71.8 (70.7–72.9)	54.4 (53.4–55.4)	12,884	15,573	11,477	–48.9%	–24.2%
Breast	1	1	1	33.1 (32.0–34.1)	21.0 (20.4–21.7)	15.1 (14.6–15.7)	3,988	4,564	3,176	–54.4%	–28.1%
Lung and bronchus	2	2	2	15.4 (14.7–16.1)	12.0 (11.5–12.4)	5.8 (5.5–6.2)	1,869	2,598	1,262	–62.3%	–51.7%
Colon and rectum	4	3	3	8.3 (7.8–8.8)	5.2 (4.9–5.5)	5.6 (5.3–5.9)	997	1,128	1,178	–32.5%	7.7%
Cervix uteri	5	5	4	7.7 (7.2–8.2)	3.9 (3.7–4.2)	3.4 (3.2–3.7)	913	848	707	–55.8%	–12.8%
Ovary	3	4	5	8.6 (8.1–9.1)	4.3 (4.1–4.6)	3.1 (2.9–3.3)	1,051	944	656	–64.0%	–27.9%
Brain and other nervous system	6	6	6	3.2 (2.9–3.6)	2.6 (2.4–2.8)	2.5 (2.3–2.7)	387	565	517	–21.9%	–3.8%
Pancreas	9	8	7	2.4 (2.2–2.7)	2.2 (2.0–2.4)	2.2 (2.0–2.4)	297	474	478	–8.3%	0.0%
Corpus and uterus	11	12	8	2.0 (1.7–2.3)	1.3 (1.2–1.5)	1.8 (1.7–2.0)	242	287	389	–10.0%	38.5%
Leukaemia	6	9	9	3.2 (2.9–3.5)	2.1 (1.9–2.3)	1.7 (1.5–1.9)	380	462	355	–46.9%	–19.0%
Stomach	10	11	10	2.2 (2.0–2.5)	1.4 (1.3–1.6)	1.4 (1.2–1.5)	271	311	285	–36.4%	0.0%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

Table S12 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death by age group (50–59 years) in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (50–59 years)											
All malignant cancers				309.3 (306.0–312.6)	236.0 (233.6–238.5)	180.0 (178.2–181.8)	33,872	35,884	40,157	–41.8%	–23.7%
Lung and bronchus	1	1	1	123.2 (121.1–125.3)	79.8 (78.4–81.2)	45.3 (44.4–46.2)	13,485	12,121	10,196	–63.2%	–43.2%
Colon and rectum	2	2	2	30.6 (29.6–31.6)	22.6 (21.8–23.3)	20.1 (19.5–20.7)	3,354	3,433	4,409	–34.3%	–11.1%
Pancreas	3	4	3	16.4 (15.6–17.2)	14.2 (13.6–14.8)	13.9 (13.4–14.4)	1,794	2,161	3,099	–15.2%	–2.1%
Liver	14	7	4	4.4 (4.0–4.8)	8.7 (8.2–9.1)	13.3 (12.8–13.8)	485	1,318	3,012	202.3%	52.9%
Oesophagus	6	5	5	11.5 (10.9–12.2)	11.4 (10.9–12.0)	9.2 (8.8–9.6)	1,262	1,734	2,049	–20.0%	–19.3%
Brain and other nervous system	7	7	6	10.1 (9.5–10.7)	8.7 (8.2–9.2)	8.3 (8.0–8.7)	1,101	1,327	1,835	–17.8%	–4.6%
Kidney and renal pelvis	9	9	7	8.5 (7.9–9.0)	8.5 (8.1–9.0)	6.0 (5.7–6.3)	924	1,298	1,328	–29.4%	–29.4%
Prostate	10	12	8	7.6 (7.0–8.1)	5.8 (5.5–6.2)	5.7 (5.3–6.0)	844	886	1,293	–25.0%	–1.7%
Lymphoma	5	6	9	11.8 (11.1–12.4)	10.5 (10.0–11.0)	5.6 (5.2–5.9)	1,285	1,594	1,223	–52.5%	–46.7%
Stomach	4	11	10	12.4 (11.8–13.1)	6.0 (5.7–6.4)	4.9 (4.6–5.2)	1,357	919	1,084	–60.5%	–18.3%
Leukaemia	8	10	10	9.1 (8.6–9.7)	7.0 (6.6–7.5)	4.9 (4.6–5.2)	1,003	1,068	1,081	–46.2%	–30.0%
Female (50–59 years)											
All malignant cancers				251.9 (249.1–254.8)	200.7 (198.5–202.9)	157.9 (156.3–159.6)	30,198	32,277	36,598	–37.3%	–21.3%
Lung and bronchus	2	1	1	39.4 (38.3–40.5)	49.8 (48.7–50.9)	35.8 (35.1–36.6)	4,729	8,015	8,414	–9.1%	–28.1%
Breast	1	2	2	64.4 (63.0–65.9)	45.8 (44.8–46.9)	31.6 (30.9–32.4)	7,682	7,373	7,229	–50.9%	–31.0%
Colon and rectum	3	3	3	26.6 (25.7–27.5)	15.5 (14.9–16.1)	13.7 (13.2–14.2)	3,205	2,491	3,150	–48.5%	–11.6%
Pancreas	6	5	4	9.8 (9.3–10.4)	8.7 (8.2–9.2)	9.6 (9.2–10.0)	1,190	1,397	2,247	–2.0%	10.3%
Ovary	4	4	5	20.7 (19.9–21.6)	13.0 (12.4–13.6)	9.2 (8.8–9.6)	2,473	2,089	2,121	–55.6%	–29.2%
Corpus and uterus	8	9	6	7.1 (6.6–7.5)	4.9 (4.6–5.3)	6.2 (5.9–6.5)	853	795	1,447	–12.7%	26.5%
Brain and other nervous system	9	7	7	6.9 (6.4–7.4)	5.5 (5.2–5.9)	5.1 (4.8–5.4)	825	892	1,181	–26.1%	–7.3%
Cervix uteri	5	7	8	10.8 (10.2–11.4)	5.5 (5.1–5.9)	4.4 (4.1–4.7)	1,278	883	991	–59.3%	–20.0%
Leukaemia	10	10	9	6.1 (5.7–6.6)	4.8 (4.5–5.2)	3.3 (3.1–3.6)	735	772	770	–45.9%	–31.3%
Liver	16	15	10	2.2 (1.9–2.5)	2.0 (1.8–2.3)	3.0 (2.8–3.2)	262	327	714	36.4%	50.0%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

Table S13 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death by age group (60–69 years) in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (60–69 years)											
All malignant cancers				763.3 (757.2–769.5)	674.4 (669.2–679.6)	485.4 (482.1–488.7)	59,858	64,245	83,485	–36.4%	–28.0%
Lung and bronchus	1	1	1	290.0 (286.2–293.8)	257.9 (254.7–261.2)	136.2 (134.4–137.9)	22,773	24,566	23,414	–53.0%	–47.2%
Colon and rectum	2	2	2	86.0 (84.0–88.1)	63.2 (61.6–64.8)	42.1 (41.2–43.1)	6,729	6,021	7,250	–51.0%	–33.4%
Pancreas	4	4	3	44.0 (42.5–45.5)	36.8 (35.6–38.0)	38.0 (37.1–39.0)	3,450	3,508	6,538	–13.6%	3.3%
Liver	12	9	4	12.3 (11.5–13.1)	16.6 (15.8–17.5)	34.0 (33.1–34.8)	964	1,586	5,861	176.4%	104.8%
Prostate	3	3	5	51.6 (50.1–53.3)	39.7 (38.5–41.0)	29.0 (28.2–29.8)	4,015	3,772	4,973	–43.8%	–27.0%
Oesophagus	7	5	6	22.3 (21.3–23.4)	26.5 (25.5–27.6)	23.6 (22.8–24.3)	1,753	2,530	4,052	5.8%	–10.9%
Brain and other nervous system	11	11	7	16.2 (15.3–17.1)	15.8 (15.0–16.6)	15.4 (14.9–16.0)	1,279	1,508	2,660	–4.9%	–2.5%
Leukaemia	8	7	8	22.0 (20.9–23.0)	22.2 (21.3–23.2)	15.3 (14.7–15.9)	1,721	2,116	2,620	–30.5%	–31.1%
Kidney and renal pelvis	10	8	9	16.9 (16.1–17.9)	18.3 (17.4–19.2)	15.0 (14.4–15.6)	1,332	1,745	2,576	–11.2%	–18.0%
Lymphoma	6	6	10	23.0 (21.9–24.1)	25.6 (24.6–26.7)	14.9 (14.3–15.4)	1,806	2,441	2,554	–35.2%	–41.8%
Female (60–69 years)											
All malignant cancers				446.0 (441.8–450.3)	476.7 (472.6–480.8)	348.9 (346.2–351.5)	42,026	51,673	66,445	–21.8%	–26.8%
Lung and bronchus	3	1	1	62.5 (60.9–64.1)	148.7 (146.4–151.0)	90.3 (89.0–91.7)	5,891	16,121	17,201	44.5%	–39.3%
Breast	1	2	2	87.0 (85.1–88.9)	72.3 (70.7–73.9)	52.3 (51.3–53.4)	8,198	7,830	9,971	–39.9%	–27.7%
Pancreas	5	5	3	26.0 (25.0–27.0)	25.0 (24.1–26.0)	26.5 (25.8–27.3)	2,449	2,716	5,052	1.9%	6.0%
Colon and rectum	2	3	4	63.1 (61.5–64.7)	40.7 (39.5–41.9)	26.0 (25.3–26.7)	5,939	4,408	4,951	–58.8%	–36.1%
Ovary	4	4	5	31.4 (30.3–32.6)	27.6 (26.6–28.6)	19.9 (19.3–20.6)	2,962	2,990	3,799	–36.6%	–27.9%
Corpus and uterus	6	7	6	17.6 (16.8–18.5)	13.3 (12.6–14.0)	18.2 (17.6–18.8)	1,658	1,444	3,460	3.4%	36.8%
Brain and other nervous system	10	9	7	11.3 (10.6–12.0)	10.4 (9.8–11.0)	10.5 (10.1–11.0)	1,065	1,128	2,006	–7.1%	1.0%
Leukaemia	10	8	8	11.3 (10.6–12.0)	12.4 (11.7–13.1)	8.6 (8.2–9.0)	1,060	1,342	1,635	–23.9%	–30.6%
Lymphoma	7	6	9	14.8 (14.1–15.6)	17.2 (16.4–18.0)	7.9 (7.5–8.3)	1,398	1,867	1,510	–46.6%	–54.1%
Liver	16	15	10	5.1 (4.6–5.5)	5.4 (5.0–5.9)	7.6 (7.2–8.0)	478	589	1,454	49.0%	40.7%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

Table S14 Mortality rate changes from 1975–2016 of the 10 leading causes of cancer death by age group (≥70 years) in the United States

All causes	Mortality rank			Age-adjusted mortality rate (95% CI)			Death count			Relative change in mortality (2016 vs. 1975)	Relative change in mortality (2016 vs. 2000)
	1975	2000	2016	1975	2000	2016	1975	2000	2016		
Male (≥70 years)											
All malignant cancers				1,591.3 (1,580.4–1,602.3)	1,719.0 (1,710.6–1,727.4)	1,305.1 (1,299.0–1,311.2)	86,605	165,628	176,712	–18.0%	–24.1%
Lung and bronchus	1	1	1	383.2 (378.1–388.4)	496.3 (491.9–500.8)	334.0 (330.9–337.1)	22,345	49,530	45,558	–12.8%	–32.7%
Prostate	2	2	2	285.0 (280.2–289.8)	290.3 (286.8–293.9)	179.9 (177.6–182.2)	14,488	26,286	24,009	–36.9%	–38.0%
Colon and rectum	3	3	3	232.3 (228.0–236.5)	180.7 (178.0–183.5)	103.6 (101.9–105.3)	12,352	17,220	14,010	–55.4%	–42.7%
Pancreas	4	4	4	86.1 (83.6–88.7)	78.5 (76.7–80.3)	84.4 (82.9–86.0)	4,742	7,675	11,487	–2.0%	7.5%
Urinary bladder	6	7	5	80.6 (78.1–83.2)	65.0 (63.3–66.6)	66.8 (65.4–68.2)	4,203	6,020	8,924	–17.1%	2.8%
Leukaemia	7	5	6	69.5 (67.2–71.9)	73.0 (71.2–74.7)	62.8 (61.5–64.2)	3,629	6,980	8,449	–9.6%	–14.0%
Lymphoma	8	6	7	41.3 (39.5–43.1)	72.0 (70.3–73.7)	54.7 (53.4–55.9)	2,279	6,938	7,365	32.4%	–24.0%
Oesophagus	9	9	8	31.9 (30.3–33.4)	43.2 (41.9–44.6)	41.4 (40.3–42.5)	1,789	4,301	5,672	29.8%	–4.2%
Liver	12	12	9	22.1 (20.8–23.4)	30.8 (29.7–31.9)	37.3 (36.3–38.3)	1,222	3,056	5,118	68.8%	21.1%
Kidney and renal pelvis	10	10	10	26.2 (24.8–27.6)	37.2 (36.0–38.5)	33.8 (32.9–34.8)	1,472	3,609	4,589	29.0%	–9.1%
Female (≥70 years)											
All malignant cancers				826.1 (820.1–832.2)	1,018.8 (1,013.8–1,023.8)	854.1 (849.9–858.3)	73,537	160,895	163,470	3.4%	–16.2%
Lung and bronchus	3	1	1	63.8 (62.2–65.5)	245.2 (242.8–247.7)	220.3 (218.2–222.5)	5,792	37,883	41,027	245.3%	–10.2%
Breast	2	2	2	123.1 (120.8–125.4)	130.3 (128.5–132.1)	103.3 (101.9–104.8)	11,007	20,660	19,953	–16.1%	–20.7%
Colon and rectum	1	3	3	171.4 (168.6–174.1)	127.7 (126.0–129.5)	75.4 (74.2–76.7)	15,109	20,583	14,945	–56.0%	–41.0%
Pancreas	4	4	4	54.0 (52.5–55.5)	66.0 (64.7–67.2)	68.1 (66.9–69.3)	4,824	10,428	12,993	26.1%	3.2%
Ovary	6	5	5	38.7 (37.4–40.0)	49.6 (48.5–50.7)	39.6 (38.7–40.5)	3,521	7,766	7,417	2.3%	–20.2%
Lymphoma	9	6	6	28.8 (27.7–29.9)	48.5 (47.5–49.6)	34.8 (34.0–35.7)	2,584	7,710	6,824	20.8%	–28.2%
Leukaemia	7	7	7	34.5 (33.3–35.7)	39.1 (38.2–40.1)	33.7 (32.9–34.5)	3,042	6,264	6,606	–2.3%	–13.8%
Corpus and uterus	8	8	8	30.7 (29.6–31.9)	25.3 (24.5–26.1)	28.4 (27.6–29.2)	2,757	3,988	5,316	–7.5%	12.3%
Myeloma	12	9	9	14.5 (13.7–15.3)	23.1 (22.3–23.8)	20.2 (19.5–20.8)	1,308	3,639	3,853	39.3%	–12.6%
Urinary bladder	10	11	10	22.5 (21.5–23.5)	18.9 (18.3–19.6)	18.3 (17.7–18.9)	1,950	3,075	3,664	–18.7%	–3.2%

Rank is based on the age-adjusted mortality rate. Age-adjusted mortality rates are per 100,000 population and age-adjusted to the 2000 United States standard population. Death count is the number of cancer deaths. CI, confidence interval.

Table S15 One-year relative survival rates for 20 leading cancers [2016] by sex in the United States, 2010–2016

Incidence rank [2016]	Cancer	One-year relative survival rates (95% CI)				NO.			
		All races	White	Black	Other	All races	White	Black	Other
Male									
	All malignant cancers	80.9% (80.8–81.1%)	81.4% (81.2–81.5%)	79.2% (78.8–79.6%)	76.0% (75.5–76.5%)	404,243	318,681	44,713	34,724
1	Prostate	99.3% (99.2–99.4%)	99.4% (99.3–99.5%)	98.9% (98.6–99.2%)	98.7% (98.2–99.1%)	116,247	87,951	17,745	7,776
2	Lung and bronchus	43.4% (42.9–43.9%)	43.1% (42.5–43.6%)	42.6% (41.1–44.0%)	46.4% (44.9–48.0%)	44,679	34,733	5,207	4,587
3	Colon and rectum	85.0% (84.6–85.4%)	84.9% (84.4–85.4%)	82.5% (81.1–83.7%)	86.9% (85.8–87.9%)	35,887	26,882	4,064	4,581
4	Urinary bladder	91.1% (90.6–91.5%)	91.5% (91.0–91.9%)	84.2% (81.7–86.4%)	88.9% (86.8–90.7%)	24,674	21,781	1,200	1,401
5	Melanoma of the skin	97.5% (97.1–97.7%)	97.4% (97.1–97.7%)	92.1%# (78.0#–97.3%#)	91.6% (86.6–94.7%)	21,934	20,853	61	243
6	Lymphoma	84.8% (84.3–85.3%)	85.5% (84.9–86.1%)	80.8% (78.8–82.5%)	80.3% (78.4–82.1%)	22,197	17,799	2,055	2,023
7	Kidney and renal pelvis	86.9% (86.3–87.4%)	87.0% (86.3–87.6%)	86.1% (84.3–87.7%)	85.9% (83.8–87.7%)	16,941	13,350	1,973	1,447
8	Leukaemia	80.4% (79.6–81.1%)	81.0% (80.2–81.8%)	79.2% (76.3–81.7%)	70.9% (68.0–73.7%)	13,558	11,211	1,030	1,064
9	Pancreas	34.4% (33.5–35.3%)	34.7% (33.6–35.7%)	32.8% (30.1–35.6%)	33.1% (30.2–36.0%)	11,392	8,915	1,287	1,145
10	Liver	50.5% (49.5–51.4%)	51.0% (49.8–52.2%)	45.1% (42.7–47.5%)	52.7% (50.4–54.9%)	11,439	7,423	1,785	2,163
11	Myeloma	82.3% (81.3–83.3%)	82.1% (80.9–83.3%)	82.8% (80.2–85.0%)	82.1% (78.4–85.2%)	6,800	4,947	1,209	581
12	Stomach	57.5% (56.3–58.7%)	56.8% (55.3–58.2%)	53.9% (50.4–57.3%)	62.4% (59.5–65.2%)	7,345	5,057	938	1,302
13	Thyroid	97.5% (97.0–98.0%)	97.8%# (97.2#–98.2%#)	95.3% (91.6–97.4%)	96.3% (94.3–97.5%)	6,475	5,315	320	736
14	Brain and other nervous system	63.0% (61.7–64.2%)	61.7% (60.4–63.0%)	70.2% (65.5–74.5%)	67.9% (63.4–71.8%)	6,817	5,766	453	531
14	Oesophagus	51.0% (49.6–52.3%)	52.3% (50.8–53.7%)	41.9% (36.9–46.8%)	43.9% (38.7–48.9%)	6,119	5,221	446	426
16	Testis	98.2% (97.8–98.5%)	98.4% (97.9–98.7%)	94.3% (89.4–96.9%)	97.3%# (95.1#–98.5%#)	5,838	5,079	190	450
17	Tongue	88.2% (87.1–89.2%)	89.1% (88.0–90.1%)	74.9% (68.8–79.9%)	87.4% (82.4–91.0%)	4,698	4,097	275	296
18	Larynx	86.0% (84.7–87.1%)	86.9% (85.5–88.1%)	81.3% (77.6–84.5%)	84.5% (78.7–88.9%)	4,264	3,360	618	248
19	Soft tissue including heart	84.9% (83.5–86.2%)	85.5% (83.9–86.9%)	81.4% (76.6–85.4%)	82.7% (78.0–86.4%)	3,285	2,511	356	373
20	Tonsil	92.7% (91.6–93.6%)	93.8% (92.7–94.7%)	82.7% (77.4–86.9%)	89.1% (82.2–93.4%)	3,319	2,860	288	154
Female									
	All malignant cancers	83.3% (83.1–83.4%)	83.5% (83.4–83.7%)	79.7% (79.3–80.1%)	83.9% (83.5–84.3%)	395,331	307,195	42,621	41,572
1	Breast	97.8% (97.7–97.9%)	98.1% (98.0–98.2%)	95.7% (95.3–96.1%)	98.2% (97.9–98.4%)	124,503	95,541	13,892	14,193
2	Lung and bronchus	51.9% (51.4–52.5%)	51.1% (50.5–51.7%)	52.2% (50.6–53.7%)	58.7% (57.0–60.4%)	41,772	33,182	4,766	3,705
3	Colon and rectum	83.5% (83.0–83.9%)	83.1% (82.5–83.6%)	82.5% (81.2–83.7%)	86.1% (84.9–87.3%)	32,815	24,431	4,209	3,855
4	Corpus and uterus	92.9% (92.5–93.2%)	94.0% (93.6–94.4%)	83.9% (82.4–85.2%)	93.1% (92.1–94.0%)	29,573	22,801	3,160	3,353
5	Thyroid	99.1%# (98.9#–99.2%#)	99.3%# (99.1#–99.4%#)	97.9%# (96.9#–98.6%#)	98.5%# (97.9#–99.0%#)	20,919	16,178	1,623	2,764
6	Melanoma of the skin	98.7% (98.4–99.0%)	98.8% (98.5–99.0%)	84.4%# (73.5%#–91.1%#)	93.5% (88.7–96.3%)	17,595	16,597	84	233
7	Lymphoma	86.0% (85.4–86.5%)	86.4% (85.8–87.0%)	85.8% (83.9–87.5%)	80.8% (78.7–82.8%)	17,620	14,033	1,693	1,664
8	Pancreas	34.0% (33.1%–34.9%)	33.9% (32.8–35.0%)	33.4% (30.8–35.9%)	34.9% (32.1–37.8%)	11,169	8,404	1,511	1,226
9	Leukaemia	77.5% (76.6–78.4%)	78.1% (77.1–79.1%)	75.7% (72.6–78.5%)	70.7% (67.2–74.0%)	9,712	7,852	914	788
9	Kidney and renal pelvis	86.9% (86.1–87.6%)	86.6% (85.7–87.4%)	87.9% (85.7–89.8%)	87.0% (84.4–89.2%)	9,596	7,374	1,245	861
11	Ovary	78.7% (77.9–79.4%)	78.6% (77.7–79.4%)	72.9% (70.0–75.6%)	84.0% (81.8–86.0%)	11,881	9,462	1,088	1,258
12	Urinary bladder	84.3% (83.4–85.2%)	85.3% (84.3–86.3%)	72.4% (68.4–76.1%)	82.4% (78.3–85.8%)	7,730	6,504	623	494
13	Cervix uteri	86.9% (86.0–87.8%)	88.2% (87.2–89.2%)	79.5% (76.5–82.2%)	86.2% (83.6–88.5%)	6,576	4,706	909	870
14	Myeloma	81.0% (79.8–82.1%)	80.1% (78.6–81.5%)	83.1% (80.7–85.3%)	81.0% (76.9–84.5%)	5,511	3,697	1,269	502
15	Stomach	58.9% (57.4–60.4%)	58.7% (56.7–60.6%)	61.0% (57.1–64.6%)	57.4% (54.1–60.6%)	4,699	2,892	756	1,006
15	Brain and other nervous system	62.1% (60.7–63.5%)	60.6% (59.1–62.1%)	69.8% (64.7–74.2%)	67.3% (62.2–71.9%)	5,252	4,399	398	398
17	Liver	51.8% (50.0–53.5%)	50.1% (47.9–52.4%)	48.5% (44.1–52.9%)	57.7% (54.1–61.1%)	3,542	2,117	559	842
18	Soft tissue including heart	84.7% (83.0–86.1%)	85.3% (83.4–87.0%)	84.6% (80.0–88.2%)	79.7% (74.2–84.1%)	2,522	1,839	358	294
19	Vulva	86.8% (85.1–88.4%)	86.3% (84.3–88.0%)	87.7% (80.6–92.4%)	91.3%# (82.9#–95.7%#)	2,088	1,791	163	113
20	Tongue	85.5% (83.6–87.3%)	85.7% (83.4–87.6%)	74.9% (64.5–82.6%)	88.8% (83.2–92.6%)	1,714	1,363	106	225
20	Small intestine	83.3% (81.4–85.0%)	84.0% (81.8–86.0%)	82.7% (77.9–86.6%)	75.8% (67.4–82.3%)	1,956	1,432	357	146

#, the relative cumulative survival increased from a prior interval and has been adjusted. Other denotes other races and ethnicities, including American Indian/AK Native, Asian/Pacific Islander. Rank is based on age-adjusted cancer incidence rate in 2016. CI, confidence interval.

Table S16 Three-year relative survival rates for 20 leading cancers [2016] by sex in the United States, 2010–2016

Incidence rank [2016]	Cancer	Three-year relative survival rates (95% CI)				NO.			
		All races	White	Black	Other	All races	White	Black	Other
Male									
	All malignant cancers	71.7% (71.6–71.9%)	72.5% (72.3–72.7%)	69.2% (68.7–69.7%)	63.5% (62.9–64.1%)	404,243	318,681	44,713	34,724
1	Prostate	98.6% (98.4–98.8%)	98.9% (98.6–99.1%)	97.3%# (96.6#–97.8%#)	95.9% (95.1–96.7%)	116,247	87,951	17,745	7,776
2	Lung and bronchus	23.1% (22.6–23.6%)	23.0% (22.4–23.5%)	21.7% (20.3–23.0%)	24.9% (23.4–26.4%)	44,679	34,733	5,207	4,587
3	Colon and rectum	72.3% (71.7–72.9%)	72.9% (72.2–73.6%)	65.4% (63.5–67.3%)	73.0% (71.3–74.5%)	35,887	26,882	4,064	4,581
4	Urinary bladder	83.4% (82.7–84.1%)	84.0% (83.2–84.7%)	73.6% (70.0–76.8%)	79.1% (76.0–81.9%)	24,674	21,781	1,200	1,401
5	Melanoma of the skin	94.4% (93.8–94.9%)	94.3% (93.7–94.8%)	68.2%# (50.3#–80.8%#)	76.3% (68.6–82.3%)	21,934	20,853	61	243
6	Lymphoma	78.7% (78.0–79.4%)	79.5% (78.7–80.2%)	74.2% (71.9–76.4%)	73.6% (71.3–75.8%)	22,197	17,799	2,055	2,023
7	Kidney and renal pelvis	79.4% (78.6–80.2%)	79.5% (78.6–80.4%)	79.5%# (77.1#–81.6%#)	75.8% (73.0–78.4%)	16,941	13,350	1,973	1,447
8	Leukaemia	71.5% (70.6–72.5%)	72.5% (71.4–73.5%)	67.0% (63.3–70.4%)	60.1% (56.7–63.4%)	13,558	11,211	1,030	1,064
9	Pancreas	14.2% (13.5–15.0%)	14.3% (13.4–15.2%)	13.1% (10.9–15.5%)	14.0% (11.6–16.5%)	11,392	8,915	1,287	1,145
10	Liver	29.3% (28.3–30.3%)	28.8% (27.5–30.0%)	25.0% (22.5–27.6%)	34.0% (31.6–36.3%)	11,439	7,423	1,785	2,163
11	Myeloma	66.6% (65.1–68.0%)	66.4% (64.6–68.1%)	66.7% (63.0–70.0%)	65.6% (60.5–70.2%)	6,800	4,947	1,209	581
12	Stomach	35.8% (34.4–37.1%)	34.9% (33.4–36.5%)	33.0% (29.4–36.7%)	39.6% (36.4–42.8%)	7,345	5,057	938	1,302
13	Thyroid	96.8%# (96.0#–97.4%#)	97.0%# (96.1#–97.7%#)	94.7%# (90.1#–97.2%#)	94.8%# (92.3#–96.6%#)	6,475	5,315	320	736
14	Brain and other nervous system	37.6% (36.3–39.0%)	36.3% (34.8–37.7%)	45.2% (39.9–50.4%)	41.2% (36.1–46.1%)	6,817	5,766	453	531
14	Oesophagus	26.8% (25.4–28.2%)	28.3% (26.8–29.8%)	14.4% (10.7–18.7%)	19.4% (14.8–24.4%)	6,119	5,221	446	426
16	Testis	97.2% (96.6–97.7%)	97.4% (96.8–97.9%)	92.0%# (86.0#–95.6%#)	96.0%# (93.4#–97.6%#)	5,838	5,079	190	450
17	Tongue	74.0% (72.4–75.6%)	75.3% (73.5–76.9%)	59.3% (52.2–65.7%)	69.3% (61.9–75.5%)	4,698	4,097	275	296
18	Larynx	71.0% (69.2–72.7%)	72.5% (70.5–74.3%)	62.2% (57.1–66.8%)	70.0% (62.3–76.4%)	4,264	3,360	618	248
19	Soft tissue including heart	71.7% (69.7–73.6%)	72.9% (70.6–75.0%)	66.3% (59.9–71.9%)	65.6%# (59.3#–71.2%#)	3,285	2,511	356	373
20	Tonsil	83.3% (81.6–84.8%)	85.0% (83.2–86.6%)	66.6%# (59.5#–72.8%#)	79.6%# (70.6#–86.1%#)	3,319	2,860	288	154
Female									
	All malignant cancers	74.2% (74.1–74.4%)	75.0% (74.8–75.2%)	67.3% (66.7–67.8%)	73.9% (73.4–74.4%)	395,331	307,195	42,621	41,572
1	Breast	94.2% (94.0–94.4%)	95.0% (94.7–95.2%)	88.5% (87.7–89.2%)	94.4% (93.9–94.9%)	124,503	95,541	13,892	14,193
2	Lung and bronchus	31.2% (30.7–31.8%)	30.9% (30.3–31.5%)	29.6% (28.1–31.2%)	35.2% (33.4–37.1%)	41,772	33,182	4,766	3,705
3	Colon and rectum	72.0% (71.3–72.6%)	72.3% (71.5–73.0%)	67.6% (65.8–69.4%)	73.2% (71.4–74.9%)	32,815	24,431	4,209	3,855
4	Corpus and uterus	85.8% (85.2–86.3%)	87.9% (87.3–88.4%)	69.2% (67.2–71.2%)	86.1% (84.6–87.4%)	29,573	22,801	3,160	3,353
5	Thyroid	99.0%# (98.8#–99.2%#)	99.2%# (99.0#–99.4%#)	97.6%# (96.2#–98.5%#)	98.0% (97.2–98.6%)	20,919	16,178	1,623	2,764
6	Melanoma of the skin	97.2% (96.7–97.7%)	97.2% (96.7–97.7%)	80.9% (66.3–89.7%)	86.6%# (79.3#–91.4%#)	17,595	16,597	84	233
7	Lymphoma	80.7% (80.0–81.5%)	81.4% (80.5–82.2%)	80.5% (78.1–82.7%)	73.2% (70.6–75.6%)	17,620	14,033	1,693	1,664
8	Pancreas	13.6% (12.8–14.4%)	13.2% (12.3–14.1%)	14.6% (12.5–16.8%)	14.9% (12.6–17.4%)	11,169	8,404	1,511	1,226
9	Leukaemia	68.0% (66.9–69.1%)	69.1% (67.9–70.4%)	63.0% (59.1–66.6%)	56.6%# (52.4#–60.5%#)	9,712	7,852	914	788
9	Kidney and renal pelvis	80.5% (79.5–81.5%)	80.1% (78.9–81.3%)	82.8% (79.9–85.3%)	78.2%# (74.7#–81.4%#)	9,596	7,374	1,245	861
11	Ovary	60.4% (59.3–61.5%)	59.9% (58.7–61.1%)	55.2% (51.6–58.7%)	67.4% (64.2–70.3%)	11,881	9,462	1,088	1,258
12	Urinary bladder	77.4% (76.1–78.6%)	78.9% (77.6–80.3%)	60.4% (55.4–65.0%)	72.6%# (67.4#–77.2%#)	7,730	6,504	623	494
13	Cervix uteri	74.3% (73.0–75.5%)	75.9% (74.4–77.4%)	63.7% (59.8–67.3%)	74.1%# (70.5#–77.3%#)	6,576	4,706	909	870
14	Myeloma	66.7% (65.1–68.3%)	66.3% (64.3–68.2%)	67.9% (64.5–71.1%)	64.0% (58.5–69.0%)	5,511	3,697	1,269	502
15	Stomach	39.2% (37.5–40.9%)	39.0% (36.9–41.1%)	44.0% (39.7–48.3%)	35.4% (31.8–38.9%)	4,699	2,892	756	1,006
15	Brain and other nervous system	40.5% (39.0–42.1%)	38.9% (37.3–40.6%)	46.2% (40.3–51.8%)	47.7%# (42.0#–53.2%#)	5,252	4,399	398	398
17	Liver	31.1% (29.3–33.0%)	29.9% (27.5–32.2%)	26.9% (22.5–31.4%)	37.0% (33.0–40.9%)	3,542	2,117	559	842
18	Soft tissue including heart	74.1% (71.9–76.1%)	74.2% (71.6–76.6%)	75.7%# (69.9#–80.5%#)	69.2%# (62.4#–75.0%#)	2,522	1,839	358	294
19	Vulva	76.9% (74.4–79.2%)	76.5%# (73.8#–79.0%#)	77.2% (67.6–84.3%)	76.9%# (65.4#–85.1%#)	2,088	1,791	163	113
20	Tongue	72.2% (69.4–74.8%)	72.7% (69.6–75.6%)	54.4%# (42.2#–65.0%#)	75.3%# (66.8#–81.9%#)	1,714	1,363	106	225
20	Small intestine	74.4% (71.9–76.7%)	75.9% (73.0–78.6%)	73.6%# (67.4#–78.8%#)	59.3% (48.9–68.2%)	1,956	1,432	357	146

#, the relative cumulative survival increased from a prior interval and has been adjusted. Other denotes other races and ethnicities, including American Indian/AK Native, Asian/Pacific Islander. Rank is based on age-adjusted cancer incidence rate in 2016. CI, confidence interval.

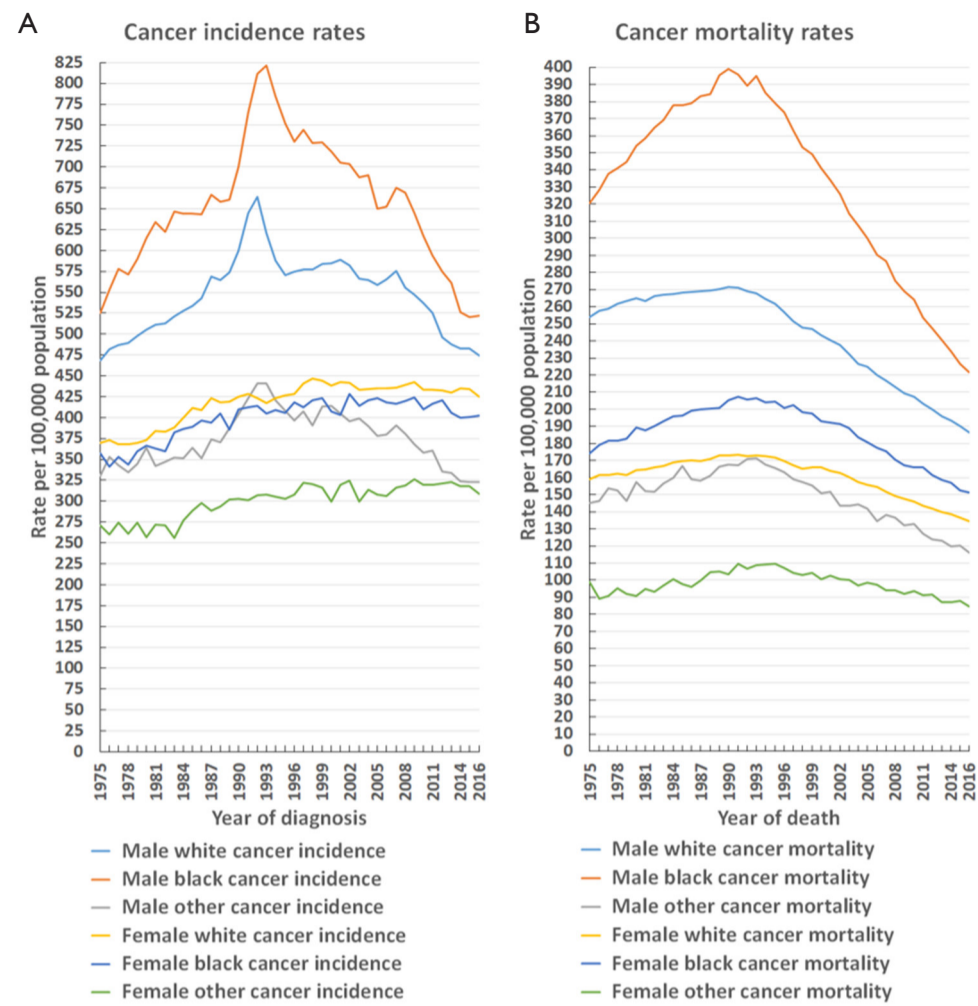


Figure S1 Trends in overall cancer incidence and mortality rates [1975–2016] by race and ethnicity, United States. Rates are age-adjusted to the 2000 United States standard population. Other denotes other races and ethnicities, including American Indian/AK Native, Asian/Pacific Islander. (A) Overall cancer incidence rates; (B) overall cancer mortality rates.

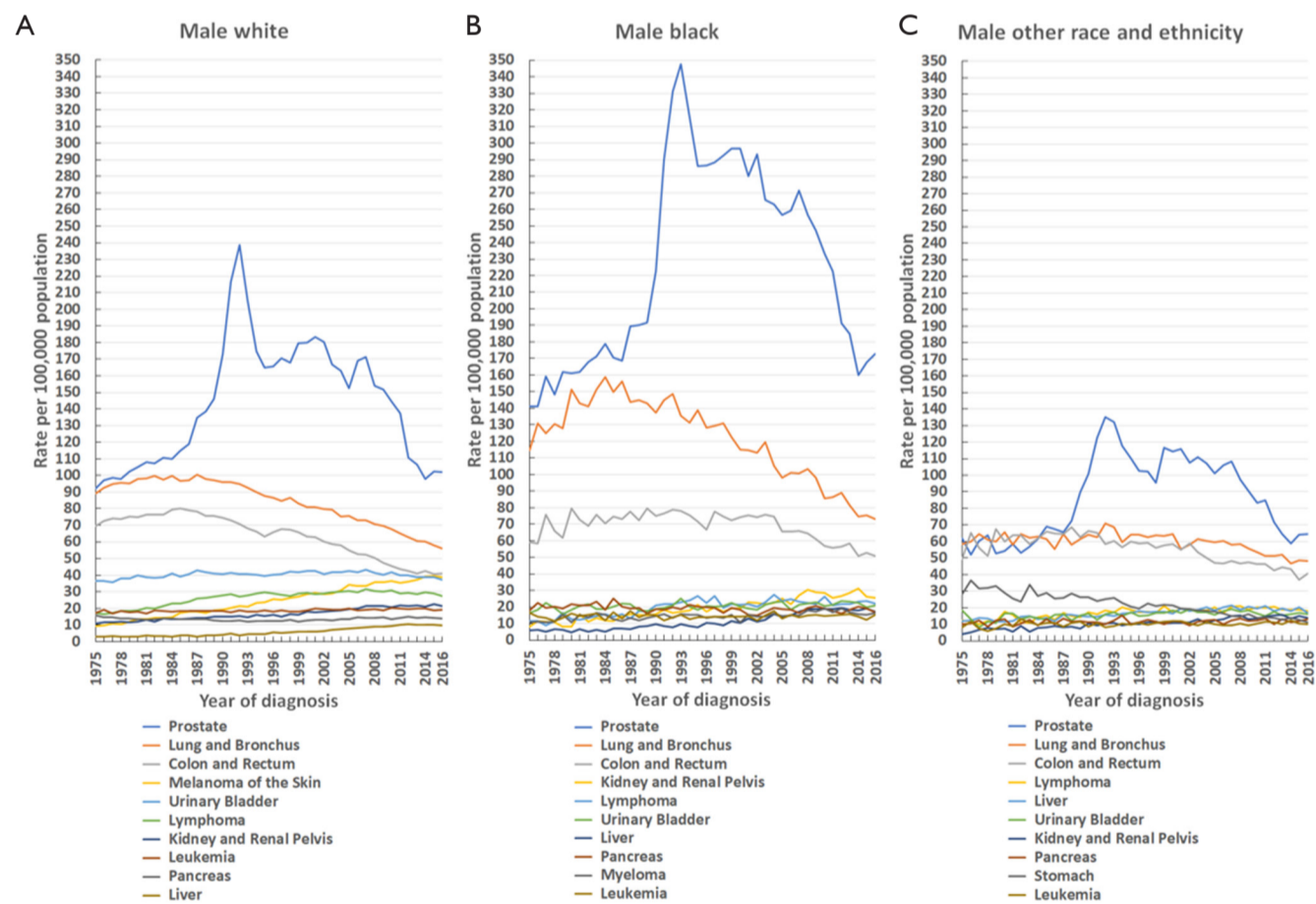


Figure S2 Trends in the incidence rate of the 10 leading cancers in males by race and ethnicity, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Male white; (B) male black; (C) male other races and ethnicities.

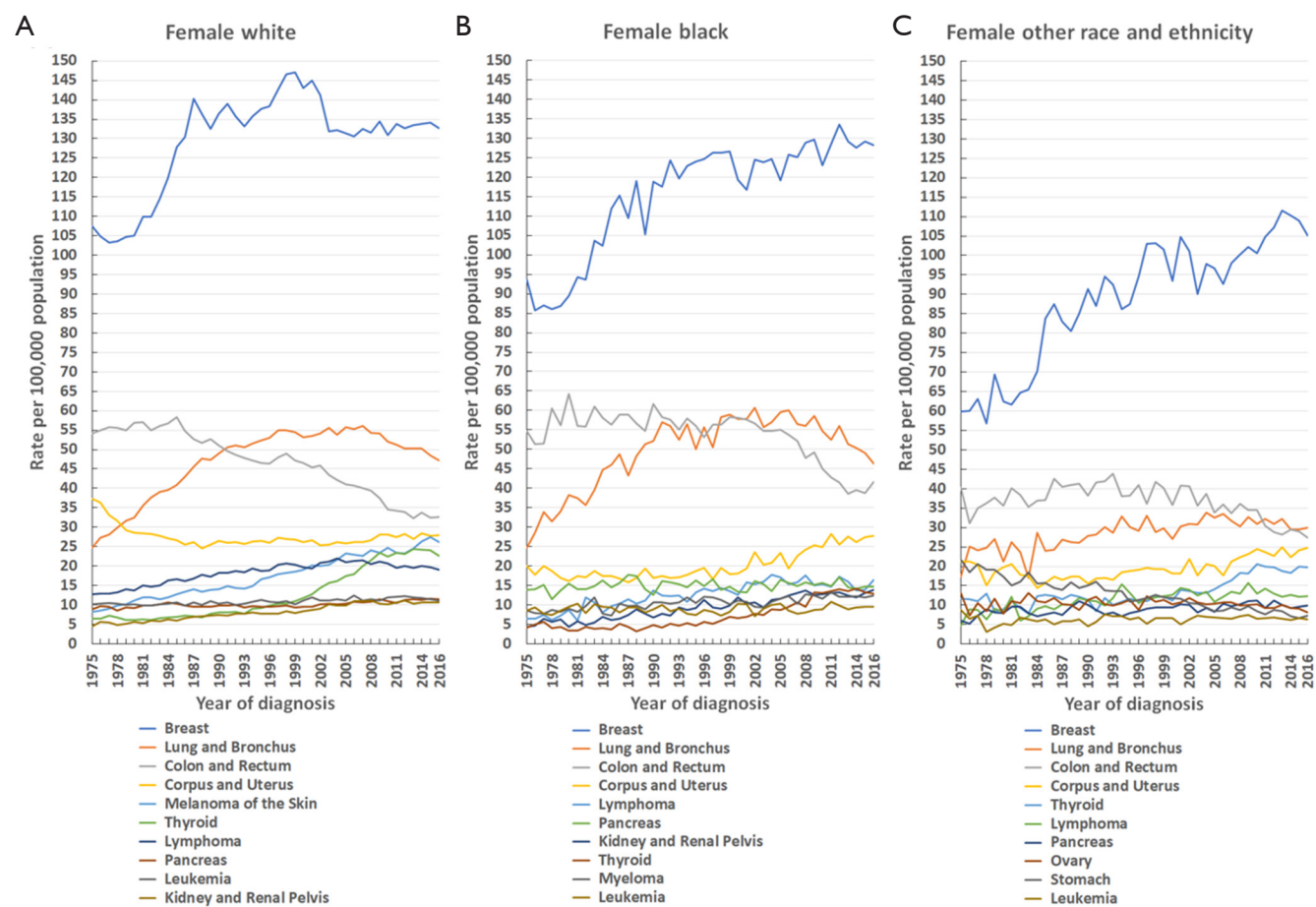


Figure S3 Trends in the incidence rate of the 10 leading cancers in females by race and ethnicity, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Female white; (B) female black; (C) female other races and ethnicities.

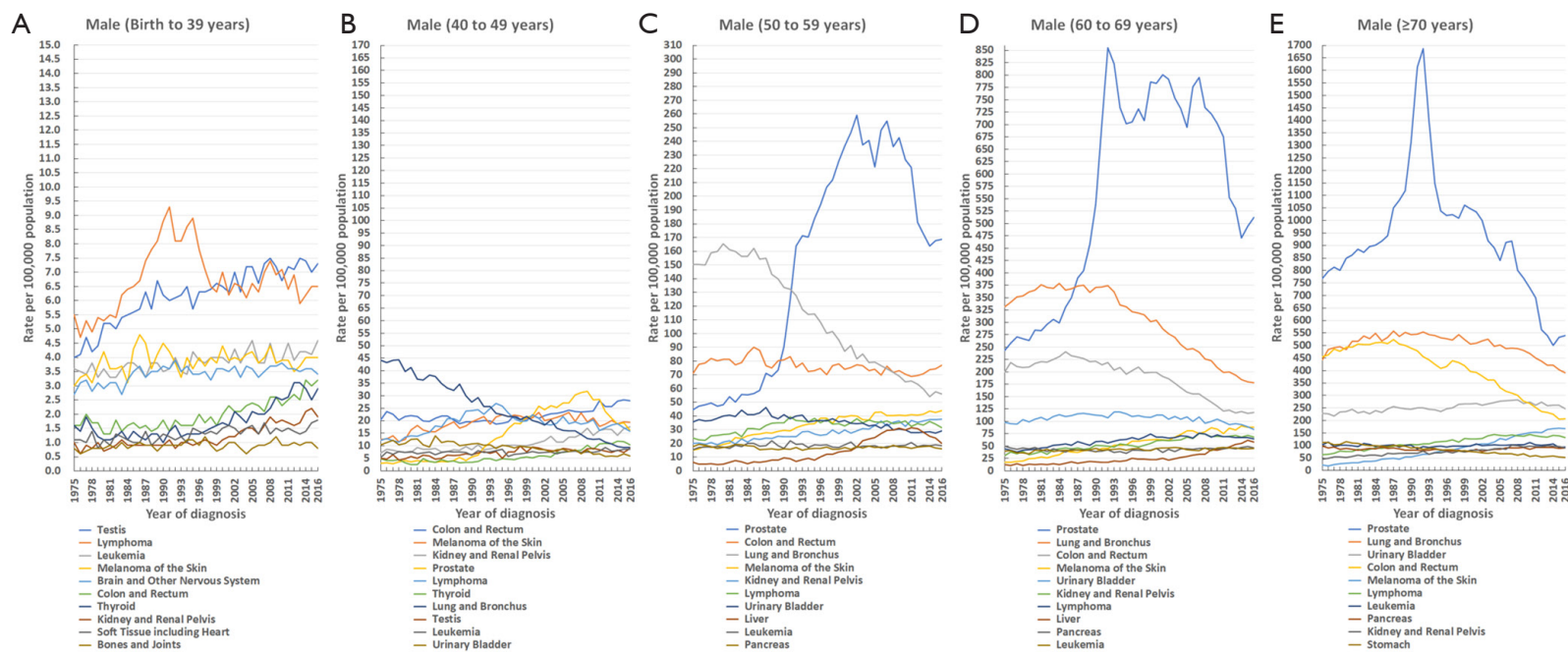


Figure S4 Trends in the incidence rate of the 10 leading cancers in males by age groups, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Birth–39 years; (B) 40–49 years; (C) 50–59 years; (D) 60–69 years; (E) ≥ 70 years.

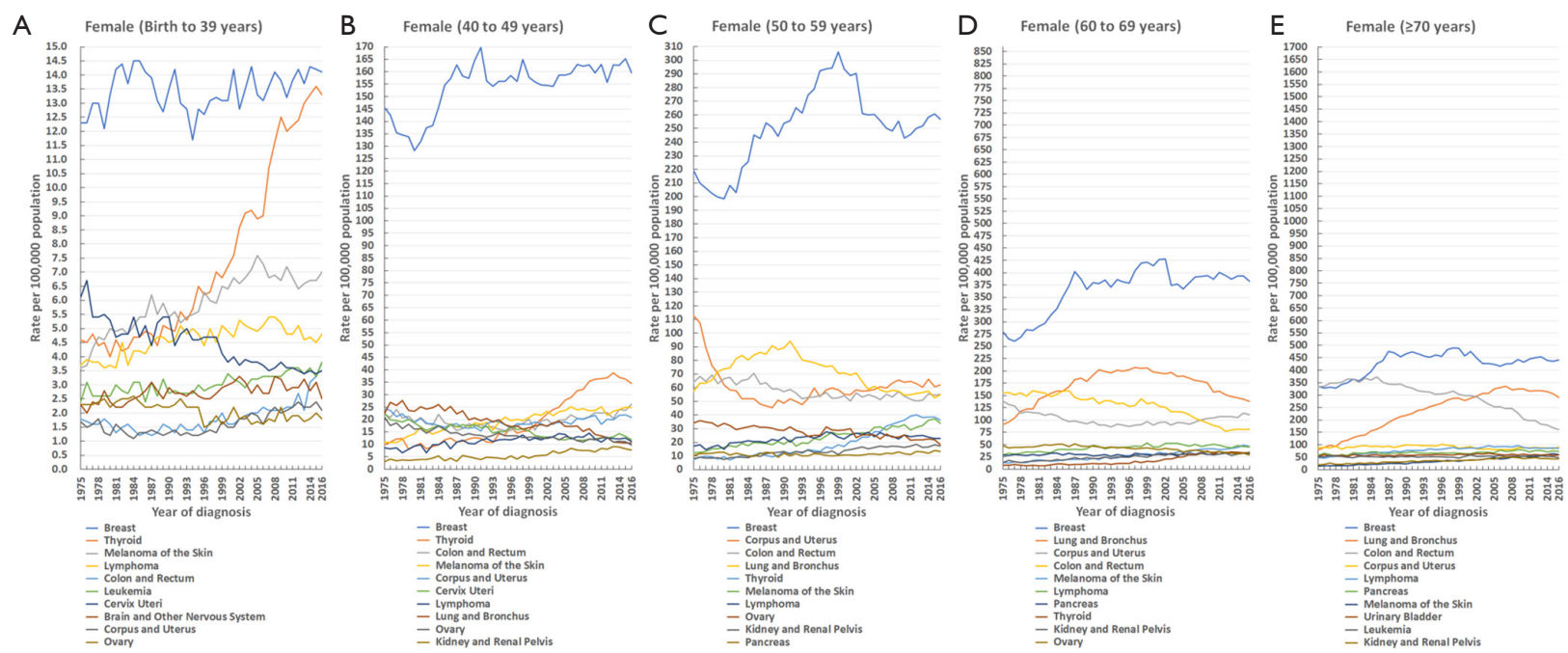


Figure S5 Trends in the incidence rate of the 10 leading cancers in females by age intervals, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Birth–39 years; (B) 40–49 years; (C) 50–59 years; (D) 60–69 years; (E) ≥70 years.

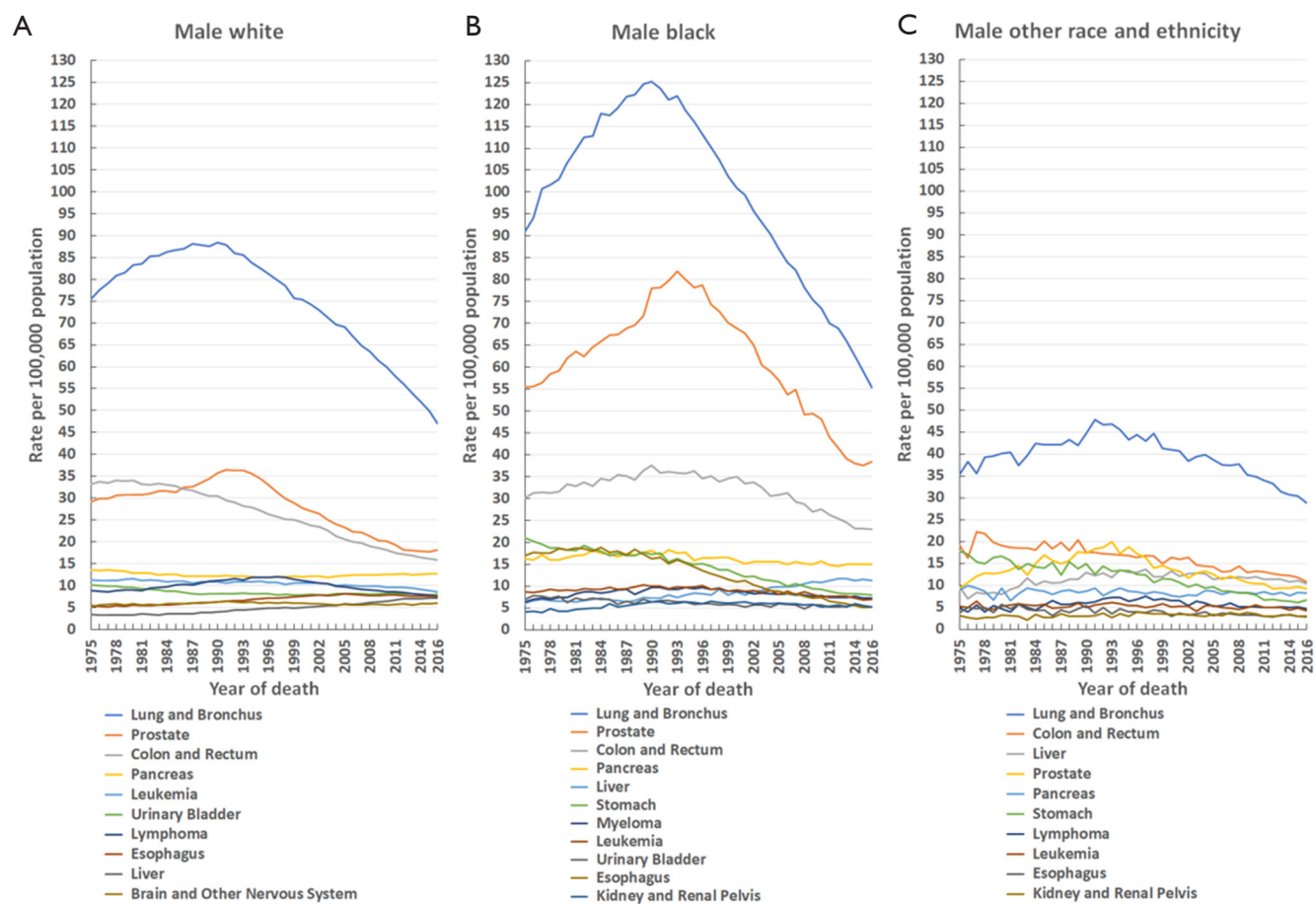


Figure S6 Trends in the mortality rate of the 10 leading causes of cancer death in males by race and ethnicity, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Male white; (B) male black; (C) male other races and ethnicities.

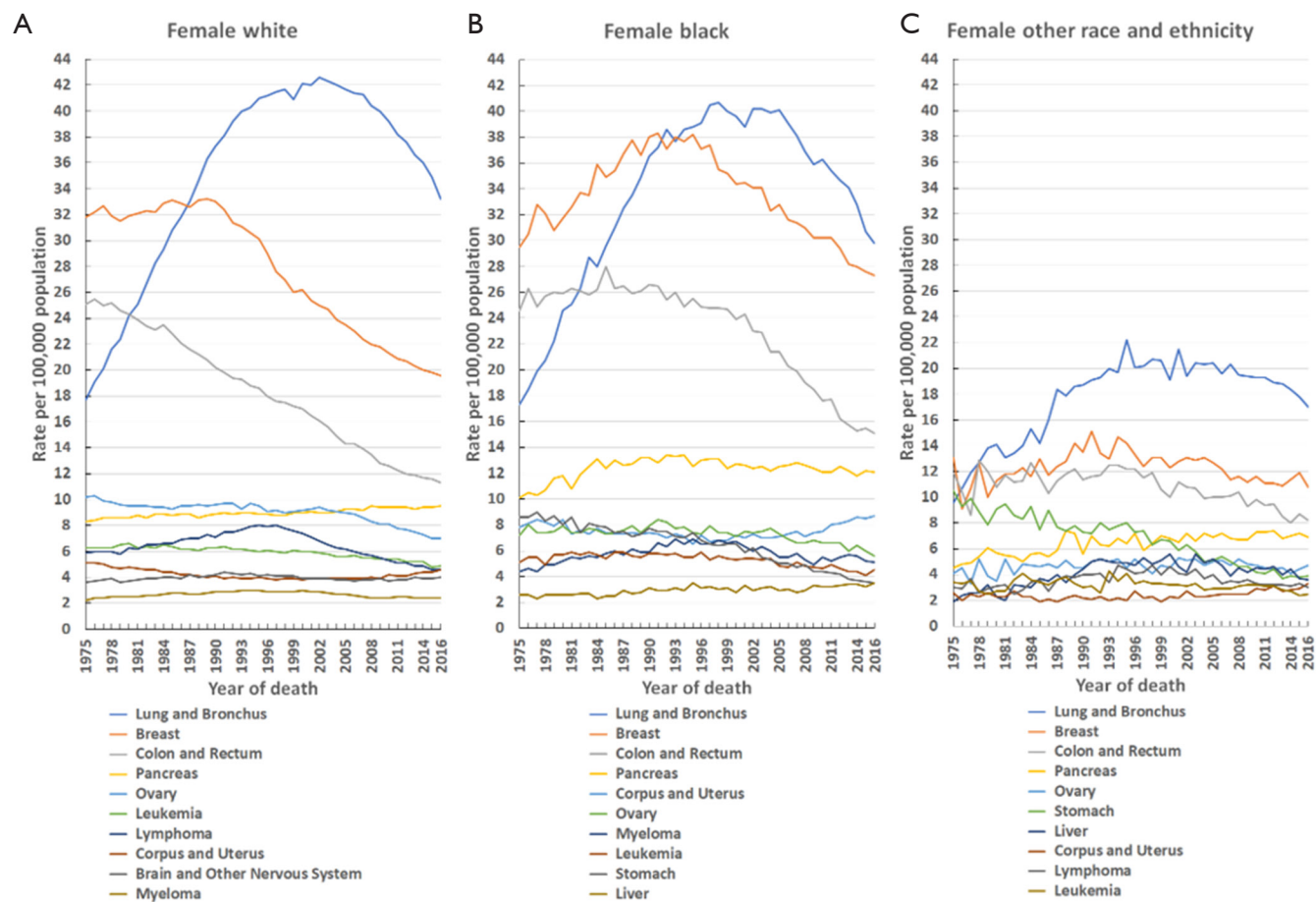


Figure S7 Trends in the mortality rate of the 10 leading causes of cancer death in females by race and ethnicity, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Female white; (B) female black; (C) female other races and ethnicities.

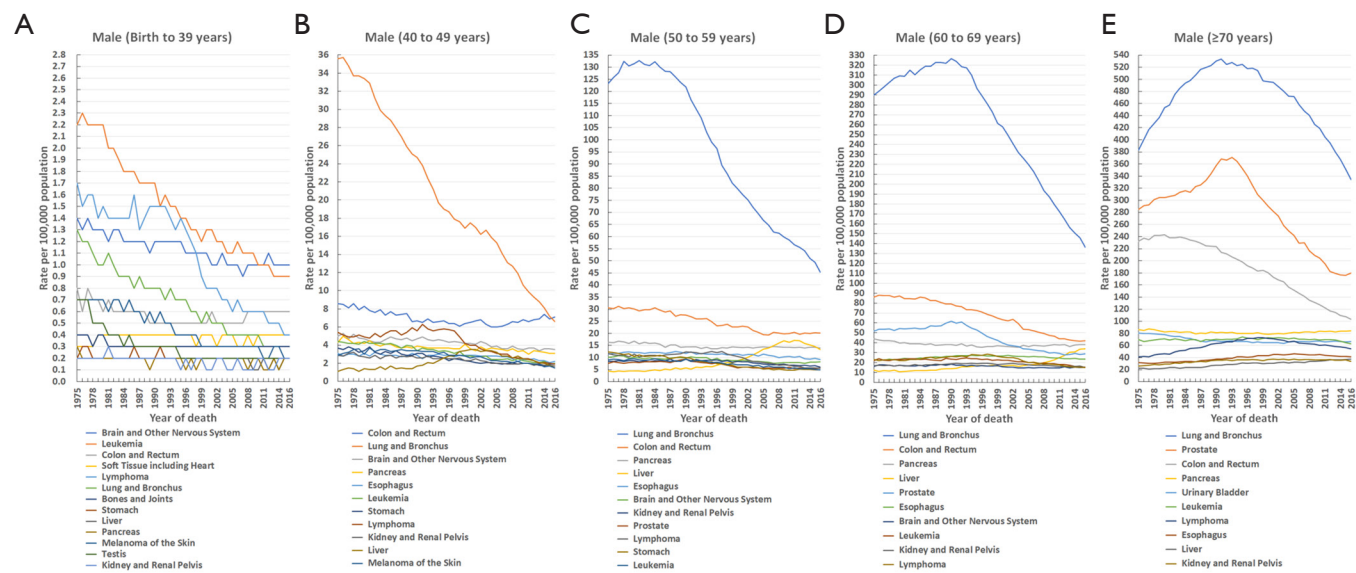


Figure S8 Trends in the mortality rate of the 10 leading causes of cancer death in males by age groups, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Birth–39 years; (B) 40–49 years; (C) 50–59 years; (D) 60–69 years; (E) ≥70 years.

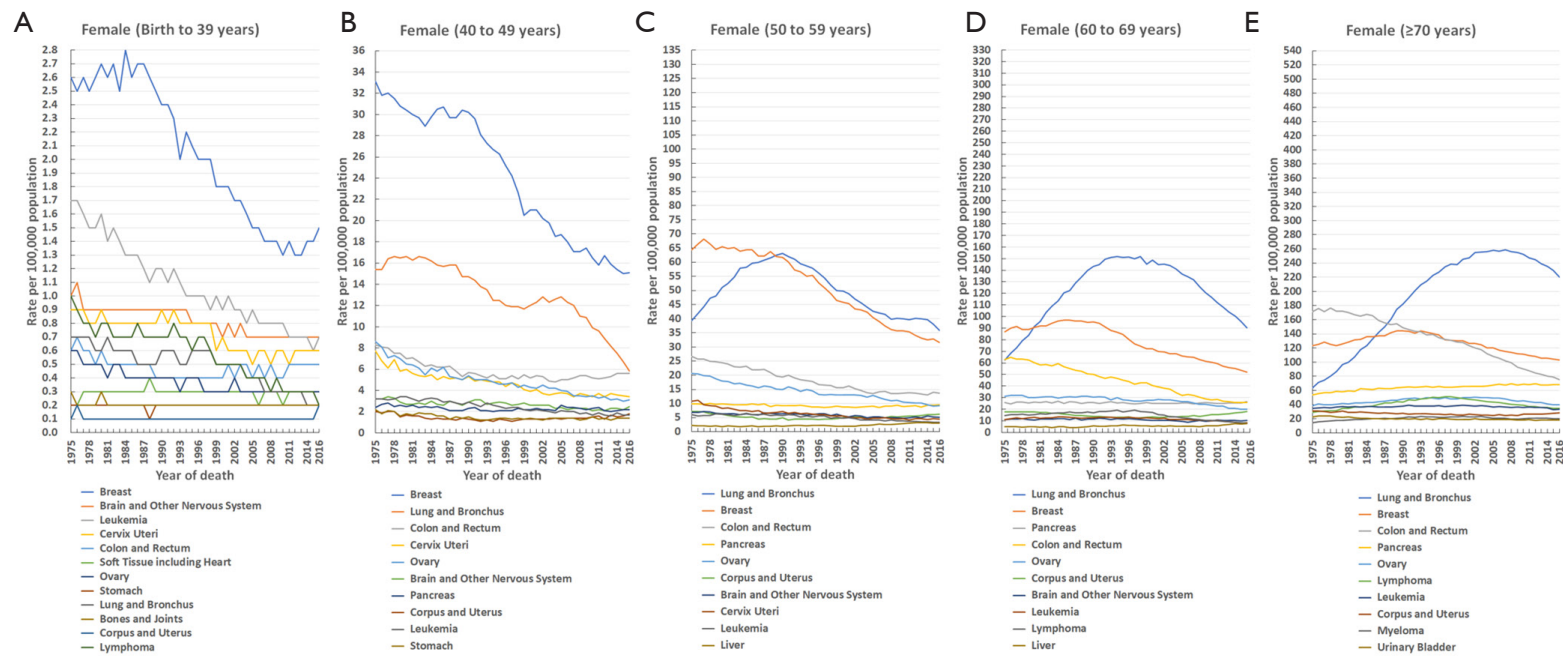


Figure S9 Trends in the mortality rate of the 10 leading causes of cancer death in females by age groups, United States, 1975–2016. Rates are age-adjusted to the 2000 United States standard population. (A) Birth–39 years; (B) 40–49 years; (C) 50–59 years; (D) 60–69 years; (E) ≥ 70 years.