LEUKEMIA & LYMPHOMA SOCIETY®

FACTS 2022-2023

UPDATED DATA ON BLOOD CANCERS

Table of Contents

PAGE FIGURES

PAGE TABLES

Executive Summary

Facts 2022-2023 is an update of data available for blood cancers (leukemia, lymphoma, myeloma, myelodysplastic syndromes and myeloproliferative neoplasms). Blood cancers are diseases that can affect the bone marrow, the blood cells, the lymph nodes and other parts of the lymphatic system.

Facts 2022-2023 provides updates from the American Cancer Society's *Cancer Facts & Figures 2023* (published online in 2023, https://www.cancer.org/research/cancer-facts-statistics.html) for estimated numbers of new blood cancer cases and estimated numbers of deaths due to blood cancers.

The incidence rates, prevalence and mortality data in *Facts 2022-2023* reflect the statistics from the National Cancer Institute's SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 March]. Available from https://seer.cancer.gov/explorer/.

Incidence rates by state and national incidence counts are calculated from the Centers for Disease Control and Prevention's U.S. Cancer Statistics Public Use Databases (https://www.cdc.gov/cancer/uscs/public-use/).

Throughout this publication, "cases" and "counts" are used interchangeably.

PLEASE CITE THIS REPORT AS: The Leukemia & Lymphoma Society. Facts 2022-2023. Updated Data on Blood Cancers. Published August 2023. Accessed [date].https://www.lls.org/booklet/facts-updated-data-blood-cancers

About Blood Cancers

Leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) and myeloproliferative neoplasms (MPNs) are types of blood cancer that can affect the bone marrow, the blood cells, the lymph nodes and other parts of the lymphatic system. These diseases may result from acquired mutations to the DNA of a single lymph- or blood-forming stem cell. With blood cancers, abnormal cells multiply and survive without the usual controls that are in place for healthy cells. The accumulation of these cells in the marrow, blood and/or lymphatic tissue interferes with production and functioning of red blood cells, white blood cells and platelets. The disease process can lead to severe anemia, bleeding, an impaired ability to fight infection and/or death.

Highlights from *Facts 2022-2023*

Prevalence

Prevalence is the estimated number of people alive on a certain date in a population who previously had a diagnosis of a specific disease (see Definitions section for additional details).

An estimated 1,629,474 people in the United States (US) are living with or in remission from leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs) (see Table 1).

Approximate US Prevalence of the Six Major Types of Blood Cancers as of January 1, 2019

Type	Prevalence
All blood cancers^*#	**1,629,474**
Myeloma^	157,561
Hodgkin Lymphoma^	159,867
Non-Hodgkin Lymphoma^	722,631
Leukemia^	437,337
Myeloproliferative Neoplasms (MPNs)*	115,125
Myelodysplastic Syndromes (MDS)*	58,835

Table 1. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/statistics-network/explorer/.

^ 27-year limited-duration prevalence.

* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.

#The prevalence of all blood cancers does not equal the sum of the six major types listed here because some people have multiple diagnoses.

New Cases

Approximately every 3 minutes, one person in the US is diagnosed with leukemia, lymphoma or myeloma.

- An estimated combined total of 184,720 people in the US are expected to be diagnosed with leukemia, lymphoma or myeloma in 2023 (see Figure 1).
- New cases of leukemia, lymphoma and myeloma are expected to account for 9.4 percent of the estimated 1,958,310 new cancer cases that will be diagnosed in the US in 2023.

Estimated New Cases (%) of Leukemia, Lymphoma and Myeloma, 2023

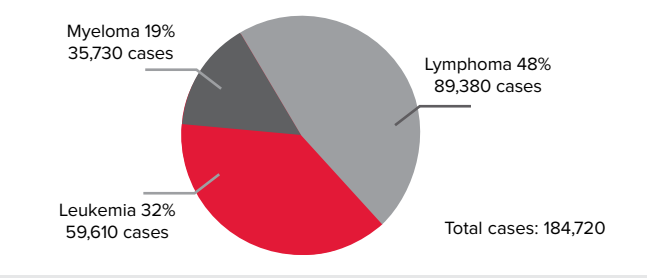

Figure 1. Source: *Cancer Facts & Figures 2023.* American Cancer Society; 2023.

Incidence

Incidence rates are the number of new cases that occur in a given year, not counting the preexisting cases. Incidence rates are usually presented as a specific number per 100,000 population. For large age groups, age-adjusted rates provide more reliable rates for comparison because they reduce the bias of age in the makeup of the populations being compared (see Definitions section for additional details).

Overall age-adjusted incidence rates per 100,000 population reported in 2022 for leukemia, lymphoma and myeloma are close to data reported in 2021: leukemia 14.1 in 2022 vs 14.3 in 2021, non-Hodgkin lymphoma (NHL) 19.0 in 2022 vs 19.6 in 2021, Hodgkin lymphoma (HL) 2.6 in 2022 and 2021 and myeloma 7.1 in 2022 and 2021.

Survival

Relative survival compares the survival rate of a person diagnosed with a disease to that of a person without the disease. The most recent survival data available may not fully represent the impact of all current therapies and, as a result, may underestimate current survival (see Definitions section for additional details). Figure 2 shows 5-year relative survival rates.

5-Year Relative Survival Rates by Year of Diagnosis

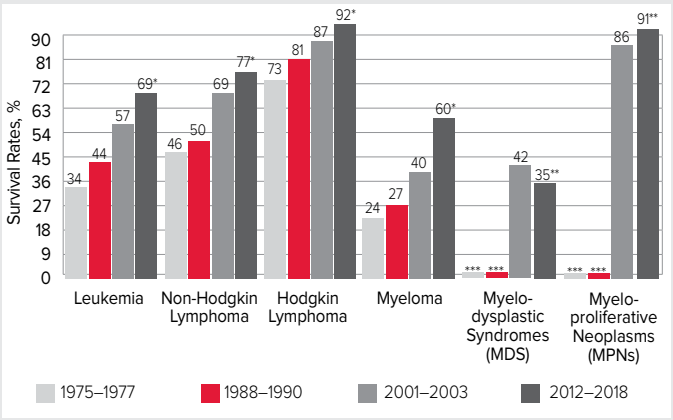

Figure 2. Source: Surveillance, Epidemiology, and End Results (SEER Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
*The difference in rates between 1975-1977 and 2012-2018 is statistically significant (P<.05).
**The difference in rates between 2001-2003 and 2012-2018 is statistically significant (P<.05).
***Due to shorter reportabliity period, long-term survival statistics are not available.

Deaths

A cancer mortality rate is the number of deaths, with cancer as the underlying cause of death, occurring in a specified population during a year. Cancer mortality is usually expressed as the number of deaths due to cancer per 100,000 population (see Definitions section for additional details).

Approximately every 9 minutes, someone in the US dies from a blood cancer.* This statistic represents approximately 157 people each day or more than six people every hour.

- Leukemia, lymphoma and myeloma are expected to cause the deaths of an estimated 57,380 people in the US in 2023.
- These diseases are expected to account for 9.4 percent of the deaths from cancer in 2023, based on the estimated total of 609,820 cancer deaths.
- Overall, the likelihood of dying from blood cancer decreased from 2000 to 2020 (the most recent data available). During this time, the mortality rate of leukemia decreased by 24.4 percent, lymphoma by 40.6 percent and myeloma by 22.2 percent.

**Data specified for "blood cancer" include leukemia, lymphoma and myeloma, and do not include myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs) due to lack of available data.*

Leukemia

- An estimated 437,337 people are living with or in remission from leukemia in the US (see Table 1).
- In 2023, 59,610 people are expected to be diagnosed with Leukemia (see Figure 1).
- In 2023, 23,710 people are expected to die from leukemia (see Table 14 on page 13).
- Approximately 35.9 percent more males than females are living with leukemia. More males than females are diagnosed with leukemia and die of leukemia.
- Leukemia is the eleventh most common cancer in the US, and the age-adjusted incidence rate increased by 17.4 percent from 1975 (12.71 per 100,000) to 2019 (14.92 per 100,000).

Hodgkin (HL) and Non-Hodgkin Lymphoma (NHL)

- An estimated 879,242 people are living with or in remission from lymphoma^ in the US.
- An estimated 159,867 people are living with or in remission from HL (see Table 1).
- An estimated 722,631 people are living with or in remission from NHL (see Table 1).
- In 2023, 89,380 new cases of lymphoma are expected to be diagnosed in the US (8,830 cases of HL; 80,550 cases of NHL) (see Figure 1).
- In 2023, 21,080 people are expected to die from lymphoma (900 from HL; 20,180 from NHL) (see Table 17 on page 17).
- NHL is the seventh most common cancer in the US, and the age-adjusted incidence rate increased by 73.7 percent from 1975 (11.02 per 100,000 population) to 2019 (19.14 per 100,000 population).

^The number of people living with or in remission from lymphoma does not equal the combined total of NHL and HL because some people have both diagnoses.

Myeloma

- An estimated 157,561 people are living with or in remission from myeloma in the US (see Table 1).
- In 2023, 35,730 people are expected to be diagnosed with Myeloma (see Figure 1).
- In 2023, approximately 12,590 people are expected to die from myeloma (see Table 20 on page 19).
- The age-adjusted incidence rate of myeloma increased by 61.1 percent from 1975 (4.76 per 100,000) to 2019 (7.67 per 100,000).
- The age-adjusted incidence rate of myeloma in non-Hispanic (NH) Black males and females (14.5 per 100,000) was 2.3 times greater than that of NH white males and females (6.4 per 100,000) from 2015 to 2019.

Distribution of Average Annual Blood Cancer Incidence Counts by Sex, 2015-2019, United States

Sex	All blood cancers	Percent	Lymphomas	Percent	NHL	Percent	Hodgkin Lymphoma	Percent	Leukemia	Percent	Myeloma	Percent	MDS	Percent	MPN	Percent
Total	189,589		80,782		72,153		8,630		52,441		27,511		15,529		13,436	
Male	105,704	55.8%	44,525	55.1%	39,762	55.1%	4,762	55.2%	30,648	58.4%	15,330	55.7%	9,036	58.2%	6,235	46.4%
Female	83,885	44.2%	36,258	44.9%	32,390	44.9%	3,867	44.8%	21,794	41.6%	12,181	44.3%	6,493	41.8%	7,201	53.6%

Table 2. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.

Myelodysplastic Syndromes (MDS)

- An estimated 58,835 people in the US are living with or in remission from MDS (see Table 1).
- An average of 15,529 new cases of MDS were diagnosed in the US each year from 2015 to 2019.
- The estimated overall age-adjusted incidence rate of MDS is 4.0 cases per 100,000 population. Non-Hispanic white males have the highest rate (6.1 per 100,000 population).

Myeloproliferative Neoplasms (MPNs)

- An estimated 115,125 people in the US are living with or in remission from MPNs (see Table 1).
- An average of 13,436 new cases of MPNs were diagnosed in the US each year from 2015 to 2019.
- The estimated overall age-adjusted incidence rate of MPNs is 3.5 cases per 100,000 population. Non-Hispanic white males have the highest rate (4.1 per 100,000 population).

Sex

An estimated 748,825 females and 880,650 males are living with or in remission from a blood cancer. Remission means the signs and symptoms of the disease have disappeared (see Definitions section for additional details).

From 2015-2019, of all blood cancer cases diagnosed, 44.2 percent were diagnosed in females and 55.8 percent in males.

More males than females are diagnosed for each blood cancer type, except for myeloproliferative neoplasms (MPNs). From 2015-2019, 53.6 percent of MPNs were diagnosed in females and 46.4 percent in males (see Table 2).

Age

- The median age at diagnosis for a blood cancer is 68. The median age at diagnosis for Hodgkin lymphoma (HL) is 39 (see Table 3).
- An average of 61,816 new cases of blood cancer among those 75 years and older were diagnosed in the US each year from 2015 to 2019 (see Table 4).
- An estimated 479,865 people in the US ages 75 years and older are living with or in remission from a blood cancer (see Table 5).

Median Age at Diagnosis for Six Major Types of Blood Cancers, 2015-2019, as of January 1, 2019

Type	Median Age at Diagnosis (in years)
All blood cancers	68
Leukemia	67
Non-Hodgkin Lymphoma	67
Hodgkin Lymphoma	39
Myeloma	69
Myelodysplastic Syndromes (MDS)	77
Myeloproliferative Neoplasms (MPNs)	66

Table 3. SEER 22, 2015-2019, Age Distribution Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Limited-Field Data, 22 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.

Average Annual Blood Cancer Incidence Counts by Age at Diagnosis, 2015-2019, United States

Age at Diagnosis	All blood cancers	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma	MDS	MPN
All Ages	**189,589**	**80,782**	72,153	8,630	**52,441**	5,404	18,446	15,716	7,148	**27,511**	**15,529**	**13,436**
Ages <15	**4,156**	**975**	623	352	**3,084**	2,440	6	438	70	^	**44**	**52**
Ages 15-39	**13,292**	**8,063**	4,152	3,910	**3,735**	1,106	132	1,316	793	**327**	**173**	**1,011**
Ages 40-64	**58,818**	**27,014**	24,397	2,617	**15,492**	1,019	5,758	4,452	2,478	**9,293**	**2,228**	**4,830**
Ages 65-74	**51,507**	**21,406**	20,416	990	**13,488**	467	5,824	4,208	1,651	**8,841**	**4,201**	**3,596**
Ages 75+	**61,816**	**23,324**	22,565	760	**16,642**	373	6,726	5,302	2,155	**9,049**	**8,882**	**3,947**
Ages <20	**5,965**	**2,048**	1,026	1,022	**3,752**	2,823	8	617	129	**4**	**62**	**102**

Table 4. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.
^ Statistic not displayed due to fewer than 16 cases in the 5 year period.

Approximate US Prevalence of Blood Cancers by Age at Prevalence, as of January 1, 2019

Age at Prevalence	**All blood cancers^#**	**Lymphomas^**	NHL^	Hodgkin Lymphoma^	**Leukemia^**	ALL^	CLL^	AML^	CML^	**Myeloma^**	**MDS***	**MPN***
All Ages	**1,629,474**	**879,242**	722,631	159,867	**437,337**	81,689	197,060	61,092	60,021	**157,561**	**58,835**	**115,125**
Ages <15	**32,233**	**4,920**	3,772	1,148	**26,880**	22,615	43	2,869	482	**-**	**249**	**193**
Ages 15-39	**170,337**	**93,818**	41,291	52,863	**68,932**	46,535	533	12,106	6,810	**1,400**	**1,236**	**5,566**
Ages 40-64	**521,672**	**313,911**	237,058	78,246	**115,302**	9,114	41,229	24,681	26,059	**49,995**	**9,190**	**37,240**
Ages 65-74	**425,368**	**223,356**	206,933	17,312	**106,039**	2,397	66,445	13,108	13,938	**54,549**	**15,265**	**32,285**
Ages 75+	**479,865**	**243,237**	233,578	10,299	**120,184**	1,027	88,810	8,328	12,733	**51,614**	**32,895**	**39,841**
Ages <20	**54,817**	**11,756**	7,406	4,365	**42,211**	35,416	61	4,467	948	**23**	**435**	**448**
Ages 20-39	**147,753**	**86,982**	37,657	49,645	**53,601**	33,734	515	10,508	6,344	**1,380**	**1,050**	**5,311**

Table 5. Source: US 2019 cancer prevalence estimates are based on 2019 cancer prevalence proportions from the SEER 12 Areas and 1/1/2019 US population estimates based on the average of 2018 and 2019 population estimates from the US Bureau of the Census. The Alaska Native Tumor Registry only includes cases diagnosed among Alaska Natives and is excluded from the analysis to avoid bias in the underlying calculations.
Methodology: Prevalence was calculated using the first invasive tumor for each cancer site diagnosed during the previous 27 years (1992-2018).
^ 27-year limited-duration prevalence.
# Prevalence counts for all blood cancers combined only includes 18-years of incidence for MDS and MPN due to fewer years of reportability for these cancers.
* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.
- Estimates based on less than 16 cases are suppressed and not shown.
Note: Due to rounding, the total for all ages may not equal the sum of the age groups.

Childhood Cancers

- An estimated 32,233 children (less than 15 years old) in the US are living with or in remission from leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs) (see Table 5).
- Leukemia is the most common cancer diagnosed in children and accounts for 30.1% percent of all cancer cases in this age-group.
- Acute lymphoblastic leukemia (ALL) is the most common type of leukemia in this age-group.

From 2015 to 2019, the most recent 5 years for which data are available, leukemia and lymphoma accounted for 39.2% of all cancer types in children.

Leukemia is the second leading cause of cancer deaths (after cancers of the brain and other nervous tissue) among children. This accounts for 25.0% of all cancer-related deaths among this age-group.

See Table 6.

Approximate US Prevalence of the Six Major Types of Blood Cancers in Children Younger than 15 years, as of January 1, 2019

Type	Prevalence
Myeloma^	**-**
Hodgkin Lymphoma^	**1,148**
Non-Hodgkin Lymphoma^	**3,772**
Leukemia^	**26,880**
Myeloproliferative Neoplasms (MPNs)*	**193**
Myelodysplastic Syndromes (MDS)*	**249**

Table 6. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/explorer/.
^ 27-year limited-duration prevalence.
* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.
- Estimates based on less than 16 cases are suppressed and not shown.

Childhood and Adolescent Blood Cancers

- An estimated 54,817 children and adolescents younger than 20 years in the US are living with or in remission from leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs) (see Table 5).
- Leukemia is the most common cancer diagnosed in children and adolescents younger than 20 years and accounts for 25.1 percent of all cancer cases in this age-group.
- From 2015 to 2019, the most recent 5 years for which data are available, leukemia and lymphoma accounted for 37.9 percent of all cancer types in children and adolescents younger than 20 years.

- The most common types of cancer in children and adolescents younger than 20 years are leukemia (25.1 percent), cancers of the brain and other nervous tissue (16.4 percent), non-Hodgkin lymphoma (NHL) (6.7 percent), Hodgkin lymphoma (HL) (6.2 percent), and thyroid cancer (6.2 percent).
- The age-adjusted incidence rate of leukemia and lymphoma in children and adolescents younger than 20 years is 7.4 per 100,000 (leukemia, 4.9 and lymphoma, 2.5).
- Leukemia is the second leading cause of cancer deaths (after cancers of the brain and other nervous tissue) among children and adolescents younger than 20 years. This accounts for 22.7 percent of all cancer-related deaths among this age-group.
- From 2015-2019, 4.9 percent of all leukemia and lymphoma cases were diagnosed in children and adolescents younger than 20 years.
- From 2015-2019, 3.5 percent of all blood cancers (leukemia, lymphoma, myeloma, MDS and MPNs*) were diagnosed in children and adolescents younger than 20 years.

See Table 7 below.

** Myeloma, MDS and MPNs are not commonly diagnosed in children and adolescents younger than 20 years.*

Approximate US Prevalence of the Six Major Types of Blood Cancers in Children and Adolescents Younger than 20 years as of January 1, 2019

Type	Prevalence
Myeloma^	23
Hodgkin Lymphoma^	4,365
Non-Hodgkin Lymphoma^	7,406
Leukemia^	42,211
Myeloproliferative Neoplasms (MPNs)*	448
Myelodysplastic Syndromes (MDS)*	435

Table 7. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/explorer/.
^ 27-year limited-duration prevalence.
* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.

Adolescent and Young Adult Blood Cancers

- An estimated 170,337 adolescents and young adults (ages 15-39 years*) in the US are living with or in remission from leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs^) (see Table 5 and Table 8).
- Approximately 10 percent of all people living with blood cancers in the US are ages 15-39 years.
- From 2015-2019, 7.6 percent of all blood cancers (leukemia, lymphoma, myeloma, MDS and MPNs^) were diagnosed in adolescents and young adults ages 15-39 years.
- Lymphoma is the most common blood cancer diagnosed in adolescents and young adults ages 15-39 years and accounts for 60.4 percent of all blood cancer cases in this age-group.
- In adolescents and young adults ages 15-39 years, lymphoma (Hodgkin and non-Hodgkin lymphoma combined) is the fourth most frequently occurring type of cancer in all races and ethnicities.
  - Non-Hodgkin lymphoma (NHL) is eighth most frequently occurring
  - Hodgkin Lymphoma (HL) is tenth most frequently occurring
- In adolescents and young adults ages 15-39 years, leukemia is the ninth most frequently occurring type of cancer in all races and ethnicities.
- From 2015 to 2019, the most recent 5 years for which data are available, leukemia and lymphoma accounted for 14.4 percent of all cancer types in adolescents and young adults ages 15-39 years.
  - Lymphoma accounted for 9.7 percent of all cancer cases in adolescents and young adults ages 15-39 years (NHL, 5.2 percent; HL, 4.5 percent).
  - Leukemia accounted for 4.7 percent of all cancer cases in adolescents and young adults ages 15-39 years.
- Leukemia is the fourth leading cause of cancer deaths among adolescents and young adults ages 15-39 years. This accounts for 10.3 percent of all cancer-related deaths among this age-group.
- NHL is the ninth leading cause of cancer deaths among adolescents and young adults ages 15-39 years. This accounts for 3.4 percent of all cancer-related deaths among this age-group.

**The reporting of adolescent and young adult cancer in this publication includes ages 15 through 39 years, in keeping with other major reporting sources. This grouping intentionally overlaps with the reporting of childhood cancers for ages under 20 years, accounting for a transitional phase between childhood and adult cancer*

^ Myeloma, MDS and MPNs are not commonly diagnosed in adolescents and young adults ages 15-39 years.

Approximate US Prevalence of the Six Major Types of Blood Cancers in Adolescents and Young Adults Ages 15-39 years as of January 1, 2019

Type	Prevalence
Myeloma^	1,400
Hodgkin Lymphoma^	52,863
Non-Hodgkin Lymphoma^	41,291
Leukemia^	68,932
Myeloproliferative Neoplasms (MPNs)*	5,566
Myelodysplastic Syndromes (MDS)*	1,236

Table 8. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/explorer/.
^ 27-year limited-duration prevalence.
* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.

Young Adult Blood Cancers

- An estimated 147,753 young adults (ages 20-39 years*) in the US are living with or in remission from leukemia, lymphoma, myeloma, myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs^) (see Table 5).
- Approximately 9.1 percent of all people living with blood cancers in the US are ages 20-39 years.
- From 2015-2019, 6.6 percent of all blood cancers (leukemia, lymphoma, myeloma, MDS and MPNs) were diagnosed in young adults ages 20-39 years.
- Lymphoma is the most common blood cancer diagnosed in young adults ages 20-39 years and account for 60.8 percent of all blood cancer cases in this age-group.
- In young adults ages 20-39 years, lymphoma (Hodgkin and non-Hodgkin lymphoma combined) is the fifth most frequently occurring type of cancer in all races and ethnicities.
    - Non-Hodgkin lymphoma (NHL) is eighth most frequently occurring
    - Hodgkin lymphoma (HL) is tenth most frequently occurring
- In young adults ages 20-39 years, leukemia is the ninth most frequently occurring type of cancer in all races and ethnicities.
- From 2015 to 2019, the most recent 5 years for which data are available, leukemia and lymphoma accounted for 13.0 percent of all cancer types in adolescents and young adults ages 20-39 years.
    - Lymphoma accounted for 9.0 percent of all cancer cases in young adults ages 20-39 years (NHL, 5.1 percent; HL, 3.9 percent).
    - Leukemia accounted for 4.0 percent of all cancer cases in young adults ages 20-39 years.
- Leukemia is the fifth leading cause of cancer deaths among young adults ages 20-39 years. This accounts for 9.0 percent of all cancer-related deaths among this age-group.
- NHL is the tenth leading cause of cancer deaths among young adults ages 20-39 years. This accounts for 3.9 percent of all cancer-related deaths among this age-group.

See Table 9.

**The reporting of adolescent and young adult cancer in this publication includes ages 15 through 39 years, in keeping with other major reporting sources. This grouping intentionally overlaps with the reporting of childhood cancers for ages under 20 years, accounting for a transitional phase between childhood and adult cancer.*

^Myeloma, MDS and MPNs are not commonly diagnosed in adolescents and young adults ages 15-39 years.

Approximate US Prevalence of the Six Major Types of Blood Cancers in Young Adults Ages 20-39 as of January 1, 2019

Type	Prevalence
Myeloma^	**1,380**
Hodgkin Lymphoma^	**49,645**
Non-Hodgkin Lymphoma^	**37,657**
Leukemia^	**53,601**
Myeloproliferative Neoplasms (MPNs)*	**5,311**
Myelodysplastic Syndromes (MDS)*	**1,050**

Table 9. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/explorer/.
^ 27-year limited-duration prevalence.
* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.

Race and Ethnicity

- An estimated 1,275,495 non-Hispanic (NH) whites; 155,979 NH Blacks; 150,160 Hispanics; 49,844 NH Asian/Pacific Islanders and 4,836 NH American Indians/Alaska Natives are living with or in remission from blood cancers (see Table 28).
- From 2015-2019, of all blood cancer cases diagnosed, 75.0 percent were diagnosed in NH whites, 10.2 percent in NH Blacks, 9.7 percent in Hispanics, 3.1 percent in NH Asian/Pacific Islanders, and 0.5 percent in NH American Indians/Alaska Natives (see Table 30).
- The age-adjusted incidence rates of all blood cancers combined are higher in NH whites than any other race or ethnicity. The age-adjusted incidence rate of myeloma is highest in NH Blacks (14.5 per 100,000), and was 127 percent greater than that of NH whites (6.4 per 100,000) as shown in Table 29.
- From 2016-2020, of all deaths attributed to blood cancers, 78.2 percent were in NH whites, 10.4 percent in NH Blacks, 7.8 percent in Hispanics, 2.9 percent in NH Asian/Pacific Islanders, and 0.3 percent in NH American Indians/Alaska Natives (see Table 33).
- From 2012-2018 5-year relative survival rates for blood cancers were as follows: 68.9 percent in NH whites, 67.6 percent in Hispanics, 66.4 percent in NH Blacks, 63.6 percent in NH American Indians/Alaska Natives, and 63.3 percent in NH Asian/Pacific Islanders (see Table 31).

See Tables 28-33 on pages 23-25.

Leukemia

"Leukemia" is the umbrella term used to describe the four major types of leukemia* (see Table 10). Visit www.LLS.org/booklets to download or order copies of free booklets about leukemia.

** There are other rare subtypes of leukemia, beyond the four main subtypes, which comprise "Other Leukemia."*

The Four Major Types of Leukemia
Acute Lymphoblastic Leukemia (ALL)
Acute Myeloid Leukemia (AML)
Chronic Lymphocytic Leukemia (CLL)
Chronic Myeloid Leukemia (CML)

Table 10. Source: The Leukemia & Lymphoma Society.

The terms "myeloid" or "myelogenous" and "lymphoid," "lymphocytic" or "lymphoblastic" denote the cell types involved. In general, leukemia is characterized by the uncontrolled accumulation of blood cells. However, the natural history of each type, and the therapies used to treat people with each type, are different.

Prevalence

An estimated 437,337 people in the United States (US) are living with or in remission from leukemia (see Table 11). Thirty-six percent more males than females are living with leukemia.

Approximate US Prevalence of the Four Major Types of Leukemia as of January 1, 2019

Type	Prevalence
Leukemia - All Types	**437,337**
Acute Lymphoblastic Leukemia (ALL)	81,689
Chronic Lymphocytic Leukemia (CLL)	197,060
Acute Myeloid Leukemia (AML)	61,092
Chronic Myeloid Leukemia (CML)	60,021

Table 11. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 13]. Available from https://seer.cancer.gov/explorer/.
27-year limited-duration prevalence.

Acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) are diseases that progress rapidly without treatment. They result in the accumulation of immature, nonfunctional cells in the bone marrow and blood. The marrow often stops producing enough normal platelets, red blood cells and white blood cells. Anemia (a deficiency of red blood cells) develops in virtually everybody who has acute leukemia. The lack of normal white blood cells impairs the body's ability to fight infections. A shortage of platelets results in bruising and easy bleeding.

The progression of chronic lymphocytic leukemia (CLL) and chronic myeloid leukemia (CML) is usually slower than that of acute types of leukemia. The slower disease progression of chronic leukemia allows greater numbers of more mature, functional cells to be made.

New Cases

An estimated 59,610 new cases of leukemia are expected to be diagnosed in the US in 2023 (see Figure 3 and Table 12 below). Chronic leukemia is expected to account for 2.8 percent more cases than those of acute leukemia.

- Most cases of leukemia occur in older adults; the median age at diagnosis is 67 years.
- From 2015 to 2019, approximately 13 times as many adults over age 19 years (an average of 48,689 each year) were diagnosed with leukemia as children and adolescents younger than 20 years (an average of 3,752 each year).
- The most common types of leukemia in adults older than 19 years are CLL (37.9% of all new leukemia cases from 2015 to 2019) and AML (31.0% of all new leukemia cases from 2015 to 2019). CML accounted for 14.4 percent of new leukemia cases and ALL accounted for 5.3 percent of new leukemia cases in this age-group from 2015 to 2019.
- Most cases of CML occur in adults. From 2015 to 2019, approximately 98.2 percent of all cases of CML occurred in adults age 20 years and older.

Estimated Proportion of New Cases (%) in 2023 for Types of Leukemia, Adults and Children

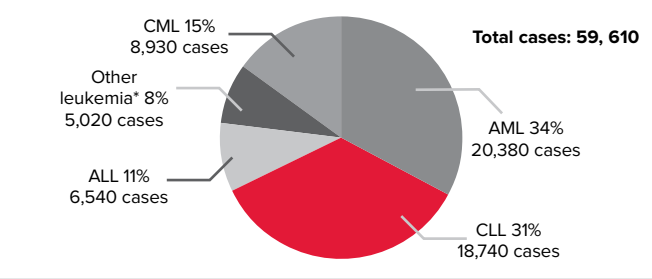

Figure 3. Source: Cancer Facts & Figures, 2023. American Cancer Society; 2023.

Estimated New Cases of Leukemia, by Sex, 2023

Type	Total	Male	Female
Acute Lymphoblastic Leukemia (ALL)	6,540	3,660	2,880
Chronic Lymphocytic Leukemia (CLL)	18,740	12,130	6,610
Acute Myeloid Leukemia (AML)	20,380	11,410	8,970
Chronic Myeloid Leukemia (CML)	8,930	5,190	3,740
Other Leukemia	5,020	3,280	1,740
Total	**59,610**	**35,670**	**23,940**

Table 12. Source: Cancer Facts & Figures 2023. American Cancer Society; 2023.

Incidence

Since 1975, the incidence of leukemia has increased slightly. In 1975 the incidence rate was 12.7 per 100,000 population and in 2019, it was 14.9 per 100,000 population. See Figure 4 for age-specific rates.

Sex. In 2015-2019, 58.4 percent of the new cases of leukemia occurred in males. Incidence rates for all types of leukemia are higher among males than among females:

- ALL – 2.1 per 100,000 for males, 1.6 per 100,000 for females
- AML – 5.1 per 100,000 for males, 3.4 per 100,000 for females
- CLL – 6.4 per 100,000 for males, 3.4 per 100,000 for females
- CML – 2.5 per 100,000 for males; 1.5 per 100,000 for females.

Race and Ethnicity. Leukemia is the eleventh most frequently occurring type of cancer in all races and ethnicities.

- Age-adjusted incidence of leukemia is highest among non-Hispanic (NH) whites (15.4 per 100,000 population); it is lowest among NH Asian and Pacific Islander populations (8.2 per 100,000 population).
- Leukemia is the eleventh most common cancer in NH whites, NH Blacks and Hispanics; twelfth most common cancer in NH American Indian and Alaska Natives and fifteenth most common cancer in NH Asian and Pacific Islanders.
- In children and adolescents younger than 20 years, leukemia incidence rates are highest among Hispanics (6.1 per 100,000 population) and lowest among NH Blacks (3.0 per 100,000 population). The incidence rate in NH whites is 4.4 per 100,000 population.

Children and Adolescents. From 2015 to 2019, leukemia represented 25.1 percent of all types of cancer occurring among children and adolescents younger than 20 years.

- In 2023, about 2,775 children and adolescents younger than 15 years are expected to be diagnosed with leukemia throughout the US.
- About 30.1 percent of cancer cases in children and adolescents younger than 15 years are leukemia.
- An average of 3,752 children and adolescents younger than 20 years were diagnosed with leukemia each year (including 2,823 diagnosed with ALL) in the US from 2015 to 2019.
- ALL is the most common cancer in children and adolescents younger than 20 years, accounting for 19.0 percent of all cancer cases in this age-group.
- ALL is also the most common type of leukemia in children and adolescents younger than 20 years, accounting for 75.5 percent of all types of new leukemia cases in this age-group from 2015 to 2019.
- From 1975 to 2019, incidence rates increased in children and adolescents younger than 20 years for ALL (2.3 in 1975 vs 3.2 in 2019).
- The highest incidence rates for ALL are seen in children and adolescents younger than 15 years. See Figure 5 on page 10. Within this group, the highest rate is in children ages 1–4 years (7.8 per 100,000 population).
- The incidence of ALL in children ages 1–4 years (7.8 per 100,000 population) is approximately 10 times greater than the rate for young adults ages 30–34 years (0.8 per 100,000 population).
- In children and adolescents younger than 20 years, AML incidence is highest in children under 1 year (1.7 per 100,000 population) and lowest in children ages 5–9 years (0.4 per 100,000 population). See Figure 6 on page 10.
- From 2015 to 2019, among children ages 5–9 years, ALL incidence was nine times greater than that of AML (3.7 per 100,000 for ALL and 0.4 per 100,000 for AML).
- In young adults ages 25–29 years, AML incidence was 37.5 percent greater than that of ALL (1.1 per 100,000 for AML and 0.8 per 100,000 for ALL).

Adults. AML, CLL and CML are most prevalent in the sixth through ninth decades of life. Incidence rates begin to increase notably among people with:

- AML – at age 55 years and older (see Figure 6 on page 10)
- CLL – at age 50 years and older (see Figure 7 on page 11)
- CML – at age 60 years and older (see Figure 8 on page 11).

Age-Specific Incidence Rates for Leukemia, 2015-2019

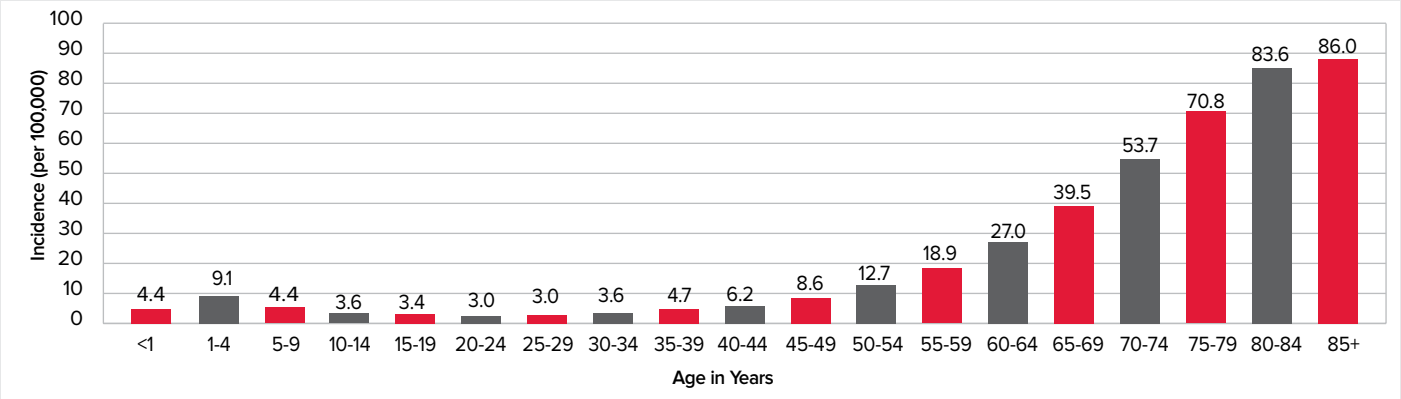

Figure 4. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 18]. Available from https://seer.cancer.gov/explorer/.

Age-Specific Incidence Rates for Acute Lymphoblastic Leukemia (ALL), 2015-2019

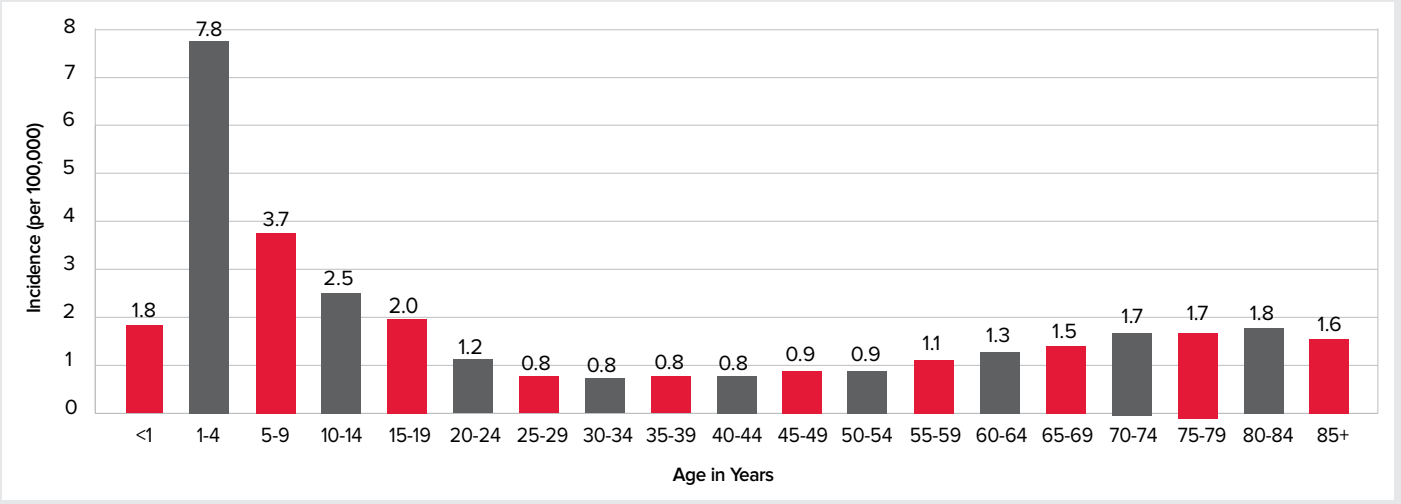

Figure 5. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 18]. Available from https://seer.cancer.gov/explorer/.

Age-Specific Incidence Rates for Acute Myeloid Leukemia (AML), 2015-2019

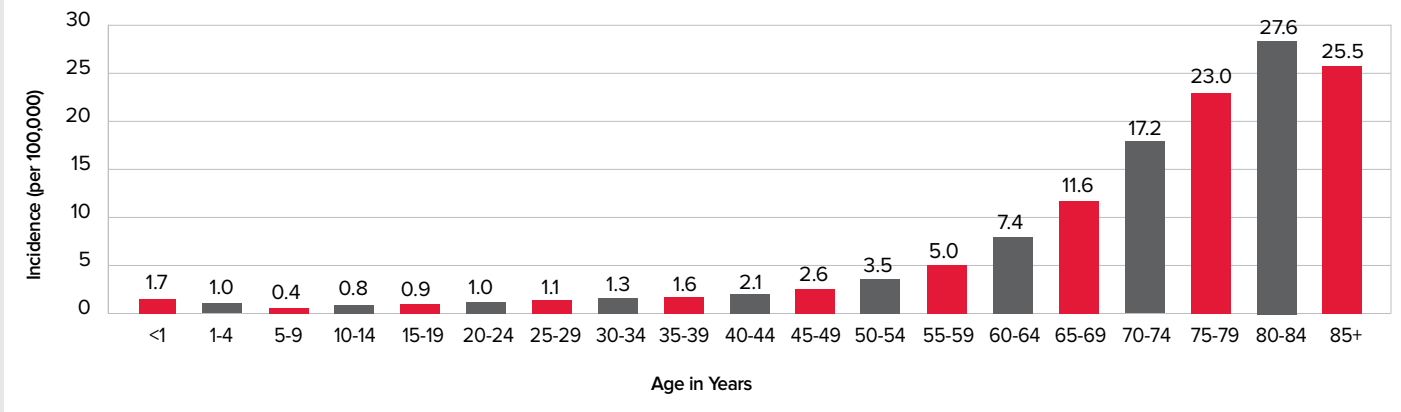

Figure 6. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 18]. Available from https://seer.cancer.gov/explorer/.

Age-Specific Incidence Rates for Chronic Lymphocytic Leukemia (CLL), 2015-2019

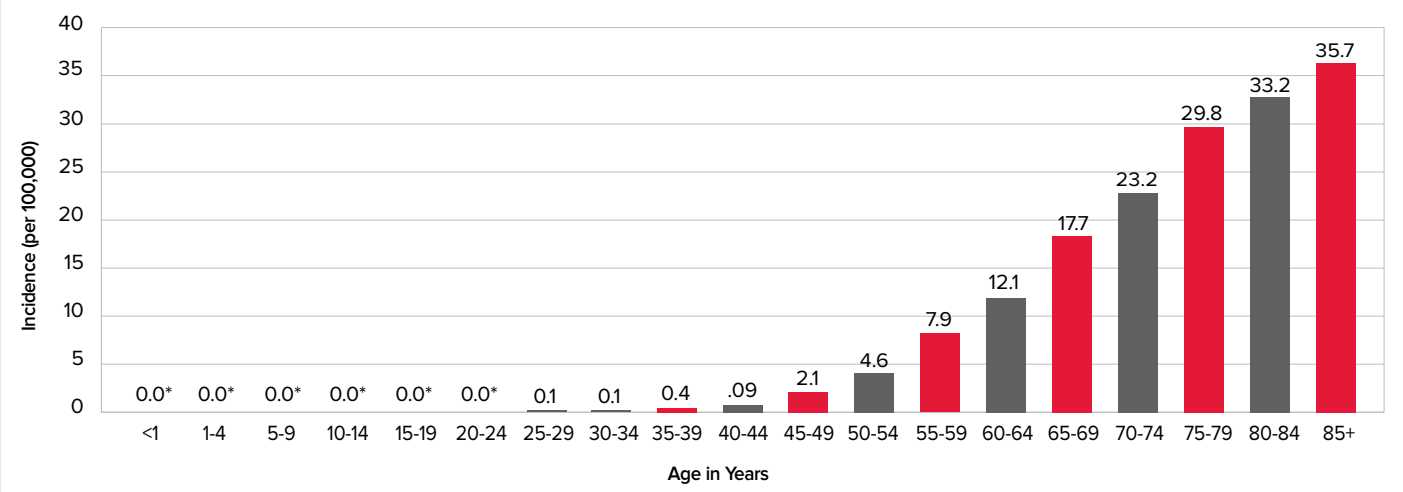

Figure 7. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 18]. Available from https://seer.cancer.gov/explorer/.
* Estimates based on less than 16 cases are suppressed and not shown.

Age-Specific Incidence Rates for Chronic Myeloid Leukemia (CML), 2015-2019

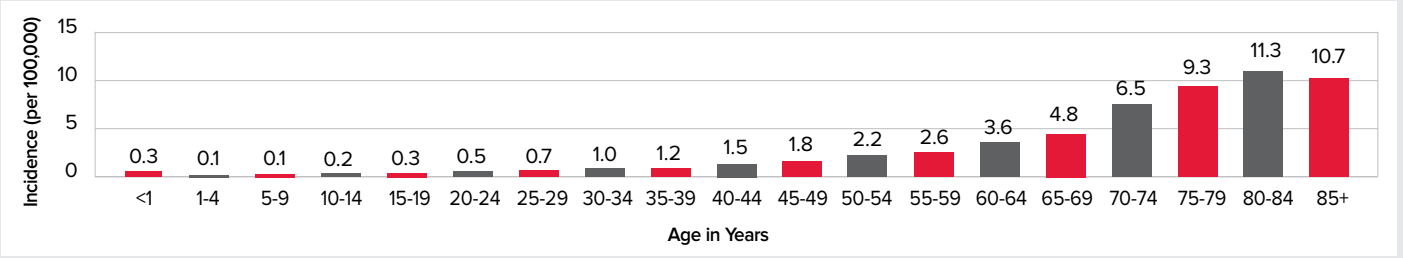

Figure 8. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 18]. Available from https://seer.cancer.gov/explorer/.

Signs and Symptoms

Signs and symptoms of acute leukemia may include bruising easily or bleeding (because of platelet deficiency), paleness or fatigue (because of anemia) and/or recurrent minor infections or poor healing of minor cuts (because of a low white blood cell count). These signs and symptoms are not unique to leukemia and may be caused by other, more common, conditions. Nonetheless, they do justify medical evaluation. The diagnosis of leukemia requires specific blood tests, including an examination of cells in the blood and bone marrow. People who have chronic leukemia may not have major signs or symptoms; diagnosis may result from periodic physical examination and testing.

Possible Causes

The cause of most cases of leukemia is not known. Extraordinary doses of radiation and certain cancer therapies are possible causes. Repeated exposure to the chemical benzene may cause acute myeloid leukemia (AML). Automobile exhaust and industrial emissions account for about 20 percent of the total national benzene exposure. About half of the benzene exposure in the US population results from tobacco smoking or from exposure to tobacco smoke. The average smoker is exposed to about 10 times the daily intake of benzene compared to nonsmokers.

Treatment

The goal of leukemia treatment is to bring about a complete remission. Patients with acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) need to start treatment soon after diagnosis. Treatment may include chemotherapy, targeted therapies (including monoclonal antibody therapy), immunotherapy (such as CAR T-cell therapy) and stem cell transplantation. Patients diagnosed with chronic myeloid leukemia (CML) are usually treated with tyrosine kinase inhibitors; these are oral drugs that may need to be taken indefinitely to keep CML under control. Some patients diagnosed with chronic lymphocytic leukemia (CLL) do not need treatment for a long period of time after diagnosis; this period is sometimes called "watch-and-wait." Patients who need treatment for CLL may receive chemotherapy, targeted therapy (including monoclonal antibody therapy) or treatments in combination. All patients should consider new approaches under study (clinical trials).

Survival

Relative survival rates vary according to a person's age at diagnosis, sex, race and type of leukemia. The 5-year relative survival rate for leukemia has more than doubled, from 34 percent for 1975 to 1977 to 69 percent for 2012 to 2018. See Table 13 on page 12; percentages in Table 13 are rounded to the nearest integer.

From 2012 to 2018, the 5-year relative survival rates overall were:

- ALL – 70.8 percent overall, 92.1 percent for children and adolescents younger than 15 years, and 93.3 percent for children younger than 5 years
- AML – 30.5 percent overall and 69.0 percent for children and adolescents younger than 15 years
- CLL – 87.9 percent overall
- CML – 70.4 percent overall.*

**The survival rate of CML in clinical trials is higher than the survival rate reported here, based on SEER data. It is speculated that close clinical monitoring and better medication adherence in clinical trials are associated with a lower risk of disease progression and higher rates of survival.*

Sex. From 2012 to 2018, 5-year relative survival for leukemia was 66.2 percent for males and 65.0 percent for females.

Race and Ethnicity. Table 13 shows the 5-year survival rates for acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myeloid leukemia (CML) and all subtypes of leukemia combined rounded to the nearest integer, spanning 4 decades.

Trends in 5-Year Relative Survival Rates for Leukemia, by Subtype, Race and Year of Diagnosis

Leukemia	1975-1977	1988-1990	2001-2003	2012-2018
All Races	34%	44%	57%	69%*
Whites	35%	45%	58%	70%*
Blacks	35%	36%	48%	66%*
ALL	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	40%	56%	66%	73%*
Whites	40%	56%	66%	74%*
Blacks	30%	46%	58%	67%*
AML	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	6%	13%	23%	32%*
Whites	6%	13%	22%	32%*
Blacks	9%	9%	27%	34%*
CLL	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	68%	74%	83%	91%*
Whites	69%	75%	84%	91%*
Blacks	68%	55%	69%	88%
CML	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	20%	31%	53%	71%*
Whites	19%	31%	53%	70%*
Blacks	28%	32%	60%	78%*

Table 13. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
* The difference in rates between 1975-1977 and 2012-2018 is statistically significant (p<.05).

Children and Adolescents. Figure 9 shows childhood ALL 5-year relative survival rates have improved significantly over the past 5 decades. Most children and adolescents younger than 20 years who have ALL are expected to become 5-year survivors of the disease. However, significant treatment-related long-term morbidity and mortality for childhood cancer have been well established by several studies. Long-term treatment-related effects among ALL and other childhood cancer survivors may include cognitive impairment, subsequent cancer, cardiac disease, pulmonary disease or other diseases.

5-Year Relative Survival Rates for Acute Lymphoblastic Leukemia in Children Under 15, Diagnosed 1964-2018

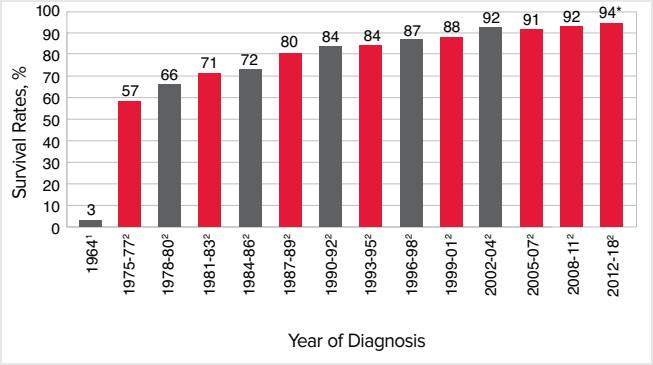

Figure 9. Sources: 1. Zuelzer WW. Implications of long-term survivals in acute stem cell leukemia of childhood treated with composite cyclic therapy. *Blood*. 1964:24:477-494. 2. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.

* The difference in rates between 1975-1977 and 2012-2018 is statistically significant (p<.05).

Deaths

Approximately 23,710 deaths (13,900 males and 9,810 females) in the US are expected to be attributed to leukemia in 2023. Estimated deaths for the four major types of leukemia in 2023 are

- ALL – 1,390 deaths
- AML – 11,310 deaths
- CLL – 4,490 deaths
- CML – 1,310 deaths
- Other leukemia* – 5,210 deaths.

**There are other rare subtypes of leukemia, beyond the four main subtypes, which comprise "Other Leukemia."*

In general, mortality rates for leukemia decreased from 1975 (8.1 per 100,000) to 2020 (5.8 per 100,000).

Sex. From 2015 to 2019, leukemia was the sixth most common cause of cancer deaths in males and the seventh most common cause of cancer deaths in females in the US. In 2023, the estimated number of deaths expected to be attributed to leukemia in the US is 41.7 percent higher for males than it is for females. Expected deaths from leukemia in 2023, according to sex, are shown in Table 14.

Estimated Deaths from Leukemia, by Sex, 2023

Type	Total	Male	Female
Acute Lymphoblastic Leukemia	1,390	700	690
Chronic Lymphocytic Leukemia	4,490	2,830	1,660
Acute Myeloid Leukemia	11,310	6,440	4,870
Chronic Myeloid Leukemia	1,310	780	530
Other Leukemia	5,210	3,150	2,060
Total	**23,710**	**13,900**	**9,810**

Table 14. Source: *Cancer Facts & Figures* **2023**. American Cancer Society; 2023.

Race and Ethnicity. For leukemia, the highest age-adjusted rates of death from 2016 to 2020 were in non-Hispanic (NH) whites at 6.4 per 100,000 population; followed by NH Blacks at 5.3 per 100,000 population and Hispanics at 4.3 per 100,000 population.

- Leukemia is the fifth most common cause of cancer deaths in NH white males and the sixth most common in NH white females.
- Leukemia is the eighth most common cause of cancer deaths in NH Black males and the ninth most common in NH Black females.
- From 2016 to 2020, NH Blacks between the ages of 15 and 64 years had a higher death rate from leukemia than NH whites.

Children and Adolescents. The leukemia age-adjusted death rate for children and adolescents younger than 20 years in the US has declined by 75.0 percent from 2.0 per 100,000 population in 1975 to 0.5 per 100,000 population in 2020. Despite this decline, leukemia is the second leading cause of cancer death among children and adolescents younger than 20 years, accounting for 22.7 percent of all cancer deaths in this age-group.

Hodgkin and Non-Hodgkin Lymphoma

"Lymphoma" is a general term for many blood cancers that originate in the lymphatic system. Visit www.LLS.org/booklets to download or order copies of free booklets about lymphoma.

Lymphoma results when a lymphocyte (a type of white blood cell) undergoes a malignant change and multiplies out of control. Eventually, healthy cells are crowded out and malignant lymphocytes amass in the lymph nodes, liver, spleen and/or other sites in the body.

Hodgkin Lymphoma (HL). This disease has characteristics that distinguish it from other diseases classified as lymphoma, including the presence of Reed-Sternberg cells (large, abnormal B lymphocytes found in a tissue sample).

Non-Hodgkin Lymphoma (NHL). This disease comprises a diverse group of blood cancers distinguished by the characteristics of the cancer cells associated with each. The designations "indolent" and "aggressive" (slow growing or fast growing, respectively) are often applied to types of NHL. Each type is associated with factors that categorize the prognosis as either more or less favorable.

Prevalence

An estimated total of 879,242 people in the United States (US) are living with or in remission from lymphoma^.

- There are 159,867 people living with or in remission from HL.
- There are 722,631 people living with or in remission from NHL.

^The unique number of people living with or in remission from lymphoma may not equal the sum of those living with or in remission from both HL and NHL due to people diagnosed with both HL and NHL.

New Cases

About 89,380 people in the US are expected to be diagnosed with lymphoma in 2023 (8,830 cases of HL and 80,550 cases of NHL). NHL represents 90.1 percent of all types of lymphoma expected to be diagnosed in 2023. HL represents 9.9 percent of all types of lymphoma expected to be diagnosed in 2023.

The median age at diagnosis for lymphoma is 66 (39 for HL and 67 for NHL).

The incidence of HL is consistently and considerably lower than that of NHL. Table 15 shows estimated new cases of lymphoma in 2023, by sex.

New Cases of Lymphoma, by Sex, 2023

Type	Total	Male	Female
Hodgkin Lymphoma	8,830	4,850	3,980
Non-Hodgkin Lymphoma	80,550	44,880	35,670
Total	**89,380**	**49,730**	**39,650**

Table 15. Source: *Cancer Facts & Figures 2023.* American Cancer Society; 2023.

Incidence

From 2015 to 2019, the age-adjusted incidence rate for lymphoma was 21.6 per 100,000. See Figure 10 (on page 15) for age-specific rates.

- The age-adjusted incidence rate for HL was 2.6 per 100,000.
- The age-adjusted incidence rate for NHL was 19.0 per 100,000.

The age-adjusted incidence rate of HL declined by 17.2 percent from 1975 (3.1 per 100,000) to 2019 (2.6 per 100,000), an annual percentage decrease of 0.4 percent. The age-adjusted incidence rate of NHL rose by 73.7 percent from 1975 (11.0 per 100,000) to 2019 (19.1 per 100,000), an average annual percentage increase of 1.7 percent.

Sex. From 2015-2019, 55.1% of those diagnosed with a lymphoma were male (55.1% males NHL, 55.2% males HL).

Age-adjusted incidence rates for HL and NHL are higher among males than among females.

- HL – 2.9 per 100,000 for males; 2.3 per 100,000 for females
- NHL – 23.0 per 100,000 for males; 15.8 per 100,000 for females

In 2023, it is expected that 21.9 percent more males than females will be diagnosed with HL and about 25.8 percent more males than females will be diagnosed with NHL.

NHL is the seventh most common cancer in both males and females in the US.

Race and Ethnicity. The highest age-adjusted incidence rate of lymphoma is in non-Hispanic (NH) whites (23.3 per 100,000), followed by Hispanics (19.8 per 100,000) and NH Blacks (17.3 per 100,000).

- The highest age-adjusted incidence rate of HL is in NH whites (2.9 per 100,000), followed by NH Blacks (2.7 pe 100,000) and Hispanics (2.3 per 100,000).
- The highest age-adjusted incidence rate of NHL is in NH whites (20.4 per 100,000), followed by Hispanics (17.5 per 100,000) and NH Blacks (14.6 per 100,000).

NH Blacks, from their mid-20s to their late-40s, have higher incidence rates of NHL than NH whites. However, beginning at age 50 years, NH whites generally have considerably higher incidence rates of NHL than NH Blacks.

Children and Adolescents. Lymphoma is the third most common cancer in children and adolescents younger than 20 years. HL accounts for 6.2 percent of all cancers in this age group; NHL accounts for 6.7 percent of all cancers in this age group.

- In 2023, an estimated 1,189 new cases of lymphoma are expected to be diagnosed in children and adolescents younger

than 15 years in the US. This will account for 12 percent of all cancers expected to be diagnosed in this age-group.

- In children younger than 15 years, the age-adjusted incidence rate for NHL (1.0 per 100,000) is higher than for HL (0.6 per 100,000).
- In adolescents and young adults ages 15–29, the age-adjusted incidence rate for HL (3.7 per 100,000) is higher than it is for NHL (2.6 per 100,000).
- In young adults ages 30–34, NHL incidence (4.8 per 100,000) is higher than HL incidence (3.5 per 100,000).
- An average of 2,048 children and adolescents younger than 20 years were diagnosed with lymphoma each year (including 1,026 diagnosed with NHL and 1,022 diagnosed with HL) in the US from 2015 to 2019.

The following data are based on age-adjusted incidence rates for children and adolescents younger than 20 years:

- Lymphoma is most commonly diagnosed in non-Hispanic (NH) whites (2.9 per 100,000 population), followed by NH Asians and Pacific Islanders (2.3 per 100,000 population).
- Lymphoma is least commonly diagnosed among NH American Indians and Alaska Natives (1.2 per 100,000 population).

Adults. HL incidence rates are higher in adolescents and young adults ages 15–34 years than in adults ages 35–64 years Incidence is highest at ages 80-84 years (see Figure 11).

In contrast, the incidence rates of NHL increase with age (see Figure 12).

- From ages 20–24 years, the incidence rate of NHL is 2.5 cases per 100,000 population.
- From ages 60–64 years, the incidence rate increases 17 times to 42.8 cases per 100,000 population.
- From ages 80–84 years, the incidence rate increases 46 times to 115.4 cases per 100,000 population.

Age-Specific Incidence Rates for Lymphoma, 2015-2019

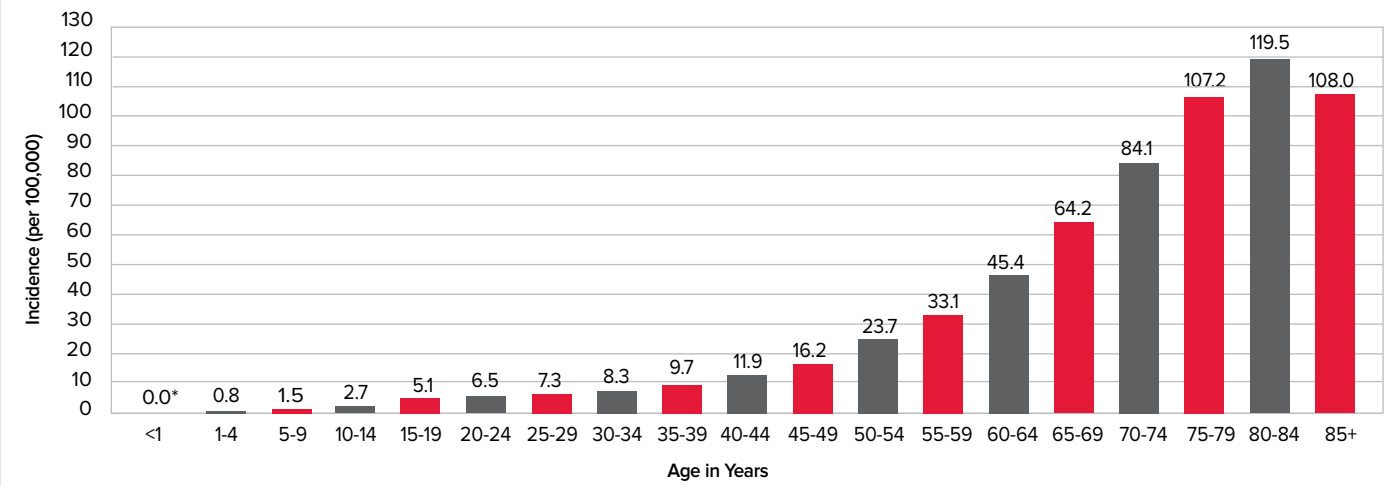

Figure 10. Source: *Surveillance, Epidemiology, and End Results (SEER)* Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Limited-Field Data, 22 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
* Estimates based on less than 16 cases are suppressed and not shown.

Age-Specific Incidence Rates for Hodgkin Lymphoma (HL), 2015-2019

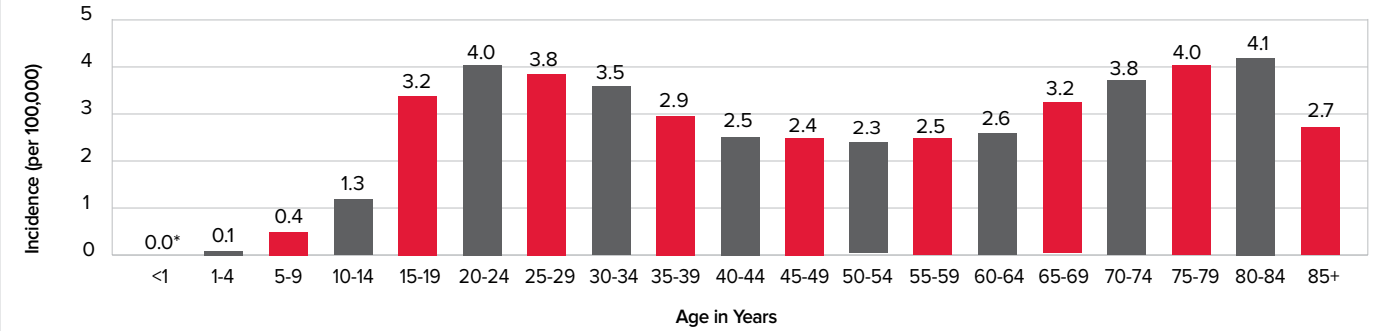

Figure 11. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 19]. Available from https://seer.cancer.gov/explorer/.
* Estimates based on less than 16 cases are suppressed and not shown.

Age-Specific Incidence Rates for Non-Hodgkin Lymphoma (NHL), 2015-2019

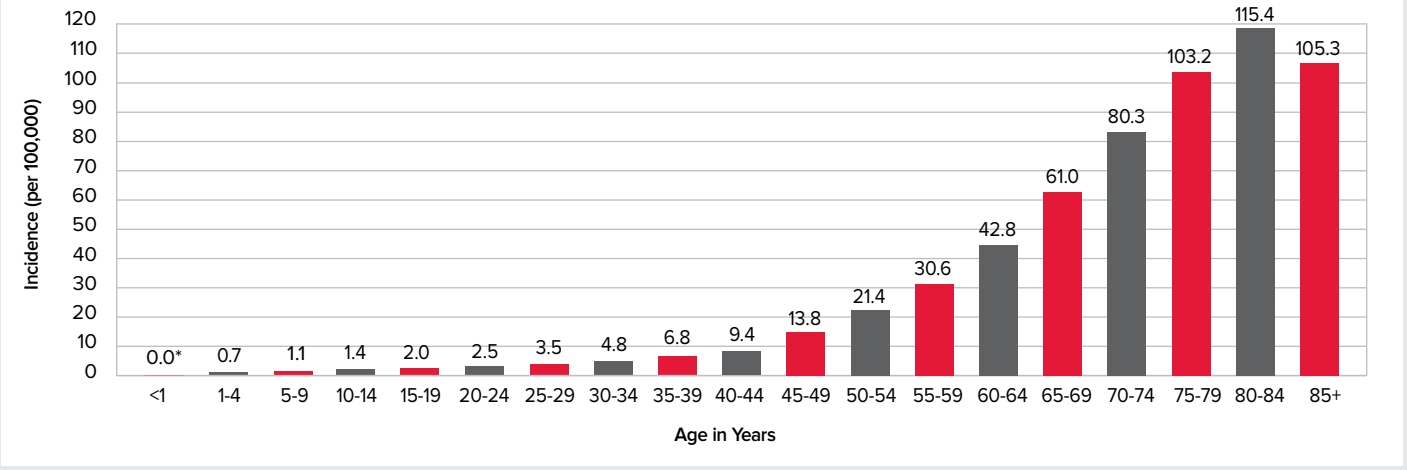

Figure 12. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 19]. Available from https://seer.cancer.gov/explorer/.
* Estimates based on less than 16 cases are suppressed and not shown.

Signs and Symptoms

A common early sign of HL or NHL is a painless enlargement of one or more lymph nodes. Enlarged lymph nodes may also be the result of inflammation in the body and are not necessarily a sign of cancer.

Other HL signs and symptoms may include recurrent high fever, persistent cough and shortness of breath, drenching night sweats of the whole body, itching and/or weight loss.

Other signs and symptoms of NHL may include bone pain, cough, chest pain, abdominal pain, rash, fever, night sweats, enlarged spleen, unexplained fatigue and/or weight loss. Some individuals may have no signs or symptoms, and a diagnosis of NHL is made as a result of a periodic physical examination and testing.

Possible Causes

The results of certain studies about causes of HL have not been definitive—many studies of links between HL and environmental exposures have been conducted, with unclear results. Although Epstein-Barr virus (EBV) has been associated with nearly half of HL cases, EBV has not been conclusively established as a cause. People infected with human immunodeficiency virus (HIV) have increased probability of developing HL.

The reasons for the development of NHL are not known. Immune suppression plays a role in some cases. People infected with HIV have a higher risk of developing NHL. Studies suggest that specific ingredients in herbicides and pesticides may be linked to NHL. Exposure to certain viruses, such as EBV and human T-lymphotropic virus (HTLV), are also associated with NHL.

The bacterium *Helicobacter pylori* causes ulcers in the stomach and is associated with the development of mucosa-associated lymphoid tissue (MALT) lymphoma in the stomach wall. About a dozen uncommon, inherited syndromes can predispose individuals to develop NHL. These risk factors explain only a small proportion of cases.

Treatment

The goal of treatment for HL is to cure the disease. Chemotherapy, either alone or combined with an antibody-drug conjugate or modality therapy (chemotherapy and radiation), is a commonly administered treatment approach for HL. Involved site radiation therapy (ISRT) is the most common type of radiotherapy used to treat HL. The radiation targets primarily the lymph node regions involved by disease. Chemotherapy is used to kill neighboring lymphoma cells.

In general, the goal of treatment for NHL is to destroy as many lymphoma cells as possible and to induce a complete remission. Treatment protocols vary according to the subtype of disease. Chemotherapy and radiation therapy are the two principal forms of treatment. Although radiation therapy is often neither the sole nor the principal curative therapy, it is an important additional treatment in some cases. Immunotherapy (such as CAR T-cell therapy) is indicated to treat individuals with specific types of NHL. Stem cell transplantation and a watch-and-wait strategy are also used to treat some NHL subtypes.

Survival

Hodgkin lymphoma (HL) is now considered to be one of the most curable forms of cancer.

- The 5-year relative survival rate for people with HL has increased more than 26 percent, from 73 percent during the period 1975 to 1977 to 92 percent during the period 2012 to 2018.
- The 5-year relative survival rate is 95.8 percent for all people with HL who were younger than 50 years at diagnosis.

The 5-year relative survival rate for people with NHL has risen from 46 percent from 1975 to 1977 to 77 percent from 2012 to 2018.

- The 5-year relative survival rate is 85.2 percent for all people with NHL who were younger than 50 years at diagnosis.

Sex. From 2012 to 2018, 5-year relative survival rates were:

- HL – 88.1 per 100,000 for males and 90.2 per 100,000 for females
- NHL – 72.5 per 100,000 for males and 75.4 per 100,000 for females.

Race and Ethnicity. Table 16 shows the 5-year relative survival rates, rounded to the nearest integer, spanning 4 decades.

Children and Adolescents. Five-year relative survival is 98.1 percent for HL in children and adolescents younger than 20 years. In children and adolescents younger than 20 years, 5-year relative survival for NHL is 90.4 percent. This represents a significant improvement in the rate of survival. As recently as the mid-1970s, most children and adolescents with NHL did not survive 5 years after they were diagnosed (44.6 percent from 1975-1977).

Trends in 5-Year Relative Survival Rates for Lymphoma, by Subtype, Race and Year of Diagnosis

Lymphoma	1975-1977	1988-1990	2001-2003	2012-2018
All Races	53%	56%	71%	79%*
Whites	53%	56%	73%	80%*
Blacks	61%	51%	69%	77%*
Hodgkin Lymphoma	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	73%	81%	87%	92%*
Whites	72%	81%	88%	92%*
Blacks	79%	74%	86%	88%*
Non-Hodgkin Lymphoma	**1975-1977**	**1988-1990**	**2001-2003**	**2012-2018**
All Races	46%	50%	69%	77%*
Whites	47%	51%	70%	78%*
Blacks	51%	45%	65%	74%*

Table 16. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
* The difference between 1975-1977 and 2012-2018 is statistically significant (p<.05).

Deaths

In 2023, an estimated 21,080 individuals in the US population are expected to die from lymphoma (900 HL and 20,180 NHL), as shown in Table 17.

Estimated Deaths from Lymphoma, by Sex, 2023

Type	Total	Male	Female
Hodgkin Lymphoma	900	540	360
Non-Hodgkin Lymphoma	20,180	11,780	8,400
Total	**21,080**	**12,320**	**8,760**

Table 17. Source: *Cancer Facts & Figures 2023.* American Cancer Society; 2023.

Sex. Non-Hodgkin lymphoma (NHL) is the eighth most common cause of cancer death in males and females in the US. Death rates for HL are much lower than those for NHL for both males and females.

- Males – 0.3 per 100,000 for HL; 6.7 per 100,000 for NHL
- Females – 0.2 per 100,000 for HL; 3.9 per 100,000 for NHL

Race and Ethnicity. For NHL, the highest age-adjusted rates of death from 2016 to 2020 were in non-Hispanic (NH) whites at 5.4 per 100,000 population, followed by NH American Indians and Alaska Natives at 4.6 per 100,000 population.

Children and Adolescents. For children and adolescents under 20 years, age-adjusted death rates for HL and NHL per 100,000 population declined from 1975 to 2020.

- For HL, the rate was 0.1 in 1975 vs 0.0* in 2020.
- For NHL, the rate was 0.4 in 1975 vs 0.0 in 2020.

**Statistic is not reported due to fewer than 16 deaths.*

Myeloma

Myeloma is a cancer of the plasma cells (a type of white blood cell). Plasma cells are found primarily in the bone marrow. Visit www.LLS.org/booklets to download or order copies of free booklets about myeloma.

About 90 percent of people with myeloma have disease involving multiple sites at the time of diagnosis (multiple myeloma). Some individuals have myeloma that progresses very slowly (sometimes referred to as "smoldering" or "indolent" myeloma).

In myeloma, a B lymphocyte (the cell type that forms plasma cells) becomes malignant. Eventually, malignant plasma cells (myeloma cells) amass in the marrow and sometimes in other sites in the body. The myeloma cells disrupt normal blood production, destroy normal bone tissue and cause pain. Healthy plasma cells produce immunoglobulins (antibodies) that protect the body against certain types of infection. The onset of myeloma interferes with antibody production, making people with myeloma susceptible to infection and other serious complications.

Prevalence

An estimated 157,561 people in the United States (US) are living with or in remission from myeloma.

New Cases

An estimated 35,730 new cases of myeloma (19,860 males and 15,870 females) are expected to be diagnosed in the US in 2023 (see Table 18).

The median age at diagnosis is 69 years; myeloma is seldom diagnosed in people younger than 40 years.

Estimated New Cases of Myeloma, by Sex, 2023

Cancer Type	Total	Male	Female
Myeloma	35,730	19,860	15,870

Table 18. Source: *Cancer Facts & Figures 2023*. American Cancer Society; 2023.

Incidence

For the years 2015 to 2019, the age-adjusted incidence rate for myeloma was 7.1 per 100,000.

Sex. In 2015-2019, 55.7 percent of those diagnosed with Myeloma were male.

The age-adjusted incidence rate for the years 2015 to 2019 was 49.2 percent higher in males (8.8 per 100,000 population) than it was in females (5.9 per 100,000 population).

Race and Ethnicity. From 2015 to 2019, myeloma was the ninth most commonly diagnosed cancer among non-Hispanic (NH) Black males and the seventh most commonly diagnosed in NH Black females. In NH white males, myeloma was the fifteenth most commonly diagnosed cancer and the sixteenth most commonly diagnosed in NH white females.

- The median age at diagnosis is 66 years for NH Blacks and 70 years for NH whites.
- NH Blacks have more than twice the age-adjusted incidence rate (14.5 per 100,000 population) of myeloma than NH whites (6.4 per 100,000 population).
- NH Blacks account for 20.7% of new myeloma cases each year.
- NH Black males have a higher age-adjusted myeloma incidence rate (17.0 per 100,000) than males or females of any other race or ethnicity.
- The highest incidence rate is found in NH Black males who are ages 80–84 (121.3 per 100,000 population).

Age. Figure 13 shows the age-specific incidence rates for myeloma for the years 2015 to 2019.

Age-Specific Incidence Rates for Myeloma, 2015-2019

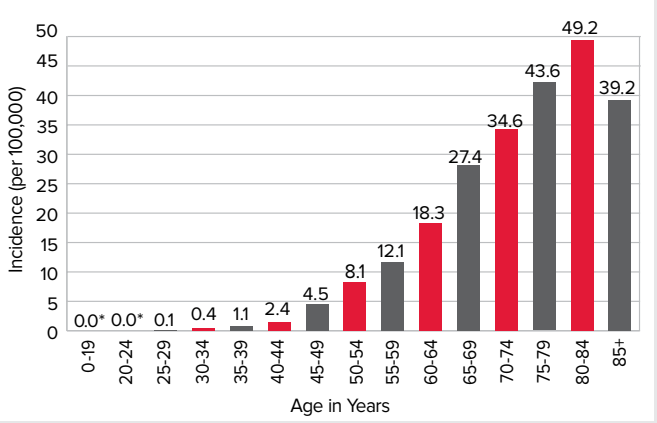

Figure 13. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.
* Estimates based on less than 16 cases are suppressed and not shown.

Signs and Symptoms

The first symptom of myeloma is often bone pain from the effects myeloma cells are having on the marrow. Fractures may occur because of the weakened bones. Anemia, recurrent infections, or numbness or pain in the hands and/or feet (caused by a condition called "peripheral neuropathy") can also be early signs and symptoms of the disease. People with myeloma may also tire more easily and feel weak, or they may have no signs or symptoms.

Possible Causes

The cause of myeloma is unknown in most cases. Long-term exposure to certain chemicals seems to increase the risk of developing myeloma, but most people who have myeloma do not have any history of such exposure, indicating other factors must play a major role. Most people diagnosed with myeloma are older than 50 years and Blacks are more likely to develop myeloma than whites. Research suggests obese people have a higher incidence of myeloma. Some studies indicate firefighters are at a higher risk for many types of cancer, including myeloma. There are presently clinical trials being conducted to look at possible causes and precursors of myeloma. Contact an LLS Information Specialist at (800) 955-4572 for more information.

Treatment

The goals of treatment for people with myeloma are to reduce symptoms, to slow disease progression and to provide prolonged remission. There have been significant treatment advances in recent years. The approach for treating each person is customized, based on the extent of disease and the rate of disease progression. People who have a slow growing myeloma and no symptoms may not need treatment immediately. Some people need only supportive care to reduce symptoms of anemia, high blood calcium levels, infections and/or bone damage or osteoporosis. Patients who require myeloma-specific therapies may receive combination drug therapy, immunotherapy (such as CAR T-cell therapy), high-dose chemotherapy with stem cell transplantation (autologous, allogeneic or reduced-intensity allogeneic), radiation therapy for local disease and/or new and emerging drug therapies as part of clinical trials.

Survival

Overall 5-year relative survival in people with myeloma has improved significantly since the 1970s. Table 19 shows the 5-year relative survival rates, rounded to the nearest integer, spanning 4 decades.

- Five-year relative survival increased from 24 percent from 1975 to 1977 to 60 percent from 2012 to 2018.
- The 3-year survival rate as of January 1, 2019, was 69.0 percent for all races and ethnicities.
- The 5-year survival rate is 76.8 percent for people with myeloma who were younger than 50 years at diagnosis.

Trends in 5-Year Relative Survival Rates for Myeloma by Race and Year of Diagnosis

	1975-1977	1988-1990	2001-2003	2012-2018
All Races	24%	27%	40%	60%*
Whites	24%	26%	40%	59%*
Blacks	26%	35%	41%	64%*

Table 19. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Time Dependent (1990-2019) Income/Rurality, 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
*The difference between 1975-1977 and 2012-2018 is statistically significant (p<.05).

Sex. From 2012 to 2018, 5-year relative survival was 57.8 percent for males and 58.1 percent for females.

Race and Ethnicity. Five-year survival from 2012 to 2018 is highest for non-Hispanic (NH) Black females (61.0 percent) compared to 59.8 percent for NH Black males, 57.2 percent for NH white males and 56.8 percent for NH white females.

Deaths

Approximately 12,590 deaths from myeloma are expected in 2023 (see Table 20).

Estimated Deaths from Myeloma, by Sex, 2023

Cancer Type	Total	Male	Female
Myeloma	12,590	7,000	5,590

Table 20. Source: *Cancer Facts & Figures 2023*. American Cancer Society; 2023.

Sex. Myeloma was the seventh most common cause of cancer death for non-Hispanic (NH) Black females and the fourteenth most common cause of cancer death for NH white females from 2016 to 2020.

Myeloma was the sixth leading cause of cancer death for NH Black males and the fourteenth most common cause of cancer death for NH white males from 2016 to 2020.

Race and Ethnicity. As reported in Cancer Facts & Figures for African Americans 2019-2021, the American Cancer Society estimated that approximately 3 percent of all cancer-related deaths among Blacks are expected to be caused by myeloma.

- The age-adjusted mortality rate for myeloma from 2016 to 2020 for NH Black males was nearly double the rate for NH white males (7.3 per 100,000 population vs 3.7 per 100,000 population).
- For NH Black females, the age-adjusted mortality rate from myeloma was more than twice the rate for NH white females (5.0 per 100,000 population vs 2.2 per 100,000 population).
- The US median age at death from myeloma is 75 years. It is 76 years for NH whites and 72 years for NH Blacks.

Myelodysplastic Syndromes

Myelodysplastic syndromes (MDS) comprise a group of diseases of the blood and bone marrow, with varying degrees of severity and life expectancy. Visit www.LLS.org/booklets to download or order copies of free booklets about MDS.

A myelodysplastic syndrome begins with a change to a normal stem cell in the marrow. The marrow becomes filled with an increased number of developing blood cells. However, the blood is usually deficient in cell numbers because the cells in the marrow die before they can be released into the blood. Normally, immature cells known as "blasts" make up less than 5 percent of all cells in the marrow. In a person with MDS, blasts often constitute more than 5 percent of the cells in the marrow; in a person with acute myeloid leukemia (AML), blasts constitute more than 20 percent of the cells. MDS has been known as "smoldering leukemia" or "preleukemia." These terms may be misleading because they imply that MDS is only serious and problematic if it evolves into AML; this is not the case.

The most common MDS subtypes are

- Refractory anemia with excess blasts, 15.5 percent
- Refractory cytopenia with multilineage dysplasia, 8.3 percent.
- People diagnosed with MDS, not otherwise specified (MDS NOS), constitute 62.7 percent of all MDS cases.

Prevalence

An estimated 58,835 people in the United States (US) are living with or in remission from MDS.

New Cases

For the 5-year period from 2015 to 2019, there were 77,646 new cases of MDS throughout the US, averaging 15,529 cases per year.

The median age at diagnosis for MDS is 77.

Incidence

The overall age-adjusted incidence rate of MDS is 4.0 cases per 100,000 population (see Table 21).

Sex. In 2015-2019, 58.2% of those diagnosed with MDS were male.

In the US, for the 5-year period from 2015 to 2019, 45,181 MDS cases were diagnosed in males (averaging 9,036 per year) and 32,465 MDS cases were diagnosed in females (averaging 6,493 per year). The overall age-adjusted incidence rates of MDS by sex are 5.4 per 100,000 in males and 2.9 per 100,000 in females.

Race and Ethnicity. Non-Hispanic (NH) white males have the highest age-adjusted incidence rates (6.1 per 100,000 population), while the lowest occur among NH American Indian and Alaska Native females (1.6 per 100,000 population).

Age. The age-adjusted incidence rate for MDS is highest for males ages 75 years and older (59.3 per 100,000) and lowest for both males and females younger than 15 years (0.1 per 100,000).

Myelodysplastic Syndromes Age-Adjusted Incidence Rates, per 100,000 Population, 2015-2019

By Race/Ethnicity	Rate
All Races	4.0
Hispanic (any race)*	2.9
Non-Hispanic American Indian / Alaska Native**	2.9
Non-Hispanic Asian / Pacific Islander	2.7
Non-Hispanic Black	3.2
Non-Hispanic White	4.4
By Age	**Rate**
Ages <15	0.1
Ages 15-39	0.2
Ages 40-64	1.7
Ages 65-74	14.1
Ages 75+	40.8

Table 21. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.

* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).

** Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

Signs and Symptoms

Most often, people diagnosed with MDS first seek medical attention because they are experiencing fatigue and shortness of breath (from anemia). Some individuals have no signs or symptoms, and a diagnosis of MDS is made because of periodic physical examination and testing.

Possible Causes

Most people with MDS have "primary MDS," for which there is usually no clear-cut triggering event. A possible cause of MDS is repeated exposure to the chemical benzene. Automobile exhaust and industrial emissions account for about 20 percent of the total national exposure to benzene. About half of the benzene exposure in the US population results from smoking tobacco or from exposure to tobacco smoke. The average smoker is exposed to about 10 times the daily intake of benzene compared to nonsmokers. Secondary MDS is caused by previous cancer treatments, such as chemotherapy or radiation.

Treatment

The goal of therapy for a person with lower-risk MDS is to manage the disease by reducing transfusion needs and infection risk. Currently, the only potentially curative therapy is high-dose chemotherapy with allogeneic stem cell transplantation. This may be a practical option for certain

younger people with higher-risk MDS (individuals whose life expectancy without successful treatment warrants the risk associated with transplantation). Other general approaches to treatment (either used alone or in combination) include a watch-and-wait strategy, transfusion, administration of blood cell growth factors, drug therapy with newer agents, chemotherapy used to treat acute myeloid leukemia (AML) and emerging drug therapies as part of clinical trials.

Survival

For 2012-2018, the 5-year relative survival rate for MDS was 36.9 percent.

Sex. From 2012 to 2018, 5-year relative survival was 34.6 percent for males and 40.1 percent for females.

Race and Ethnicity. Five-year survival from 2012 to 2018 was highest for non-Hispanic (NH) Black females (47.6 percent), followed by NH Black males (40.8 percent) and Hispanic females (40.2 percent). See Table 22.

Myelodysplastic Syndromes 5-Year Relative Survival Rates, by Race/Ethnicity and Sex, 2012-2018

	Both Sexes	Male	Female
All Races	36.9	34.6	40.1
Hispanic (any race)*	37.0	34.3	40.2
Non-Hispanic American Indian / Alaska Native**	43.4	35.6	-
Non-Hispanic Asian / Pacific Islander	32.1	31.5	32.7
Non-Hispanic Black	44.2	40.8	47.6
Non-Hispanic White	36.3	33.9	39.6

Table 22. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.

* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).

** Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

- Estimates based on less than 16 cases are suppressed and not shown.

Deaths

The SEER report reflects mortality data from the National Cancer for Health Statistics (NCHS) database, in which MDS is not included as a cause of death. Therefore, mortality statistics were not reported in 2023 at the time of this publication.

Myeloproliferative Neoplasms

Myeloproliferative neoplasms (MPNs) make up a group of blood cancers characterized by the overproduction of one or more types of blood cells—red blood cells, white blood cells and/or platelets. MPNs usually develop slowly over time, and different MPNs affect different blood cells. Visit www.LLS.org/booklets to download or order copies of free booklets about MPNs.

There are several types of MPNs. The following three classic types are traditionally grouped together because of their overlapping features:

- Essential thrombocythemia (ET), which accounted for 48.7 percent of MPNs from 2015 to 2019.
- Polycythemia vera (PV), which accounted for 40.4 percent of MPNs from 2015 to 2019.
- Myelofibrosis (MF), which accounted for 10.0 percent of MPNs from 2015 to 2019.

Prevalence

An estimated 115,125 people in the United States (US) are living with or in remission from MPNs.

New Cases

For the 5-year period from 2015 to 2019, there were 67,181 new cases of MPNs throughout the US, averaging 13,436 cases per year. The median age at diagnosis for MPN is 66.

Incidence

The overall age-adjusted incidence rate of MPNs is 3.5 cases per 100,000 population (see Table 23).

Myeloproliferative Neoplasms Age-Adjusted Incidence Rates, per 100,000 Population, 2015-2019

By Race/Ethnicity	Rate
All Races	3.5
Hispanic (any race)*	2.2
Non-Hispanic American Indian / Alaska Native**	2.6
Non-Hispanic Asian / Pacific Islander	2.0
Non-Hispanic Black	3.2
Non-Hispanic White	3.9
By Age	**Rate**
Ages <15	0.1
Ages 15-39	0.9
Ages 40-64	4.0
Ages 65-74	11.9
Ages 75+	18.3

Table 23. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/..
* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).
** Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

Sex. In 2015-2019, 53.6% of those diagnosed with MPN were female.

In the US, for the 5-year period from 2015 to 2019, 31,176 MPN cases were diagnosed in males (averaging 6,235 per year) and 36,005 MPN cases were diagnosed in females (averaging 7,201 per year). The overall age-adjusted incidence rates of MPNs by sex are 3.6 per 100,000 in males and 3.4 per 100,000 in females.

Race and Ethnicity. Non-Hispanic (NH) white males have the highest age-adjusted incidence rates of MPNs (4.1 per 100,000 population), while the lowest occur among NH Asian and Pacific Islander females (1.9 per 100,000 population).

Age. The age-adjusted incidence rate for MPNs is highest for males ages 75 years and older (18.7 per 100,000 population) and lowest for both males and females younger than 15 years (0.1 per 100,000 population).

Signs and Symptoms

Many people with MPNs experience few or no signs or symptoms for extended periods of time with proper monitoring and treatment. Each type of MPN may show different signs and symptoms.

Essential thrombocythemia (ET) is often detected during a routine blood test before an individual has any signs or symptoms. One of the first indications of ET may be the development of a blood clot (thrombus). In a small subset of patients, ET may cause bleeding in individuals with an extremely high platelet count.

Polycythemia vera (PV) develops slowly, and it may not cause signs or symptoms for many years. The condition is often diagnosed during a routine blood test before severe signs or symptoms occur.

Myelofibrosis (MF) usually develops slowly. Often, MF does not cause early signs or symptoms and it may be found during a routine blood test. However, as disruption of normal blood cell production increases, people may experience signs or symptoms such as fatigue, weakness, shortness of breath and/or pale skin.

Possible Causes

Myeloproliferative neoplasms (MPNs) are considered "clonal disorders." Clonal disorders begin with one or more changes to the DNA of a single stem cell in the bone marrow.

In most cases, the cause of the change to the stem cell is unknown. Mutations may be caused by environmental factors or by an error during cell division. While family clusters of ET, PV and MF have been reported, these are generally not inherited diseases. They arise from gene mutations that occur during a person's lifetime.

Researchers believe that proteins known as "Janus kinases" (JAKs) are involved. JAKs send signals that affect the production of blood cells in the bone marrow. These proteins help control the numbers of red blood cells, white blood cells and platelets. When JAKs send too many signals, they cause the bone marrow to make too many blood cells. This chain of events is referred to as "overactive JAK signaling." JAK signaling may become overactive in many ways. One way is a mutation of the JAK2 gene.

Approximately 95 percent of PV patients have a mutation of the JAK2 gene. Mutations in genes of hematopoietic stem cells (blood stem cells) are thought to be responsible for the overactive JAK signaling that causes MF. The mutations may be in the genes that make JAKs, or the mutations may be in genes that affect how JAKs work. Most patients with MF have either a mutation of the JAK2, MPL or CALR gene.

Most cases of ET are associated with one or more acquired genetic mutations to a hematopoietic stem cell that results in the overproduction of megakaryocytes, the precursor cells of platelets in the bone marrow. Most patients with ET have a mutation of the JAK2, MPL or CALR gene.

Treatment

Treatment for MPNs can vary based on specific diagnosis. Patients have symptoms and circumstances that require different treatments. There is no single treatment that is effective for all patients. Treatment for patients may include low-dose aspirin, therapeutic phlebotomy, drug therapy, allogeneic stem cell transplantation and emerging drug therapies as part of clinical trials. All patients need to be closely monitored through regular examinations, so their doctor may watch for any signs of disease progression.

Survival

For 2012-2018, the 5-year relative survival rate for MPNs was 88.3 percent.

Sex. From 2012 to 2018, 5-year relative survival rate was 86.5 percent for males and 89.9 percent for females.

Race and Ethnicity. Five-year survival from 2012 to 2018 was highest for non-Hispanic (NH) Asian and Pacific Islander females (91.8 percent), followed by NH Black females (91.1 percent) and NH white females (89.3 percent). See Table 24.

Myeloproliferative Neoplasms 5-Year Relative Survival Rates, by Race/Ethnicity and Sex, 2012-2018

	Both Sexes	Male	Female
All Races	88.3	86.5	89.9
Hispanic (any race)*	86.5	86.5	86.5
Non-Hispanic American Indian / Alaska Native**	77.9	77.9	82.8
Non-Hispanic Asian / Pacific Islander	88.2	84.0	91.8
Non-Hispanic Black	88.6	85.4	91.1
Non-Hispanic White	87.8	86.3	89.3

Table 24. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.
* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).
** Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

Deaths

The SEER report reflects mortality data from the National Cancer for Health Statistics (NCHS) database, in which MPNs are not included as a cause of death. Therefore, mortality statistics were not reported in 2023 at the time of this publication.

Incidence Rates

Tables 25, 26 and 27 show incidence rates for leukemia, non-Hodgkin lymphoma, Hodgkin lymphoma, myeloma, myelodysplastic syndromes (MDS) and myeloproliferative neoplasms (MPNs) using data figures from 2015 to 2019 (the most recent data available). Rates are per 100,000 population and are age-adjusted to the 2000 US standard population.

Age-Adjusted Incidence Rates, by Sex, All Races, per 100,000 Population, 2015-2019

Type	Total	Male	Female
Leukemia	14.1	18.0	11.0
Non-Hodgkin Lymphoma	19.0	23.0	15.8
Hodgkin Lymphoma	2.6	2.9	2.3
Myeloma	7.1	8.8	5.9
Myelodysplastic Syndromes	4.0	5.4	2.9
Myeloproliferative Neoplasms	3.5	3.6	3.4

Table 25. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.

Age-Adjusted Incidence Rates, by Sex, for Non-Hispanic Blacks, per 100,000 Population, 2015-2019

Type	Total	Male	Female
Leukemia	11.1	13.8	9.2
Non-Hodgkin Lymphoma	14.6	17.4	12.4
Hodgkin Lymphoma	2.7	3.0	2.4
Myeloma	14.5	17.0	12.9
Myelodysplastic Syndromes	3.2	3.9	2.7
Myeloproliferative Neoplasms	3.2	3.2	3.3

Table 26. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.

Age-Adjusted Incidence Rates, by Sex, for Non-Hispanic Whites, per 100,000 Population, 2015-2019

Type	Total	Male	Female
Leukemia	15.4	19.8	11.8
Non-Hodgkin Lymphoma	20.4	24.7	16.7
Hodgkin Lymphoma	2.9	3.3	2.6
Myeloma	6.4	8.1	5.0
Myelodysplastic Syndromes	4.4	6.1	3.1
Myeloproliferative Neoplasms	3.9	4.1	3.8

Table 27. Source: SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2023 February 20]. Available from https://seer.cancer.gov/explorer/.

Race and Ethnicity

Tables 28-33, below through page 25, show prevalence, incidence, survival and mortality for blood cancers by race and ethnicity. United States (US) prevalence estimates for January 1, 2019 are based on 2019 cancer prevalence proportions from the SEER 13 cancer registries (excluding the Alaska Native Registry) and US population estimates from the US Bureau of the Census. Incidence and mortality rates are per 100,000 population and are age-adjusted to the 2000 US standard population. To adjust for possible reporting delay, counts of incidence and mortality cases are provided as average annual counts for recent years using national data from US Cancer Statistics and the National Center for Health Statistics. Five-year relative survival is provided based on the SEER 18 cancer registries for 2012-2018.

Approximate US Prevalence of Blood Cancers, by Race/Ethnicity, as of January 1, 2019

Race/Ethnicity	All blood cancers^#	Lymphomas^	NHL^	HL^	Leukemia^	ALL^	CLL^	AML^	CML^	Myelo-ma^	MDS*	MPN*
All Races	**1,629,474**	**879,242**	722,631	159,867	**437,337**	81,689	197,060	61,092	60,021	**157,561**	**58,835**	**115,125**
Hispanic (any race)**	**150,160**	**80,680**	62,705	18,231	**46,830**	22,315	6,599	8,490	6,532	**13,202**	**3,400**	**7,064**
Non-Hispanic American Indian / Alaska Native	**4,836**	**2,116**	1,791	330	**1,602**	579	283	288	287	**599**	**186**	**359**
Non-Hispanic Asian / Pacific Islander	**49,844**	**27,461**	23,633	3,914	**12,080**	3,798	1,985	3,058	2,390	**4,342**	**2,040**	**4,329**
Non-Hispanic Black	**155,979**	**75,773**	57,617	18,551	**31,770**	5,432	10,953	5,853	6,677	**32,300**	**5,363**	**12,671**
Non-Hispanic White	**1,275,495**	**697,561**	577,305	122,866	**346,946**	45,746	183,297	43,127	43,452	**106,007**	**48,748**	**92,137**

Table 28. Source: US 2019 cancer prevalence estimates are based on 2019 cancer prevalence proportions from the SEER 12 Areas and 1/1/2019 US population estimates based on the average of 2018 and 2019 population estimates from the US Bureau of the Census. The Alaska Native Tumor Registry only includes cases diagnosed among Alaska Natives and is excluded from the analysis to avoid bias in the underlying calculations.

^ 27-year limited-duration prevalence.

Prevalence counts for all blood cancers combined only includes 18-years of incidence for MDS and MPN due to fewer years of reportability for these cancers.

* 18-year limited-duration prevalence. Shorter duration prevalence required due to fewer years of reportability for these cancers.

** Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).

Blood Cancer Incidence Rates, by Race/Ethnicity, 2015-2019, SEER 21 (Rates per 100,000 Population)

Race/Ethnicity	All blood cancers	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma	MDS	MPN
All Races	**50.2**	**21.6**	19.0	2.6	**14.1**	1.8	4.7	4.1	1.9	**7.1**	**4.0**	**3.5**
Hispanic (any race)*	**42.8**	**19.7**	17.5	2.3	**11.0**	2.6	2.1	3.4	1.6	**6.8**	**2.9**	**2.2**
Non-Hispanic American Indian / Alaska Native**	**41.0**	**16.2**	14.6	1.6	**11.9**	2.5	2.6	3.2	1.8	**7.4**	**2.9**	**2.6**
Non-Hispanic Asian / Pacific Islander	**31.9**	**15.0**	13.6	1.4	**8.2**	1.5	1.1	3.5	1.2	**4.0**	**2.7**	**2.0**
Non-Hispanic Black	**49.3**	**17.3**	14.6	2.7	**11.1**	1.0	3.2	3.7	1.8	**14.5**	**3.2**	**3.2**
Non-Hispanic White	**53.4**	**23.3**	20.4	2.9	**15.4**	1.6	5.8	4.4	2.1	**6.4**	**4.4**	**3.9**

Table 29. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Limited-Field Data, 22 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard.
* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).
** Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

Average Annual Blood Cancer Incidence Counts, by Race/Ethnicity, 2015-2019, United States

Race/Ethnicity	All blood cancers	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma	MDS	MPN
All Races	**189,589**	**80,782**	72,153	8,630	**52,441**	5,404	18,446	15,716	7,148	**27,511**	**15,529**	**13,436**
Hispanic (any race)*	**18,312**	**8,340**	7,129	1,211	**5,182**	1,563	846	1,505	725	**2,600**	**1,089**	**1,112**
Non-Hispanic American Indian / Alaska Native	**1,006**	**419**	370	48	**291**	56	61	88	49	**172**	**66**	**58**
Non-Hispanic Asian / Pacific Islander	**5,950**	**2,820**	2,541	279	**1,538**	283	221	647	231	**754**	**452**	**390**
Non-Hispanic Black	**19,254**	**6,892**	5,772	1,120	**4,328**	431	1,221	1,452	714	**5,686**	**1,123**	**1,239**
Non-Hispanic White	**142,273**	**61,284**	55,422	5,862	**40,228**	3,007	15,600	11,936	5,289	**18,027**	**12,590**	**10,225**

Table 30. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.
* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).

Blood Cancer 5-Year Relative Survival Rates, by Race/Ethnicity, 2012-2018, SEER 17

Race/Ethnicity	All blood cancers	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma	MDS	MPN
All Races	**68.4**	**75.7**	73.8	89.1	**65.7**	70.8	87.9	30.5	70.4	**57.9**	**36.9**	**88.3**
Hispanic (any race)*	**67.6**	**74.0**	71.6	87.0	**64.5**	71.0	82.5	40.6	78.4	**57.0**	**37.0**	**89.2**
Non-Hispanic American Indian / Alaska Native**	**63.6**	**67.7**	66.8	73.8	**62.2**	65.7	90.7	38.8	68.5	**58.4**	**43.4**	**77.9**
Non-Hispanic Asian / Pacific Islander	**63.3**	**70.4**	68.4	89.6	**56.2**	72.5	82.8	33.0	73.6	**57.7**	**32.1**	**88.2**
Non-Hispanic Black	**66.4**	**72.9**	69.7	87.3	**62.0**	66.7	84.0	31.4	73.1	**60.4**	**44.2**	**88.6**
Non-Hispanic White	**68.9**	**76.7**	74.9	89.9	**66.5**	70.7	88.1	27.2	67.1	**57.0**	**36.3**	**87.8**

Table 31. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Data, 17 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.
* Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).
**Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

Blood Cancer Mortality Rates, by Race/Ethnicity, 2016-2020, US (Rates per 100,000 Population)

Race/Ethnicity	All blood cancers**	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma
All Races	**14.5**	**5.4**	5.1	0.3	**6.0**	0.4	1.1	2.7	0.3	**3.1**
Hispanic (any race)	**11.7**	**4.8**	4.5	0.3	**4.3**	0.7	0.4	1.9	0.2	**2.6**
Non-Hispanic American Indian / Alaska Native*	**12.4**	**4.8**	4.6	0.2	**4.3**	0.6	0.5	1.8	0.3	**3.2**
Non-Hispanic Asian / Pacific Islander	**8.6**	**3.7**	3.6	0.1	**3.4**	0.3	0.2	2.0	0.2	**1.5**
Non-Hispanic Black	**15.3**	**4.1**	3.9	0.2	**5.3**	0.3	0.9	2.3	0.3	**5.9**
Non-Hispanic White	**15.0**	**5.7**	5.4	0.3	**6.4**	0.4	1.2	2.9	0.3	**2.9**

Table 32. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated Total U.S. (1990-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard.
* Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.
**The National Center for Health Statistics (NCHS) US data, reported by SEER, does not include MDS nor MPNs as a cause of death. Therefore, mortality statistics for MDS and MPNs were not reported in 2023 at the time of this publication.

Average Annual Blood Cancer Deaths, by Race/Ethnicity, 2016-2020, US

Race/Ethnicity	All blood cancers**	Lymphomas	NHL	Hodgkin Lymphoma	Leukemia	ALL	CLL	AML	CML	Myeloma
All Races	**57,098**	**21,291**	20,291	1,000	**23,447**	1,509	4,310	10,678	1,175	**12,359**
Hispanic (any race)	**4,471**	**1,767**	1,639	128	**1,758**	360	141	759	88	**946**
Non-Hispanic American Indian / Alaska Native*	**185**	**71**	67	3	**66**	10	6	28	5	**48**
Non-Hispanic Asian / Pacific Islander	**1,671**	**714**	692	21	**664**	54	41	392	30	**294**
Non-Hispanic Black	**5,931**	**1,619**	1,525	94	**2,048**	129	340	913	126	**2,264**
Non-Hispanic White	**44,667**	**17,053**	16,303	750	**18,841**	950	3,768	8,556	923	**8,772**

Table 33. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated Total U.S. (1990-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

* Incidence data for American Indian/Alaska Native are based on the PRCDA (Purchased/Referred Care Delivery Areas) counties.

** The National Center for Health Statistics (NCHS) US data, reported by SEER, does not include MDS nor MPNs as a cause of death. Therefore, mortality statistics for MDS and MPNs were not reported in 2023 at the time of this publication.

Estimated New Cases and Estimated Deaths, by State

Estimated New Cases of Blood Cancers, by State, 2023

State	Total**	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin
Alabama	2,490	780	1,030	560	120
Alaska	230	90	140	*	*
Arizona	3,730	1,190	1,710	660	170
Arkansas	1,650	520	720	330	80
California	18,070	5,510	8,280	3,380	900
Colorado	2,660	870	1,150	490	150
Connecticut	2,350	810	1,020	400	120
Delaware	650	200	310	140	*
Dist. of Columbia	260	60	120	80	*
Florida	18,840	6,080	8,200	3,780	780
Georgia	5,390	1,700	2,090	1,330	270
Hawaii	680	210	330	140	*
Idaho	1,000	380	440	180	*
Illinois	6,640	2,090	2,990	1,200	360
Indiana	3,690	1,230	1,580	700	180
Iowa	2,020	740	860	330	90
Kansas	1,520	500	680	260	80
Kentucky	2,540	850	1,120	460	110
Louisiana	2,540	820	1,040	550	130
Maine	930	340	450	140	*
Maryland	3,380	1,050	1,380	800	150
Massachusetts	3,950	1,280	1,750	710	210
Michigan	5,670	1,820	2,580	1,010	260
Minnesota	3,460	1,200	1,510	610	140
Mississippi	1,510	460	600	380	70
Missouri	3,510	1,190	1,500	650	170
Montana	630	220	290	120	*
Nebraska	1,090	380	470	180	60
Nevada	1,560	540	720	230	70
New Hampshire	840	290	410	140	*
New Jersey	5,550	1,790	2,420	1,060	280
New Mexico	1,080	350	470	200	60
New York	11,600	3,560	5,150	2,280	610
North Carolina	6,360	2,100	2,560	1,420	280
North Dakota	390	160	170	60	*
Ohio	6,340	1,980	2,900	1,150	310
Oklahoma	2,080	710	890	390	90
Oregon	2,260	680	1,090	380	110
Pennsylvania	8,170	2,600	3,690	1,490	390
Rhode Island	650	220	310	120	*
South Carolina	2,980	890	1,230	720	140
South Dakota	490	190	220	80	*
Tennessee	3,700	1,200	1,600	730	170
Texas	13,920	4,780	5,540	2,910	690
Utah	1,240	440	510	220	70
Vermont	400	130	210	60	*
Virginia	4,270	1,230	1,910	920	210
Washington	4,140	1,360	1,900	690	190
West Virginia	1,180	390	550	190	50
Wisconsin	3,760	1,320	1,630	640	170
Wyoming	250	90	110	50	*
United States	**184,720**	**59,610**	**80,550**	**35,730**	**8,830**

Table 34. Source: American Cancer Society.
* Estimate is fewer than 50 cases.
**Total does not include individually suppressed estimates
Estimates are rounded to the nearest 10. State estimates may not sum to US total due to rounding and exclusion of state estimates with fewer than 50 cases or deaths.
(Please note: The projected numbers of new cancer cases and deaths in 2023 should not be compared with previous years to track cancer trends because they are model-based and vary from year to year for reasons other than changes in cancer occurrence. Age-standardized incidence and death rates should be used to measure cancer trends.)

Estimated Deaths from Blood Cancers, by State, 2023

State	Total**	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin
Alabama	870	370	290	210	*
Alaska	0	*	*	*	*
Arizona	1,250	530	430	290	*
Arkansas	510	200	190	120	*
California	5,900	2,290	2,180	1,310	120
Colorado	830	340	280	210	*
Connecticut	660	290	230	140	*
Delaware	230	90	80	60	*
Dist. of Columbia	0	*	*	*	*
Florida	4,580	1,970	1,580	980	50
Georgia	1,500	660	500	340	*
Hawaii	230	90	90	50	*
Idaho	330	140	120	70	*
Illinois	2,150	910	780	460	*
Indiana	1,190	510	460	220	*
Iowa	610	260	200	150	*
Kansas	540	240	190	110	*
Kentucky	870	400	320	150	*
Louisiana	880	390	290	200	*
Maine	310	120	120	70	*
Maryland	1,050	420	350	280	*
Massachusetts	1,070	490	350	230	*
Michigan	2,020	800	760	460	*
Minnesota	1,070	450	400	220	*
Mississippi	550	230	170	150	*
Missouri	1,200	470	420	260	50
Montana	210	80	70	60	*
Nebraska	350	160	110	80	*
Nevada	530	200	220	110	*
New Hampshire	250	100	100	50	*
New Jersey	1,490	640	530	320	*
New Mexico	340	130	130	80	*
New York	2,720	1,200	1,000	520	*
North Carolina	1,820	760	640	420	*
North Dakota	120	70	50	*	*
Ohio	2,420	1,060	830	530	*
Oklahoma	780	340	290	150	*
Oregon	820	330	310	180	*
Pennsylvania	2,640	1,140	950	550	*
Rhode Island	150	80	70	*	*
South Carolina	990	410	310	270	*
South Dakota	240	130	60	50	*
Tennessee	1,270	520	460	290	*
Texas	4,010	1,590	1,440	930	50
Utah	390	160	140	90	*
Vermont	100	50	50	*	*
Virginia	1,540	590	510	390	50
Washington	1,270	510	480	280	*
West Virginia	410	180	150	80	*
Wisconsin	1,130	480	410	240	*
Wyoming	0	*	*	*	*
United States	**57,380**	**23,710**	**20,180**	**12,590**	**900**

Table 35. Source: American Cancer Society.
*Estimate is fewer than 50 cases.
**Total does not include individually suppressed estimates
Estimates are rounded to the nearest 10. State estimates may not sum to US total due to rounding and exclusion of state estimates with fewer than 50 cases or deaths.
(Please note: The projected numbers of new cancer cases and deaths in 2023 should not be compared with previous years to track cancer trends because they are model-based and vary from year to year for reasons other than changes in cancer occurrence. Age-standardized incidence and death rates should be used to measure cancer trends.)

Average Annual Incidence and Deaths, by State

Average Annual Blood Cancer Incidence Counts, by State, 2015-2019 (All Races, Males and Females)

State	All Blood Cancers	Leukemia	NHL	Myeloma	HL	MDS	MPN
Alabama	2,570	734	943	455	119	160	161
Alaska	291	82	127	36	16	14	16
Arizona	3,203	887	1,291	470	147	273	138
Arkansas	1,834	534	680	264	80	159	119
California	18,829	5,106	7,721	2,640	879	1,481	1,013
Colorado	2,658	753	1,030	397	141	181	159
Connecticut	2,454	652	968	347	119	198	172
Delaware	566	150	231	91	27	35	33
Dist. of Columbia	265	63	98	64	19	9	12
Florida	19,961	4,973	6,497	2,510	690	2,585	2,715
Georgia	5,778	1,566	1,984	973	255	533	472
Hawaii	661	180	277	91	26	51	37
Idaho	1,026	318	378	137	40	76	78
Illinois	7,020	1,948	2,859	1,043	366	450	356
Indiana	3,575	1,034	1,417	525	174	246	182
Iowa	2,137	650	817	292	89	177	113
Kansas	1,681	493	646	219	72	132	120
Kentucky	2,851	853	1,050	383	118	251	198
Louisiana	2,733	737	999	451	133	202	212
Maine	951	273	391	121	41	68	56
Maryland	3,293	849	1,248	574	163	248	214
Massachusetts	3,932	1,039	1,588	567	204	295	241
Michigan	5,925	1,675	2,401	867	254	427	304
Minnesota	3,595	1,061	1,408	450	165	288	226
Mississippi	1,580	412	583	313	73	122	78
Missouri	3,555	1,020	1,384	509	165	283	195
Montana	708	207	245	103	27	63	64
Nebraska	1,084	314	449	141	54	81	46
Nevada	775	249	312	105	35	50	25
New Hampshire	880	231	370	107	44	64	63
New Jersey	6,202	1,675	2,353	873	292	571	440
New Mexico	1,016	328	375	152	47	60	55
New York	13,764	3,751	5,067	2,006	633	1,126	1,190
North Carolina	6,109	1,725	2,161	985	267	478	495
North Dakota	433	136	158	53	21	34	31
Ohio	6,482	1,742	2,785	933	330	434	261
Oklahoma	2,015	601	790	296	86	134	108
Oregon	2,214	648	934	285	102	138	111
Pennsylvania	8,731	2,425	3,387	1,206	410	713	594
Rhode Island	631	186	253	82	34	49	29
South Carolina	2,727	756	998	494	119	201	161
South Dakota	537	165	196	75	21	46	34
Tennessee	3,596	1,012	1,429	548	175	240	194
Texas	13,555	3,897	4,838	2,109	658	986	1,075
Utah	1,302	400	493	175	75	91	69
Vermont	376	100	161	50	17	24	23
Virginia	3,862	1,024	1,624	657	192	223	145
Washington	4,216	1,204	1,638	566	181	342	290
West Virginia	1,240	375	498	156	45	96	71
Wisconsin	3,921	1,159	1,508	525	179	328	224
Wyoming	286	88	115	39	14	14	17
United States	**189,589**	**52,441**	**72,153**	**27,511**	**8,630**	**15,529**	**13,436**

Table 36. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.
Note: Due to rounding, the total for all blood cancers may not equal the sum of the subtypes.

Average Annual Blood Cancer Deaths, by State, 2016-2020 (All Races, Males and Females)

State	All Blood Cancers*	Leukemia	NHL	Myeloma	Hodgkin
Alabama	902	374	298	215	16
Alaska	85	35	34	14	^
Arizona	1,197	504	410	261	23
Arkansas	555	232	195	116	11
California	5,911	2,392	2,152	1,243	124
Colorado	797	328	265	190	14
Connecticut	652	274	236	133	9
Delaware	205	83	72	48	3
Dist. of Columbia	89	31	28	28	^
Florida	4,385	1,861	1,542	907	75
Georgia	1,531	621	511	370	29
Hawaii	222	86	90	43	2
Idaho	316	129	113	68	5
Illinois	2,222	922	798	465	36
Indiana	1,258	513	461	265	19
Iowa	649	268	233	139	9
Kansas	560	241	198	113	8
Kentucky	894	377	324	174	19
Louisiana	827	333	284	194	16
Maine	299	118	112	64	6
Maryland	1,040	408	340	276	17
Massachusetts	1,198	494	430	253	20
Michigan	2,046	813	754	449	30
Minnesota	1,074	449	391	217	18
Mississippi	546	231	172	133	10
Missouri	1,181	487	419	252	23
Montana	204	81	71	48	4
Nebraska	351	154	120	71	6
Nevada	468	191	177	90	10
New Hampshire	249	100	93	51	5
New Jersey	1,549	641	548	337	23
New Mexico	330	127	118	77	8
New York	3,325	1,378	1,200	684	63
North Carolina	1,794	726	605	432	31
North Dakota	141	63	45	31	3
Ohio	2,368	970	849	513	36
Oklahoma	774	327	280	154	14
Oregon	806	325	298	170	13
Pennsylvania	2,714	1,118	1,001	554	41
Rhode Island	203	86	75	39	4
South Carolina	949	382	307	245	14
South Dakota	176	68	63	42	2
Tennessee	1,288	522	459	286	21
Texas	3,916	1,586	1,382	871	76
Utah	369	158	128	80	4
Vermont	127	51	49	26	^
Virginia	1,425	575	493	333	24
Washington	1,243	500	460	262	20
West Virginia	425	179	155	82	8
Wisconsin	1,163	490	418	236	19
Wyoming	96	43	34	18	^
United States	**57,098**	**23,447**	**20,291**	**12,359**	**1,000**

Table 37. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs) Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
^ Statistic not displayed due to fewer than 10 total deaths in the 5-year period or because counts for a subgroup are supressed. The suppressed cases, however, are included in the counts and rates for the US combined.
* The National Center for Health Statistics (NCHS) US data, reported by SEER, does not include MDS nor MPNs as a cause of death. Therefore, mortality statistics for MDS and MPNs were not reported in 2023 at the time of this publication.
Note: Due to rounding, the total for all blood cancers may not equal the sum of the subtypes.

Average Annual Incidence, by Race and State

Average Annual Blood Cancer Incidence Counts, by Race/Ethnicity and State, 2015-2019, Males and Females

State	All Races	Hispanic (any race)**	Non-Hispanic American Indian / Alaska Native	Non-Hispanic Asian / Pacific Islander	Non-Hispanic Black	Non-Hispanic White
Alabama	2,570	35	4	16	549	1,867
Alaska	291	8	40	17	8	216
Arizona	3,203	530	81	61	105	2,404
Arkansas	1,834	42	16	16	222	1,496
California	18,829	4,416	94	2,095	1,127	10,750
Colorado	2,658	314	15	45	94	2,162
Connecticut	2,454	207	^	38	187	1,994
Delaware	566	27	^	9	93	431
Dist. of Columbia	265	21	^	5	145	85
Florida	19,961	3,101	33	221	1,853	14,028
Georgia	5,778	243	5	123	1,536	3,844
Hawaii	661	39	^	403	9	197
Idaho	1,026	54	7	7	3	949
Illinois	7,020	-	~	+	#	#
Indiana	3,575	98	3	31	262	3,158
Iowa	2,137	41	4	15	46	2,016
Kansas	1,681	79	~	+	#	#
Kentucky	2,851	36	^	17	174	2,598
Louisiana	2,733	69	7	27	701	1,918
Maine	951	5	5	4	4	928
Maryland	3,293	131	4	121	867	2,147
Massachusetts	3,932	-	#	#	#	#
Michigan	5,925	118	31	73	657	4,932
Minnesota	3,595	71	28	62	113	3,276
Mississippi	1,580	11	4	10	498	1,057
Missouri	3,555	48	7	31	328	3,117
Montana	708	11	27	^	^	661
Nebraska	1,084	42	6	10	41	969
Nevada*	1,292	174	8	73	96	916
New Hampshire	880	12	^	8	6	843
New Jersey	6,202	711	~	275	623	4,443
New Mexico	1,016	335	54	16	17	565
New York	13,764	1,631	~	625	1,601	9,761
North Carolina	6,109	223	41	68	1,128	4,556
North Dakota	433	^	14	^	7	406
Ohio	6,482	92	5	58	620	5,609
Oklahoma	2,015	82	188	25	123	1,579
Oregon	2,214	114	29	60	34	1,963
Pennsylvania	8,731	278	7	112	676	7,560
Rhode Island	631	47	^	7	24	540
South Carolina	2,727	54	4	20	590	2,007
South Dakota	537	5	23	^	4	502
Tennessee	3,596	72	3	28	442	3,003
Texas	13,555	3,283	49	374	1,490	8,309
Utah	1,302	118	8	25	12	1,127
Vermont	376	^	^	^	^	364
Virginia	3,862	139	8	113	690	2,831
Washington	4,216	213	59	239	134	3,517
West Virginia	1,240	5	^	4	31	1,190
Wisconsin	3,921	91	26	33	172	3,582
Wyoming	286	14	5	^	^	262

Table 38. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.
* Average annual counts for Nevada are for 2015-2017 only, 2018-2019 data not available.
** Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA).
^ Statistic not displayed due to fewer than 16 total cases in the 5-year period.
- Hispanic ethnicity data cannot be displayed for Illinois and Massachusetts.
~ Data for American Indian and Alaska Native people cannot be displayed for Illinois, Kansas, New Jersey, and New York.
+ Data for Asian and Pacific Islander people cannot be displayed for Illinois and Kansas.
# Race and ethnicity combinations—Black non-Hispanic, White non-Hispanic—cannot be displayed for Illinois, Kansas, and Massachusetts.

Average Annual Deaths, by Race and State

Average Annual Blood Cancer Deaths, by Race/Ethnicity and State, 2016-2020*, Males and Females

State	All Races	Hispanic (any race)	Non-Hispanic American Indian / Alaska Native	Non-Hispanic Asian / Pacific Islander	Non-Hispanic Black	Non-Hispanic White
Alabama	902	8	^	4	194	694
Alaska	85	^	8	6	^	68
Arizona	1,197	168	23	21	38	942
Arkansas	555	7	^	2	65	479
California	5,911	1,251	18	657	382	3,589
Colorado	797	83	^	10	26	674
Connecticut	652	36	^	7	47	561
Delaware	205	7	^	4	31	163
Dist. of Columbia	89	5	^	^	55	28
Florida	4,385	647	^	60	485	3,188
Georgia	1,531	49	^	26	409	1,045
Hawaii	222	9	^	150	^	60
Idaho	316	12	^	^	^	299
Illinois	2,222	140	^	53	278	1,750
Indiana	1,258	22	^	7	84	1,144
Iowa	649	8	^	5	10	626
Kansas	560	19	^	5	28	501
Kentucky	894	5	^	3	51	834
Louisiana	827	17	^	7	219	581
Maine	299	^	^	^	^	293
Maryland	1,040	27	^	35	282	695
Massachusetts	1,198	43	^	28	54	1,057
Michigan	2,046	38	5	18	212	1,765
Minnesota	1,074	18	4	17	28	1,005
Mississippi	546	4	^	^	164	376
Missouri	1,181	13	^	8	104	1,054
Montana	204	^	6	^	^	194
Nebraska	351	6	^	2	12	330
Nevada	468	49	3	31	38	347
New Hampshire	249	^	^	^	^	245
New Jersey	1,549	142	^	63	185	1,157
New Mexico	330	111	17	2	6	193
New York	3,325	324	3	134	423	2,407
North Carolina	1,794	37	^	18	342	1,381
North Dakota	141	^	4	^	^	134
Ohio	2,368	23	^	15	234	2,094
Oklahoma	774	22	47	8	43	654
Oregon	806	24	7	17	13	745
Pennsylvania	2,714	61	^	26	224	2,393
Rhode Island	203	8	^	^	8	185
South Carolina	949	11	^	7	213	716
South Dakota	176	^	6	^	^	166
Tennessee	1,288	13	^	6	161	1,107
Texas	3,916	864	^	92	422	2,528
Utah	369	22	^	6	3	336
Vermont	127	^	^	^	^	126
Virginia	1,425	40	^	34	258	1,086
Washington	1,243	46	16	58	35	1,087
West Virginia	425	2	^	^	11	410
Wisconsin	1,163	18	4	9	44	1,087
Wyoming	96	4	^	^	^	90

Table 39. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1990-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
* The National Center for Health Statistics (NCHS) US data, reported by SEER, does not include MDS nor MPNs as a cause of death. Therefore, mortality counts for blood cancers only include lymphomas, leukemias and myelomas.
^ Statistic not displayed due to fewer than 10 total cases in the 5-year period.

Average Annual Leukemia Incidence and Deaths, by State

Average Annual Leukemia Incidence Counts, by State, 2015-2019, All Races, Males and Females

State	Leukemia	Acute Lymphoblastic Leukemia	Chronic Lymphocytic Leukemia	Acute Myeloid Leukemia	Chronic Myeloid Leukemia
Alabama	734	67	248	208	108
Alaska	82	11	21	25	13
Arizona	887	135	223	307	119
Arkansas	534	47	207	153	74
California	5,106	776	1,490	1,646	675
Colorado	753	82	253	239	83
Connecticut	652	53	263	186	85
Delaware	150	13	49	53	20
Dist. of Columbia	63	11	19	18	9
Florida	4,973	415	1,827	1,386	722
Georgia	1,566	151	559	457	233
Hawaii	180	24	40	70	29
Idaho	318	31	124	86	44
Illinois	1,948	218	632	639	261
Indiana	1,034	100	374	330	129
Iowa	650	53	261	198	80
Kansas	493	44	192	144	66
Kentucky	853	73	329	242	119
Louisiana	737	63	279	218	112
Maine	273	21	121	78	27
Maryland	849	89	278	268	115
Massachusetts	1,039	98	361	326	139
Michigan	1,675	142	595	544	231
Minnesota	1,061	94	416	323	141
Mississippi	412	38	133	136	63
Missouri	1,020	89	360	311	127
Montana	207	14	97	46	26
Nebraska	314	33	109	99	40
Nevada	249	30	89	68	29
New Hampshire	231	19	87	70	30
New Jersey	1,675	164	667	450	210
New Mexico	328	40	119	90	47
New York	3,751	312	1,512	1,062	480
North Carolina	1,725	157	662	499	252
North Dakota	136	13	56	37	18
Ohio	1,742	181	531	579	235
Oklahoma	601	65	207	180	89
Oregon	648	65	241	204	75
Pennsylvania	2,425	210	874	758	313
Rhode Island	186	17	66	56	26
South Carolina	756	69	247	235	116
South Dakota	165	13	67	49	24
Tennessee	1,012	97	318	311	157
Texas	3,897	545	1,255	1,011	565
Utah	400	51	141	115	54
Vermont	100	9	37	31	12
Virginia	1,024	121	272	366	138
Washington	1,204	119	482	346	155
West Virginia	375	23	149	112	54
Wisconsin	1,159	94	475	321	164
Wyoming	88	8	30	29	12
United States	**52,441**	**5,404**	**18,446**	**15,716**	**7,148**

Table 40. Source: National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022. Accessed at www.cdc.gov/cancer/uscs/public-use.

Average Annual Leukemia Deaths, by State, 2016-2020, All Races, Males and Females

State	Leukemia	Acute Lymphoblastic Leukemia	Chronic Lymphocytic Leukemia	Acute Myeloid Leukemia	Chronic Myeloid Leukemia
Alabama	374	22	53	145	16
Alaska	35	2	6	19	^
Arizona	504	38	100	221	24
Arkansas	232	15	38	96	11
California	2,392	227	419	1,116	119
Colorado	328	19	67	157	15
Connecticut	274	15	54	130	13
Delaware	83	5	15	43	3
Dist. of Columbia	31	2	7	13	3
Florida	1,861	119	336	846	103
Georgia	621	37	97	260	36
Hawaii	86	7	10	43	5
Idaho	129	9	26	59	7
Illinois	922	54	158	419	51
Indiana	513	32	103	236	26
Iowa	268	14	63	130	12
Kansas	241	14	43	115	13
Kentucky	377	19	75	166	18
Louisiana	333	19	55	129	14
Maine	118	7	25	55	6
Maryland	408	23	79	188	19
Massachusetts	494	22	104	229	21
Michigan	813	46	164	361	42
Minnesota	449	23	106	205	25
Mississippi	231	11	30	79	11
Missouri	487	27	100	224	23
Montana	81	4	21	34	3
Nebraska	154	9	31	77	8
Nevada	191	16	30	88	10
New Hampshire	100	5	21	50	3
New Jersey	641	40	112	276	29
New Mexico	127	9	21	58	8
New York	1,378	81	253	665	61
North Carolina	726	39	136	347	35
North Dakota	63	2	14	28	2
Ohio	970	56	176	442	50
Oklahoma	327	24	57	135	16
Oregon	325	15	68	155	20
Pennsylvania	1,118	55	221	512	52
Rhode Island	86	4	16	36	6
South Carolina	382	23	68	170	23
South Dakota	68	3	17	29	4
Tennessee	522	33	102	233	29
Texas	1,586	144	241	710	84
Utah	158	10	31	65	8
Vermont	51	3	9	26	3
Virginia	575	35	105	268	27
Washington	500	34	96	253	24
West Virginia	179	9	37	80	9
Wisconsin	490	26	91	239	22
Wyoming	43	3	7	20	3
United States	23,447	1,509	4,310	10,678	1,175

Table 41. Source; Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
^ Statistic not displayed due to fewer than 10 total deaths in the 5-year period or because counts for a subgroup are supressed. The suppressed cases, however, are included in the counts and rates for the US combined.

Notes and Definitions

The classification of leukemia, myeloma and lymphomas used in this publication is based on The National Cancer Institute's Surveillance, Epidemiology, and End Results' (SEER) site recode definition (https://seer.cancer.gov/siterecode/icdo3_dwhoheme/index.html). This is consistent with the classifications used for most national cancer reporting, including SEER, United States Cancer Statistics (USCS) and the North American Association of Central Cancer Registries (NAACCR). Myelodysplastic syndromes (MDS) are defined using International Classification of Diseases-Oncology, Third Edition (ICD-O-3), histologic type codes 9980-9989. Myeloproliferative neoplasms (MPNs) are defined using ICD-O-3 histologies 9950-9964.

The data within *Facts 2022-2023* reflect the most recent statistics available at the time of the start of this publication from The National Cancer Institute's SEER*Explorer interactive website (https://seer.cancer.gov/explorer/). SEER*Explorer reports cancer incidence, mortality, survival, prevalence and lifetime risk statistics. Incidence, prevalence and survival data were released online by SEER, www.seer.cancer.gov, on April 15, 2022. Recent SEER statistics were published in the spring of 2023. That data is not reflected in this publication.

Incidence and mortality rates measure exactly what occurred and cover the entire period through the most recent year reported, 2019 for incidence and 2020 for mortality. However, in order to calculate survival rates, the most current year of data is not considered, because not enough time has passed for it to be included.

The SEER Program's SEER*Explorer presents statistics by age, sex, race and ethnicity. Statistics for these categories reflect a blend of biological and cultural factors. Additionally, data reported by race and ethnicity represent both the diversity and the mixed heritage of the United States (US) population.

SEER's recommendations for producing statistics by race and origin changed with the November 2021 databases and have been changed accordingly in this publication. See here for more information: https://seer.cancer.gov/seerstat/variables/seer/race_ethnicity/

Data on Hispanic ethnicity are not shown for statistics/years for which they are not available. Incidence data for Hispanics and Non-Hispanics are based on the NAACCR Hispanic Latino Identification Algorithm (NHIA).

Mortality data reflected in the referenced SEER statistics reflect data from the National Cancer for Health Statistics (NCHS) from 1969 to 2020 and were made available in 2022. State-level mortality data is also provided by NCHS and is presented as a yearly average of deaths from 2016-2020.

When reporting statistics using the SEER data, different populations are used depending on the statistic type. The SEER22 regions, used for recent incidence rates, cover about 47.9 percent of the US population. Survival data is not available for all of the SEER 22 areas, so the SEER 17 areas (about 26.5 percent of the US population) are used for recent survival statistics. Data is not available for either the SEER 22 or SEER 17 regions before 2000, so long-term incidence and survival trends must rely on a smaller subset of the data, most often SEER 8, which covers only about 8.3 percent of the US population. The data can be extrapolated for the entire US by multiplying by the population ratio, but these figures do not take into account differences in geography, race and ethnicity in various regions, or region-specific health risks. These registry groupings were changed from previous publications, reflecting revised SEER registry participation starting with the November 2021 data submission. See here for more information: https://seer.cancer.gov/registries/terms.html

Data on American Indians and Alaska Natives (AIs/ANs) should be interpreted with care because the data reflect statistics from purchased/referred care delivery areas only. A purchased/referred care delivery area (PRCDA) is a geographic area within which purchased/referred care is made available by the Indian Health Service (IHS) to members of an identified Indian community who reside in the area. A PRCDA was formerly a contract health service delivery area (CHSDA). Many AIs/ANs do not reside in such counties, and other AI/AN individuals are not members of federally recognized tribes and cannot avail themselves of IHS services.

Limited data on myelodysplastic syndromes (MDS) and myeloproliferative neoplasms (MPNs) were included in the SEER statistics as entities on their own beginning in 2007.

The American Cancer Society (ACS) projected the number of estimated cancer cases for 2023 using a model based on incidence data from 50 states and the District of Columbia for the years from 2005 to 2019. That incidence data met the NAACCR's high-quality data standard for incidence. This method considers geographic variations in sociodemographic and lifestyle factors, medical settings and cancer screening behaviors as predictors of incidence, and also accounts for expected delays in case reporting. The ACS projected the estimated number of US cancer deaths by fitting the number of cancer deaths from 2006 to 2020 to a statistical model that forecasts the number of deaths expected to occur in 2023. The estimated number of cancer deaths for each state is calculated similarly, using state-level data. For both US and state estimates, data on the number of deaths are obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC).

In instances where 2023 incidence count estimates are not available from the ACS, actual national incidence counts were obtained using the USCS public use database, which contains cancer incidence for the entire US for 2001 to 2019, sourced from the CDC's National Program for Cancer Registries (NPCR) and SEER. National and state-level incidence counts are presented as a yearly average of the 5 most recent years of US incidence available.

Definitions

Age-adjusted rate is an incidence or death rate that has been adjusted to reduce the bias of age in the makeup of the populations that are being compared, thereby providing a more reliable rate for comparison. Incidence or death rates can be adjusted for any demographic factor or any combination of factors, such as age (the most common), sex and race.

Cancer mortality rate is the number of deaths, with cancer as the underlying cause of death, occurring in a specified population during a year. Cancer mortality is usually expressed as the number of deaths due to cancer per 100,000 population. The population used depends on the rate to be calculated. The mortality rate can be computed for a given cancer site or for all cancers combined.

Incidence is the number of newly diagnosed cases either for a specific cancer, or for all cancers combined, during a specific time period. When expressed as a rate, it is the number of new cases per standard unit of population during the time period. Incidence rates can be calculated based on a number of factors, such as age, race or sex.

Prevalence is the estimated number of people alive on a certain date in a population who previously had a diagnosis of the disease. It includes new cases (incidence) and preexisting cases and is a function of both past incidence and survival. Prevalence may be calculated in a number of different ways, especially in looking at populations in which individuals have had more than one type of cancer. In some prevalence statistics, only the first diagnosed cancer counts. Thus, if a person is initially diagnosed with melanoma and later develops leukemia, his or her survival with leukemia may not be counted in leukemia prevalence statistics. Therefore, prevalence numbers reported may vary depending upon the method used to determine them. In this report, complete prevalence is reported as defined by SEER as "an estimate of the number of persons (or the proportion of population) alive on a specified date who had been diagnosed with the given cancer, no matter how long ago that diagnosis was." Most prevalence in this publication is using the "27-year limited duration" prevalence figures, based on the "first invasive tumor for each cancer site diagnosed during the previous 27 years (1992-2018)," as per SEER*Explorer prevalence reporting. Because myelodysplastic syndromes (MDS) and myeloproliferative neoplasms (MPNs) have been collected for a shorter period of time, 18-year limited duration prevalence is used for those cancers. The specified date is January 1, 2019 for the prevalence estimates.

The prevalence counts in *Facts 2022-2023* are adjusted for race, sex and age.

Relative survival rate is an estimate of the percentage of patients who would be expected to survive the effects of the cancer. This rate is calculated by adjusting the observed survival rate so the effects of causes of death other than those related to the cancer in question are removed. The relative survival rate is a comparison of survival to that of a person who is free of the disease. "Observed survival" is the actual percentage of patients still alive at some specified time after diagnosis of cancer. It considers deaths from all causes, cancer or otherwise.

Remission is when signs of a disease disappear. This usually follows treatment. The words "complete" and "partial" are sometimes used to further define the term "remission." Complete remission means all evidence of the disease is gone. Partial remission means the disease is markedly improved by treatment, but residual evidence of the disease is present.

About The Leukemia & Lymphoma Society

The Leukemia & Lymphoma Society (LLS) has helped millions impacted by blood cancer since our founding in 1949, funding research to advance breakthroughs and providing lifesaving support and advocacy for patients.

- **LLS is the largest nonprofit funder of leading-edge research for every type of blood cancer. Our thoughtful investments in blood cancer research have led and will lead to scientific breakthroughs that improve and save the lives of patients.**
- **LLS is the leading source of free blood cancer information, education and support, and helps patients navigate their cancer treatment, access quality care and find clinical trials.**
- **LLS advocates for policy changes to break down the barriers that stand between patients and the care they need.**

Research

Since our founding in 1949, The Leukemia & Lymphoma Society (LLS) has invested more than $1.6 billion in groundbreaking blood cancer research, pioneering many of today's most innovative approaches. We provide funding across the continuum, from basic research through clinical trials—from bench to bedside. **Research Grants** have funded many of today's most promising advances, including targeted therapies and immunotherapies and our funding supports the training of the next generation of first-rate cancer researchers. Four of our ***Therapy Acceleration Program® (TAP)*** supported therapies have been approved by the FDA or included in the National Comprehensive Cancer Network (NCCN) Guidelines.

LLS creates partnerships with universities and biotechnology and pharmaceutical companies to get treatments to patients faster than ever—especially to patients with unmet medical needs.

Our **Research Grant programs** support scientific studies at academic centers throughout the world.

- The *Career Development Program (CDP)* is designed to encourage promising young investigators to embark on academic careers, offering the opportunity to take part in basic, translational, or clinical research to help understand and treat blood cancers and relevant premalignant conditions.
- The *Translational Research Program (TRP)* is designed to reduce the time between laboratory findings and actual treatment, putting research on the bench-to-bedside fast track when it comes to finding better treatment and cures for blood cancers.
- The *Specialized Center of Research Program (SCOR)* supports teams of researchers from one or several institutions representing different disciplines engaged in collaborative efforts to discover new approaches to treat patients with blood cancers.
- The Discovery Grants: the *Blood Cancer Discoveries Grants Program (BCDG)* and the *Discovery Grant Program (DGP)* support cutting edge, innovative research that is oriented toward discovery, concerned with understanding blood cancer properties and vulnerabilities and aimed toward advancing treatments for blood cancers.
- The *Impactful Medicine Providing Access to Clinical Trials (IMPACT)* program supports clinical trial networks that expand access to patients in underserved communities.
- The *Academic Clinical Trials Program (ACT)* program supports academic investigator initiated clinical trials (IIT) in the hematological malignancy space, primarily IIT Phase 1 or 2 trials.
- We also announce disease focused special programs on a regular basis to accelerate research areas with high unmet need, such as mantle cell lymphoma, hairy cell leukemia or chronic myelomonocytic leukemia.

Research Grants currently has ongoing foundation partnerships with:

- The **MPN Research Foundation**, to fund innovative grants to better understand and treat the range of myeloproliferative neoplasms (MPNs)
- The **International Waldenström's Macroglobulinemia Foundation**, to fund research to improve quality of life and to better understand and treat Waldenström's Macroglobulinemia (WM) and other B-cell malignancies
- The **Rising Tide Foundation for Clinical Cancer Research**, to fund novel immunotherapy and prevention research linked to clinical trials for all blood cancers
- The **Sarah Cannon Research Institute**, to fund an intensive research program in mantle cell lymphoma
- The **Snowdome Foundation**, and the **Leukaemia Foundation** to fund translational research on blood cancer in Australia
- The **Mark Foundation** and **The Paul G. Allen Frontiers Group**, to fund early-stage discovery research
- The **Hairy Cell Leukemia Foundation**, to invest in targeted research for hairy cell leukemia
- Major partnerships with the Mayo Clinic, Vanderbilt University Medical Center, Weill Cornell Medicine, Emory University, University of Colorado, and the Fred Hutchinson Cancer Center, to support large, multi-investigator research grants.

Our ***Therapy Acceleration Program® (TAP)*** is a strategic venture philanthropy initiative that builds business alliances and collaborations with biotechnology companies to identify potential breakthrough therapies with the ability to change the standard of

care in leukemia, lymphoma, and multiple myeloma. TAP works with companies to guide and provide funding support for late-stage preclinical studies, and proof of concept or registrational clinical trials to help advance therapeutics along the drug development and approval pathway to improve patient lives.

Established in 2007, TAP has invested >$140 million in over 70 projects. Since 2017, four of these TAP-supported therapies have been approved by the FDA or included NCCN Guidelines and have greatly impacted patient care.

- **CPX-351 (Vyxeos®)**, first approved treatment (an innovative reformulation of two chemotherapies) for patients with certain types of high-risk acute myeloid leukemia
- **Axicabtagene ciloleucel (Yescarta®)**, first CAR T-cell immunotherapy approved for patients with non-Hodgkin lymphoma and transformed follicular lymphoma
- **Tagraxofusp-erzs (Elzonris®)**, first approved therapy for children and adults with blastic plasmacytoid dendritic cell neoplasm
- **Duvelisib (Copiktra®)**, first dual inhibitor of PI3K-delta and gamma pathways included in NCCN Guidelines for patients with all subtypes of peripheral T-cell lymphoma

Currently, there are over 20 TAP-supported companies with promising therapies in active development, including several in ongoing registration-enabling clinical studies in blood cancer.

Visit www.LLS.org/Research or email researchprograms@LLS.org for information about LLS research grant programs. To learn more about TAP visit https://www.lls.org/TAP.

Public Policy

The Leukemia & Lymphoma Society (LLS) recognizes finding cures is not enough. We must also work diligently to ensure patients have access to affordable treatments that allow them to live healthy, productive lives. Working closely with dedicated volunteer advocates, the LLS Office of Public Policy (OPP) elevates the voices of patients to state and federal elected officials, the White House, governors and even courts. Together, we advocate for safe and effective treatments. We pursue policies that would make care more accessible to all patients. And, most of all, we advocate for the hope for a cure.

The department is composed of leaders in government affairs, public policy, grassroots advocacy, legal advocacy and communications. They are proud to work closely with an incredible network of volunteer patient advocates whose lives have been touched by blood cancer. Together, we work to elevate the voices of cancer patients and their families and make their interests heard by all levels of government.

To learn more about OPP's work and how to get involved, visit www.LLS.org/policy-advocacy or text SPEAK to 73727 to join the LLS Mobile Action Network

Education and Support Services

The Leukemia & Lymphoma Society (LLS) is the leading source of free blood cancer information, education and support. To help ensure access to the latest treatments and survivorship care, and improve quality of life, staff and volunteers provide assistance and resources to patients, caregivers and healthcare professionals nationally and in communities through our chapters across the United States (US) and Canada.

- **Personalized disease and treatment information and support.** Our Information Specialists are highly trained oncology social workers and nurses who provide free one-on-one assistance to patients, families and healthcare professionals. These Specialists offer personalized guidance for coping with a blood cancer diagnosis, current disease and treatment information and referral to financial and support resources within LLS and beyond. Information Specialists can be contacted at (800) 955-4572, Monday through Friday, from 9 am to 9 pm Eastern Time, or by email or live chat at www.LLS.org/InformationSpecialists.
- **One-on-one clinical trial support.** Through our Clinical Trial Support Center (CTSC) patients and caregivers can work one-on-one with an LLS Clinical Trial Nurse Navigator who will conduct a comprehensive clinical trial search and personally assist them throughout the entire clinical trial process. Clinical Trial Nurse Navigators are registered nurses with expertise in blood cancers. To speak with a CTSC nurse navigator at no cost, call our Information Specialists or visit www.LLS.org/CTSC.
- **Nutrition consultations.** LLS offers free one-on-one nutrition consultations to patients and caregivers by phone or email with a registered dietitian who has expertise in oncology nutrition. Visit www.LLS.org/nutrition.
- **Assistance with financial burdens.** LLS offers financial assistance to help individuals with blood cancer.
    - *Local Financial Assistance Programs* provide assistance for non-medical expenses including transportation, housing, utilities, child/elder care, food, clothing, phone and/or acute dental work related to treatment. Eligible patients receive a $500 grant. Visit www.LLS.org/LocalFinancialAssistance or call (877) 557-2672.
    - *Patient Aid Program* provides financial assistance to blood cancer patients. Eligible patients will receive a one-time $100 stipend to help offset expenses. There are no income criteria to qualify for this program. Visit www.LLS.org/PatientAid or call (877) 557-2672.
    - *Susan Lang Pay-it-Forward Patient Travel Assistance Program* provides financial assistance to patients diagnosed with a blood cancer who struggle to pay for treatment-related transportation and/or lodging expenses. Eligible patients will receive $500. Patient assistance is based upon available funding. Visit www.LLS.org/travel or call (877) 557-2672.

- *Susan Lang Pre CAR T-cell Therapy Travel Assistance Program* is available to blood cancer patients with significant financial need who are being evaluated to receive CAR T-cell therapy as either standard treatment or a clinical trial. Eligible patients will receive $2,500 to help pay for approved transportation and/or lodging expenses. Patient assistance is based upon available funding. Visit www.LLS.org/PreCARTtravel or call (877) 557-2672.
- *Urgent Need Program,* established in partnership with Moppie's Love and Charlie's Fund, helps pediatric, young adult and adult blood cancer patients with acute financial need. The program provides a $500 grant to assist with non-medical expenses, including utilities, rent, mortgage, food, lodging, dental care, childcare, elder care and other essential needs. Patient assistance is based upon available funding. Visit www.LLS.org/UrgentNeed or call (877) 557-2672.
- *Veterans Dental Partnership* provides assistance to Veterans with blood cancer to access dental care to begin lifesaving therapy or as a consequence of therapy. All expenses for the required dental care will be covered, as long as funding is available. Visit www.LLS.org/VeteransDental or call (800) 955-4572.

For information about all LLS Financial Assistance Programs, visit www.LLS.org/finances.

- **Information booklets.** Free disease, treatment and support booklets in English, Spanish and several other languages are available through our Information Specialists and LLS chapters, and can be downloaded and ordered at www.LLS.org/booklets.
- **Education programs.** LLS provides free education programs for patients, caregivers and healthcare professionals. Programs and videos for patients and caregivers feature experts who share the latest disease, treatment and research updates, including information about survivorship. These programs are available via telephone and Web. Visit www.LLS.org/programs and www.LLS.org/EducationVideos.

  LLS also offers free continuing education programs for healthcare professionals including nurses, social workers and physicians. Visit www.LLS.org/ProfessionalEd.
- **Free Mobile Apps**
  - LLS Health Manager™ – Helps you track side effects, medication, food and hydration, questions for your doctor, and more. Available in Spanish and French Canadian. Visit www.LLS.org/HealthManager to download for free.
  - LLS Coloring For Kids™ – Allows children to express their creativity and offers activities to help them learn about blood cancer and its treatment. Visit www.LLS.org/ColoringApp to download for free.
- **Podcasts.**
  - Our podcast series for patients and caregivers, *The Bloodline with LLS,* features patients, caregivers, advocates, doctors and other healthcare professionals who discuss diagnosis, treatment options, quality-of-life concerns, treatment side effects, doctor-patient communication and other important survivorship topics. For more information and to subscribe, visit www.LLS.org/TheBloodline.
  - Our podcast series for healthcare professionals (HCPs), *Treating Blood Cancers,* provides up-to-date and accurate information on diagnosis, treatment and survivorship to educate HCPs. For more information and to subscribe, visit www.LLS.org/CE.
- **Connection with other blood cancer survivors.** LLS has created many opportunities for peer-to-peer support.
  - Weekly online chats are moderated by a licensed social worker; the chats give cancer patients and caregivers the opportunity to reach out, share information and provide support to one another in a structured, online setting. For more information, visit www.LLS.org/chat.
  - *The Patti Robinson Kaufmann First Connection® Program* gives patients and caregivers the opportunity to talk about their experiences one-on-one with someone who has "been through it" and obtain valuable information about the community resources available to support them. Visit www.LLS.org/FirstConnection.
  - *LLS Community* is a one-stop virtual meeting place for talking with other patients and caregivers, receiving the latest blood cancer resources and information and getting personalized support from trained LLS staff. To join, visit www.LLS.org/community.
  - Support groups in local communities provide mutual support and offer the opportunity to discuss anxieties and concerns with others who share the same experiences. To find out if there is a support group near you, visit www.LLS.org/ChapterFind to contact your chapter.
- **Blood Cancer Conferences.** LLS Blood Cancer Conferences are free educational events where blood cancer patients, caregivers and their families can learn more about the latest disease-specific breakthroughs, current treatments and survivorship information from local and national experts. Visit www.LLS.org/BCC for a list of these upcoming events.
- ***Myeloma Link.*** Myeloma Link is a special initiative designed to connect Black communities to information, expert myeloma care, treatment and support, as the rate of myeloma is twice as high among Blacks than whites. This unique community-based program is currently being implemented in select cities around the US. Visit www.LLS.org/MyelomaLink to learn more.

Visit www.LLS.org/PatientSupport for access to up-to-date disease, treatment and support information.

Citations and Acknowledgements

PLEASE CITE THIS REPORT AS: The Leukemia & Lymphoma Society. Facts 2022-2023. Updated Data on Blood Cancers. Published August 2023. Accessed [date]. https://www.lls.org/booklet/facts-updated-data-blood-cancers

Citations

Benzene. Toxic Substances Portal. Agency for Toxic Substances & Disease Registry. Accessed May 2, 2023. https://wwwn.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=40&tid=14

Cancer Facts & Figures 2023. Atlanta, GA: American Cancer Society; 2023.

Cancer Facts & Figures for African Americans 2019-2021. Atlanta, GA: American Cancer Society; 2019.

Haque R, Shi J, Chung J, et al, eds. Medication adherence, molecular monitoring, and clinical outcomes in patients with chronic myelogenous leukemia in a large HMO. *Journal of the American Pharmacists Association.* 2017;57:303-310.

National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2021 Submission (2001-2019). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2022.

SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute; [cited 2023 March]. Available from https://seer.cancer.gov/statistics-network/explorer/.

Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Data, 8 Registries, Nov 2021 Sub (1975-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.

Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Data, 17 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.

Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Plus Limited-Field Data, 22 Registries, Nov 2021 Sub (2000-2019) - Linked To County Attributes - Total U.S., 1969-2020 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2022, based on the November 2021 submission.

Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2020) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released June 2022. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

Zuelzer WW. Implications of long-term survival in acute stem cell leukemia of childhood treated with composite cyclic therapy. *Blood.* 1964;24:477-494.

Acknowledgements

Control and Population Sciences; National Cancer Institute and Rebecca Siegel, MPH, Director, Surveillance Information, American Cancer Society, for providing statistical assistance. Data compilation services were provided by Information Management Services, Inc.

LEUKEMIA & LYMPHOMA SOCIETY®

The Leukemia & Lymphoma Society 3 International Drive, Suite 200, Rye Brook, NY 10573 914-949-5213

The mission of The Leukemia & Lymphoma Society (LLS) is to cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. Find out more at www.LLS.org.

PS80 1.5M 8/23