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Facts 2016-2017

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Executive Summary

Facts 2016-2017 is an update of data available for leukemia, lymphoma, myeloma and myelodysplastic syndromes (blood cancers*). Blood cancers are diseases that can affect the bone marrow, the blood cells, the lymph nodes and other parts of the lymphatic system.

Facts 2016-2017 provides updates from The American Cancer Society's *Cancer Facts and Figures 2017* (published online in 2017, https://www.cancer.org/research/cancer-facts-statistics.html) for estimated new blood cancer cases and estimated deaths due to blood cancers. The incidence, prevalence and mortality data in *Facts 2016-2017* reflect the statistics from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program, *Cancer Statistics Review (CSR) 1975-2013* (published online in April 2016, www.seer.cancer.gov). Incidence rates by state are provided by the North American Association of Central Cancer Registries, *Cancer in North America: 2009-2013* (published online in July 2016, www.naaccr.org).

About Blood Cancers

Leukemia, Hodgkin lymphoma (HL), non-Hodgkin lymphoma (NHL), 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 are related in the sense that they may all 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, or death. Figure 1 shows the percentage of estimated new cases for leukemia, lymphoma and myeloma in 2017.

Estimated New Cases (%) of Leukemia, Lymphoma, and Myeloma, 2017

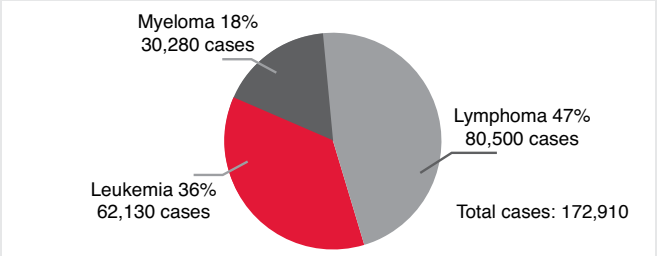

Figure 1. Source: *Cancer Facts & Figures, 2017.* American Cancer Society; 2017.

Highlights From *Facts 2016-2017*

Prevalence

Prevalence is the estimated number of people alive on a certain date in a population who previously had a diagnosis of the disease.

An estimated 1,290,773 people in the US are either living with, or are in remission from, leukemia, lymphoma or myeloma (see Table 1).

Approximate US Prevalence of the Four Major Types of Blood Cancers as of January 1, 2013

Type	Prevalence
Myeloma	110,345
Hodgkin Lymphoma	186,607
Non-Hodgkin Lymphoma	630,027
Leukemia	363,794

Table 1. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013*, National Cancer Institute; 2016.

New Cases

Approximately every 3 minutes one person in the United States (US) is diagnosed with a blood cancer.

- An estimated combined total of 172,910 people in the US are expected to be diagnosed with leukemia, lymphoma or myeloma in 2017.
- New cases of leukemia, lymphoma and myeloma are expected to account for 10.2 percent of the estimated 1,688,780 new cancer cases diagnosed in the US in 2017.

**Data specified for "blood cancers" include leukemia, lymphoma and myeloma, and do not include data for myelodysplastic syndromes (MDS) or myeloproliferative neoplasms (MPNs).*

Incidence

Incidence rates are the number of new cases in a given year, not counting the preexisting cases. The incidence rates are usually presented as a specific number per 100,000 population. Age-adjusted rates reduce the bias of age in the makeup of the populations being compared, thereby providing more reliable rates for comparison.

Overall age-adjusted incidence rates per 100,000 population reported in 2016 for leukemia, lymphoma and myeloma are either close to, or the same as, data reported in 2015: leukemia 13.5 in 2016 vs 13.3 in 2015; non-Hodgkin lymphoma (NHL) 19.5 in 2016 vs 19.7 in 2015; Hodgkin lymphoma (HL) 2.6 in 2016 vs 2.7 in 2015; myeloma 6.5 in 2016 vs 6.3 in 2015.

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 outcomes of all current therapies and, as a result, may underestimate current survival. Figure 2 shows the 5-year relative survival rates for leukemia, lymphoma and myeloma during 1960-1963, 1975-1977 and 2006-2012.

Five-Year Relative Survival Rates by Year of Diagnosis
1960-1963 vs 1975-1977 vs 2006-2012

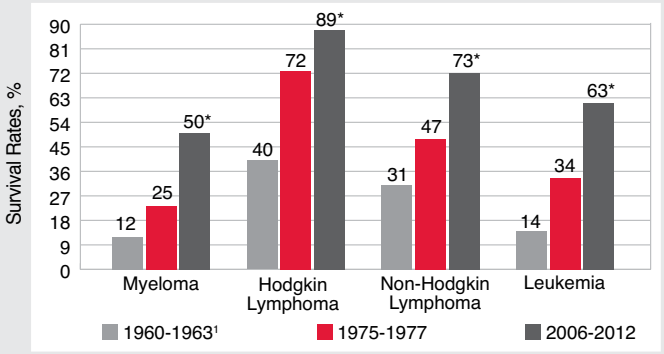

Figure 2. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

*The difference in rates between 1975-1977 and 2006-2012 is statistically significant ($P<.05$).

[1]Survival rate among whites (only data available).

Deaths

Approximately every 9 minutes, someone in the US dies from a blood cancer. This statistic represents approximately 160 people each day or more than six people every hour.

- Leukemia, lymphoma and myeloma are expected to cause the deaths of an estimated 58,300 people in the US in 2017.
- These diseases are expected to account for 9.7 percent of the deaths from cancer in 2017, based on the estimated total of 600,920 cancer deaths.
- Overall, the likelihood of dying from most types of leukemia, lymphoma or myeloma decreased from 2004-2013 (the most recent data available).

Leukemia

- There are an estimated 363,794 people either living with, or in remission from, leukemia in the US.
- In 2017, 62,130 people are expected to be diagnosed with leukemia.
- In 2017, 24,500 people are expected to die from leukemia.
- Approximately 32.6 percent more males are living with leukemia than females. More males than females are diagnosed with leukemia and die of leukemia.

Hodgkin and Non-Hodgkin Lymphoma

- There are an estimated 816,634 people either living with, or in remission from, lymphoma in the US.
- For HL, an estimated 186,607 people are either living with the disease or are in remission.
- For NHL, an estimated 630,027 people are either living with the disease or are in remission.
- In 2017, there are expected to be 80,500 new cases of lymphoma diagnosed in the US (8,260 cases of HL, 72,240 cases of NHL).
- In 2017, 21,210 people are expected to die from lymphoma (1,070 from HL, 20,140 from NHL).
- NHL is the seventh most common cancer in the US, and age-adjusted incidence rate rose by 76.2 percent from 1975 to 2013.

Myeloma

- There are an estimated 110,345 people either living with, or in remission from, myeloma in the US.
- In 2017, 30,280 people are expected to be diagnosed with myeloma.
- In 2017, approximately 12,590 people are expected to die from myeloma.
- From 1975 to 2013, the age-adjusted incidence rate of myeloma increased by 38.3 percent.
- The age-adjusted incidence rate of myeloma in black males and females was 115.4 percent greater than that of white males and females in 2013.
- Overall, mortality from myeloma has been decreasing slightly from 2004 to 2013 (the most recent data available).

Myelodysplastic Syndromes

- There were an estimated 15,351 new cases of myelodysplastic syndromes (MDS) diagnosed each year from 2009 to 2013.
- The estimated overall age-adjusted incidence rate of MDS is 4.9 cases per 100,000 population. White males have the highest rate (7.0 per 100,000 population).
- A possible cause of MDS and acute myeloid leukemia is repeated exposure to benzene. About half of the exposure to benzene in the US results from smoking tobacco or from exposure to tobacco smoke.
- Therapy-related MDS accounts for 0.4 percent of all cases.

Childhood Blood Cancers

- The most common types of cancer in children, adolescents and young adults younger than 20 years are leukemia (26.7 percent), cancers of the brain and other nervous tissue (17.6 percent), NHL (6.8 percent), HL (6.8 percent), and soft tissue (6.3 percent).
- For 2009-2013, the latest 5 years for which data are available, leukemia and lymphoma accounted for 40.3 percent of all cancer sites in children, adolescents and young adults under age 20.
- The age-adjusted incidence rate of leukemia and lymphoma in children, adolescents and young adults under age 20 was 7.1 per 100,000 (leukemia, 4.7 and lymphoma, 2.4).
- Leukemia is the second leading cause of cancer deaths, after cancers of the brain and other nervous tissue, among children, adolescents and young adults younger than 20 years. This accounts for 26.1 percent of all cancer-related deaths among this age-group.

Childhood statistics are not available for myeloma, as it is not commonly diagnosed in children, adolescents and young adults under age 20.

Leukemia

"Leukemia" is the term used to describe the four major types of leukemia (see Table 2).

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

Table 2. 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 363,794 people in the United States (US) are either living with, or are in remission from, leukemia (see Table 3). Thirty-three percent more males than females are living with leukemia.

ALL and AML are diseases that progress rapidly without treatment. They result in the accumulation of immature, nonfunctional cells in the 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 all people who have 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 CLL and CML is usually slower than that of acute types of leukemia. The slower disease progression allows greater numbers of more mature, functional cells to be made.

Approximate US Prevalence of the Four Major Types of Leukemia as of January 1, 2013	
Type	Prevalence
Acute Lymphoblastic Leukemia	75,300
Chronic Lymphocytic Leukemia	162,374
Acute Myeloid Leukemia	48,615
Chronic Myeloid Leukemia	44,386

Table 3. Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov). Prevalence database: "US Estimated 38-Year L-D Prevalence Counts on 1/1/2013". National Cancer Institute, DCCPS, Surveillance Research Program, Data Modeling Branch, released April 2016, based on the November 2015 SEER data submission.

Note: Other types of leukemia are not shown.

New Cases

An estimated 62,130 new cases of leukemia are expected to be diagnosed in the US in 2017 (see Figure 3 and Table 4 on page 4). Cases of chronic leukemia are expected to account for 6.3 percent more cases than acute leukemia.

Estimated Proportion of New Cases (%) in 2017 for Types of Leukemia, Adults and Children

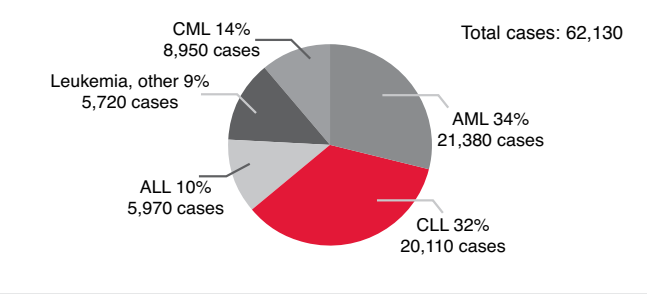

Figure 3. Source: *Cancer Facts & Figures, 2017.* American Cancer Society; 2017.
Note: Total percentage does not add up to 100% due to rounding in the calculation of individual percentages.

- Most cases of leukemia occur in older adults; the median age at diagnosis is 66 years.
- In 2017, leukemia is expected to strike approximately 11.5 times as many adults (57,160) as children, adolescents and young adults younger than 20 years (4,970).
- The most common types of leukemia in adults are AML and CLL.
- The most common type of leukemia in children, adolescents and young adults younger than 20 years is ALL.
- For 2009-2013, the latest 5 years for which data are available, ALL accounted for 74.5 percent of the new leukemia cases in children, adolescents and young adults younger than 20 years.
- Most cases of CML occur in adults. For 2009-2013, the latest 5 years for which data are available, about 3.1 percent of new cases of leukemia in children, adolescents and young adults younger than 20 years are CML. Approximately 0.9 percent of all cases of CML are in adolescents and young adults ages 15 to 19 years.

Estimated New Cases of Leukemia, by Gender, 2017

Type	Total	Male	Female
Acute Lymphoblastic Leukemia	5,970	3,350	2,620
Chronic Lymphocytic Leukemia	20,110	12,310	7,800
Acute Myeloid Leukemia	21,380	11,960	9,420
Chronic Myeloid Leukemia	8,950	5,230	3,720
Other Leukemia	5,720	3,440	2,280
Total Estimated New Cases	62,130	36,290	25,840

Table 4. Source: *Cancer Facts & Figures 2017.* American Cancer Society; 2017.

Incidence

Since 1975, the incidence of leukemia has increased slightly. In 1975 the incidence rate was 12.8 per 100,000 population and in 2013, it was 13.8 per 100,000 population.

Gender. Incidence rates for all types of leukemia are higher among males than among females. In 2017, approximately 58 percent of the new cases of leukemia are expected to occur in males.

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

- Age-adjusted incidence of leukemia is highest among non-Hispanic whites (14.6 per 100,000 population); it is lowest among Asian and Pacific Islander populations (7.7 per 100,000 population) and American Indian and Alaska Native populations (8.2 per 100,000 population).
- Leukemia is the tenth most common cancer in whites, eleventh most common cancer in blacks, and thirteenth most common cancer in Hispanics.
- In children, adolescents and young adults younger than 20 years, leukemia incidence rates are highest among Hispanics (59.1 per 100,000 population) and lowest among blacks (30.1 per 100,000 population).

Children, Adolescents and Young Adults. From 2009 to 2013, leukemia represented 26.7 percent of all of the types of cancer occurring among children, adolescents and young adults younger than 20 years.

- ALL is the most common cancer in children, adolescents and young adults younger than 20 years.
- In 2017, about 4,970 children, adolescents and young adults younger than 20 years are expected to be diagnosed with leukemia throughout the US.
- About 32.9 percent of cancer cases in children and adolescents younger than 15 years are leukemia.
- In the 18 SEER regions, from 2009 to 2013, there were 5,576 children, adolescents and young adults under the age of 20 years diagnosed with leukemia, including 4,163 diagnosed with ALL.
- From 1975 to 2013, incidence rates increased for childhood and adolescent ALL (1.9 in 1975 vs 3.2 in 2013) and AML (0.6 in 1975 vs 0.7 in 2013).
- The highest incidence rates for ALL are seen in children and adolescents younger than 15 years. Within this group, the highest rate is in children ages 1-4 years (7.8 per 100,000).

- The incidence of ALL among 1- to 4-year-olds (7.8 per 100,000) is more than eleven times greater than the rate for young adults ages 25 to 39 years (0.7 per 100,000).
- In children, adolescents and young adults younger than 20 years, AML incidence is highest in children under 1 year and lowest in children and adolescents ages 5 to 14 years.
- From 2009 to 2013, among 5- to 9-year-olds, ALL incidence was almost ten times greater than that of AML (3.7 per 100,000 for ALL and 0.4 per 100,000 for AML).
- In 25- to 29-year-olds, AML incidence was 57.1 percent higher than that of ALL.

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

- CLL – at age 50 years and older
- AML – at age 60 years and older (see Figure 4)
- CML – at age 65 years and older.

Signs and Symptoms

Signs of acute leukemia may include easy bruising or bleeding (because of platelet deficiency), paleness or easy fatigue (because of anemia), recurrent minor infections or poor healing of minor cuts (because of an inadequate white blood cell count). These signs are not unique to leukemia and may be caused by other, more common conditions. Nonetheless, they do warrant medical evaluation. The diagnosis of leukemia requires specific blood tests, including an examination of cells in the blood and marrow. People who have chronic leukemia may not have major symptoms; they may be diagnosed as a result of a 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. As previously noted, repeated exposure to the chemical benzene may cause AML. Automobile exhaust and industrial emissions account for about 20 percent of the total national benzene exposure. About half of US benzene exposure 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 treatment for leukemia is to bring about a complete remission. “Complete remission” means that there is no evidence of disease. “Relapsed” leukemia indicates return of the cancer cells and the return of disease signs and symptoms. For acute leukemia, a complete remission that lasts 5 years after diagnosis often indicates long-term survival. Treatment centers report increasing numbers of people with leukemia who are in complete remission at least 5 years after diagnosis of their disease.

Age-Specific Incidence Rates for Acute Myeloid Leukemia (All Races), 2009-2013

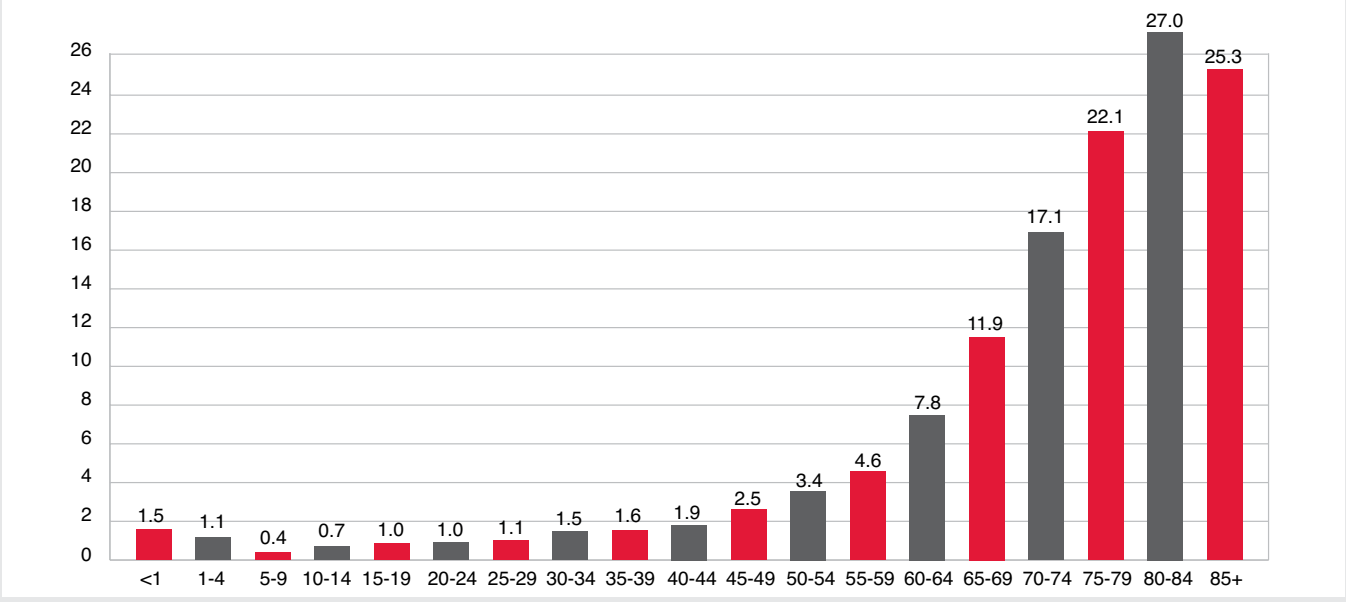

Figure 4. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

Survival

Relative survival rates vary according to a person's age at diagnosis, gender, race and type of leukemia. The overall 5-year relative survival rate for leukemia has more than quadrupled since 1960. From 1960 to 1963, the 5-year relative survival rate among whites (only data available) with leukemia was 14 percent. From 1975 to 1977, the 5-year relative survival rate for the total population with leukemia was 34.2 percent, and from 2006 to 2012, the overall relative survival rate was 62.7 percent (see Figure 5; percentages in Figure 5 are rounded to the nearest integer).

From 2006-2012, the 5-year relative survival rates overall were

- CML – 65.9 percent
- CLL – 85.1 percent
- AML – 26.8 percent overall and 66.8 percent for children and adolescents younger than 15 years
- ALL – 70.7 percent overall, 92.3 percent for children and adolescents younger than 15 years, and 94.1 percent for children younger than 5 years.

Five-Year Relative Survival Rates for All Ages, All Types of Leukemia, Diagnosed 1975-2012

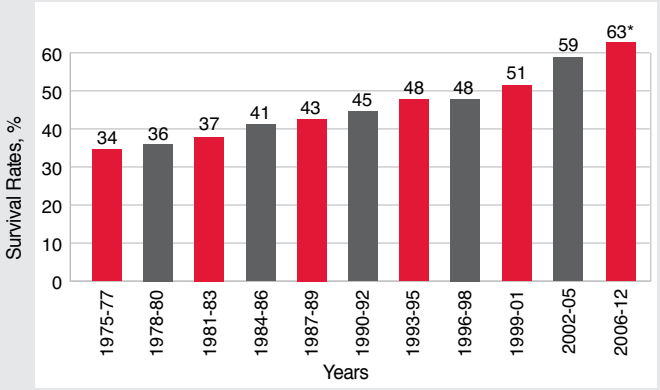

Figure 5. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

*The difference between 1975-1977 and 2006-2012 is statistically significant (*P*<.05).

Figure 6 shows that childhood ALL 5-year survival rates have improved significantly over the past 5 decades. Most children, adolescents and young adults 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 has been well established by several studies. Long-term treatment-related effects among ALL and other childhood cancer survivors may include any subsequent cancer, cardiac disease, pulmonary disease or other diseases.

Five-Year Relative Survival Rates for Acute Lymphoblastic Leukemia in Children under 15, Diagnosed 1964-2012

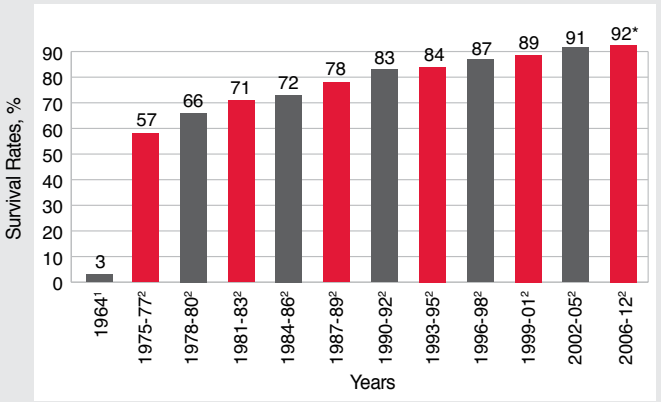

Figure 6. Sources: 1. Zuelzer WW. Implications of long-term survivals in acute stem cell leukemia of childhood treated with composite cyclic therapy. *Blood.*1964;24:477-494. 2. *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

*The difference in rates between 1975-1977 and 2006-2012 is statistically significant (*P*<.05).

Deaths

Approximately 24,500 deaths (14,300 males and 10,200 females) in the US are expected to be attributed to leukemia in 2017. Estimated deaths for the four major types of leukemia in 2017 are

- ALL – 1,440 deaths
- CLL – 4,660 deaths
- AML – 10,590 deaths
- CML – 1,080 deaths.

For other unclassified forms of leukemia, an additional 6,730 deaths in 2017 are estimated. In general, mortality rates for leukemia decreased from 1975 to 2013 (the latest year for which these data are available).

Gender. In 2009-2013, leukemia was the fifth most common cause of cancer deaths in men and the sixth most common in women in the US. In 2017, the estimated number of deaths attributed to leukemia in the US is 40.2 percent higher for males than for females. Expected deaths from leukemia in 2017, according to gender, are shown in Table 5.

Estimated Deaths from Leukemia, by Gender, 2017

Type	Total	Male	Female
Acute Lymphoblastic Leukemia	1,440	800	640
Chronic Lymphocytic Leukemia	4,660	2,880	1,780
Acute Myeloid Leukemia	10,590	6,110	4,480
Chronic Myeloid Leukemia	1,080	610	470
Other Leukemia	6,730	3,900	2,830
Total	24,500	14,300	10,200

Table 5. Source: *Cancer Facts & Figures 2017.* American Cancer Society; 2017.

Race and Ethnicity. For leukemia, the highest age-adjusted rates of death from 2009 to 2013 were in non-Hispanic whites at 7.2 per 100,000 population, followed by blacks at 5.8 per 100,000 population and Hispanic whites at 5.2 per 100,000 population.

- Leukemia is the seventh most common cause of cancer deaths in black males and the eighth most common in black females.
- Leukemia is the fifth most common cause of cancer deaths in white males and the sixth most common in white females.

From 2009 to 2013, black males between the ages of 25 and 59 years had a higher death rate from leukemia than white males.

As reported in *Cancer Facts & Figures for African Americans 2016-2018*, the American Cancer Society estimated that approximately 2,020 blacks (1,110 males and 910 females) are expected to die from leukemia.

Children, Adolescents and Young Adults. The leukemia age-adjusted death rate for children and adolescents younger than 15 years in the US has declined by 80.0 percent from 3.0 per 100,000 population in 1969 to 0.6 per 100,000 population in 2013. Death rates for all types of cancer for children, adolescents and young adults younger than 20, including acute lymphoblastic leukemia, declined from 1975 to 2013. Despite this decline, leukemia is the second leading cause of cancer death among children, adolescents and young adults younger than 20 years.

Hodgkin and Non-Hodgkin Lymphoma

"Lymphoma" is a general term for many blood cancers that originate in the lymphatic system. 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. Hodgkin lymphoma (HL) represents 10.3 percent of all types of lymphoma expected to be diagnosed in 2017. This disease has characteristics that distinguish it from other diseases classified as lymphoma, including the presence of the Reed-Sternberg cell, a large, malignant cell found in HL tissues.

Non-Hodgkin Lymphoma. Non-Hodgkin lymphoma (NHL) represents 89.7 percent of all types of lymphoma expected to be diagnosed in 2017. This disease represents a diverse group of diseases that are distinguished by the characteristics of the cancer cells associated with each disease type. The designations "indolent" and "aggressive" 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 816,634 individuals in the United States (US) population are either living with, or are in remission from, lymphoma.

- There are 186,607 people living with Hodgkin lymphoma (active disease or in remission).
- There are 630,027 people living with non-Hodgkin lymphoma (active disease or in remission).

New Cases

About 80,500 people living in the US are expected to be diagnosed with lymphoma in 2017 (8,260 cases of HL and 72,240 cases of NHL). The incidence of HL is consistently and considerably lower than that of NHL. Table 6 shows estimated new cases of lymphoma in 2017, by gender.

Estimated New Cases of Lymphoma, by Gender, 2017

Type	Total	Male	Female
Hodgkin Lymphoma	8,260	4,650	3,610
Non-Hodgkin Lymphoma	72,240	40,080	32,160
Total	80,500	44,730	35,770

Table 6. Source: *Cancer Facts & Figures 2016.* American Cancer Society; 2017.

Incidence

For the years 2009-2013, the age-adjusted incidence rate for lymphoma was 22.1 per 100,000.

- The age-adjusted incidence rate for NHL was 19.5 per 100,000.
- The age-adjusted incidence rate for HL was 2.6 per 100,000.

The age-adjusted incidence rate of NHL rose by 76.2 percent from 1975 to 2013, an average annual percentage increase of 2.0 percent. The age-adjusted incidence rate of HL rose by 16.2 percent from 1975 to 2013, an annual percentage increase of 0.4 percent.

Gender. Incidence rates for HL and NHL tend to be higher among males than among females. In 2017, it is expected that 28.8 percent more males than females will be diagnosed with HL. About 24.6 percent more males than females are expected to be diagnosed with NHL in that same year.

- NHL is the sixth most common cancer in males and the seventh most common cancer in females in the US.
- For NHL, the incidence rates for males are higher than those for females across all age-groups.

Race and Ethnicity. The highest age-adjusted incidence rate of lymphoma is in non-Hispanic whites (23.9 per 100,000), followed by Hispanic whites (20.7 per 100,000), and blacks (17.2 per 100,000).

- The highest age-adjusted incidence rate of NHL is in non-Hispanic whites (20.9 per 100,000), followed by Hispanic whites (18.3 per 100,000), and blacks (14.6 per 100,000).
- The highest age-adjusted incidence rate of HL is in non-Hispanic whites (3.0 per 100,000), followed by blacks (2.6 per 100,000), and Hispanic whites (2.3 per 100,000).

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

NHL is the fifth most common cancer in Hispanics, constituting 5.1 percent of all types of cancer cases in Hispanics.

Children, Adolescents and Young Adults. Lymphoma (HL, 6.8 percent; NHL, 6.8 percent) is the third most common cancer in children, adolescents and young adults younger than 20 years.

- In 2017, lymphoma will account for 8 percent (HL, 3 percent; NHL, 5 percent) of all cancers expected to be diagnosed in children and adolescents younger than 15 years. The number of cases expected to be diagnosed in children and adolescents younger than 15 years is 308 for HL and 514 for NHL.
- Older children and adolescents are more commonly diagnosed with HL than younger children.
- NHL is more common than HL in children under 15. HL is more common than NHL in adolescents and young adults between the ages of 15 and 29.
- The lymphoma age-adjusted incidence rates (HL and NHL), for the years 2009 to 2013, were higher for the 20- to 24-year-old age-group (6.8 per 100,000 population) than for the 15- to 19-year-old age-group (4.8 per 100,000 population).

The following is based on age-adjusted incidence rates for children, adolescents and young adults younger than 20 years:

- Lymphoma is most commonly diagnosed in non-Hispanic whites (2.7 per 100,000 population), followed by blacks (2.2 per 100,000 population), and Hispanic whites (2.2 per 100,000 population).
- Lymphoma is least commonly diagnosed among American Indian and Alaska Native children, adolescents and young adults (1.4 per 100,000 population).

Adults. HL incidence rates are higher in adolescents and young adults ages 15-34 than in adults ages 35-64. Incidence peaks at ages 75-79 (see Figure 7 on page 9). The incidence rates of NHL increase with age (see Figure 8 on page 9).

- From ages 20 to 24 years the incidence rate of NHL is about 2.5 cases per 100,000 population.
- From ages 60 to 64 years the incidence rate increases almost 18 times to 43.8 cases per 100,000 population.
- From ages 80 to 84 years the incidence rate increases almost 48 times to 119.3 cases per 100,000 population.

Signs and Symptoms

A common early sign of HL or NHL is a painless enlargement of one or more lymph nodes. However, enlarged lymph nodes may 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 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 or weight loss. Some individuals may have no symptoms, and a diagnosis of NHL is made as a result of a periodic physical examination and testing.

Age-Specific Incidence Rates for Hodgkin Lymphoma, 2009-2013

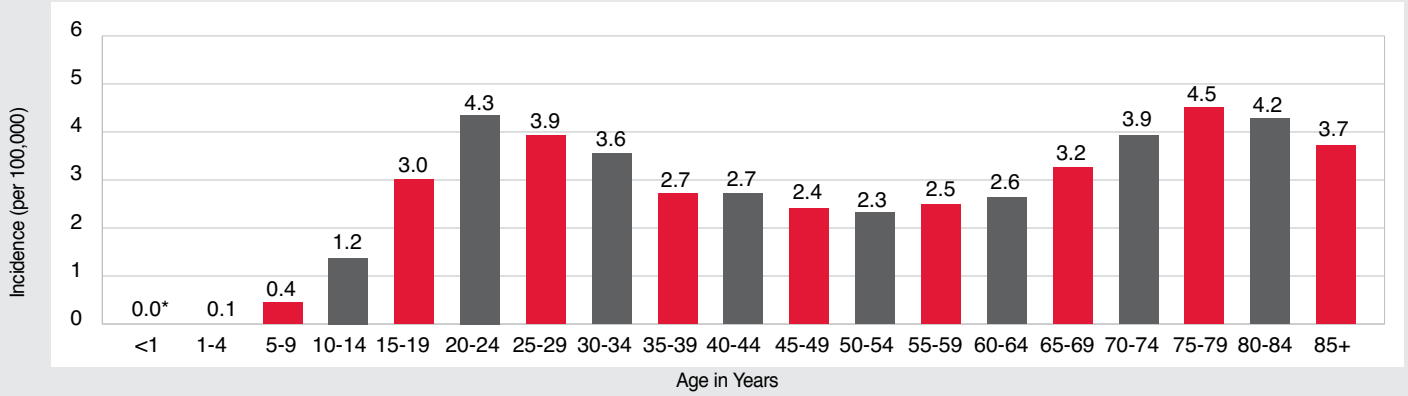

Figure 7. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.
*<16 cases for each age and time interval, SEER 18 areas.

Age-Specific Incidence Rates for Non-Hodgkin Lymphoma, 2009-2013

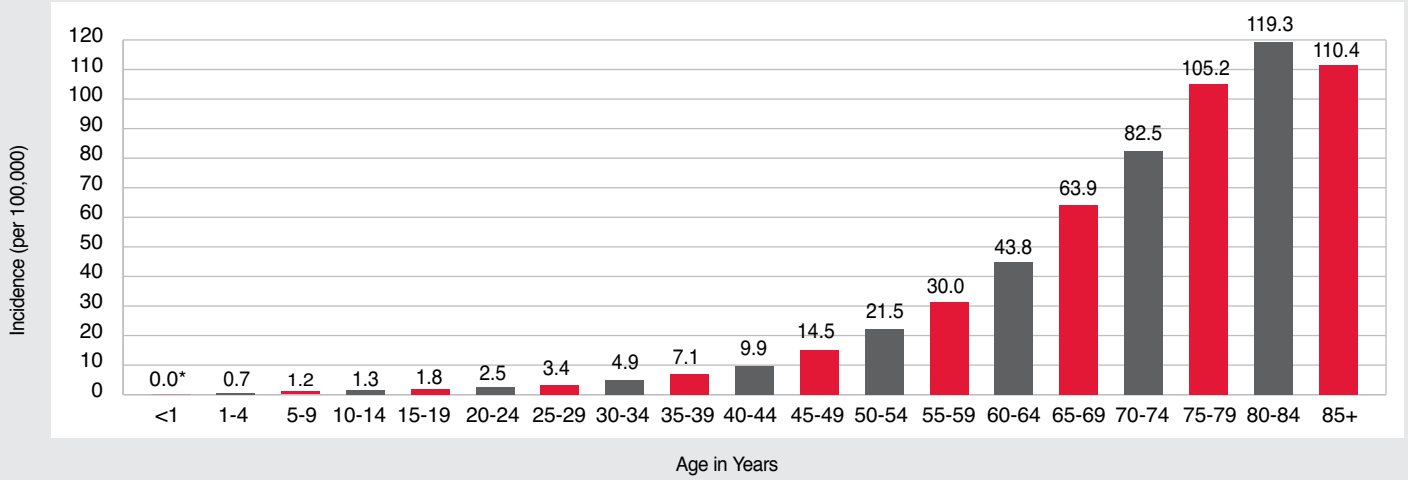

Figure 8. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.
*<16 cases for each age and time interval, SEER 18 areas.

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. Most cases of HL occur in people who do not have identifiable risk factors; most people with identifiable risk factors do not develop HL.

The reasons for the development of NHL are not known. Immune suppression plays a role in some cases. People infected with the human immunodeficiency virus (HIV) have a higher risk of developing lymphoma. 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 it 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 later development of NHL. These risk factors explain only a small proportion of cases.

Treatment

The goal of treatment for HL is to cure the disease. Chemotherapy alone or combined modality therapy (chemotherapy and radiotherapy) are commonly administered treatment approaches for HL. Involved field radiation therapy (IFRT) and involved site radiation therapy (ISRT) are the most common types 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 type 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. Stem cell transplantation and a watch-and-wait strategy are also used to treat some NHL subtypes. Immunotherapy is indicated to treat individuals with specific types of NHL.

Survival

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 more than doubled, from 40 percent in whites from 1960 to 1963 (only data available) to 88.5 percent for all races from 2006 to 2012.
- The 5-year relative survival rate is 94.3 percent for all people with HL who were younger than 45 years at diagnosis.

The 5-year relative survival rate for people with NHL has risen from 31 percent in whites from 1960 to 1963 (only data available) to 72.6 percent for all races from 2006 to 2012.

Race and Ethnicity. Table 7 shows the HL and NHL 5-year relative survival rates, rounded to the nearest integer, for all races, for blacks and for whites, spanning four decades.

Trends in Five-Year Relative Survival Rates by Race for Hodgkin Lymphoma and Non-Hodgkin Lymphoma, by Year of Diagnosis

Hodgkin Lymphoma	1975-1977	1981-1983	1990-1992	2006-2012
All Races	72%	74%	82%	89%*
Whites	72%	75%	83%	89%*
Blacks	70%	72%	74%	86%*
Non-Hodgkin Lymphoma	**1975-1977**	**1981-1983**	**1990-1992**	**2006-2012**
All Races	47%	51%	51%	73%*
Whites	47%	51%	52%	74%*
Blacks	49%	50%	42%	65%*

Table 7. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.
*The difference between 1975-1977 and 2006-2012 is statistically significant ($P<.05$).

Children, Adolescents and Young Adults. Five-year relative survival is 97.1 percent for HL in adolescents and young adults ages 15 to 19 years. Five-year relative survival is 97.7 percent for HL in children and adolescents younger than 15 years.

In children, adolescents and young adults younger than 20 years, 5-year relative survival for NHL is 88.0 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.

Subsequent Primary Cancers. The growing US cancer survivor population has special needs for medical follow-up. Efforts are under way to provide information about survivors' risks for developing multiple primary cancers. The information will help physicians and patients discuss the risks and any established prevention and screening guidelines. Tables 8 and 9 (on page 11) show the observed-to-expected ratio (O/E) for subsequent primary cancer development in HL and NHL survivors (see Notes and Definitions, page 19). Subsequent cancers among HL survivors have been well studied because of the high long-term survival rates and the relatively young age at diagnosis for many people with this disease. NHL represents a broad range of diseases, with varying risk factors and treatments; the relative risk for subsequent cancers depends on the NHL subtype and the treatment. The SEER data show that as a group, survivors of NHL have an increased O/E for developing subsequent cancers (O/E = 1.25), but their risk is lower than the risk of HL survivors (O/E = 2.13).

Observed-to-Expected Ratio for Developing Subsequent Primary Cancer after Hodgkin Lymphoma (HL) by Age at Diagnosis of HL, SEER 1973-2013								
Second Primary Site	Birth to 19 (N=3,849)	20 to 39 (N=12,920)	40 to 59 (N=5,908)	60 and older (N=4,350)	All Ages (N=27,027)	All Ages		
						Observed	Expected	EAR**
Lung and Bronchus	7.43*	4.78*	3.00*	1.75*	2.92*	577	197	11.37
Female Breast	9.66*	3.04*	1.18	0.92	2.40*	534	222	20.07
Non-Hodgkin Lymphoma	6.18*	6.27*	6.12*	5.09*	5.90*	404	68	10.04
Acute Non-Lymphocytic Leukemia (ANLL)	22.65*	13.83*	13.75*	5.58*	11.66*	161	14	4.41
All Sites Excluding Non-Melanoma Skin	5.75*	2.71*	1.88*	1.34*	2.13*	3,436	1,612	54.61

Table 8. Source: *Surveillance, Epidemiology and End Results (SEER)* Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 9 Regs Research Data, Nov 2015 Sub (1973-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total US, 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.

**P*<.05

***EAR=Estimated absolute risk (see *Notes and Definitions*, page 19)

Observed-to-Expected Ratio for Developing Subsequent Primary Cancer after Non-Hodgkin Lymphoma (NHL) by Age at Diagnosis of NHL, SEER 1973-2013								
Second Primary Site	Birth to 19 (N=3,042)	20 to 39 (N=12,653)	40 to 59 (N=39,039)	60 and older (N=76,216)	All Ages (N=130,950)	All Ages		
						Observed	Expected	EAR**
Lung and Bronchus	0*	2.06*	1.56*	1.21*	1.32*	2,433	1,845	6.88
Hodgkin Lymphoma	3.93*	9.75*	9.43*	4.98*	6.99*	218	31	2.19
Acute Non-Lymphocytic Leukemia (ANLL)	19.69*	12.15*	7.17*	3.15*	4.38*	490	112	4.43
Melanoma of the Skin	1.31	1.24	1.37*	1.29*	1.31*	573	437	1.59
Kaposi Sarcoma	0	14.26*	14.70*	2.36*	9.73*	137	14	1.44
All Sites Excluding Non-Melanoma Skin	3.86*	2.03*	1.42*	1.14*	1.25*	15,319	12,215	36.36

Table 9. Source: *Surveillance, Epidemiology and End Results (SEER)* Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 9 Regs Research Data, Nov 2015 Sub (1973-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total US, 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.

**P*<.05

***EAR=Estimated absolute risk (see *Notes and Definitions*, page 19)

Deaths

In 2017, an estimated 21,210 members of the US population are expected to die from lymphoma (20,140 NHL and 1,070 HL), as shown in Table 10. Overall, death rates have been declining for people with HL since 1975.

Estimated Deaths from Hodgkin Lymphoma and Non-Hodgkin Lymphoma, by Gender, 2017			
Type	Total	Male	Female
Hodgkin Lymphoma	1,070	630	440
Non-Hodgkin Lymphoma	20,140	11,450	8,690
Total	21,210	12,080	9,130

Table 10. Source: *Cancer Facts & Figures 2017*. American Cancer Society; 2017.

Gender. NHL is the seventh most common cause of cancer death in both males and females in the US. Death rates for HL are much lower than those for NHL for both males and females.

- From 2009-2013, for males, the age-adjusted death rate for NHL was 7.7 per 100,000 and for HL, 0.5 per 100,000.
- For females, the age-adjusted death rate for NHL was 4.7 per 100,000 and for HL, 0.3 per 100,000.

Race and Ethnicity. For NHL, the highest age-adjusted rates of death from 2009 to 2013 were in non-Hispanic whites at 6.3 per 100,000 population, followed by Hispanic whites at 5.4 per 100,000 population and Asian and Pacific Islanders at 4.5 per 100,000 population.

Children, Adolescents and Young Adults. For children, adolescents and young adults under 20 years, age-adjusted death rates for HL and NHL per 100,000 population declined from 1975 to 2013

- For HL, the rate was 0.1 in 1975 vs 0.0 in 2013
- For NHL, the rate was 0.4 in 1975 vs 0.1 in 2013.

Myeloma

Myeloma is a cancer of the plasma cells (a type of white blood cell). Plasma cells are found primarily in the marrow. About 90 percent of people with myeloma have disease involving multiple sites at the time of diagnosis. 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 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 110,345 people in the United States (US) are either living with, or are in remission from, myeloma.

New Cases

An estimated 30,280 new cases of myeloma (17,490 males and 12,790 females) are expected to be diagnosed in the US in 2017 (see Table 11).

Estimated New Cases of Myeloma, by Gender, 2017

Type	Total	Male	Female
Myeloma	30,280	17,490	12,790

Table 11. Source: *Cancer Facts & Figures 2017.* American Cancer Society; 2017.

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

Incidence

For the years 2009-2013, the age-adjusted incidence rate for myeloma was 6.5 per 100,000.

Gender. The age-adjusted incidence rate for the years 2009 to 2013 was 57.7 percent higher in males (8.2 per 100,000 population) than in females (5.2 per 100,000 population).

Race and Ethnicity. From 2009 to 2013, myeloma was the ninth most commonly diagnosed cancer among black males and black females.

- The median age at diagnosis is 65 years for blacks and 70 years for whites.
- Blacks have more than twice the age-adjusted incidence rate (13.2 per 100,000 population) of myeloma than whites (5.9 per 100,000 population).
- Black males have a higher age-adjusted myeloma incidence rate than males or females of any other race/ethnicity.
- The highest incidence rates are found in black males who are ages 80 to 84 (109.3 per 100,000 population).

Age. Figure 9 shows the age-specific incidence rates for myeloma for the years 2009 to 2013.

Age-Specific Incidence Rates for Myeloma, 2009-2013

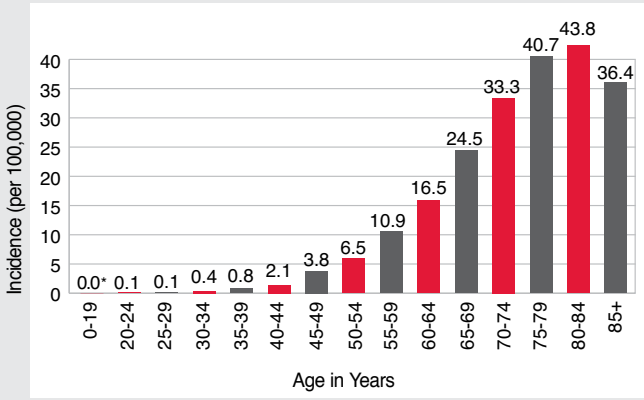

Figure 9. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

*<16 cases for each age and time interval, SEER 18 areas.

Signs and Symptoms

The first symptom of myeloma is often bone pain from the effects that myeloma cells are having on the marrow. Fractures may occur as a result 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 of the disease. People with myeloma may also have no symptoms, or they may tire more easily and feel weak.

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 that other factors must play major roles.

Treatment

The goals of treatment for people with myeloma are to reduce symptoms, to slow disease progression and to provide prolonged remissions. 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, 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

Current statistical databases show that overall 5-year relative survival in people with myeloma has improved significantly since the 1960s.

- Five-year relative survival has increased from 12 percent from 1960 to 1963 (for whites, only data available) to 50.2 percent from 2006 to 2012 (for all races and ethnicities).
- Five-year survival from 2006 to 2012 is highest for black females (53.7 percent) compared to 49.7 percent for black males, 50.6 percent for white males and 48.9 percent for white females.
- The 3-year survival rate as of January 1, 2013, is 65.0 percent (for all races and ethnicities).

Deaths

Approximately 12,590 deaths from myeloma are anticipated in 2017 (see Table 12).

Estimated Deaths from Myeloma, by Gender, 2017			
Type	Total	Male	Female
Myeloma	12,590	6,660	5,930

Table 12. Source: *Cancer Facts & Figures 2017.* American Cancer Society; 2017.

Gender. Myeloma was the seventh most common cause of cancer death for black females and the twelfth most common cause of cancer death for white females from 2009 to 2013.

Myeloma was the eighth leading cause of cancer death for black males and the thirteenth most common cause of cancer death for white males from 2009 to 2013.

Race and Ethnicity. As reported in *Cancer Facts & Figures for African Americans 2016-2018*, 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 2009 to 2013 for black males was nearly double the rate for white males (7.5 per 100,000 population vs 4.0 per 100,000 population).
- For black females, the age-adjusted mortality rate from myeloma was more than twice the rate for white females (5.4 per 100,000 population vs 2.4 per 100,000 population).
- The US median age at death from myeloma is 75 years. It is 71 years for blacks and 71 years for Hispanics.

Myelodysplastic Syndromes

Myelodysplastic syndromes (MDS) are a group of diseases of the blood and marrow, with varying degrees of severity and life expectancy. 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 MDS, blasts often constitute more than 5 percent of the cells. (A person with acute myeloid leukemia [AML] has more than 20 percent blasts in the marrow.) 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 subtype is refractory anemia with excess blasts (RAEB), 14.3 percent, followed by refractory anemia (RA), 8.0 percent.

- People diagnosed with MDS, not otherwise specified (MDS NOS) constitute 60.1 percent of all MDS cases.
- People diagnosed with therapy-related MDS constitute 0.4 percent of all reported cases.

Prevalence

The SEER program only recently began maintaining statistics for MDS. Prevalence statistics were not reported by SEER for MDS in 2017 at the time of this publication.

New Cases

For the 5-year period from 2009 to 2013, there were approximately 76,755 new cases of MDS throughout the US, averaging an estimated 15,351 cases per year.

Incidence

The overall age-adjusted incidence rate of MDS is 4.9 cases per 100,000 population (see Table 13).

Myelodysplastic Syndromes Age-Adjusted Incidence Rates, per 100,000 Population, 2009-2013	
By Race	Rate
All Races	4.9
White	5.1
Black	4.1
Asian/Pacific Islander	3.7
American Indian/Alaska Native*	3.4
Hispanic**	3.5
By Age	Rate
Ages <40	0.1
Ages 40-49	0.7
Ages 50-59	2.4
Ages 60-69	9.3
Ages 70-79	30.2
Ages 80+	59.8

Table 13. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

*Incidence data for American Indians/Alaska Natives are based on the CHSDA (Contract Health Service Delivery Area) counties.

**Hispanics are not mutually exclusive from whites, blacks, Asian/Pacific Islanders, and American Indians/Alaska Natives. Incidence data for Hispanics are based on NAACCR Hispanic Identification Algorithm (NHIA) and exclude cases from the Alaska Native Registry.

Gender. In the United States (US), for the 5-year period from 2009 to 2013, approximately 43,518 MDS cases were diagnosed in males (averaging 8,704 per year) and approximately 33,237 MDS cases were diagnosed in females (averaging 6,647 per year). The overall age-adjusted incidence rates of MDS by gender are 6.7 per 100,000 in males and 3.7 per 100,000 in females.

Race and Ethnicity. White males have the highest age-adjusted incidence rates (7.0 per 100,000 population), while the lowest occur among Asian and Pacific Islander females (2.8 per 100,000 population) and Hispanic females (2.9 per 100,000 population).

Age. The age-adjusted incidence rate for MDS from 2009 to 2013 was highest for males ages 80 years and older (90.0 per 100,000).

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 symptoms, and a diagnosis of MDS is made as a result of a periodic physical examination and testing.

Possible Causes

Most people with MDS have primary MDS, which usually has 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 exposure to benzene in the US 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 transfusion; a watch-and-wait strategy; administration of blood cell growth factors; drug therapy with newer agents; or chemotherapy of the type used to treat AML.

Survival

The SEER program only recently began maintaining statistics for MDS. Survival statistics were not reported by SEER for MDS in 2017 at the time of this publication.

Deaths

The SEER program only recently began maintaining statistics for MDS. Mortality statistics were not reported by SEER for MDS in 2017 at the time of this publication.

Incidence Rates: Leukemia, Lymphoma, Myeloma and Myelodysplastic Syndromes

Tables 14, 15 and 16 show incidence rates for leukemia, NHL, HL, myeloma and MDS using data figures from 2009 to 2013 (the most recent available). Rates are per 100,000 population and are age-adjusted to the 2000 US standard population.

Age-Adjusted Incidence Rates by Gender, All Races, per 100,000 Population, 2009-2013

Type	Total	Male	Female
Leukemia	13.5	17.3	10.5
Non-Hodgkin Lymphoma	19.5	23.7	16.1
Hodgkin Lymphoma	2.6	3.0	2.3
Myeloma	6.5	8.2	5.2
Myelodysplastic Syndromes	4.9	6.7	3.7

Table 14. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

Age-Adjusted Incidence Rates by Gender, for Blacks, per 100,000 Population, 2009-2013

Type	Total	Male	Female
Leukemia	10.8	13.8	8.7
Non-Hodgkin Lymphoma	14.6	17.6	12.2
Hodgkin Lymphoma	2.6	3.0	2.2
Myeloma	13.2	15.7	11.5
Myelodysplastic Syndromes	4.1	5.3	3.4

Table 15. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

Age-Adjusted Incidence Rates by Gender, for Whites, per 100,000 Population, 2009-2013

Type	Total	Male	Female
Leukemia	14.3	18.2	11.1
Non-Hodgkin Lymphoma	20.4	24.8	16.9
Hodgkin Lymphoma	2.8	3.1	2.5
Myeloma	5.9	7.7	4.5
Myelodysplastic Syndromes	5.1	7.0	3.8

Table 16. Source: *SEER (Surveillance, Epidemiology and End Results) Cancer Statistics Review, 1975-2013.* National Cancer Institute; 2016.

Estimated New Cases and Estimated Deaths by State

Estimated New Cases of Blood Cancers, by State, 2017

State	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin Lymphoma
Alabama	770	960	460	120
Alaska	100	140	60	*
Arizona	1,170	1,410	540	160
Arkansas	580	660	280	80
California	6,740	7,880	3,000	850
Colorado	960	1,090	420	130
Connecticut	800	950	380	110
Delaware	180	250	100	*
Dist. of Columbia	90	110	70	*
Florida	5,070	5,410	2,400	580
Georgia	1,550	1,890	1,000	240
Hawaii	210	260	100	*
Idaho	310	370	130	*
Illinois	2,350	2,750	1,160	330
Indiana	1,280	1,560	640	180
Iowa	760	800	300	80
Kansas	560	630	250	70
Kentucky	1,050	1,070	400	110
Louisiana	770	990	470	120
Maine	310	380	130	*
Maryland	1,000	1,260	580	160
Massachusetts	1,220	1,630	660	200
Michigan	2,010	2,480	930	260
Minnesota	1,290	1,370	540	150
Mississippi	530	560	310	70
Missouri	1,210	1,420	560	160
Montana	260	280	110	*
Nebraska	380	440	170	50
Nevada	460	560	240	50
New Hampshire	290	340	130	*
New Jersey	1,990	2,380	950	270
New Mexico	370	400	170	50
New York	4,320	4,760	2,170	610
North Carolina	1,970	2,180	1,130	260
North Dakota	150	170	60	*
Ohio	2,270	2,860	1,220	310
Oklahoma	760	840	340	100
Oregon	730	970	350	90
Pennsylvania	2,800	3,310	1,230	380
Rhode Island	190	260	100	*
South Carolina	990	1,120	600	130
South Dakota	200	210	80	*
Tennessee	1,300	1,490	640	160
Texas	4,550	5,250	2,300	660
Utah	460	490	200	70
Vermont	110	170	60	*
Virginia	1,380	1,720	750	220
Washington	1,390	1,740	580	180
West Virginia	410	480	180	50
Wisconsin	1,460	1,380	620	150
Wyoming	100	120	*	*
United States	62,130	72,240	30,280	8,260

Table 17. Source: American Cancer Society, Inc. Projections for 2017 based on modeling of incidence data for the years 1999-2013 reported by the North American Association of Central Cancer Registries. The sum of the state estimates may not equal the US total due to rounding and exclusion of state estimates with fewer than 50 cases. Numbers are rounded to the nearest 10.
*Estimate is fewer than 50 cases.
Note: The projected numbers of new cancer cases and deaths in 2017 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, 2017

State	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin Lymphoma
Alabama	420	320	220	*
Alaska	*	*	*	*
Arizona	550	430	260	*
Arkansas	250	210	130	*
California	2,610	2,140	1,280	140
Colorado	340	260	160	*
Connecticut	300	230	140	*
Delaware	70	70	50	*
Dist. of Columbia	*	*	*	*
Florida	1,800	1,510	910	80
Georgia	620	510	460	*
Hawaii	90	100	50	*
Idaho	110	110	60	*
Illinois	990	790	470	*
Indiana	550	450	270	*
Iowa	260	240	130	*
Kansas	260	180	130	*
Kentucky	390	330	180	*
Louisiana	320	300	190	*
Maine	130	110	60	*
Maryland	410	340	270	*
Massachusetts	540	410	270	*
Michigan	830	760	440	*
Minnesota	480	390	230	*
Mississippi	230	170	130	*
Missouri	550	390	270	*
Montana	80	70	*	*
Nebraska	150	120	80	*
Nevada	200	160	90	*
New Hampshire	110	80	50	*
New Jersey	640	510	320	*
New Mexico	150	110	70	*
New York	1,460	1,210	730	70
North Carolina	760	620	450	*
North Dakota	60	*	*	*
Ohio	990	860	540	*
Oklahoma	340	270	160	*
Oregon	320	290	180	*
Pennsylvania	1,210	1,010	560	*
Rhode Island	90	60	*	*
South Carolina	380	300	240	*
South Dakota	90	50	*	*
Tennessee	570	470	300	*
Texas	1,690	1,380	810	90
Utah	170	120	80	*
Vermont	50	*	*	*
Virginia	550	490	340	*
Washington	520	460	240	*
West Virginia	190	160	100	*
Wisconsin	540	420	280	*
Wyoming	60	*	*	*
United States	24,500	20,140	12,590	1,070

Table 18. Source: American Cancer Society, Inc. Projections for 2017 based on modeling of cancer deaths reported to the National Center for Health Statistics from 2000 to 2014. Estimates are rounded to the nearest 10. The sum of the state estimates may not equal the US total due to rounding and exclusion of state estimates with fewer than 50 deaths. Numbers are rounded to the nearest 10.
*Estimate is fewer than 50 cases.
Note: The projected numbers of new cancer cases and deaths in 2017 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.

Five-Year Incidence and Mortality Cases by State, 2009-2013

Five-Year Blood Cancer Incidence Cases by State, 2009-2013

State	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin Lymphoma
Alabama	3,181	4,445	1,774	559
Alaska	332	531	150	62
Arizona	4,073	5,668	1,861	726
Arkansas	1,922	2,932	1,048	412
California	23,692	35,064	10,984	4,472
Colorado	3,542	4,567	1,498	691
Connecticut	3,144	4,359	1,421	637
Delaware	717	1,095	393	147
Dist. of Columbia	297	536	252	114
Florida	15,394	21,792	7,619	2,525
Georgia	6,064	8,357	3,742	1,193
Hawaii	923	1,445	458	125
Idaho	1,315	1,509	510	214
Illinois	9,013	13,210	4,279	1,814
Indiana	4,644	6,863	2,285	947
Iowa	2,875	3,995	1,181	472
Kansas	2,394	3,065	960	356
Kentucky	3,692	5,050	1,598	604
Louisiana	3,046	4,721	1,694	637
Maine	1,316	1,749	507	212
Maryland	3,869	5,509	2,085	813
Massachusetts	4,778	7,508	2,498	1,012
Michigan	7,517	11,501	3,698	1,416
Minnesota	4,740	6,516	1,841	833
Mississippi	1,895	2,709	1,190	359
Missouri	4,447	6,272	2,111	838
Montana	927	1,169	385	152
Nebraska	1,372	2,092	631	276
Nevada	1,803	2,251	608	254
New Hampshire	1,060	1,677	465	207
New Jersey	7,165	10,468	3,465	1,456
New Mexico	1,415	1,745	583	240
New York	16,988	23,498	8,656	3,252
North Carolina	6,666	9,329	3,765	1,276
North Dakota	617	807	235	115
Ohio	7,695	12,594	3,927	1,532
Oklahoma	2,691	3,712	1,208	505
Oregon	2,689	4,163	1,167	524
Pennsylvania	11,035	16,818	5,151	2,135
Rhode Island	842	1,297	366	194
South Carolina	3,350	4,311	2,005	622
South Dakota	654	919	337	110
Tennessee	4,743	6,474	2,256	877
Texas	16,030	21,297	7,917	3,107
Utah	1,617	2,137	686	345
Vermont	475	819	227	104
Virginia	4,575	7,380	2,667	1,019
Washington	5,309	7,570	2,212	933
West Virginia	1,594	2,225	696	235
Wisconsin	5,461	6,734	2,265	885
Wyoming	421	497	171	65
United States	217,551	311,252	106,191	41,111

Table 19. Source: *Cancer in North America: 2009-2013, Volume Two: Registry-specific Cancer Incidence in the United States and Canada.*

Five-Year Blood Cancer Mortality Cases by State, 2009-2013

State	Leukemia	Non-Hodgkin Lymphoma	Myeloma	Hodgkin Lymphoma
Alabama	1,977	1,628	1,055	100
Alaska	160	143	84	^
Arizona	2,333	1,986	1,054	103
Arkansas	1,250	1,105	575	66
California	11,988	10,514	5,714	703
Colorado	1,529	1,256	735	67
Connecticut	1,462	1,221	659	64
Delaware	357	319	191	18
Dist. of Columbia	164	142	124	13
Florida	8,355	7,503	3,989	409
Georgia	2,816	2,374	1,638	166
Hawaii	428	448	205	17
Idaho	532	510	273	32
Illinois	5,026	4,237	2,294	202
Indiana	2,602	2,317	1,296	118
Iowa	1,348	1,295	637	64
Kansas	1,212	1,016	587	54
Kentucky	1,791	1,631	827	61
Louisiana	1,642	1,519	888	110
Maine	615	564	275	30
Maryland	1,970	1,628	1,137	108
Massachusetts	2,579	2,163	1,256	125
Michigan	4,045	3,901	2,062	204
Minnesota	2,243	2,051	997	101
Mississippi	1,154	885	600	68
Missouri	2,471	2,067	1,222	115
Montana	397	347	216	18
Nebraska	705	649	350	36
Nevada	881	720	368	45
New Hampshire	511	418	254	29
New Jersey	3,208	2,819	1,596	155
New Mexico	663	559	311	41
New York	7,096	6,302	3,413	382
North Carolina	3,404	2,937	1,886	172
North Dakota	274	231	147	^
Ohio	4,846	4,453	2,454	227
Oklahoma	1,593	1,372	709	83
Oregon	1,554	1,441	778	80
Pennsylvania	5,828	5,326	2,692	277
Rhode Island	430	363	185	25
South Carolina	1,699	1,444	1006	82
South Dakota	377	294	182	11
Tennessee	2,560	2,260	1,307	141
Texas	7,635	6,518	3,584	447
Utah	634	598	364	29
Vermont	245	242	122	22
Virginia	2,660	2,444	1,532	150
Washington	2,425	2,234	1,185	112
West Virginia	893	794	428	47
Wisconsin	2,595	2,152	1,196	121
Wyoming	251	161	106	^
United States	115,413	101,501	56,745	5,869

Table 20. Source: *Surveillance, Epidemiology, and End Results* (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2013) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

^Statistic not displayed due to fewer than 10 cases.

Five-Year Leukemia Incidence and Mortality Cases by State, 2009-2013

Five-Year Leukemia Incidence Cases By State, 2009-2013

State	Leukemia	Acute Lymphocytic Leukemia	Chronic Lymphocytic Leukemia	Acute Myeloid Leukemia	Chronic Myeloid Leukemia
Alabama	3,181	306	997	991	348
Alaska	332	44	99	103	46
Arizona	4,073	539	1,053	1,372	493
Arkansas	1,922	190	618	603	251
California	23,692	3,640	7,362	7,262	2,882
Colorado	3,542	379	1,238	949	467
Connecticut	3,144	268	1,177	927	401
Delaware	717	65	264	197	97
Dist. of Columbia	297	39	86	81	34
Florida	15,394	1,550	4,860	4,990	2,014
Georgia	6,064	675	1,969	1,886	796
Hawaii	923	104	251	337	123
Idaho	1,315	132	529	320	188
Illinois	9,013	1,011	2,699	3,100	1,197
Indiana	4,644	480	1,479	1,559	631
Iowa	2,875	250	1,128	820	381
Kansas	2,394	226	845	666	318
Kentucky	3,692	311	1,391	1,087	516
Louisiana	3,046	296	989	949	468
Maine	1,316	94	555	396	151
Maryland	3,869	382	1,221	1,275	465
Massachusetts	4,778	490	1,581	1,485	567
Michigan	7,517	753	2,620	2,334	992
Minnesota	4,740	426	1,920	1,234	626
Mississippi	1,895	188	602	622	254
Missouri	4,447	411	1,334	1,427	598
Montana	927	64	402	244	119
Nebraska	1,372	136	495	425	164
Nevada	1,803	230	614	530	169
New Hampshire	1,060	88	442	276	131
New Jersey	7,165	693	2,771	1,983	854
New Mexico	1,415	170	531	376	185
New York	16,988	1,470	6,907	4,643	2,121
North Carolina	6,666	725	2,292	2,024	916
North Dakota	617	42	292	162	65
Ohio	7,695	807	2,210	2,451	939
Oklahoma	2,691	292	882	788	343
Oregon	2,689	289	916	879	285
Pennsylvania	11,035	1,027	3,896	3,429	1,426
Rhode Island	842	62	288	248	110
South Carolina	3,350	327	1,167	1,023	410
South Dakota	654	62	242	206	73
Tennessee	4,743	471	1,751	1,405	575
Texas	16,030	2,369	4,896	4,243	2,171
Utah	1,617	235	572	453	189
Vermont	475	44	183	150	58
Virginia	4,575	518	1,369	1,526	549
Washington	5,309	551	2,074	1,489	657
West Virginia	1,594	126	568	490	230
Wisconsin	5,461	447	2,143	1,515	761
Wyoming	421	42	169	122	42
United States	217,551	23,690	73,787	65,685	27,800

Table 21. Source: Cancer in North America: 2009-2013,Volume Two: Registry-specific Cancer Incidence in the United States and Canada

Five-Year Leukemia Mortality Cases By State, 2009-2013

State	Leukemia	Acute Lymphocytic Leukemia	Chronic Lymphocytic Leukemia	Acute Myeloid Leukemia	Chronic Myeloid Leukemia
Alabama	1,977	82	347	711	81
Alaska	160	10	34	72	^
Arizona	2,333	186	420	935	109
Arkansas	1,250	47	226	420	58
California	11,988	1,123	2,180	5,169	558
Colorado	1,529	124	299	641	82
Connecticut	1,462	69	299	628	63
Delaware	357	21	78	138	18
Dist. of Columbia	164	14	40	64	11
Florida	8,355	505	1,553	3,283	381
Georgia	2,816	171	485	993	121
Hawaii	428	23	39	203	20
Idaho	532	28	117	210	31
Illinois	5,026	243	977	1,948	191
Indiana	2,602	127	515	1,099	112
Iowa	1,348	88	333	609	62
Kansas	1,212	56	264	472	58
Kentucky	1,791	98	387	689	95
Louisiana	1,642	85	263	541	93
Maine	615	25	131	259	26
Maryland	1,970	89	373	748	99
Massachusetts	2,579	148	550	1,069	101
Michigan	4,045	198	864	1,653	171
Minnesota	2,243	119	524	994	104
Mississippi	1,154	71	179	368	40
Missouri	2,471	129	525	1,032	114
Montana	397	21	91	157	15
Nebraska	705	36	172	309	19
Nevada	881	73	125	370	29
New Hampshire	511	28	144	193	19
New Jersey	3,208	166	651	1,262	104
New Mexico	663	51	134	268	26
New York	7,096	429	1,421	3,137	287
North Carolina	3,404	156	741	1,443	169
North Dakota	274	15	70	120	12
Ohio	4,846	236	1,009	2,077	221
Oklahoma	1,593	94	312	579	76
Oregon	1,554	94	344	676	75
Pennsylvania	5,828	328	1,231	2,290	226
Rhode Island	430	22	96	185	17
South Carolina	1,699	82	315	737	84
South Dakota	377	22	95	148	10
Tennessee	2,560	146	569	1,050	124
Texas	7,635	679	1,263	2,985	407
Utah	634	46	129	238	32
Vermont	245	12	58	117	13
Virginia	2,660	136	552	1,020	110
Washington	2,425	193	583	1,185	100
West Virginia	893	37	214	324	35
Wisconsin	2,595	131	533	1,141	95
Wyoming	251	12	52	100	^
United States	115,413	7,124	22,906	47,059	5,119

Table 22. Source: *Surveillance, Epidemiology, and End Results* (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1990-2013) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

^Statistic not displayed due to fewer than 10 cases.

Notes and Definitions

The data within *Facts 2016-2017* reflect the most recent statistics from The National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program, Cancer Statistics Review (CSR) 1975-2013. The CSR 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, 2016. The next SEER Cancer Statistics Review is expected to be published online in the spring of 2017.

Incidence and mortality rates measure exactly what occurred and cover the entire period through the most recent year reported, 2013. However, in order to calculate survival rates, the most current year of data are not considered, because not enough time has passed for it to to be included.

The SEER Program's CSR presents statistics by age, sex, race and ethnicity. These distinctions, while definitely useful, should not be thought of as absolute. 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 US population.

Data by Hispanic ethnicity is not shown for statistics/years for which they are not available. The Hispanic ethnicity categorization is not mutually exclusive with race, so in instances where comparisons are made using ethnicity, the groupings Hispanic whites and non-Hispanic whites are used to enable meaningful comparisons.

The United States (US) does not have a nationwide reporting system or registry for blood cancer, so the exact number of cancer cases is unknown. The data presented in the report are either an extrapolation from, or are an estimate of, the number of cases reported by the 18 SEER regions (or, in some cases, fewer than 18 SEER regions) and mortality data from the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). These numbers are extrapolated to the entire 18 SEER regions by dividing the number of cancer cases or deaths in a specific region by the US Bureau of the Census population data for that region. Mortality data reflected in the 2016 referenced SEER report reflect data updates from the NCHS from 1969 to 2013, made available in 2016.

The SEER (18 region) data cover only about 27.8 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 and region-specific health risks.

Data on American Indians and Alaska Natives (AI/AN) should be interpreted with care because the data reflect statistics from Indian Health Service (IHS) Contract Health Service Delivery Area (CHSDA) counties only. Many AI/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 myelodysplastic syndromes (MDS) data were included in the SEER statistics as separate entities beginning in 2007.

State level incidence rates presented in *Facts 2016-2017* are provided by the North American Association of Central Cancer Registries (NAACCR). NAACCR presents the most current 5-year incidence rate for the US and Canada in the annual publication, Cancer In North America.

The American Cancer Society (ACS) projected the number of estimated cancer cases for 2017 using a model based on incidence data from 49 states and the District of Columbia for the years from 1995 to 2013. That incidence data met the North American Association of Central Cancer Registries' (NAACCR) 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. ACS projected the estimated number of US cancer deaths in the US by fitting the number of cancer deaths from 1995 to 2013 to a statistical model that forecasts the number of deaths expected to occur in 2017. 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.

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 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.

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." This publication is using the "38-year limited duration" prevalence figures, based on the "first invasive tumor for each cancer site diagnosed during the previous 38 years (1975-2012)," as per SEER Table 1.22. The specified date is January 1, 2013, for the prevalence estimates. The prevalence counts in *Facts 2016-2017* 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 that 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.)

Observed-to-expected ratio (O/E) is the observed number of cancers in a population of cancer survivors divided by the number of cancers expected. The number of cancers expected is calculated using cancer rates from the general population and person-years-at-risk of the survivor population under study. The risk of developing subsequent cancers varies by the type of first cancer diagnosed, age at first diagnosis, environmental exposures, genetic factors, treatment and other factors.

Person-years-at-risk (PYAR) is counted from the date 2 months after the diagnosis of the first cancer (to exclude multiple primaries diagnosed at the same time) until the date of last known vital status or death, and allocated by age, sex, race and calendar year. All second and later (third, fourth, etc.) cancer diagnoses are included.

Estimated absolute risk (EAR) is calculated by subtracting the expected number of cancer cases from the observed number, dividing by the PYAR and multiplying by 10,000. The EAR represents the number of excess cancers per 10,000 PYAR (for example, a population of 10,000 cancer survivors followed for 1 year or 1,000 cancer survivors followed for 10 years).

About The Leukemia & Lymphoma Society

The Leukemia & Lymphoma Society (LLS) exists to find cures and ensure access to the most appropriate treatments for blood cancer patients. We are saving lives not someday, but today.

LLS funds research to advance more breakthrough therapies for blood cancer patients.

LLS is the voice for all blood cancer patients, and is working to ensure access to treatments for all blood cancer patients.

Despite progress, more than a third of blood cancer patients still do not survive 5 years after their diagnosis.

Research

Over the past 68 years, LLS has invested more than $1 billion in research to advance therapies and save lives. We provide funding across the continuum from basic research through clinical trials—from bench to bedside. LLS research grants have funded many of today's most promising advances, including targeted therapies and immunotherapies. Our funding supports the training of the next generation of first-rate cancer researchers.

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

- *The Career Development Program (CDP)* provides stipends to investigators of exceptional promise in the early stages of their careers. CDP is stratified into two separately reviewed programs: basic or clinical research.
- *The Translational Research Program* supports outstanding investigations likely to translate basic biomedical discoveries into safe and effective treatments. Awards are for an initial 3-year period.
- *The Specialized Center of Research Program (SCOR)* encourages multidisciplinary academic investigations by teams of at least three research groups, regardless of their location.
- *The New Idea Award* seeks innovative approaches that can lead to significant improvements in clinical outcomes and changes to standards of care for blood cancer patients.
- *The Screen to Lead Program* provides support for medicinal chemistry and/or drug target screening in blood cancers.
- *Quest For Cures* funds research to identify and develop safer, more effective treatment paradigms for patients who have blood cancers.

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

Our ***Therapy Acceleration Program™ (TAP)*** speeds the path of potentially better therapies into preclinical development and clinical trials. Working with academic investigators, medical centers, biotechnology and pharmaceutical companies, TAP is increasing the likelihood that breakthrough treatments will be available to patients sooner.

Our ***Transforming CURES Initiative (TCI)–Intercepting Progression to Advanced Myeloid Blood Cancers*** is a program designed to advance the scientific and medical understanding of myeloid disease, and, ultimately, stop progression of certain types of blood cancers from early-stage malignancies to much more lethal states of disease.

LLS has foundation partnerships with

- The MPN Research Foundation, to fund innovative grants to better understand and treat the range of myeloproliferative neoplasms (MPN)
- The International Waldenström's Macroglobulinemia (WM) Foundation, to fund research to improve quality of life and to better understand and treat WM and other B-cell malignancies
- The Rising Tide Foundation for Clinical Cancer Research, to fund novel immunotherapy research and clinical trials for all blood cancers
- The Babich Family Foundation/RUNX1 Research Program, to fund translational research seeking to control Familial Platelet Disorder (FPD) leading to Acute Myeloid Leukemia (AML).

Visit www.LLS.org or email researchprograms@LLS.org for information about LLS research grant programs.

Public Policy

LLS recognizes that finding cures is not enough; we need to ensure that patients have access to the treatments they need to live longer, better, healthier lives. The LLS Office of Public Policy (OPP) is dedicated to removing barriers to care by advancing Federal and State public policy, and regulatory initiatives. OPP works with a nationwide team of advocates to drive public policies that accelerate the development and approval of innovative treatments, and ensure that patients have sustainable access to quality, affordable coordinated care.

OPP provides **access to better therapies, faster.** LLS is a strong voice in Washington, DC and throughout the US, representing the healthcare and medical research interests of patients and families to policy makers at all levels of government. Our staff includes legislative and regulatory affairs experts and patient access professionals. We collaborate with our passionate and extensive Advocates Network of volunteers—many individuals whose lives have been touched by a blood cancer. Currently, we are working at federal, state and community levels to ensure that patients have affordable health insurance coverage and to remove barriers to access. To join the LLS Advocates Network, visit www.LLS.org/advocacy.

Patient Education and Support Services

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 US and Canada.

- **Accurate, up-to-date information.** Our Information Specialists are master's level oncology professionals who provide a one-to-one connection for patients, families and healthcare professionals. The staff members offer personalized guidance for coping with a blood cancer diagnosis, current disease information and referral to resources within LLS and beyond. Information Specialists can help conduct clinical-trial searches and, when appropriate, personalized clinical-trial navigation by trained nurses is also available. Information Specialists can be contacted at (800) 955-4572, Monday through Friday, from 9 a.m. to 9 p.m. Eastern Time, or by visiting www.LLS.org/informationspecialists.

- **Assistance with financial burdens.** Our *Co-Pay Assistance Program* has provided more than $323 million to date to patients to help pay for co-pays and health insurance premiums. Eligibility for this program is based on fund availability for specific blood cancer diagnoses and financial need criteria. A current list of funds by blood cancer diagnosis is available at www.LLS.org/copay or at (877) 557-2672.

  Our *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 costs. Qualified patients, meeting program eligibility criteria, receive an annual stipend to help cover these expenses. Patient assistance is based upon available funding. Visit www.LLS.org/travel or call (844) 565-2269.

- **Free information booklets.** Disease, treatment and support booklets in English, Spanish and French 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 telephone, Web, in-person, and video education programs for patients, caregivers and healthcare professionals.

  Programs for patients and caregivers feature experts who share the latest disease, treatment and research updates, including information about survivorship. Visit www.LLS.org/programs and www.LLS.org/EducationVideos.

  LLS offers free continuing education programs online and in communities for nurses, social workers, and physicians. Visit www.LLS.org/ProfessionalEd.

- **Connection with other blood cancer survivors.** LLS creates many opportunities for peer-to-peer support.

  Weekly online chats are moderated by a social worker and can provide support and help cancer patients to reach out and share information. For more information, visit www.LLS.org/chat.

  The *Patti Robinson Kaufmann First Connection Program* gives patients and caregivers the opportunity to share experiences 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 shop for chatting with other patients and staying up-to-date on the latest diagnosis and treatment news. Patients and caregivers can share their experiences with one another and get personalized support from trained LLS staff. To join, visit www.LLS.org/community.

Support groups in communities throughout LLS chapters 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, in-person, educational events for blood cancer patients, caregivers and their families to learn more about the latest disease-specific breakthroughs and current treatments from local and national experts. Visit www.LLS.org/bcc for a list of these upcoming regional events.

Visit www.LLS.org for access to up-to-date disease, treatment and support information and mobile-web tools.

Notes

Citations and Acknowledgements

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