

Chapter 17

New Malignancies Following Leukemia

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Synopsis

The risk of subsequent primary cancer was assessed in more than 46,000 individuals diagnosed with any of the 4 major leukemias between 1973 and 2000. The overall risk of subsequent cancers was significantly increased among survivors of chronic lymphocytic leukemia (CLL) (O/E=1.19,¹ O=2,718, EAR=38 per 10,000 person-years), chronic myeloid leukemia (CML) (O/E=1.16,¹ O=334, EAR=19), and acute lymphocytic leukemia (ALL) (O/E=1.55,¹ O=66, EAR=5), but not acute myeloid leukemia (O/E=0.94,¹ O=157). The risk of a new malignancy was notably high among children diagnosed with ALL (O/E=5.01,¹ O=36, EAR=7), with statistically significant increased risks seen for cancers of the salivary gland, brain and other central nervous system, thyroid, and bone, based on small numbers. Much of the excess was likely related to treatment with radiotherapy at a young age, although familial cancer syndromes could have played a small role. Immune dysfunction, which is an intrinsic part of CLL, may have contributed to the significantly increased incidence for subsequent cancers of the lip, larynx, and lung, as well as subsequent cutaneous melanoma, Hodgkin lymphoma, and Kaposi sarcoma seen in these patients. Excess new malignancies of the oral cavity, lung, and colon (females only) and non-Hodgkin lymphoma were seen following CML for reasons that are unclear.

Leukemia

The leukemias are a heterogeneous group of malignancies constituting 2.5% of incident cancer cases and 4.0% of cancer deaths (Jemal et al, 2005). Leukemias are classified by lineage into 2 main groups, myeloid and lymphoid, and further subdivided into acute and chronic forms. All 4 major subtypes of leukemia originate from a common stem cell that normally divides and differentiates into subtypes of cells that play an important role in immune function. The hematologic malignancies of each lineage arise from genetic changes that occur at some point along the

differentiation pathway of this stem cell, and each has its own unique pattern of disease presentation.

The etiology is largely unknown for all 4 major subtypes of leukemia. Ionizing radiation has been shown to cause excesses of each leukemia subtype except chronic lymphocytic leukemia (CLL) (Preston et al, 1994), whereas chemotherapeutic agents (alkylating agents, topoisomerase II inhibitors) and the organic solvent benzene have been associated with acute myeloid leukemia (AML) (Hayes et al, 1997). Most studies of environmental and occupational exposures and leukemia have shown inconsistent results in both children and adults. Epidemiologic evidence suggests a weak association between smoking and leukemia, particularly AML (Kane et al, 1999). Some investigators have linked childhood acute lymphocytic leukemia (ALL) to various risk factors, such as parental exposures (Shu et al, 1999; Schüz et al, 2000), infectious agents (Kinlen and Balkwill, 2001), and high birth weight (Hjalgrim et al, 2004).

Genetic factors contribute also to the etiology of leukemia, especially in familial aggregation of CLL (Ishibe et al, 2001). Approximately 5% of acute leukemia has been related to genetic syndromes, such as Down syndrome, ataxia telangiectasia, neurofibromatosis type 1, Li-Fraumeni syndrome, Fanconi anemia, and other bone marrow failure disorders (Lindor and Greene, 1998).

Overall risks presented below for each leukemia subtype exclude observed and expected numbers of subsequent leukemia of the same lineage (i.e., myeloid or lymphoid) as the first primary leukemia, because according to SEER abstracting rules, new leukemia diagnoses of the same lineage are not considered new, separate primaries.

Acute Leukemias

ALL is the most common childhood leukemia; more than 60% of all ALL cases occur in children and adolescents younger than 17 years of age. In contrast, AML is typically diagnosed in adulthood, and pediatric patients constitute less than 10% of the total. Survival among children with ALL has improved greatly since the 1970s due to advances in treatment, with current relative survival rates reaching 84.9% at 5 years and 78.1% at 10 years. In contrast, adults with ALL have a poor prognosis: 29.6% relative survival at 5 years. Substantially lower 5-year relative survival rates are seen for AML: 50.9% for children and 17.4% for adults. Patients with acute leukemia

¹Observed-to-expected ratios for acute and chronic lymphocytic leukemia exclude subsequent lymphocytic leukemias; those for acute and chronic myeloid leukemia exclude subsequent myeloid leukemias. Abbreviations: O=observed number of subsequent (2nd, 3rd, etc.) primary cancers; O/E=ratio of observed to expected cancers; CI=confidence interval; PYR=person-years at risk; EAR=excess absolute risk (excess cancers per 10,000 person-years, calculated as [(O-E)/PYR] × 10,000).

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are usually treated for curative intent with chemotherapy relying heavily on antimetabolites and anthracyclines (Hoelzer et al, 2002). With ALL, and to a lesser extent AML, cranial or craniospinal irradiation has been used to prevent or treat central nervous system (CNS) involvement. (Treatment with cranial radiotherapy has been reportable to the SEER Program since its inception, but cranial irradiation given for prophylaxis was not recorded in registry databases until 1988.) Current efforts to reduce the late sequelae of cranial irradiation have led to wider use of intrathecal chemotherapy alone for lower-risk patients. Younger ALL/AML patients with a poor prognosis or those who fail conventional treatment may be considered for bone marrow transplantation.

Results and Discussion

Acute Lymphocytic Leukemia

The overall risk of subsequent primary cancer was significantly increased among the 7,246 ALL patients who survived 2 months or more (O/E=1.55, O=66, 95% CI=1.20-1.98, EAR=5 per 10,000 person-years). The cumulative incidence of developing a second cancer following ALL, adjusted for the competing risk of death due to other causes, was 2.3% (95% CI=1.4%-3.6%) at 25 years. The increase in risk of developing a new malignancy was confined to pediatric patients (ages <17 years, O/E=5.01, 95% CI=3.51-6.93, EAR=7); no elevation in risk was observed among older patients (ages ≥17 years, O/E=0.85, 95% CI=0.57-1.21). Among children with ALL, significantly increased relative risks were observed for new cancers of the salivary gland, small intestine, brain and other CNS, thyroid, and bone, based on small numbers. The risk of a new malignancy among pediatric ALL patients was increased 3-fold compared to expected values among those surviving 1 to 5 years and then rose to 5-fold among those surviving 5 years or more. Females and males appeared to have similar risks. These results are consistent with previous studies of childhood ALL, which have reported increased risks of subsequent cancers ranging from 4- to 14-fold, with significant elevations noted for cancers of the brain, thyroid, buccal cavity (especially salivary gland), and bone, as well as for AML (Neglia et al, 1991, 2001; Kimball Dalton et al, 1998; Bhatia et al, 2002; Pui et al, 2003).

We observed an overall 10-fold increase in risk of developing a subsequent malignancy of the brain/CNS among children with ALL, rising to 17-fold among long-term survivors (≥5 years). Gliomas (O=7) and primitive neuroectodermal tumors (O=2) were the most frequent cell types. Most of the patients developing subsequent brain/CNS tumors (7 out of 11) were known to have received initial radiation treatment for ALL, and 9 of the brain cancers occurred among ALL patients diagnosed at 5 years of age or younger. These findings resemble those of previous studies of childhood ALL showing a marked increase in risk of subsequent brain/CNS tumors following cranial irradiation at doses of 18 to 24 Gy (Walter et al, 1998). The especially high risks seen among very

young children in our series and other studies (Neglia et al, 1991; Walter et al, 1998) indicate that the developing brain is particularly susceptible to the carcinogenic effects of radiation.

Treatment of ALL with cranial irradiation during childhood may also account for the excess cancers of the thyroid, salivary gland, and bone, since the patterns over time for these subsequent cancers are consistent with a radiation effect. Thyroid tissue is highly radiosensitive (Thompson et al, 1994; Ron et al, 1995), and an excess of thyroid cancer has been reported after head and neck radiotherapy during childhood (de Vathaire et al, 1999). Similarly, radiation exposure is associated with excess tumors of the salivary gland (Land et al, 1996), and bone cancer is well documented as a second cancer following radiotherapy for childhood cancer (Hawkins et al, 1996; Le Vu et al, 1998). Three of the 4 bone tumors in the current study were located in the skull or shoulder/upper limb, sites that may have received direct or scatter radiation. In addition, genetic susceptibility may have played a role, since brain tumors, bone sarcomas, and acute leukemia are part of the constellation of tumors seen in Li-Fraumeni syndrome (Hisada et al, 1998; Lindor and Greene, 1998).

Data from clinical trials have shown an increased risk of subsequent AML following treatment for ALL with topoisomerase II inhibitors (etoposide, teniposide) since their introduction in the mid-1980s (Pui et al, 1991). Although only 1 case of subsequent AML was observed among pediatric ALL patients, we found a 15-fold significantly increased risk among older ALL patients, based on 4 cases.

Acute Myeloid Leukemia

The number of new malignancies observed among the 11,169 individuals diagnosed with AML did not differ from that expected based on general population rates (O/E=0.94, O=157, 95% CI=0.79-1.09). Approximately 3% of patients developed a second cancer within 20 years of initial diagnosis (cumulative incidence=2.2%, CI=1.8%-2.7%). Subsequent cancer risks appeared similar among males and females and did not differ significantly by race or follow-up period. Although significantly increased risks were detected for subsequent kidney and thyroid cancers, the elevations in risk were limited to the first year after AML diagnosis, suggesting an effect of increased medical surveillance during this period.

Pediatric AML patients in our series appeared at increased risk of subsequent cancers, although the risk was not statistically significant (O/E=3.51, O=3). A previous study of childhood AML found a 10-fold elevation in the risk of second cancers following conventional treatment, based on 5 cases (Leung et al, 2001). The risks were substantially higher (48-fold) in a survey of 1,100 children undergoing allogeneic bone marrow transplantation for AML, with excesses of lymphoma and melanoma of the skin, and cancers of the tongue, salivary gland, brain/CNS, bone, soft tissue, and thyroid (Socié et al, 2000).

Chronic Leukemias

CLL is typically a disease of older adults; its median age at onset is 70 years. In contrast, incidence rates for chronic myeloid leukemia (CML) begin increasing in adolescence, rise rapidly in young adulthood, and reach a peak at older ages. In general, age-adjusted incidence rates of leukemia tend to be higher for males than females; however, the sex difference is most pronounced for CLL and CML (Jemal et al, 2005). CLL is generally indolent, with 5- and 10-year relative survival rates of 72.7% and 52.9%, respectively. Prognosis for CML varies by age at diagnosis, with more favorable 5-year survival rates under age 55 years (56.1%) compared to older ages (24.2%). Patients with CLL and CML typically receive palliative treatment, but low-risk CLL patients may remain untreated until the disease progresses. Chemotherapy for CLL usually includes alkylating agents (chlorambucil, cyclophosphamide) and more recently nucleoside analogues (e.g., fludarabine) (Kipps, 2000). Frontline chemotherapy for CML includes busulfan, hydroxyurea, and interferon α , although the recent introduction of Gleevec™ (imatinib mesylate) has revolutionized the treatment of CML (Garcia-Manero et al, 2003). Bone marrow transplantation is frequently considered as a treatment option for younger CML patients.

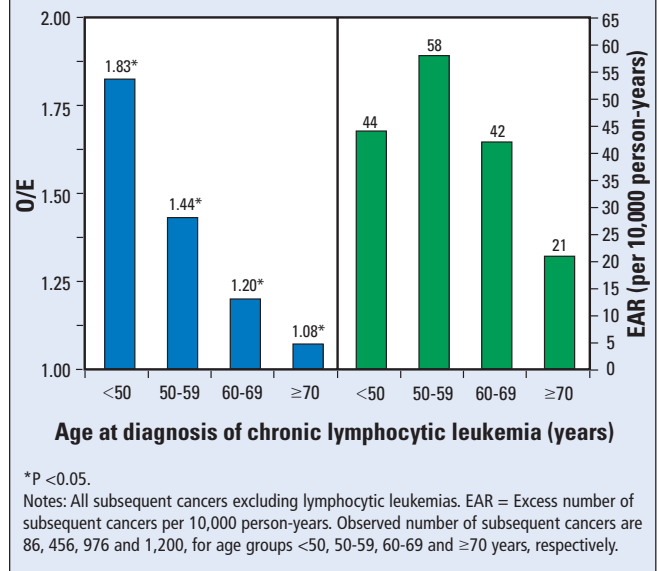
Results and Discussion

Chronic Lymphocytic Leukemia

A 19% elevation in risk of subsequent primary cancers was observed among 19,631 patients who survived 2 months or more following a diagnosis of CLL (O/E=1.19, O=2,718, 95% CI=1.15-1.24, EAR=38). An estimated 17% of patients developed a second cancer within 25 years of follow-up (cumulative incidence=16.7%, CI=16.1%-17.4%). An 80% increase in risk was seen among CLL patients diagnosed at less than 50 years of age, and then risk declined at older ages (Figure 17.1). Both relative and absolute risks of new cancers were higher among blacks (O/E=1.41, EAR=82) than whites (O/E=1.19, EAR=37). The risk was greatest during the first 5 years of follow-up and then diminished. Significantly heightened risks were observed for subsequent cancers of the lip, salivary gland, nose and nasal cavity, larynx, lung, colon, rectum (females), and kidney, as well as cutaneous melanoma, Hodgkin lymphoma, and Kaposi sarcoma. Significantly decreased risks were seen for new malignancies of the bile ducts and of the corpus uteri. Our findings are consistent with previous surveys of CLL patients (Mellempgaard et al, 1994; Wiernik 2004), including 2 earlier SEER analyses (Travis et al, 1992; Hisada et al, 2001) that reported increased risks for subsequent cancers of the lung, as well as Hodgkin lymphoma, Kaposi sarcoma, and melanoma of the skin. CLL transformation to large B-cell non-Hodgkin lymphoma, known as Richter's syndrome, is not reportable to SEER (Robak, 2004).

Cancers of the respiratory tract are the most common new cancers seen after a diagnosis of CLL (Mellempgaard

Figure 17.1: Observed-to-expected ratio (O/E) and excess absolute risk (EAR) of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, SEER 1973-2000.



et al, 1994; Hisada et al, 2001). In our survey, 50-60% increased risks of subsequent cancers of the lung were observed in all follow-up periods. Excess cancers of the larynx were confined to long-term survivors. Reasons for these excesses are not entirely clear but may be related to the combined effects of cigarette smoking (Parekh et al, 1999), immunologic impairment (Bartik et al, 1998; Sgambati et al, 2001), and treatment with alkylating agents (Travis et al, 2002) or nucleoside analogues (Robak et al, 2004).

Immune alterations probably contributed to the excess risks reported for lip cancer, as well as for melanoma of the skin, Hodgkin lymphoma, and Kaposi sarcoma, as these malignancies occur excessively in other immunocompromised groups, such as transplant recipients (Curtis et al, 1997; Euvrard et al, 2003) and Hodgkin lymphoma patients (Dores et al, 2002). Infections with Epstein-Barr virus and human herpesvirus 8 may account for Hodgkin lymphoma and Kaposi sarcoma, respectively, in the setting of immunosuppression. However, some cases of Hodgkin lymphoma after CLL may represent a Hodgkin variant of Richter's syndrome (Ohno et al, 1998).

The risk of subsequent primary cancer has been reported to be higher in patients with familial CLL as compared with nonfamilial CLL, particularly at younger ages (Ishibe et al, 2001). Thus the nearly 2-fold increased risk of subsequent cancers seen among CLL patients diagnosed under age 50 years, with excesses of cancers of the lip and lung, as well as melanoma of the skin and AML, may be related in part to an underlying genetic susceptibility.

The excess of kidney cancers was confined to the first year of follow-up, likely due to increased medical surveillance during the initial diagnostic work-up. The elevated risks of new cancers of the colon, rectum, and

salivary gland that were observed in the current CLL cohort, but not in earlier surveys of the SEER Program, may provide etiologic clues for future studies.

Chronic Myeloid Leukemia

There was a 16% increased risk for all subsequent primary cancers combined among the 8,005 patients who survived 2 months or more after a diagnosis of CML (O/E=1.16, O=334, 95% CI=1.04-1.29, EAR=19). The cumulative incidence of developing a new malignancy at 15 years was 4.8% (CI=4.3%-5.4%). Females had a 30% elevation in the risk of subsequent cancers, whereas no excess was observed among males. No discernible pattern in risk was evident over time since initial diagnosis. Significantly increased risks were observed for new primary cancers of the oral cavity and lung and for non-Hodgkin lymphoma in both sexes combined, as well as for cancers of the colon among females but not males. Because little is known of the etiology of CML, the reasons for these associations are unclear. Secondary ALL appeared more frequently than expected in this cohort, based on 7 cases, but this may represent a transformation of the original CML to a lymphoblastic phase (Garcia-Manero et al, 2003).

Among younger CML patients who were potential candidates for bone marrow transplantation, there was a 5-fold significantly increased risk of subsequent malignancies involving a variety of sites, including 2 lymphomas. Although the effects of bone marrow transplantation could not be evaluated in our study, previous transplant studies of CML have reported increased risks for lymphomas and solid tumors (Socié et al, 2001).

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Acute Lymphocytic Leukemia Both Sexes

Table 17.1.1: Characteristics of patients with an initial acute lymphocytic leukemia, both sexes, SEER 1973-2000.

Characteristics	Males		Females		Total	
	No.	%	No.	%	No.	%
Number of patients with 1st primary cancer						
Total	4,205	100.0	3,041	100.0	7,246	100.0
Initial treatment						
Any radiation	1,221	29.0	819	26.9	2,040	28.2
With surgery	5	0.1	1	0.0	6	0.1
Without surgery	1,216	28.9	818	26.9	2,034	28.1
No radiation	2,984	71.0	2,222	73.1	5,206	71.8
With surgery	9	0.2	1	0.0	10	0.1
Without surgery	2,975	70.7	2,221	73.0	5,196	71.7
Race						
White	3,523	83.8	2,511	82.6	6,034	83.3
Black	275	6.5	235	7.7	510	7.0
Other	389	9.3	278	9.1	667	9.2
Unknown	18	0.4	17	0.6	35	0.5
Age at 1st primary cancer diagnosis, years						
< 30	3,274	77.9	2,359	77.6	5,633	77.7
30–49	415	9.9	275	9.0	690	9.5
50–69	335	8.0	256	8.4	591	8.2
70–79	133	3.2	89	2.9	222	3.1
≥ 80	48	1.1	62	2.0	110	1.5
Number of patients with one or more primary cancers						
One primary cancer only	4,171	99.2	3,013	99.1	7,184	99.1
1st and 2nd cancers	31	0.7	27	0.9	58	0.8
1st, 2nd, and 3rd cancers	3	0.1	1	0.0	4	0.1
1st, 2nd, 3rd, and additional cancers	0	0.0	0	0.0	0	0.0
Other statistics						
Median age at 1st cancer diagnosis	9.9	—	7.8	—	8.8	—
Median year of 1st cancer diagnosis	1988.9	—	1989.0	—	1989.0	—
Median person-years at risk	3.3	—	4.0	—	3.6	—
Percent histologically confirmed*						
Both 1st and 2nd cancers	—	100.0	—	96.4	—	98.4
1st, 2nd, and additional cancers	—	100.0	—	96.4	—	98.4
1st cancer only	—	0.0	—	3.6	—	1.6

*Percent histologically confirmed among patients who developed a subsequent primary cancer.

Table 17.1.2: Risk of subsequent primary cancers after acute lymphocytic leukemia, both sexes, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	7	0.80	19	1.24	19	2.10*	21	1.98*	66	43.79	1.51*	4.77
All excluding same site	7	0.82	19	1.28	19	2.17*	21	2.02*	66	42.46	1.55*	5.06
Buccal cavity, pharynx	0	0.00	1	2.55	1	4.61	3	12.44*	5	1.09	4.61*	0.84
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.03
Tongue	0	0.00	0	0.00	0	0.00	1	20.09	1	0.22	4.63	0.17
Salivary gland	0	0.00	1	22.87	1	30.31	1	21.91	3	0.14	20.78*	0.61
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.25	0.00	-0.05
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.02
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.10	0.00	-0.02
Oropharynx	0	0.00	0	0.00	0	0.00	1	253.03*	1	0.03	39.48	0.21
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.02
Digestive system	3	1.76	1	0.37	0	0.00	2	1.42	6	7.31	0.82	-0.28
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.36	0.00	-0.08
Stomach	0	0.00	0	0.00	0	0.00	0	0.00	0	0.75	0.00	-0.16
Small intestine	1	39.84	1	23.74	0	0.00	0	0.00	2	0.12	16.72*	0.40
Colon	1	1.35	0	0.00	0	0.00	0	0.00	1	3.18	0.31	-0.47
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	1	4.08	1	1.29	0.78	-0.06
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.02
Liver	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.07
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.02
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.03
Pancreas	1	5.00	0	0.00	0	0.00	0	0.00	1	0.84	1.19	0.03
Respiratory system	1	0.75	2	0.94	3	2.72	0	0.00	6	5.55	1.08	0.10
Nose, nasal cavity, ear	0	0.00	0	0.00	1	63.21	0	0.00	1	0.08	13.00	0.20
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.39	0.00	-0.08
Lung, bronchus	1	0.82	2	1.04	2	2.00	0	0.00	5	5.02	1.00	0.00
Female breast	0	0.00	0	0.00	1	1.23	1	1.01	2	4.15	0.48	-1.03
Female genital system	0	0.00	0	0.00	1	2.37	0	0.00	1	2.21	0.45	-0.58
Cervix uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.50	0.00	-0.24
Corpus uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.78	0.00	-0.37
Ovary	0	0.00	0	0.00	1	6.49	0	0.00	1	0.76	1.32	0.12
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.01
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.04
Male genital system	1	0.66	4	1.53	0	0.00	1	0.58	6	7.43	0.81	-0.55
Prostate	1	0.70	4	1.66	0	0.00	1	0.83	6	6.41	0.94	-0.16
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.96	0.00	-0.37
Urinary system	1	1.51	2	1.79	0	0.00	1	1.69	4	2.97	1.35	0.22
Urinary bladder	1	2.39	1	1.43	0	0.00	1	2.57	3	1.90	1.58	0.24
Kidney parenchyma	0	0.00	1	2.75	0	0.00	0	0.00	1	0.92	1.09	0.02
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.03
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.01
Bone, joints	1	27.66	0	0.00	1	7.39	2	14.33*	4	0.44	9.12*	0.76
Soft tissue including heart	0	0.00	2	11.24*	1	7.97	0	0.00	3	0.55	5.44*	0.53
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.41	0.00	-0.09
Melanoma of skin	0	0.00	0	0.00	0	0.00	2	2.66	2	1.90	1.05	0.02
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.03
Brain, central nervous system	0	0.00	1	1.66	7	17.96*	3	7.83*	11	1.61	6.85*	2.02
Thyroid	0	0.00	1	4.43	2	10.08*	5	10.17*	8	1.01	7.90*	1.50
Lymphatic, hematopoietic	0	0.00	5	2.58	1	0.79	0	0.00	6	5.74	1.05	0.06
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	1.09	0.00	-0.24
Non-Hodgkin lymphoma	0	0.00	1	1.56	0	0.00	0	0.00	1	1.98	0.51	-0.21
Myeloma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.41	0.00	-0.09
Leukemia	0	0.00	4	4.48*	1	2.04	0	0.00	5	2.25	2.22	0.59
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.94	0.00	-0.20
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.33	0.00	-0.07
Acute non-lymphocytic	0	0.00	4	18.07*	1	6.96	0	0.00	5	0.65	7.70*	0.93
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.21	0.00	-0.04

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 20,836 PYR and for male cancers on 25,728 PYR.

Acute Lymphocytic Leukemia Females

Table 17.1.3: Risk of subsequent primary cancers after acute lymphocytic leukemia, females, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	1	0.32	7	1.27	11	3.39*	10	2.32*	29	16.25	1.78*	6.12
All excluding same site	1	0.32	7	1.32	11	3.50*	10	2.36*	29	15.78	1.84*	6.34
Buccal cavity, pharynx	0	0.00	0	0.00	1	17.60	1	13.54	2	0.28	7.17	0.83
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	-0.01
Tongue	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.03
Salivary gland	0	0.00	0	0.00	1	76.41	0	0.00	1	0.06	17.26	0.45
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.04
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.01
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.01
Oropharynx	0	0.00	0	0.00	0	0.00	1	†	1	0.01	175.46*	0.48
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	-0.01
Digestive system	0	0.00	0	0.00	0	0.00	0	0.00	0	2.50	0.00	-1.20
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.03
Stomach	0	0.00	0	0.00	0	0.00	0	0.00	0	0.21	0.00	-0.10
Small intestine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.02
Colon	0	0.00	0	0.00	0	0.00	0	0.00	0	1.18	0.00	-0.57
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	0	0.00	0	0.40	0.00	-0.19
Rectum	0	0.00	0	0.00	0	0.00	0	0.00	0	0.27	0.00	-0.13
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.02
Liver	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.04
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.02
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.03
Pancreas	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.15
Respiratory system	0	0.00	1	1.83	1	3.49	0	0.00	2	1.47	1.36	0.25
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.01
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.03
Lung, bronchus	0	0.00	1	1.96	1	3.73	0	0.00	2	1.37	1.46	0.30
Female breast	0	0.00	0	0.00	1	1.23	1	1.01	2	4.15	0.48	-1.03
Female genital system	0	0.00	0	0.00	1	2.37	0	0.00	1	2.21	0.45	-0.58
Cervix uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.50	0.00	-0.24
Corpus uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.78	0.00	-0.37
Ovary	0	0.00	0	0.00	1	6.49	0	0.00	1	0.76	1.32	0.12
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.01
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.04
Urinary system	1	6.88	1	4.20	0	0.00	0	0.00	2	0.62	3.24	0.66
Urinary bladder	1	13.99	0	0.00	0	0.00	0	0.00	1	0.30	3.37	0.34
Kidney parenchyma	0	0.00	1	8.72	0	0.00	0	0.00	1	0.28	3.54	0.34
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.02
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	-0.01
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.08
Soft tissue including heart	0	0.00	1	14.18	1	19.90	0	0.00	2	0.22	9.12*	0.85
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	0.00
Melanoma of skin	0	0.00	0	0.00	0	0.00	2	5.46	2	0.79	2.55	0.58
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.03
Brain, central nervous system	0	0.00	1	4.44	4	26.20*	3	20.81*	8	0.61	13.20*	3.55
Thyroid	0	0.00	0	0.00	1	7.01	3	7.81*	4	0.74	5.39*	1.56
Lymphatic, hematopoietic	0	0.00	3	4.56	0	0.00	0	0.00	3	2.00	1.50	0.48
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.46	0.00	-0.22
Non-Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.60	0.00	-0.29
Myeloma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.07
Leukemia	0	0.00	3	9.30*	0	0.00	0	0.00	3	0.80	3.74	1.06
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.37	0.00	-0.18
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.04
Acute non-lymphocytic	0	0.00	3	36.58*	0	0.00	0	0.00	3	0.24	12.28*	1.32
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.03

*P < 0.05. †O/E > 500. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Table 17.1.4: Risk of subsequent primary cancers after acute lymphocytic leukemia, males, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
Number starting interval	4,205		3,368		1,723		1,018		4,205			
Person-years in interval	3,100		9,333		6,621		6,674		25,728			
All subsequent cancers	6	1.08	12	1.22	8	1.38	11	1.74	37	27.54	1.34	3.68
All excluding same site	6	1.11	12	1.26	8	1.42	11	1.78	37	26.68	1.39	4.01
Buccal cavity, pharynx	0	0.00	1	3.36	0	0.00	2	11.96*	3	0.81	3.72	0.85
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.05
Tongue	0	0.00	0	0.00	0	0.00	1	28.61	1	0.16	6.28	0.33
Salivary gland	0	0.00	1	36.37	0	0.00	1	40.95	2	0.09	23.13*	0.74
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.07
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.02
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.03
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.01
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.03
Digestive system	3	2.73	1	0.56	0	0.00	2	2.12	6	4.81	1.25	0.46
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.29	0.00	-0.11
Stomach	0	0.00	0	0.00	0	0.00	0	0.00	0	0.54	0.00	-0.21
Small intestine	1	61.54	1	36.32	0	0.00	0	0.00	2	0.08	25.74*	0.75
Colon	1	2.23	0	0.00	0	0.00	0	0.00	1	2.00	0.50	-0.39
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	1	6.00	1	0.89	1.13	0.04
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.02
Liver	0	0.00	0	0.00	0	0.00	0	0.00	0	0.24	0.00	-0.09
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.01
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.11	0.00	-0.04
Pancreas	1	8.13	0	0.00	0	0.00	0	0.00	1	0.53	1.90	0.18
Respiratory system	1	1.01	1	0.63	2	2.45	0	0.00	4	4.08	0.98	-0.03
Nose, nasal cavity, ear	0	0.00	0	0.00	1	100.67*	0	0.00	1	0.05	20.19	0.37
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.33	0.00	-0.13
Lung, bronchus	1	1.13	1	0.71	1	1.37	0	0.00	3	3.64	0.82	-0.25
Male breast	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.02
Male genital system	1	0.66	4	1.53	0	0.00	1	0.58	6	7.43	0.81	-0.55
Prostate	1	0.70	4	1.66	0	0.00	1	0.83	6	6.41	0.94	-0.16
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.96	0.00	-0.37
Urinary system	0	0.00	1	1.13	0	0.00	1	2.12	2	2.35	0.85	-0.14
Urinary bladder	0	0.00	1	1.70	0	0.00	1	3.03	2	1.60	1.25	0.15
Kidney parenchyma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.63	0.00	-0.25
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.12	0.00	-0.05
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.02
Bone, joints	1	41.97	0	0.00	1	12.03	2	22.27*	4	0.28	14.44*	1.45
Soft tissue including heart	0	0.00	1	9.31	0	0.00	0	0.00	1	0.33	3.01	0.26
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.40	0.00	-0.16
Melanoma of skin	0	0.00	0	0.00	0	0.00	0	0.00	0	1.11	0.00	-0.43
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.03
Brain, central nervous system	0	0.00	0	0.00	3	12.66*	0	0.00	3	1.00	3.00	0.78
Thyroid	0	0.00	1	13.79	1	17.99	2	18.61*	4	0.27	14.80*	1.45
Lymphatic, hematopoietic	0	0.00	2	1.57	1	1.20	0	0.00	3	3.74	0.80	-0.29
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.64	0.00	-0.25
Non-Hodgkin lymphoma	0	0.00	1	2.23	0	0.00	0	0.00	1	1.38	0.72	-0.15
Myeloma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.27	0.00	-0.10
Leukemia	0	0.00	1	1.75	1	3.17	0	0.00	2	1.45	1.38	0.21
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.58	0.00	-0.22
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.25	0.00	-0.10
Acute non-lymphocytic	0	0.00	1	7.18	1	10.96	0	0.00	2	0.41	4.94	0.62
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.05

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Acute Lymphocytic Leukemia

Both Sexes, <17 Years of Age

Table 17.1.5: Risk of subsequent primary cancers after acute lymphocytic leukemia, both sexes, <17 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis													
	<1 year		1-4 years		5-9 years		≥10 years		Total					
	Number starting interval	Person-years in interval	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR		
All subsequent cancers	4,811	3,821	1	1.65	6	3.19*	13	7.87*	16	4.06*	36	8.08	4.45*	7.10
All excluding same site			1	2.21	6	4.09*	13	8.95*	16	4.19*	36	7.19	5.01*	7.33
Buccal cavity, pharynx			0	0.00	1	41.12	1	31.65	2	25.86*	4	0.14	28.84*	0.98
Lip			0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	0.00
Tongue			0	0.00	0	0.00	0	0.00	1	69.87	1	0.02	50.83	0.25
Salivary gland			0	0.00	1	119.23*	1	77.72*	1	37.53	3	0.05	60.63*	0.75
Mouth			0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.01
Nasopharynx			0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.01
Tonsil			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Oropharynx			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Hypopharynx			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Digestive system			0	0.00	1	19.21	0	0.00	1	6.36	2	0.27	7.44	0.44
Esophagus			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Stomach			0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.01
Small intestine			0	0.00	1	†	0	0.00	0	0.00	1	0.01	113.27*	0.25
Colon			0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.02
Rectum, rectosigmoid junction			0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.01
Anus, anal canal			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Liver			0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.01
Gallbladder			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Bile ducts, other biliary			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Pancreas			0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	0.00
Respiratory system			0	0.00	0	0.00	1	48.54	0	0.00	1	0.12	8.07	0.22
Nose, nasal cavity, ear			0	0.00	0	0.00	1	207.29*	0	0.00	1	0.02	47.24	0.25
Larynx			0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	0.00
Lung, bronchus			0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.01
Female breast			0	0.00	0	0.00	0	0.00	1	5.37	1	0.19	5.13	0.45
Female genital system			0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-0.25
Cervix uteri			0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.08
Corpus uteri			0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.01
Ovary			0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.13
Vagina			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Vulva			0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	-0.01
Male genital system			0	0.00	0	0.00	0	0.00	0	0.00	0	0.59	0.00	-0.28
Prostate			0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	0.00
Testis			0	0.00	0	0.00	0	0.00	0	0.00	0	0.57	0.00	-0.27
Urinary system			0	0.00	0	0.00	0	0.00	1	13.64	1	0.25	3.97	0.19
Urinary bladder			0	0.00	0	0.00	0	0.00	1	25.87	1	0.06	18.06	0.24
Kidney parenchyma			0	0.00	0	0.00	0	0.00	0	0.00	0	0.19	0.00	-0.05
Renal pelvis, other urinary			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Ureter			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Bone, joints			1	49.21	0	0.00	1	8.20	2	15.50*	4	0.37	10.79*	0.92
Soft tissue including heart			0	0.00	1	9.70	1	11.92	0	0.00	2	0.35	5.66	0.42
Kaposi sarcoma			0	0.00	0	0.00	0	0.00	0	0.00	0	0.12	0.00	-0.03
Melanoma of skin			0	0.00	0	0.00	0	0.00	0	0.00	0	0.60	0.00	-0.15
Eye, orbit			0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.02
Brain, central nervous system			0	0.00	1	2.46	7	24.61*	3	10.36*	11	1.10	9.98*	2.52
Thyroid			0	0.00	1	23.62	1	11.06	5	12.78*	7	0.53	13.18*	1.64
Lymphatic, hematopoietic			0	0.00	1	1.26	1	1.59	0	0.00	2	2.70	0.74	-0.18
Hodgkin lymphoma			0	0.00	0	0.00	0	0.00	0	0.00	0	0.80	0.00	-0.20
Non-Hodgkin lymphoma			0	0.00	1	7.27	0	0.00	0	0.00	1	0.60	1.66	0.10
Myeloma			0	0.00	0	0.00	0	0.00	0	0.00	0	0.01	0.00	0.00
Leukemia			0	0.00	0	0.00	1	3.43	0	0.00	1	1.29	0.77	-0.07
Acute lymphocytic			0	0.00	0	0.00	0	0.00	0	0.00	0	0.89	0.00	-0.23
Chronic lymphocytic			0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
Acute non-lymphocytic			0	0.00	0	0.00	1	13.52	0	0.00	1	0.31	3.18	0.17
Chronic myeloid			0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.02

*P < 0.05. †O/E > 500. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 18,065 PYR and for male cancers on 21,264 PYR.

Acute Lymphocytic Leukemia Both Sexes, ≥17 Years of Age

Table 17.1.6: Risk of subsequent primary cancers after acute lymphocytic leukemia, both sexes, ≥17 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	6	0.74	13	0.96	6	0.81	5	0.75	30	35.70	0.84	-7.88
All excluding same site	6	0.75	13	0.97	6	0.82	5	0.76	30	35.27	0.85	-7.28
Buccal cavity, pharynx	0	0.00	0	0.00	0	0.00	1	6.11	1	0.95	1.06	0.07
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.20
Tongue	0	0.00	0	0.00	0	0.00	0	0.00	0	0.20	0.00	-0.27
Salivary gland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.13
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.32
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.07
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.13
Oropharynx	0	0.00	0	0.00	0	0.00	1	262.50*	1	0.02	40.42	1.35
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.11
Digestive system	3	1.79	0	0.00	0	0.00	1	0.80	4	7.04	0.57	-4.21
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.35	0.00	-0.48
Stomach	0	0.00	0	0.00	0	0.00	0	0.00	0	0.72	0.00	-1.00
Small intestine	1	40.28	0	0.00	0	0.00	0	0.00	1	0.11	9.02	1.23
Colon	1	1.35	0	0.00	0	0.00	0	0.00	1	3.12	0.32	-2.92
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	1	4.66	1	1.25	0.80	-0.35
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.11
Liver	0	0.00	0	0.00	0	0.00	0	0.00	0	0.27	0.00	-0.37
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.12
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.21
Pancreas	1	5.01	0	0.00	0	0.00	0	0.00	1	0.83	1.21	0.24
Respiratory system	1	0.75	2	0.95	2	1.85	0	0.00	5	5.43	0.92	-0.59
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.08
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.38	0.00	-0.53
Lung, bronchus	1	0.82	2	1.04	2	2.02	0	0.00	5	4.97	1.01	0.04
Female breast	0	0.00	0	0.00	1	1.24	0	0.00	1	3.96	0.25	-10.67
Female genital system	0	0.00	0	0.00	1	2.83	0	0.00	1	1.76	0.57	-2.75
Cervix uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.35	0.00	-1.27
Corpus uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.76	0.00	-2.73
Ovary	0	0.00	0	0.00	1	9.37	0	0.00	1	0.53	1.90	1.71
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.08
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.25
Male genital system	1	0.67	4	1.55	0	0.00	1	0.78	6	6.84	0.88	-1.88
Prostate	1	0.70	4	1.66	0	0.00	1	0.84	6	6.41	0.94	-0.91
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.39	0.00	-0.87
Urinary system	1	1.62	2	1.96	0	0.00	0	0.00	3	2.72	1.10	0.39
Urinary bladder	1	2.40	1	1.45	0	0.00	0	0.00	2	1.84	1.08	0.21
Kidney parenchyma	0	0.00	1	3.68	0	0.00	0	0.00	1	0.72	1.38	0.38
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.21
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.07
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.09
Soft tissue including heart	0	0.00	1	13.36	0	0.00	0	0.00	1	0.20	5.06	1.11
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.29	0.00	-0.40
Melanoma of skin	0	0.00	0	0.00	0	0.00	2	6.89	2	1.30	1.54	0.97
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.08
Brain, central nervous system	0	0.00	0	0.00	0	0.00	0	0.00	0	0.50	0.00	-0.70
Thyroid	0	0.00	0	0.00	1	9.27	0	0.00	1	0.48	2.08	0.72
Lymphatic, hematopoietic	0	0.00	4	3.49	0	0.00	0	0.00	4	3.03	1.32	1.34
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.29	0.00	-0.40
Non-Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	1.38	0.00	-1.90
Myeloma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.40	0.00	-0.56
Leukemia	0	0.00	4	10.94*	0	0.00	0	0.00	4	0.96	4.16*	4.20
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.08
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.33	0.00	-0.46
Acute non-lymphocytic	0	0.00	4	31.29*	0	0.00	0	0.00	4	0.33	11.95*	5.07
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.20

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 2,771 PYR and for male cancers on 4,465 PYR.

Acute Myeloid Leukemia Both Sexes

Table 17.2.1: Characteristics of patients with an initial acute myeloid leukemia, both sexes, SEER 1973-2000.

Characteristics	Males		Females		Total	
	No.	%	No.	%	No.	%
Number of patients with 1st primary cancer						
Total	6,080	100.0	5,089	100.0	11,169	100.0
Initial treatment						
Any radiation	296	4.9	254	5.0	550	4.9
With surgery	4	0.1	2	0.0	6	0.1
Without surgery	292	4.8	252	5.0	544	4.9
No radiation	5,784	95.1	4,835	95.0	10,619	95.1
With surgery	12	0.2	14	0.3	26	0.2
Without surgery	5,772	94.9	4,821	94.7	10,593	94.8
Race						
White	5,152	84.7	4,285	84.2	9,437	84.5
Black	429	7.1	420	8.3	849	7.6
Other	486	8.0	374	7.3	860	7.7
Unknown	13	0.2	10	0.2	23	0.2
Age at 1st primary cancer diagnosis, years						
< 30	924	15.2	872	17.1	1,796	16.1
30–49	1,106	18.2	1,008	19.8	2,114	18.9
50–69	2,201	36.2	1,534	30.1	3,735	33.4
70–79	1,318	21.7	1,020	20.0	2,338	20.9
≥ 80	531	8.7	655	12.9	1,186	10.6
Number of patients with one or more primary cancers						
One primary cancer only	5,987	98.5	5,028	98.8	11,015	98.6
1st and 2nd cancers	91	1.5	59	1.2	150	1.3
1st, 2nd, and 3rd cancers	2	0.0	2	0.0	4	0.0
1st, 2nd, 3rd, and additional cancers	0	0.0	0	0.0	0	0.0
Other statistics						
Median age at 1st cancer diagnosis	61.5	—	59.8	—	60.9	—
Median year of 1st cancer diagnosis	1989.0	—	1989.0	—	1989.0	—
Median person-years at risk	0.6	—	0.7	—	0.7	—
Percent histologically confirmed*						
Both 1st and 2nd cancers	—	87.1	—	90.2	—	88.3
1st, 2nd, and additional cancers	—	87.1	—	90.2	—	88.3
1st cancer only	—	12.9	—	9.8	—	11.7

*Percent histologically confirmed among patients who developed a subsequent primary cancer.

Table 17.2.2: Risk of subsequent primary cancers after acute myeloid leukemia, both sexes, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	61	1.05	54	0.85	20	0.82	23	0.96	158	169.81	0.93	-5.35
All excluding same site	61	1.06	53	0.84	20	0.83	23	0.97	157	167.91	0.94	-4.94
Buccal cavity, pharynx	0	0.00	2	1.17	2	3.18	1	1.73	5	4.48	1.12	0.24
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.60	0.00	-0.27
Tongue	0	0.00	0	0.00	0	0.00	1	7.84	1	0.92	1.08	0.03
Salivary gland	0	0.00	1	6.59	1	16.89	0	0.00	2	0.40	4.98	0.72
Mouth	0	0.00	1	2.27	1	6.18	0	0.00	2	1.16	1.73	0.38
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.10
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.45	0.00	-0.21
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.12	0.00	-0.06
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-0.20
Digestive system	8	0.63	14	1.05	3	0.62	4	0.83	29	35.61	0.81	-3.00
Esophagus	0	0.00	2	3.01	0	0.00	1	4.02	3	1.79	1.68	0.55
Stomach	1	0.75	0	0.00	1	2.01	0	0.00	2	3.70	0.54	-0.77
Small intestine	1	5.72	1	5.07	0	0.00	0	0.00	2	0.53	3.74	0.66
Colon	4	0.71	8	1.37	1	0.47	1	0.48	14	15.72	0.89	-0.78
Rectum, rectosigmoid junction	2	0.89	1	0.42	0	0.00	0	0.00	3	6.24	0.48	-1.47
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.38	0.00	-0.17
Liver	0	0.00	0	0.00	1	5.06	2	9.19*	3	1.35	2.22	0.75
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.50	0.00	-0.22
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.77	0.00	-0.35
Pancreas	0	0.00	2	1.26	0	0.00	0	0.00	2	4.26	0.47	-1.02
Respiratory system	11	1.11	10	0.96	2	0.53	1	0.27	24	27.90	0.86	-1.77
Nose, nasal cavity, ear	1	11.46	0	0.00	0	0.00	0	0.00	1	0.26	3.91	0.34
Larynx	1	1.44	0	0.00	0	0.00	0	0.00	1	1.89	0.53	-0.40
Lung, bronchus	9	0.98	10	1.04	2	0.57	1	0.29	22	25.66	0.86	-1.66
Female breast	2	0.34	2	0.25*	4	1.08	4	1.22	12	20.94	0.57	-8.10
Female genital system	1	0.36	2	0.56	1	0.64	3	2.23	7	9.24	0.76	-2.03
Cervix uteri	0	0.00	0	0.00	0	0.00	2	9.75*	2	1.39	1.44	0.55
Corpus uteri	0	0.00	1	0.59	1	1.38	0	0.00	2	4.40	0.45	-2.17
Ovary	1	1.26	0	0.00	0	0.00	1	2.39	2	2.74	0.73	-0.67
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.13	0.00	-0.12
Vulva	0	0.00	1	7.02	0	0.00	0	0.00	1	0.38	2.61	0.56
Male genital system	17	1.51	9	0.81	1	0.27	3	0.68	30	30.56	0.98	-0.50
Prostate	16	1.44	9	0.83	1	0.28	3	0.70	29	29.80	0.97	-0.72
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.56	0.00	-0.50
Urinary system	8	1.75	7	1.49	3	1.81	2	1.20	20	12.59	1.59	3.36
Urinary bladder	0	0.00	4	1.27	3	2.81	1	0.93	8	8.43	0.95	-0.20
Kidney parenchyma	7	6.19*	3	2.36	0	0.00	1	2.00	11	3.40	3.24*	3.44
Renal pelvis, other urinary	1	3.48	0	0.00	0	0.00	0	0.00	1	0.76	1.32	0.11
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.25	0.00	-0.11
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.22	0.00	-0.10
Soft tissue including heart	0	0.00	0	0.00	0	0.00	0	0.00	0	0.78	0.00	-0.35
Kaposi sarcoma	0	0.00	1	4.37	0	0.00	0	0.00	1	0.57	1.75	0.19
Melanoma of skin	1	0.73	2	1.14	0	0.00	0	0.00	3	4.67	0.64	-0.76
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.26	0.00	-0.12
Brain, central nervous system	1	1.55	1	1.28	0	0.00	0	0.00	2	2.03	0.99	-0.01
Thyroid	6	14.65*	0	0.00	1	3.29	0	0.00	7	1.60	4.37*	2.45
Lymphatic, hematopoietic	3	0.68	3	0.61	2	1.03	4	2.14	12	13.10	0.92	-0.50
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.73	0.00	-0.33
Non-Hodgkin lymphoma	2	1.04	1	0.45	1	1.08	2	2.22	6	5.98	1.00	0.01
Myeloma	0	0.00	1	1.32	0	0.00	1	3.44	2	2.04	0.98	-0.02
Leukemia	1	0.65	1	0.61	1	1.68	1	1.76	4	4.35	0.92	-0.16
Acute lymphocytic	0	0.00	0	0.00	1	26.33	0	0.00	1	0.23	4.42	0.35
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	1	5.04	1	1.59	0.63	-0.27
Acute non-lymphocytic	0	0.00	1	1.79	0	0.00	0	0.00	1	1.50	0.67	-0.22
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.61	0.00	-0.28

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 11,036 PYR and for male cancers on 11,037 PYR.

Acute Myeloid Leukemia

Females

Table 17.2.3: Risk of subsequent primary cancers after acute myeloid leukemia, females, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	19	0.93	22	0.84	11	0.94	11	1.05	63	68.86	0.91	-5.31
All excluding same site	19	0.94	22	0.85	11	0.95	11	1.06	63	68.13	0.92	-4.65
Buccal cavity, pharynx	0	0.00	1	2.15	2	9.90*	0	0.00	3	1.21	2.49	1.63
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.07
Tongue	0	0.00	0	0.00	0	0.00	0	0.00	0	0.27	0.00	-0.24
Salivary gland	0	0.00	0	0.00	1	38.30	0	0.00	1	0.15	6.68	0.77
Mouth	0	0.00	1	6.56	1	15.27	0	0.00	2	0.40	5.02	1.45
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.05
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.11	0.00	-0.10
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.03	0.00	-0.03
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.07
Digestive system	4	0.88	9	1.67	1	0.44	1	0.48	15	14.29	1.05	0.65
Esophagus	0	0.00	2	13.64*	0	0.00	0	0.00	2	0.39	5.11	1.46
Stomach	0	0.00	0	0.00	0	0.00	0	0.00	0	1.19	0.00	-1.07
Small intestine	1	15.66	1	12.47	0	0.00	0	0.00	2	0.22	9.13*	1.61
Colon	3	1.33	4	1.53	0	0.00	1	0.99	8	6.96	1.15	0.95
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	0	0.00	0	2.30	0.00	-2.08
Rectum	0	0.00	0	0.00	0	0.00	0	0.00	0	1.51	0.00	-1.37
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.21	0.00	-0.19
Liver	0	0.00	0	0.00	1	17.25	0	0.00	1	0.34	2.95	0.60
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.29
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.29
Pancreas	0	0.00	2	2.91	0	0.00	0	0.00	2	1.84	1.09	0.14
Respiratory system	4	1.58	2	0.62	1	0.68	1	0.75	8	8.54	0.94	-0.49
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.08
Larynx	1	11.63	0	0.00	0	0.00	0	0.00	1	0.29	3.47	0.64
Lung, bronchus	3	1.24	2	0.66	1	0.71	1	0.79	7	8.14	0.86	-1.03
Female breast	2	0.34	2	0.25*	4	1.08	4	1.22	12	20.94	0.57	-8.10
Female genital system	1	0.36	2	0.56	1	0.64	3	2.23	7	9.24	0.76	-2.03
Cervix uteri	0	0.00	0	0.00	0	0.00	2	9.75*	2	1.39	1.44	0.55
Corpus uteri	0	0.00	1	0.59	1	1.38	0	0.00	2	4.40	0.45	-2.17
Ovary	1	1.26	0	0.00	0	0.00	1	2.39	2	2.74	0.73	-0.67
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.13	0.00	-0.12
Vulva	0	0.00	1	7.02	0	0.00	0	0.00	1	0.38	2.61	0.56
Urinary system	1	1.07	3	2.61	0	0.00	1	2.15	5	3.05	1.64	1.76
Urinary bladder	0	0.00	2	3.05	0	0.00	1	3.82	3	1.75	1.71	1.13
Kidney parenchyma	1	3.22	1	2.49	0	0.00	0	0.00	2	1.07	1.88	0.85
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.24	0.00	-0.22
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.07
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.09
Soft tissue including heart	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.29
Kaposi sarcoma	0	0.00	1	118.35*	0	0.00	0	0.00	1	0.02	42.67	0.88
Melanoma of skin	0	0.00	1	1.45	0	0.00	0	0.00	1	1.83	0.55	-0.75
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.11	0.00	-0.10
Brain, central nervous system	0	0.00	0	0.00	0	0.00	0	0.00	0	0.80	0.00	-0.72
Thyroid	4	15.55*	0	0.00	0	0.00	0	0.00	4	1.09	3.66	2.63
Lymphatic, hematopoietic	1	0.64	1	0.51	1	1.14	1	1.25	4	5.17	0.77	-1.06
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.30	0.00	-0.27
Non-Hodgkin lymphoma	1	1.39	1	1.10	0	0.00	0	0.00	2	2.44	0.82	-0.40
Myeloma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.82	0.00	-0.75
Leukemia	0	0.00	0	0.00	1	3.85	1	4.22	2	1.60	1.25	0.36
Acute lymphocytic	0	0.00	0	0.00	1	56.38	0	0.00	1	0.10	10.48	0.82
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	1	12.67	1	0.55	1.80	0.40
Acute non-lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.59	0.00	-0.53
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.20

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Table 17.2.4: Risk of subsequent primary cancers after acute myeloid leukemia, males, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	42	1.12	32	0.85	9	0.72	12	0.89	95	100.94	0.94	-5.39
All excluding same site	42	1.13	31	0.84	9	0.73	12	0.90	94	99.78	0.94	-5.24
Buccal cavity, pharynx	0	0.00	1	0.81	0	0.00	1	2.45	2	3.27	0.61	-1.15
Lip	0	0.00	0	0.00	0	0.00	0	0.00	0	0.53	0.00	-0.48
Tongue	0	0.00	0	0.00	0	0.00	1	11.30	1	0.65	1.53	0.31
Salivary gland	0	0.00	1	10.61	0	0.00	0	0.00	1	0.25	3.97	0.68
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.76	0.00	-0.69
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.15
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.34	0.00	-0.31
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.09
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.36	0.00	-0.32
Digestive system	4	0.49	5	0.63	2	0.77	3	1.11	14	21.33	0.66	-6.64
Esophagus	0	0.00	0	0.00	0	0.00	1	5.21	1	1.40	0.72	-0.36
Stomach	1	1.04	0	0.00	1	3.25	0	0.00	2	2.52	0.79	-0.47
Small intestine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.32	0.00	-0.29
Colon	1	0.29	4	1.23	1	0.97	0	0.00	6	8.76	0.68	-2.50
Rectum, rectosigmoid junction	2	1.32	1	0.68	0	0.00	0	0.00	3	3.94	0.76	-0.85
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.15
Liver	0	0.00	0	0.00	0	0.00	2	12.18*	2	1.01	1.98	0.90
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.16
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.45	0.00	-0.41
Pancreas	0	0.00	0	0.00	0	0.00	0	0.00	0	2.42	0.00	-2.19
Respiratory system	7	0.94	8	1.10	1	0.43	0	0.00	16	19.36	0.83	-3.04
Nose, nasal cavity, ear	1	16.79	0	0.00	0	0.00	0	0.00	1	0.16	6.10	0.76
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	1.61	0.00	-1.45
Lung, bronchus	6	0.89	8	1.22	1	0.48	0	0.00	15	17.53	0.86	-2.29
Male breast	0	0.00	0	0.00	0	0.00	0	0.00	0	0.19	0.00	-0.17
Male genital system	17	1.51	9	0.81	1	0.27	3	0.68	30	30.56	0.98	-0.50
Prostate	16	1.44	9	0.83	1	0.28	3	0.70	29	29.80	0.97	-0.72
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.56	0.00	-0.50
Urinary system	7	1.93	4	1.13	3	2.60	1	0.83	15	9.53	1.57	4.95
Urinary bladder	0	0.00	2	0.80	3	3.83	0	0.00	5	6.68	0.75	-1.52
Kidney parenchyma	6	7.32*	2	2.30	0	0.00	1	3.03	9	2.33	3.86*	6.04
Renal pelvis, other urinary	1	4.77	0	0.00	0	0.00	0	0.00	1	0.52	1.91	0.43
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.18	0.00	-0.16
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.13	0.00	-0.12
Soft tissue including heart	0	0.00	0	0.00	0	0.00	0	0.00	0	0.46	0.00	-0.42
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.55	0.00	-0.50
Melanoma of skin	1	1.10	1	0.94	0	0.00	0	0.00	2	2.85	0.70	-0.77
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.14
Brain, central nervous system	1	2.40	1	2.12	0	0.00	0	0.00	2	1.23	1.63	0.70
Thyroid	2	13.14*	0	0.00	1	11.90	0	0.00	3	0.51	5.91*	2.26
Lymphatic, hematopoietic	2	0.71	2	0.68	1	0.94	3	2.81	8	7.92	1.01	0.07
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.43	0.00	-0.39
Non-Hodgkin lymphoma	1	0.83	0	0.00	1	1.99	2	3.90	4	3.53	1.13	0.42
Myeloma	0	0.00	1	2.22	0	0.00	1	6.04	2	1.22	1.64	0.71
Leukemia	1	0.96	1	0.97	0	0.00	0	0.00	2	2.74	0.73	-0.67
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.13	0.00	-0.12
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.04	0.00	-0.94
Acute non-lymphocytic	0	0.00	1	2.95	0	0.00	0	0.00	1	0.91	1.10	0.08
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.38	0.00	-0.35

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Chronic Lymphocytic Leukemia Both Sexes

Table 17.3.1: Characteristics of patients with an initial chronic lymphocytic leukemia, both sexes, SEER 1973-2000.

Characteristics	Males		Females		Total	
	No.	%	No.	%	No.	%
Number of patients with 1st primary cancer						
Total	11,528	100.0	8,103	100.0	19,631	100.0
Initial treatment						
Any radiation	285	2.5	171	2.1	456	2.3
With surgery	8	0.1	4	0.0	12	0.1
Without surgery	277	2.4	167	2.1	444	2.3
No radiation	11,243	97.5	7,932	97.9	19,175	97.7
With surgery	130	1.1	71	0.9	201	1.0
Without surgery	11,113	96.4	7,861	97.0	18,974	96.7
Race						
White	10,560	91.6	7,460	92.1	18,020	91.8
Black	705	6.1	494	6.1	1,199	6.1
Other	162	1.4	97	1.2	259	1.3
Unknown	101	0.9	52	0.6	153	0.8
Age at 1st primary cancer diagnosis, years						
< 30	7	0.1	9	0.1	16	0.1
30–49	804	7.0	345	4.3	1,149	5.9
50–69	5,567	48.3	3,049	37.6	8,616	43.9
70–79	3,360	29.1	2,616	32.3	5,976	30.4
≥ 80	1,790	15.5	2,084	25.7	3,874	19.7
Number of patients with one or more primary cancers						
One primary cancer only	9,842	85.4	7,313	90.3	17,155	87.4
1st and 2nd cancers	1,527	13.2	726	9.0	2,253	11.5
1st, 2nd, and 3rd cancers	148	1.3	59	0.7	207	1.1
1st, 2nd, 3rd, and additional cancers	11	0.1	5	0.1	16	0.1
Other statistics						
Median age at 1st cancer diagnosis	68.3	—	72.4	—	70.0	—
Median year of 1st cancer diagnosis	1987.9	—	1988.0	—	1987.9	—
Median person-years at risk	4.4	—	4.8	—	4.6	—
Percent histologically confirmed*						
Both 1st and 2nd cancers	—	92.0	—	89.6	—	91.2
1st, 2nd, and additional cancers	—	91.6	—	89.2	—	90.8
1st cancer only	—	4.9	—	6.1	—	5.3

*Percent histologically confirmed among patients who developed a subsequent primary cancer.

Table 17.3.2: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	353	1.26*	1,228	1.22*	728	1.13*	409	1.05	2,718	2,314.31	1.17*	35.06
All excluding same site	353	1.28*	1,228	1.24*	728	1.15*	409	1.07	2,718	2,284.29	1.19*	37.67
Buccal cavity, pharynx	9	1.24	29	1.15	15	1.00	8	0.99	61	55.73	1.09	0.46
Lip	4	3.07	7	1.60	6	2.35	4	2.91	21	9.62	2.18*	0.99
Tongue	1	0.72	3	0.62	1	0.34	1	0.63	6	10.82	0.55	-0.42
Salivary gland	2	3.16	5	2.20	3	2.06	2	2.21	12	5.26	2.28*	0.59
Mouth	2	1.05	6	0.90	2	0.51	1	0.47	11	14.67	0.75	-0.32
Nasopharynx	0	0.00	2	2.50	1	2.16	0	0.00	3	1.73	1.73	0.11
Tonsil	0	0.00	1	0.45	1	0.79	0	0.00	2	4.73	0.42	-0.24
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	1.50	0.00	-0.13
Hypopharynx	0	0.00	4	1.60	0	0.00	0	0.00	4	5.40	0.74	-0.12
Digestive system	74	1.13	259	1.11	166	1.13	89	1.01	588	533.47	1.10*	4.74
Esophagus	2	0.65	8	0.73	11	1.62	3	0.75	24	24.77	0.97	-0.07
Stomach	10	1.47	29	1.23	18	1.27	8	0.99	65	52.58	1.24	1.08
Small intestine	1	1.21	4	1.33	2	1.01	1	0.80	8	7.05	1.13	0.08
Colon	34	1.12	125	1.15	87	1.25*	42	0.99	288	251.10	1.15*	3.20
Rectum, rectosigmoid junction	13	1.15	41	1.03	25	1.03	23	1.66*	102	89.28	1.14	1.10
Anus, anal canal	1	1.86	1	0.52	1	0.80	1	1.34	4	4.47	0.89	-0.04
Liver	1	0.52	5	0.72	2	0.45	1	0.36	9	15.99	0.56	-0.61
Gallbladder	2	2.12	6	1.83	1	0.49	2	1.68	11	7.45	1.48	0.31
Bile ducts, other biliary	0	0.00	2	0.40	2	0.61	1	0.46	5	11.79	0.42*	-0.59
Pancreas	9	1.14	29	1.04	16	0.91	7	0.66	61	64.00	0.95	-0.26
Respiratory system	76	1.59*	278	1.63*	183	1.70*	94	1.50*	631	389.15	1.62*	21.00
Nose, nasal cavity, ear	2	4.89	3	2.08	4	4.44*	0	0.00	9	3.28	2.74*	0.50
Larynx	4	1.24	14	1.24	16	2.40*	5	1.46	39	24.60	1.59*	1.25
Lung, bronchus	69	1.57*	259	1.64*	163	1.63*	89	1.52*	580	360.30	1.61*	19.08
Female breast	14	0.59*	92	1.06	50	0.86	31	0.85	187	205.54	0.91	-3.69
Female genital system	7	0.64	32	0.82	15	0.60*	14	0.94	68	90.06	0.76*	-4.39
Cervix uteri	0	0.00	4	1.03	1	0.45	1	0.87	6	8.40	0.71	-0.48
Corpus uteri	2	0.36	16	0.80	7	0.56	3	0.40	28	45.59	0.61*	-3.50
Ovary	4	1.25	7	0.60	6	0.79	7	1.49	24	27.04	0.89	-0.61
Vagina	0	0.00	0	0.00	0	0.00	1	3.69	1	1.59	0.63	-0.12
Vulva	1	1.70	5	2.31	1	0.69	2	2.05	9	5.18	1.74	0.76
Male genital system	71	1.22	214	1.01	133	0.96	63	0.75*	481	491.50	0.98	-1.62
Prostate	70	1.22	210	1.00	132	0.96	61	0.73*	473	487.22	0.97	-2.19
Testis	1	5.57	1	1.74	0	0.00	0	0.00	2	1.15	1.74	0.13
Urinary system	42	1.79*	100	1.19	48	0.89	35	1.07	225	193.82	1.16*	2.71
Urinary bladder	20	1.20	68	1.14	31	0.81	27	1.15	146	138.13	1.06	0.68
Kidney parenchyma	18	3.46*	23	1.22	15	1.23	6	0.82	62	43.56	1.42*	1.60
Renal pelvis, other urinary	4	2.65	9	1.69	2	0.60	2	1.02	17	12.13	1.40	0.42
Ureter	2	4.00	5	2.82	0	0.00	0	0.00	7	4.04	1.73	0.26
Bone, joints	0	0.00	1	1.22	1	2.01	0	0.00	2	1.83	1.09	0.02
Soft tissue including heart	3	2.83	6	1.59	4	1.67	1	0.66	14	8.73	1.60	0.46
Kaposi sarcoma	4	12.63*	4	3.74*	4	6.47*	0	0.00	12	2.33	5.14*	0.84
Melanoma of skin	18	3.25*	52	2.53*	31	2.25*	27	3.05*	128	48.68	2.63*	6.89
Eye, orbit	1	2.44	3	2.09	1	1.12	0	0.00	5	3.26	1.54	0.15
Brain, central nervous system	4	1.51	11	1.16	8	1.33	1	0.29	24	21.67	1.11	0.20
Thyroid	4	3.45	6	1.46	1	0.40	0	0.00	11	9.21	1.19	0.16
Lymphatic, hematopoietic	11	0.52*	83	1.09	43	0.88	27	0.88	164	176.80	0.93	-1.11
Hodgkin lymphoma	1	1.57	16	7.39*	10	7.90*	8	11.76*	35	4.75	7.37*	2.63
Non-Hodgkin lymphoma	7	0.78	44	1.34	23	1.05	13	0.93	87	77.74	1.12	0.80
Myeloma	2	0.55	12	0.92	7	0.84	3	0.58	24	30.23	0.79	-0.54
Leukemia	1	0.13*	11	0.39*	3	0.17*	3	0.28*	18	64.09	0.28*	-4.00
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.61	0.00	-0.14
Chronic lymphocytic	0	0.00	0	0.00*	0	0.00*	0	0.00*	0	26.03	0.00*	-2.26
Acute non-lymphocytic	1	0.39	7	0.76	2	0.34	2	0.55	12	21.29	0.56*	-0.81
Chronic myeloid	0	0.00	3	0.81	1	0.43	0	0.00	4	8.59	0.47	-0.40

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 50,255 PYR and for male cancers on 64,887 PYR.

Chronic Lymphocytic Leukemia Both Sexes, Long-term Follow-up

Table 17.3.3: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, long-term follow-up, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<10 years		10-14 years		15-19 years		≥20 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	2,309	1.20*	291	1.09	97	1.01	21	0.85	2,718	2,314.31	1.17*	35.06
All excluding same site	2,309	1.21*	291	1.10	97	1.02	21	0.86	2,718	2,284.29	1.19*	37.67
Buccal cavity, pharynx	53	1.11	6	1.05	2	1.04	0	0.00	61	55.73	1.09	0.46
Lip	17	2.06*	4	4.15*	0	0.00	0	0.00	21	9.62	2.18*	0.99
Tongue	5	0.54	0	0.00	1	2.63	0	0.00	6	10.82	0.55	-0.42
Salivary gland	10	2.29*	2	3.28	0	0.00	0	0.00	12	5.26	2.28*	0.59
Mouth	10	0.80	0	0.00	1	1.95	0	0.00	11	14.67	0.75	-0.32
Nasopharynx	3	2.00	0	0.00	0	0.00	0	0.00	3	1.73	1.73	0.11
Tonsil	2	0.49	0	0.00	0	0.00	0	0.00	2	4.73	0.42	-0.24
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	1.50	0.00	-0.13
Hypopharynx	4	0.85	0	0.00	0	0.00	0	0.00	4	5.40	0.74	-0.12
Digestive system	499	1.12*	62	1.03	23	1.05	4	0.68	588	533.47	1.10*	4.74
Esophagus	21	1.01	1	0.36	2	2.02	0	0.00	24	24.77	0.97	-0.07
Stomach	57	1.28	5	0.89	3	1.51	0	0.00	65	52.58	1.24	1.08
Small intestine	7	1.21	1	1.18	0	0.00	0	0.00	8	7.05	1.13	0.08
Colon	246	1.18*	27	0.93	11	1.04	4	1.38	288	251.10	1.15*	3.20
Rectum, rectosigmoid junction	79	1.05	20	2.07*	3	0.90	0	0.00	102	89.28	1.14	1.10
Anus, anal canal	3	0.80	1	1.96	0	0.00	0	0.00	4	4.47	0.89	-0.04
Liver	8	0.60	0	0.00	1	1.42	0	0.00	9	15.99	0.56	-0.61
Gallbladder	9	1.44	2	2.45	0	0.00	0	0.00	11	7.45	1.48	0.31
Bile ducts, other biliary	4	0.42	0	0.00	1	1.75	0	0.00	5	11.79	0.42*	-0.59
Pancreas	54	1.01	5	0.69	2	0.75	0	0.00	61	64.00	0.95	-0.26
Respiratory system	537	1.65*	74	1.70*	14	0.91	6	1.52	631	389.15	1.62*	21.00
Nose, nasal cavity, ear	9	3.27*	0	0.00	0	0.00	0	0.00	9	3.28	2.74*	0.50
Larynx	34	1.61*	5	2.03	0	0.00	0	0.00	39	24.60	1.59*	1.25
Lung, bronchus	491	1.63*	69	1.70*	14	0.97	6	1.61	580	360.30	1.61*	19.08
Female breast	156	0.92	22	0.89	7	0.76	2	0.76	187	205.54	0.91	-3.69
Female genital system	54	0.72*	11	1.08	2	0.54	1	0.97	68	90.06	0.76*	-4.39
Cervix uteri	5	0.69	1	1.23	0	0.00	0	0.00	6	8.40	0.71	-0.48
Corpus uteri	25	0.66*	1	0.20	1	0.54	1	1.96	28	45.59	0.61*	-3.50
Ovary	17	0.76	6	1.89	1	0.84	0	0.00	24	27.04	0.89	-0.61
Vagina	0	0.00	1	5.44	0	0.00	0	0.00	1	1.59	0.63	-0.12
Vulva	7	1.67	2	3.09	0	0.00	0	0.00	9	5.18	1.74	0.76
Male genital system	418	1.03	45	0.77	16	0.77	2	0.45	481	491.50	0.98	-1.62
Prostate	412	1.02	43	0.74*	16	0.78	2	0.45	473	487.22	0.97	-2.19
Testis	2	1.93	0	0.00	0	0.00	0	0.00	2	1.15	1.74	0.13
Urinary system	190	1.18*	22	0.98	12	1.46	1	0.46	225	193.82	1.16*	2.71
Urinary bladder	119	1.04	17	1.06	9	1.52	1	0.63	146	138.13	1.06	0.68
Kidney parenchyma	56	1.55*	5	0.99	1	0.55	0	0.00	62	43.56	1.42*	1.60
Renal pelvis, other urinary	15	1.48	0	0.00	2	4.09	0	0.00	17	12.13	1.40	0.42
Ureter	7	2.07	0	0.00	0	0.00	0	0.00	7	4.04	1.73	0.26
Bone, joints	2	1.29	0	0.00	0	0.00	0	0.00	2	1.83	1.09	0.02
Soft tissue including heart	13	1.80	1	0.99	0	0.00	0	0.00	14	8.73	1.60	0.46
Kaposi sarcoma	12	5.99*	0	0.00	0	0.00	0	0.00	12	2.33	5.14*	0.84
Melanoma of skin	101	2.54*	15	2.52*	9	3.96*	3	4.68	128	48.68	2.63*	6.89
Eye, orbit	5	1.83	0	0.00	0	0.00	0	0.00	5	3.26	1.54	0.15
Brain, central nervous system	23	1.27	1	0.41	0	0.00	0	0.00	24	21.67	1.11	0.20
Thyroid	11	1.41	0	0.00	0	0.00	0	0.00	11	9.21	1.19	0.16
Lymphatic, hematopoietic	137	0.94	17	0.82	10	1.29	0	0.00	164	176.80	0.93	-1.11
Hodgkin lymphoma	27	6.64*	5	10.51*	3	18.31*	0	0.00	35	4.75	7.37*	2.63
Non-Hodgkin lymphoma	74	1.16	9	0.96	4	1.12	0	0.00	87	77.74	1.12	0.80
Myeloma	21	0.84	1	0.29	2	1.54	0	0.00	24	30.23	0.79	-0.54
Leukemia	15	0.28*	2	0.27*	1	0.37	0	0.00	18	64.09	0.28*	-4.00
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.61	0.00	-0.14
Chronic lymphocytic	0	0.00*	0	0.00	0	0.00	0	0.00	0	26.03	0.00*	-2.26
Acute non-lymphocytic	10	0.57	1	0.40	1	1.07	0	0.00	12	21.29	0.56*	-0.81
Chronic myeloid	4	0.56	0	0.00	0	0.00	0	0.00	4	8.59	0.47	-0.40

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 50,255 PYR and for male cancers on 64,887 PYR.

Table 17.3.4: Risk of subsequent primary cancers after chronic lymphocytic leukemia, females, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	99	1.10	393	1.19*	218	0.99	150	1.07	860	779.49	1.10*	16.02
All excluding same site	99	1.11	393	1.21*	218	1.01	150	1.08	860	769.88	1.12*	17.93
Buccal cavity, pharynx	3	1.89	4	0.70	2	0.53	0	0.00	9	13.37	0.67	-0.87
Lip	0	0.00	0	0.00	1	3.26	0	0.00	1	1.09	0.92	-0.02
Tongue	0	0.00	1	0.80	0	0.00	0	0.00	1	2.91	0.34	-0.38
Salivary gland	1	5.63	0	0.00	0	0.00	0	0.00	1	1.52	0.66	-0.10
Mouth	2	3.52	1	0.48	1	0.75	0	0.00	4	4.81	0.83	-0.16
Nasopharynx	0	0.00	1	5.25	0	0.00	0	0.00	1	0.44	2.29	0.11
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	1.01	0.00	-0.20
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.31	0.00	-0.06
Hypopharynx	0	0.00	1	2.75	0	0.00	0	0.00	1	0.83	1.21	0.03
Digestive system	28	1.18	109	1.27*	64	1.12	37	1.01	238	203.33	1.17*	6.90
Esophagus	0	0.00	0	0.00	1	0.68	0	0.00	1	5.22	0.19	-0.84
Stomach	6	3.15*	12	1.78	8	1.85	2	0.75	28	15.64	1.79*	2.46
Small intestine	0	0.00	0	0.00	0	0.00	0	0.00	0	2.63	0.00	-0.52
Colon	12	0.99	59	1.34*	40	1.36	24	1.26	135	104.77	1.29*	6.02
Rectum, rectosigmoid junction	3	0.82	15	1.14	11	1.30	7	1.36	36	30.38	1.18	1.12
Rectum	2	0.83	12	1.39	10	1.80	6	1.75	30	19.97	1.50*	2.00
Anus, anal canal	1	3.65	0	0.00	0	0.00	0	0.00	1	2.39	0.42	-0.28
Liver	1	2.28	2	1.24	0	0.00	0	0.00	3	3.90	0.77	-0.18
Gallbladder	1	1.75	5	2.47	0	0.00	2	2.64	8	4.63	1.73	0.67
Bile ducts, other biliary	0	0.00	0	0.00	1	0.78	1	1.11	2	4.55	0.44	-0.51
Pancreas	4	1.31	10	0.89	3	0.40	1	0.20	18	26.75	0.67	-1.74
Respiratory system	21	1.93*	66	1.61*	39	1.36	32	1.67*	158	99.62	1.59*	11.62
Nose, nasal cavity, ear	1	8.16	0	0.00	2	6.58	0	0.00	3	1.07	2.80	0.38
Larynx	0	0.00	3	2.46	1	1.26	0	0.00	4	2.81	1.42	0.24
Lung, bronchus	20	1.93*	62	1.58*	36	1.31	32	1.73*	150	95.47	1.57*	10.85
Female breast	14	0.59*	92	1.06	50	0.86	31	0.85	187	205.54	0.91	-3.69
Female genital system	7	0.64	32	0.82	15	0.60*	14	0.94	68	90.06	0.76*	-4.39
Cervix uteri	0	0.00	4	1.03	1	0.45	1	0.87	6	8.40	0.71	-0.48
Corpus uteri	2	0.36	16	0.80	7	0.56	3	0.40	28	45.59	0.61*	-3.50
Ovary	4	1.25	7	0.60	6	0.79	7	1.49	24	27.04	0.89	-0.61
Vagina	0	0.00	0	0.00	0	0.00	1	3.69	1	1.59	0.63	-0.12
Vulva	1	1.70	5	2.31	1	0.69	2	2.05	9	5.18	1.74	0.76
Urinary system	9	1.97	24	1.42	14	1.23	8	1.07	55	40.27	1.37*	2.93
Urinary bladder	4	1.41	14	1.35	11	1.58	6	1.30	35	24.82	1.41	2.03
Kidney parenchyma	3	2.24	6	1.21	3	0.88	1	0.44	13	12.00	1.08	0.20
Renal pelvis, other urinary	2	4.98	4	2.73	0	0.00	1	1.61	7	3.46	2.02	0.70
Ureter	1	7.97	2	4.35	0	0.00	0	0.00	3	1.08	2.78	0.38
Bone, joints	0	0.00	1	3.42	0	0.00	0	0.00	1	0.68	1.48	0.06
Soft tissue including heart	0	0.00	2	1.56	1	1.17	1	1.77	4	3.05	1.31	0.19
Kaposi sarcoma	2	45.42*	2	12.08*	2	17.53*	0	0.00	6	0.40	14.99*	1.11
Melanoma of skin	7	4.60*	10	1.77	9	2.34*	6	2.33	32	13.60	2.35*	3.66
Eye, orbit	0	0.00	1	2.05	1	3.24	0	0.00	2	1.12	1.78	0.17
Brain, central nervous system	0	0.00	1	0.31	2	0.94	1	0.76	4	7.49	0.53	-0.70
Thyroid	0	0.00	1	0.46	1	0.73	0	0.00	2	4.93	0.41	-0.58
Lymphatic, hematopoietic	1	0.14*	26	0.97	11	0.61	13	1.08	51	64.22	0.79	-2.63
Hodgkin lymphoma	0	0.00	4	5.70*	2	4.53	4	15.30*	10	1.60	6.23*	1.67
Non-Hodgkin lymphoma	0	0.00	17	1.37	5	0.58	5	0.86	27	30.20	0.89	-0.64
Myeloma	1	0.78	2	0.43	3	0.96	3	1.48	9	11.11	0.81	-0.42
Leukemia	0	0.00	3	0.33*	1	0.17*	1	0.26	5	21.30	0.23*	-3.24
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.55	0.00	-0.11
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	8.45	0.00*	-1.68
Acute non-lymphocytic	0	0.00	3	0.98	1	0.49	0	0.00	4	7.32	0.55	-0.66
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	2.88	0.00	-0.57

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Chronic Lymphocytic Leukemia

Males

Table 17.3.5: Risk of subsequent primary cancers after chronic lymphocytic leukemia, males, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	Number starting interval	Person-years in interval	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
	11,528	8,866										
	10,037	30,203										
	5,378	17,171										
	1,982	8,647										
	11,528	64,887										
All subsequent cancers	254	1.34*	835	1.24*	510	1.21*	259	1.05	1,858	1,534.82	1.21*	49.81
All excluding same site	254	1.36*	835	1.25*	510	1.22*	259	1.06	1,858	1,514.40	1.23*	52.95
Buccal cavity, pharynx	6	1.06	25	1.28	13	1.15	8	1.38	52	42.36	1.23	1.49
Lip	4	3.40	7	1.78	5	2.22	4	3.41	20	8.53	2.34*	1.77
Tongue	1	0.96	2	0.55	1	0.47	1	0.91	5	7.91	0.63	-0.45
Salivary gland	1	2.19	5	3.07	3	2.92	2	3.17	11	3.74	2.94*	1.12
Mouth	0	0.00	5	1.09	1	0.38	1	0.77	7	9.86	0.71	-0.44
Nasopharynx	0	0.00	1	1.64	1	2.92	0	0.00	2	1.30	1.54	0.11
Tonsil	0	0.00	1	0.57	1	1.01	0	0.00	2	3.72	0.54	-0.27
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	1.19	0.00	-0.18
Hypopharynx	0	0.00	3	1.40	0	0.00	0	0.00	3	4.58	0.66	-0.24
Digestive system	46	1.09	150	1.02	102	1.14	52	1.01	350	330.14	1.06	3.06
Esophagus	2	0.81	8	0.92	10	1.87	3	0.98	23	19.55	1.18	0.53
Stomach	4	0.81	17	1.01	10	1.02	6	1.10	37	36.94	1.00	0.01
Small intestine	1	1.87	4	2.07	2	1.64	1	1.36	8	4.42	1.81	0.55
Colon	22	1.20	66	1.02	47	1.18	18	0.77	153	146.33	1.05	1.03
Rectum, rectosigmoid junction	10	1.31	26	0.98	14	0.88	16	1.84*	66	58.90	1.12	1.09
Anus, anal canal	0	0.00	1	1.07	1	1.74	1	3.16	3	2.09	1.44	0.14
Liver	0	0.00	3	0.57	2	0.60	1	0.50	6	12.09	0.50	-0.94
Gallbladder	1	2.69	1	0.79	1	1.34	0	0.00	3	2.81	1.07	0.03
Bile ducts, other biliary	0	0.00	2	0.64	1	0.50	0	0.00	3	7.24	0.41	-0.65
Pancreas	5	1.04	19	1.14	13	1.29	6	1.05	43	37.25	1.15	0.89
Respiratory system	55	1.49*	212	1.63*	144	1.82*	62	1.42*	473	289.53	1.63*	28.27
Nose, nasal cavity, ear	1	3.49	3	3.02	2	3.35	0	0.00	6	2.21	2.71	0.58
Larynx	4	1.38	11	1.09	15	2.55*	5	1.69	35	21.78	1.61*	2.04
Lung, bronchus	49	1.46*	197	1.66*	127	1.75*	57	1.41*	430	264.83	1.62*	25.46
Male breast	1	2.79	3	2.38	2	2.56	0	0.00	6	2.86	2.10	0.48
Male genital system	71	1.22	214	1.01	133	0.96	63	0.75*	481	491.50	0.98	-1.62
Prostate	70	1.22	210	1.00	132	0.96	61	0.73*	473	487.22	0.97	-2.19
Testis	1	5.57	1	1.74	0	0.00	0	0.00	2	1.15	1.74	0.13
Urinary system	33	1.75*	76	1.13	34	0.80	27	1.06	170	153.55	1.11	2.54
Urinary bladder	16	1.15	54	1.10	20	0.64*	21	1.11	111	113.31	0.98	-0.36
Kidney parenchyma	15	3.88*	17	1.22	12	1.37	5	0.99	49	31.57	1.55*	2.69
Renal pelvis, other urinary	2	1.81	5	1.29	2	0.85	1	0.74	10	8.67	1.15	0.20
Ureter	1	2.67	3	2.28	0	0.00	0	0.00	4	2.96	1.35	0.16
Bone, joints	0	0.00	0	0.00	1	3.23	0	0.00	1	1.15	0.87	-0.02
Soft tissue including heart	3	4.24	4	1.61	3	1.95	0	0.00	10	5.68	1.76	0.67
Kaposi sarcoma	2	7.34	2	2.22	2	3.97	0	0.00	6	1.93	3.10*	0.63
Melanoma of skin	11	2.74*	42	2.83*	22	2.22*	21	3.34*	96	35.08	2.74*	9.39
Eye, orbit	1	3.67	2	2.10	0	0.00	0	0.00	3	2.13	1.41	0.13
Brain, central nervous system	4	2.25	10	1.58	6	1.54	0	0.00	20	14.17	1.41	0.90
Thyroid	4	7.26*	5	2.57	0	0.00	0	0.00	9	4.28	2.10	0.73
Lymphatic, hematopoietic	10	0.72	57	1.16	32	1.04	14	0.75	113	112.58	1.00	0.06
Hodgkin lymphoma	1	2.29	12	8.20*	8	9.71*	4	9.55*	25	3.14	7.95*	3.37
Non-Hodgkin lymphoma	7	1.24	27	1.32	18	1.36	8	0.98	60	47.54	1.26	1.92
Myeloma	1	0.42	10	1.19	4	0.77	0	0.00	15	19.12	0.78	-0.63
Leukemia	1	0.18	8	0.42*	2	0.17*	2	0.29	13	42.79	0.30*	-4.59
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.06	0.00	-0.16
Chronic lymphocytic	0	0.00	0	0.00*	0	0.00*	0	0.00	0	17.58	0.00*	-2.71
Acute non-lymphocytic	1	0.58	4	0.65	1	0.26	2	0.87	8	13.97	0.57	-0.92
Chronic myeloid	0	0.00	3	1.20	1	0.65	0	0.00	4	5.71	0.70	-0.26

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Table 17.3.6: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, <50 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	9	3.66*	20	1.62	19	1.39	38	2.00*	86	47.59	1.81*	43.17
All excluding same site	9	3.70*	20	1.63	19	1.40	38	2.02*	86	47.04	1.83*	43.79
Buccal cavity, pharynx	0	0.00	1	1.73	2	3.33	1	1.60	4	1.92	2.08	2.34
Lip	0	0.00	0	0.00	1	17.07	1	16.04	2	0.20	10.18*	2.03
Tongue	0	0.00	0	0.00	1	7.27	0	0.00	1	0.44	2.28	0.63
Salivary gland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.16
Mouth	0	0.00	1	6.79	0	0.00	0	0.00	1	0.49	2.04	0.57
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.09	0.00	-0.10
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.27	0.00	-0.30
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.06
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.19	0.00	-0.21
Digestive system	1	2.70	0	0.00	0	0.00	7	2.11	8	8.01	1.00	-0.02
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.59	0.00	-0.66
Stomach	0	0.00	0	0.00	0	0.00	1	3.33	1	0.79	1.27	0.24
Small intestine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.18	0.00	-0.20
Colon	1	7.59	0	0.00	0	0.00	3	2.27	4	3.04	1.31	1.07
Rectum, rectosigmoid junction	0	0.00	0	0.00	0	0.00	0	0.00	0	1.63	0.00	-1.83
Anus, anal canal	0	0.00	0	0.00	0	0.00	1	20.89	1	0.14	7.03	0.96
Liver	0	0.00	0	0.00	0	0.00	0	0.00	0	0.37	0.00	-0.41
Gallbladder	0	0.00	0	0.00	0	0.00	1	32.79	1	0.07	14.42	1.05
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.17
Pancreas	0	0.00	0	0.00	0	0.00	1	2.51	1	0.96	1.04	0.05
Respiratory system	3	8.66*	6	3.07*	8	3.32*	9	2.60*	26	8.17	3.18*	20.04
Nose, nasal cavity, ear	0	0.00	1	36.08	0	0.00	0	0.00	1	0.09	11.00	1.02
Larynx	1	25.75	0	0.00	0	0.00	0	0.00	1	0.80	1.25	0.22
Lung, bronchus	2	6.67	5	2.94	8	3.77*	9	2.88*	24	7.25	3.31*	18.82
Female breast	0	0.00	1	0.49	2	1.01	1	0.50	4	6.47	0.62	-8.66
Female genital system	0	0.00	0	0.00	1	1.27	0	0.00	1	2.56	0.39	-5.46
Cervix uteri	0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-1.55
Corpus uteri	0	0.00	0	0.00	1	2.70	0	0.00	1	1.19	0.84	-0.65
Ovary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.79	0.00	-2.75
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.02	0.00	-0.08
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.26
Male genital system	2	13.74*	1	1.03	2	1.22	8	1.89	13	6.99	1.86	9.94
Prostate	1	10.47	1	1.24	2	1.30	8	1.92	12	6.61	1.81	8.91
Testis	1	21.96	0	0.00	0	0.00	0	0.00	1	0.31	3.26	1.15
Urinary system	1	5.83	0	0.00	1	0.95	3	2.04	5	3.61	1.39	1.57
Urinary bladder	0	0.00	0	0.00	0	0.00	2	2.20	2	2.11	0.95	-0.12
Kidney parenchyma	1	13.83	0	0.00	1	2.48	1	2.02	3	1.34	2.23	1.86
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.17
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.04	0.00	-0.05
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.07	0.00	-0.08
Soft tissue including heart	0	0.00	0	0.00	0	0.00	0	0.00	0	0.28	0.00	-0.32
Kaposi sarcoma	0	0.00	1	5.33	0	0.00	0	0.00	1	0.40	2.51	0.68
Melanoma of skin	0	0.00	3	3.82	1	1.44	4	5.91*	8	2.34	3.42*	6.37
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.10	0.00	-0.11
Brain, central nervous system	1	16.46	1	3.67	0	0.00	0	0.00	2	0.83	2.42	1.32
Thyroid	1	16.29	0	0.00	0	0.00	0	0.00	1	0.67	1.49	0.37
Lymphatic, hematopoietic	0	0.00	5	4.23*	1	0.86	4	2.94	10	3.95	2.53*	6.80
Hodgkin lymphoma	0	0.00	0	0.00	0	0.00	2	34.55*	2	0.28	7.21	1.94
Non-Hodgkin lymphoma	0	0.00	3	4.75	0	0.00	2	2.90	5	2.06	2.43	3.30
Myeloma	0	0.00	1	7.89	0	0.00	0	0.00	1	0.51	1.97	0.55
Leukemia	0	0.00	1	3.18	1	3.08	0	0.00	2	1.11	1.80	1.00
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.06	0.00	-0.07
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.41	0.00	-0.46
Acute non-lymphocytic	0	0.00	1	9.60	1	9.92	0	0.00	2	0.36	5.62	1.85
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.19

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 2,854 PYR and for male cancers on 6,044 PYR.

Chronic Lymphocytic Leukemia Both Sexes, 50-59 Years of Age

Table 17.3.7: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, 50-59 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	Number starting interval	Person-years in interval	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
	3,103	2,487	2,889	9,618	1,925	6,996	932	5,127	3,103	24,227		
All subsequent cancers	42	2.19*	139	1.48*	137	1.39*	138	1.27*	456	320.18	1.42*	56.06
All excluding same site	42	2.22*	139	1.50*	137	1.41*	138	1.28*	456	316.50	1.44*	57.58
Buccal cavity, pharynx	2	2.28	3	0.78	4	1.23	3	1.20	12	10.48	1.14	0.63
Lip	0	0.00	1	2.34	2	5.14	1	2.84	4	1.26	3.16	1.13
Tongue	1	5.39	0	0.00	0	0.00	1	1.90	2	2.23	0.90	-0.09
Salivary gland	1	19.21	0	0.00	1	4.63	1	4.48	3	0.72	4.14	0.94
Mouth	0	0.00	1	0.95	1	1.17	0	0.00	2	2.78	0.72	-0.32
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.39	0.00	-0.16
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	1.17	0.00	-0.48
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.34	0.00	-0.14
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	1.19	0.00	-0.49
Digestive system	6	1.64	20	1.11	15	0.81	24	1.14	65	61.25	1.06	1.55
Esophagus	0	0.00	0	0.00	0	0.00	2	1.67	2	4.10	0.49	-0.87
Stomach	1	2.66	1	0.55	2	1.15	1	0.54	5	5.77	0.87	-0.32
Small intestine	0	0.00	1	3.21	0	0.00	0	0.00	1	1.02	0.98	-0.01
Colon	2	1.43	10	1.41	8	1.04	12	1.27	32	25.62	1.25	2.63
Rectum, rectosigmoid junction	3	3.95	5	1.35	3	0.81	4	1.09	15	11.84	1.27	1.30
Anus, anal canal	0	0.00	1	4.25	0	0.00	0	0.00	1	0.73	1.38	0.11
Liver	0	0.00	1	1.47	0	0.00	0	0.00	1	2.30	0.43	-0.54
Gallbladder	0	0.00	0	0.00	0	0.00	1	4.02	1	0.63	1.58	0.15
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	1.20	0.00	-0.50
Pancreas	0	0.00	1	0.46	2	0.90	4	1.54	7	7.43	0.94	-0.18
Respiratory system	12	3.01*	44	2.25*	52	2.64*	35	1.77*	143	63.03	2.27*	33.01
Nose, nasal cavity, ear	0	0.00	0	0.00	2	13.24*	0	0.00	2	0.50	4.00	0.62
Larynx	0	0.00	0	0.00	3	1.81	3	2.46	6	5.17	1.16	0.34
Lung, bronchus	12	3.40*	44	2.52*	47	2.63*	32	1.74*	135	57.21	2.36*	32.11
Female breast	2	0.92	7	0.73	8	0.87	10	0.92	27	31.77	0.85	-5.30
Female genital system	2	1.84	3	0.63	1	0.23	5	1.10	11	14.69	0.75	-4.10
Cervix uteri	0	0.00	1	1.80	0	0.00	0	0.00	1	1.47	0.68	-0.52
Corpus uteri	2	3.38	1	0.38	0	0.00	2	0.80	5	8.12	0.62	-3.47
Ovary	0	0.00	0	0.00	1	0.81	3	2.17	4	4.21	0.95	-0.23
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.19
Vulva	0	0.00	1	8.68	0	0.00	0	0.00	1	0.45	2.21	0.61
Male genital system	3	1.19	18	1.15	29	1.38	24	0.93	74	64.84	1.14	6.02
Prostate	3	1.22	17	1.11	29	1.40	24	0.94	73	64.12	1.14	5.84
Testis	0	0.00	1	6.75	0	0.00	0	0.00	1	0.31	3.20	0.45
Urinary system	5	3.31*	8	1.08	8	1.03	10	1.15	31	25.42	1.22	2.30
Urinary bladder	2	2.18	4	0.86	3	0.59	8	1.35	17	16.62	1.02	0.16
Kidney parenchyma	3	5.82*	4	1.67	5	2.19	1	0.45	13	7.42	1.75	2.30
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	1	2.00	1	1.38	0.73	-0.16
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-0.18
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.30	0.00	-0.13
Soft tissue including heart	0	0.00	1	2.47	0	0.00	0	0.00	1	1.24	0.81	-0.10
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.35	0.00	-0.15
Melanoma of skin	4	5.88*	10	3.35*	5	1.87	11	4.22*	30	8.95	3.35*	8.69
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.52	0.00	-0.21
Brain, central nervous system	1	3.28	1	0.75	2	1.70	0	0.00	4	3.91	1.02	0.04
Thyroid	1	5.50	3	4.14	0	0.00	0	0.00	4	1.97	2.03	0.84
Lymphatic, hematopoietic	3	2.09	9	1.34	5	0.75	10	1.29	27	22.58	1.20	1.83
Hodgkin lymphoma	0	0.00	3	9.44*	0	0.00	2	9.94*	5	0.85	5.91*	1.71
Non-Hodgkin lymphoma	3	4.36	6	1.88	4	1.26	5	1.35	18	10.75	1.67	2.99
Myeloma	0	0.00	0	0.00	1	0.89	1	0.76	2	3.73	0.54	-0.71
Leukemia	0	0.00	0	0.00	0	0.00	2	0.79	2	7.25	0.28*	-2.17
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.09
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	3.10	0.00	-1.28
Acute non-lymphocytic	0	0.00	0	0.00	0	0.00	1	1.14	1	2.34	0.43	-0.55
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.94	0.00	-0.39

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 9,002 PYR and for male cancers on 15,226 PYR.

Table 17.3.8: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, 60-69 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	108	1.52*	417	1.33*	286	1.10	165	0.92	976	823.07	1.19*	39.34
All excluding same site	108	1.54*	417	1.34*	286	1.12	165	0.93	976	813.29	1.20*	41.85
Buccal cavity, pharynx	2	0.87	14	1.56	6	0.98	4	1.14	26	20.90	1.24	1.31
Lip	1	3.01	3	2.20	2	1.98	2	3.09	8	3.35	2.39*	1.20
Tongue	0	0.00	2	1.11	0	0.00	0	0.00	2	4.17	0.48	-0.56
Salivary gland	0	0.00	2	3.12	1	1.92	1	2.52	4	1.71	2.35	0.59
Mouth	1	1.66	3	1.30	1	0.64	1	1.09	6	5.38	1.11	0.16
Nasopharynx	0	0.00	2	6.50	0	0.00	0	0.00	2	0.67	2.97	0.34
Tonsil	0	0.00	0	0.00	1	1.88	0	0.00	1	1.89	0.53	-0.23
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.63	0.00	-0.16
Hypopharynx	0	0.00	2	1.89	0	0.00	0	0.00	2	2.31	0.87	-0.08
Digestive system	16	1.10	65	1.02	64	1.19	38	0.94	183	172.95	1.06	2.58
Esophagus	2	2.19	4	1.06	7	2.47	1	0.55	14	9.35	1.50	1.20
Stomach	3	2.07	8	1.28	5	0.98	2	0.54	18	16.52	1.09	0.38
Small intestine	1	4.86	0	0.00	2	2.57	1	1.75	4	2.48	1.62	0.39
Colon	3	0.49	27	0.97	32	1.30	17	0.86	79	78.21	1.01	0.20
Rectum, rectosigmoid junction	6	2.11	14	1.15	10	1.05	14	2.20*	44	30.88	1.42*	3.38
Anus, anal canal	0	0.00	0	0.00	1	2.09	0	0.00	1	1.54	0.65	-0.14
Liver	0	0.00	2	0.90	1	0.55	0	0.00	3	5.81	0.52	-0.72
Gallbladder	0	0.00	1	1.36	0	0.00	0	0.00	1	2.10	0.48	-0.28
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	1	1.00	1	3.59	0.28	-0.67
Pancreas	1	0.57	8	1.03	6	0.92	2	0.41	17	20.92	0.81	-1.01
Respiratory system	33	2.26*	117	1.89*	75	1.57*	37	1.25	262	153.56	1.71*	27.89
Nose, nasal cavity, ear	1	9.29	0	0.00	0	0.00	0	0.00	1	1.11	0.90	-0.03
Larynx	2	1.69	8	1.75	6	2.00	2	1.34	18	10.26	1.75*	1.99
Lung, bronchus	29	2.19*	108	1.91*	69	1.56*	35	1.26	241	141.83	1.70*	25.51
Female breast	4	0.67	25	0.99	21	1.00	13	0.86	63	67.45	0.93	-2.80
Female genital system	1	0.32	10	0.81	4	0.43	5	0.81	20	30.90	0.65*	-6.86
Cervix uteri	0	0.00	1	0.86	1	1.32	0	0.00	2	2.68	0.75	-0.43
Corpus uteri	0	0.00	5	0.73	2	0.39	1	0.32	8	16.85	0.47*	-5.57
Ovary	0	0.00	2	0.58	1	0.36	3	1.55	6	8.98	0.67	-1.87
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.45	0.00	-0.28
Vulva	1	11.27	2	4.80	0	0.00	1	2.51	4	1.32	3.04	1.69
Male genital system	24	1.60*	77	1.07	52	0.82	25	0.61*	178	190.90	0.93	-5.61
Prostate	24	1.62*	76	1.06	52	0.83	23	0.57*	175	189.54	0.92	-6.32
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.30	0.00	-0.13
Urinary system	10	1.74	36	1.41	18	0.84	14	0.90	78	68.38	1.14	2.47
Urinary bladder	4	1.03	27	1.54*	14	0.93	11	0.97	56	47.86	1.17	2.09
Kidney parenchyma	4	2.66	6	0.94	3	0.59	2	0.60	15	16.29	0.92	-0.33
Renal pelvis, other urinary	2	5.66	3	1.88	1	0.75	1	1.06	7	4.23	1.65	0.71
Ureter	2	16.72*	1	1.84	0	0.00	0	0.00	3	1.44	2.09	0.40
Bone, joints	0	0.00	1	3.87	1	5.11	0	0.00	2	0.64	3.13	0.35
Soft tissue including heart	0	0.00	2	1.91	1	1.15	0	0.00	3	2.84	1.05	0.04
Kaposi sarcoma	0	0.00	0	0.00	3	20.90*	0	0.00	3	0.48	6.23*	0.65
Melanoma of skin	7	4.57*	18	2.74*	12	2.27*	8	2.07	45	17.25	2.61*	7.14
Eye, orbit	1	8.86	0	0.00	1	2.77	0	0.00	2	1.18	1.70	0.21
Brain, central nervous system	1	1.22	5	1.48	3	1.18	0	0.00	9	8.31	1.08	0.18
Thyroid	0	0.00	1	0.73	1	1.04	0	0.00	2	3.23	0.62	-0.32
Lymphatic, hematopoietic	6	1.25	24	1.12	17	0.92	12	0.85	59	58.94	1.00	0.02
Hodgkin lymphoma	1	5.71	5	7.30*	4	8.20*	4	13.37*	14	1.65	8.50*	3.18
Non-Hodgkin lymphoma	4	1.86	11	1.14	12	1.43	5	0.77	32	26.68	1.20	1.37
Myeloma	1	1.18	5	1.32	0	0.00	2	0.83	8	10.27	0.78	-0.58
Leukemia	0	0.00	3	0.41	1	0.16*	1	0.20	5	20.34	0.25*	-3.95
Acute lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.50	0.00	-0.13
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	8.49	0.00*	-2.18
Acute non-lymphocytic	0	0.00	2	0.83	1	0.46	1	0.58	4	6.85	0.58	-0.73
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	2.64	0.00	-0.68

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 15,891 PYR and for male cancers on 22,986 PYR.

Chronic Lymphocytic Leukemia

Both Sexes, ≥70 Years of Age

Table 17.3.9: Risk of subsequent primary cancers after chronic lymphocytic leukemia, both sexes, ≥70 years of age, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis													
	<1 year		1-4 years		5-9 years		≥10 years		Total					
	Number starting interval	Person-years in interval	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR		
All subsequent cancers	9,850	7,333	194	1.04	652	1.12*	286	1.05	68	0.83	1,200	1,123.48	1.07*	17.74
All excluding same site			194	1.05	652	1.13*	286	1.07	68	0.85	1,200	1,107.45	1.08*	21.45
Buccal cavity, pharynx			5	1.26	11	0.93	3	0.59	0	0.00	19	22.43	0.85	-0.80
Lip			3	3.49	3	1.18	1	0.91	0	0.00	7	4.81	1.46	0.51
Tongue			0	0.00	1	0.47	0	0.00	0	0.00	1	3.98	0.25	-0.69
Salivary gland			1	2.35	3	2.21	1	1.48	0	0.00	5	2.69	1.86	0.53
Mouth			1	0.96	1	0.32	0	0.00	0	0.00	2	6.02	0.33	-0.93
Nasopharynx			0	0.00	0	0.00	1	7.88	0	0.00	1	0.59	1.71	0.10
Tonsil			0	0.00	1	1.29	0	0.00	0	0.00	1	1.40	0.71	-0.09
Oropharynx			0	0.00	0	0.00	0	0.00	0	0.00	0	0.47	0.00	-0.11
Hypopharynx			0	0.00	2	2.08	0	0.00	0	0.00	2	1.72	1.16	0.06
Digestive system			51	1.08	174	1.17*	87	1.21	20	0.86	332	291.25	1.14*	9.45
Esophagus			0	0.00	4	0.71	4	1.58	0	0.00	8	10.73	0.75	-0.63
Stomach			6	1.21	20	1.31	11	1.55	4	1.79	41	29.51	1.39	2.66
Small intestine			0	0.00	3	1.74	0	0.00	0	0.00	3	3.37	0.89	-0.09
Colon			28	1.23	88	1.20	47	1.30	10	0.84	173	144.22	1.20*	6.67
Rectum, rectosigmoid junction			4	0.52	22	0.94	12	1.13	5	1.59	43	44.94	0.96	-0.45
Anus, anal canal			1	3.00	0	0.00	0	0.00	0	0.00	1	2.07	0.48	-0.25
Liver			1	0.80	2	0.51	1	0.55	1	1.87	5	7.50	0.67	-0.58
Gallbladder			2	2.68	5	2.11	1	0.86	0	0.00	8	4.65	1.72	0.78
Bile ducts, other biliary			0	0.00	2	0.59	2	1.13	0	0.00	4	6.84	0.59	-0.66
Pancreas			8	1.43	20	1.13	8	0.93	0	0.00	36	34.70	1.04	0.30
Respiratory system			28	0.97	111	1.27*	48	1.27	13	1.29	200	164.40	1.22*	8.25
Nose, nasal cavity, ear			1	3.89	2	2.47	2	5.09	0	0.00	5	1.58	3.16*	0.79
Larynx			1	0.63	6	1.30	7	3.96*	0	0.00	14	8.37	1.67	1.30
Lung, bronchus			26	0.97	102	1.24*	39	1.09	13	1.37	180	154.00	1.17*	6.03
Female breast			8	0.52	59	1.17	19	0.74	7	0.82	93	99.85	0.93	-3.04
Female genital system			4	0.60	19	0.89	9	0.86	4	1.18	36	41.92	0.86	-2.63
Cervix uteri			0	0.00	2	1.02	0	0.00	1	3.56	3	3.80	0.79	-0.36
Corpus uteri			0	0.00	10	0.99	4	0.85	0	0.00	14	19.43	0.72	-2.41
Ovary			4	1.98	5	0.76	4	1.20	1	0.89	14	13.07	1.07	0.41
Vagina			0	0.00	0	0.00	0	0.00	1	11.63	1	0.95	1.05	0.02
Vulva			0	0.00	2	1.24	1	1.11	1	2.77	4	3.34	1.20	0.29
Male genital system			42	1.04	118	0.96	50	0.95	6	0.46*	216	228.77	0.94	-6.19
Prostate			42	1.05	116	0.95	49	0.94	6	0.46	213	226.95	0.94	-6.76
Testis			0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.11
Urinary system			26	1.63*	56	1.12	21	0.90	8	1.13	111	96.41	1.15	3.38
Urinary bladder			14	1.19	37	1.00	14	0.80	6	1.13	71	71.53	0.99	-0.12
Kidney parenchyma			10	3.21*	13	1.34	6	1.36	2	1.56	31	18.51	1.67*	2.90
Renal pelvis, other urinary			2	1.87	6	1.81	1	0.66	0	0.00	9	6.37	1.41	0.61
Ureter			0	0.00	4	3.61	0	0.00	0	0.00	4	2.12	1.89	0.44
Bone, joints			0	0.00	0	0.00	0	0.00	0	0.00	0	0.81	0.00	-0.19
Soft tissue including heart			3	4.30	3	1.35	3	2.77	1	2.75	10	4.37	2.29*	1.31
Kaposi sarcoma			4	23.63*	3	5.48*	1	3.57	0	0.00	8	1.10	7.26*	1.60
Melanoma of skin			7	2.23	21	2.06*	13	2.55*	4	2.32	45	20.15	2.23*	5.76
Eye, orbit			0	0.00	3	3.94	0	0.00	0	0.00	3	1.46	2.06	0.36
Brain, central nervous system			1	0.68	4	0.88	3	1.47	1	1.76	9	8.62	1.04	0.09
Thyroid			2	3.51	2	1.14	0	0.00	0	0.00	4	3.34	1.20	0.15
Lymphatic, hematopoietic			2	0.14*	45	0.96	20	0.88	1	0.14*	68	91.33	0.74*	-5.41
Hodgkin lymphoma			0	0.00	8	7.61*	6	13.26*	0	0.00	14	1.98	7.08*	2.79
Non-Hodgkin lymphoma			0	0.00*	24	1.23	7	0.72	1	0.32	32	38.24	0.84	-1.45
Myeloma			1	0.39	6	0.74	6	1.55	0	0.00	13	15.72	0.83	-0.63
Leukemia			1	0.17*	7	0.39*	1	0.11*	0	0.00	9	35.39	0.25*	-6.12
Acute lymphocytic			0	0.00	0	0.00	0	0.00	0	0.00	0	0.83	0.00	-0.19
Chronic lymphocytic			0	0.00	0	0.00*	0	0.00	0	0.00	0	14.03	0.00*	-3.25
Acute non-lymphocytic			1	0.53	4	0.66	0	0.00	0	0.00	5	11.75	0.43*	-1.56
Chronic myeloid			0	0.00	3	1.22	1	0.83	0	0.00	4	4.84	0.83	-0.19

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 22,508 PYR and for male cancers on 20,632 PYR.

Table 17.4.1: Characteristics of patients with an initial chronic myeloid leukemia, both sexes, SEER 1973-2000.

Characteristics	Males		Females		Total	
	No.	%	No.	%	No.	%
Number of patients with 1st primary cancer						
Total	4,520	100.0	3,485	100.0	8,005	100.0
Initial treatment						
Any radiation	235	5.2	154	4.4	389	4.9
With surgery	3	0.1	1	0.0	4	0.0
Without surgery	232	5.1	153	4.4	385	4.8
No radiation	4,285	94.8	3,331	95.6	7,616	95.1
With surgery	31	0.7	18	0.5	49	0.6
Without surgery	4,254	94.1	3,313	95.1	7,567	94.5
Race						
White	3,822	84.6	2,958	84.9	6,780	84.7
Black	414	9.2	337	9.7	751	9.4
Other	270	6.0	177	5.1	447	5.6
Unknown	14	0.3	13	0.4	27	0.3
Age at 1st primary cancer diagnosis, years						
< 30	406	9.0	241	6.9	647	8.1
30–49	1,015	22.5	689	19.8	1,704	21.3
50–69	1,633	36.1	1,165	33.4	2,798	35.0
70–79	948	21.0	728	20.9	1,676	20.9
≥ 80	518	11.5	662	19.0	1,180	14.7
Number of patients with one or more primary cancers						
One primary cancer only	4,341	96.0	3,347	96.0	7,688	96.0
1st and 2nd cancers	168	3.7	133	3.8	301	3.8
1st, 2nd, and 3rd cancers	11	0.2	4	0.1	15	0.2
1st, 2nd, 3rd, and additional cancers	0	0.0	1	0.0	1	0.0
Other statistics						
Median age at 1st cancer diagnosis	61.9	—	64.6	—	63.1	—
Median year of 1st cancer diagnosis	1988.5	—	1988.1	—	1988.3	—
Median person-years at risk	1.9	—	2.2	—	2.0	—
Percent histologically confirmed*						
Both 1st and 2nd cancers	—	93.9	—	87.0	—	90.9
1st, 2nd, and additional cancers	—	93.3	—	87.0	—	90.5
1st cancer only	—	5.0	—	8.0	—	6.3

*Percent histologically confirmed among patients who developed a subsequent primary cancer.

Chronic Myeloid Leukemia

Both Sexes

Table 17.4.2: Risk of subsequent primary cancers after chronic myeloid leukemia, both sexes, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	Number starting interval	Person-years in interval	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
	8,005	5,618										
			5,879	13,333	1,699	4,214	371	1,250	8,005	24,415		
All subsequent cancers	74	1.03	191	1.19*	48	1.04	21	1.56	334	291.80	1.14*	17.29
All excluding same site	74	1.04	191	1.21*	48	1.06	21	1.57	334	288.51	1.16*	18.63
Buccal cavity, pharynx	7	3.69*	3	0.72	3	2.58	2	6.07	15	7.54	1.99*	3.05
Lip	0	0.00	2	3.18	1	6.44	0	0.00	3	1.14	2.63	0.76
Tongue	2	5.48	1	1.21	0	0.00	1	14.12	4	1.50	2.66	1.02
Salivary gland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.68	0.00	-0.28
Mouth	4	8.02*	0	0.00	1	3.26	1	11.82	6	1.99	3.02*	1.64
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.31	0.00	-0.13
Tonsil	0	0.00	0	0.00	1	8.53	0	0.00	1	0.72	1.39	0.12
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.21	0.00	-0.08
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.73	0.00	-0.30
Digestive system	19	1.14	39	1.09	7	0.71	5	1.77	70	65.29	1.07	1.93
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	3.17	0.00	-1.30
Stomach	3	1.70	5	1.37	0	0.00	1	3.83	9	6.61	1.36	0.98
Small intestine	1	4.62	0	0.00	1	6.64	0	0.00	2	0.91	2.20	0.45
Colon	8	1.05	21	1.28	5	1.10	2	1.54	36	29.92	1.20	2.49
Rectum, rectosigmoid junction	2	0.70	6	0.98	1	0.60	1	2.13	10	11.13	0.90	-0.46
Anus, anal canal	0	0.00	1	2.96	0	0.00	0	0.00	1	0.62	1.62	0.16
Liver	0	0.00	3	2.57	0	0.00	0	0.00	3	2.13	1.41	0.36
Gallbladder	1	4.14	1	1.96	0	0.00	0	0.00	2	0.93	2.16	0.44
Bile ducts, other biliary	1	2.86	0	0.00	0	0.00	0	0.00	1	1.39	0.72	-0.16
Pancreas	3	1.51	2	0.46	0	0.00	1	2.93	6	7.85	0.76	-0.76
Respiratory system	12	0.99	43	1.61*	7	0.92	1	0.46	63	48.56	1.30	5.91
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-0.18
Larynx	0	0.00	1	0.56	0	0.00	0	0.00	1	3.24	0.31	-0.92
Lung, bronchus	12	1.08	41	1.66*	7	1.00	1	0.50	61	44.76	1.36*	6.65
Female breast	9	1.28	17	0.98	1	0.17*	2	1.23	29	31.76	0.91	-2.49
Female genital system	1	0.31	8	1.02	3	1.22	2	3.08	14	14.19	0.99	-0.17
Cervix uteri	0	0.00	2	1.98	2	6.53	0	0.00	4	1.82	2.20	1.97
Corpus uteri	1	0.63	3	0.78	1	0.83	2	6.39	7	6.98	1.00	0.02
Ovary	0	0.00	3	1.31	0	0.00	0	0.00	3	4.17	0.72	-1.05
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.22	0.00	-0.20
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.67	0.00	-0.61
Male genital system	9	0.64	28	0.93	9	1.11	2	0.77	48	54.96	0.87	-5.21
Prostate	9	0.65	27	0.91	9	1.14	2	0.79	47	54.01	0.87	-5.25
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.57	0.00	-0.43
Urinary system	5	0.87	17	1.36	3	0.86	2	1.93	27	22.81	1.18	1.72
Urinary bladder	4	0.99	10	1.16	2	0.85	1	1.44	17	15.76	1.08	0.51
Kidney parenchyma	1	0.74	6	1.95	1	1.08	1	3.54	9	5.63	1.60	1.38
Renal pelvis, other urinary	0	0.00	1	1.27	0	0.00	0	0.00	1	1.43	0.70	-0.17
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.47	0.00	-0.19
Bone, joints	0	0.00	0	0.00	0	0.00	1	71.38	1	0.28	3.51	0.29
Soft tissue including heart	0	0.00	2	3.02	0	0.00	0	0.00	2	1.21	1.65	0.32
Kaposi sarcoma	0	0.00	1	2.59	0	0.00	0	0.00	1	0.73	1.38	0.11
Melanoma of skin	2	1.30	4	1.09	1	0.83	0	0.00	7	6.81	1.03	0.08
Eye, orbit	0	0.00	1	4.25	1	14.85	0	0.00	2	0.43	4.68	0.64
Brain, central nervous system	0	0.00	2	1.19	0	0.00	0	0.00	2	3.06	0.65	-0.43
Thyroid	3	7.29*	2	1.99	0	0.00	0	0.00	5	1.85	2.70	1.29
Lymphatic, hematopoietic	7	1.27	18	1.47	8	2.24	3	2.82	36	22.39	1.61*	5.57
Hodgkin lymphoma	1	4.71	0	0.00	2	13.59*	0	0.00	3	0.89	3.38	0.87
Non-Hodgkin lymphoma	2	0.84	14	2.57*	1	0.60	2	3.97	19	9.97	1.91*	3.70
Myeloma	2	2.14	1	0.48	1	1.70	0	0.00	4	3.75	1.07	0.10
Leukemia	2	1.00	3	0.70	4	3.40	1	2.90	10	7.78	1.28	0.91
Acute lymphocytic	1	16.46	3	22.31*	2	49.98*	1	82.48*	7	0.25	28.30*	2.77
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	3.05	0.00	-1.25
Acute non-lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	2.61	0.00	-1.07
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	1.09	0.00	-0.45

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000. EAR for female cancers is based on 11,071 PYR and for male cancers on 13,344 PYR.

Table 17.4.3: Risk of subsequent primary cancers after chronic myeloid leukemia, females, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	30	1.18	87	1.42*	21	1.07	6	1.11	144	111.63	1.29*	29.24
All excluding same site	30	1.19	87	1.44*	21	1.08	6	1.12	144	110.41	1.30*	30.34
Buccal cavity, pharynx	1	2.21	1	0.92	1	2.91	0	0.00	3	1.98	1.52	0.93
Lip	0	0.00	0	0.00	1	43.81	0	0.00	1	0.14	7.29	0.78
Tongue	1	10.20	1	4.23	0	0.00	0	0.00	2	0.43	4.64	1.42
Salivary gland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.21
Mouth	0	0.00	0	0.00	0	0.00	0	0.00	0	0.68	0.00	-0.62
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.08	0.00	-0.07
Tonsil	0	0.00	0	0.00	0	0.00	0	0.00	0	0.17	0.00	-0.15
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.05	0.00	-0.04
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.13	0.00	-0.12
Digestive system	7	1.11	25	1.72*	4	0.92	2	1.68	38	26.39	1.44*	10.49
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.72	0.00	-0.65
Stomach	1	1.92	2	1.73	0	0.00	0	0.00	3	2.09	1.44	0.82
Small intestine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.37	0.00	-0.33
Colon	3	0.94	15	2.05*	4	1.83	1	1.65	23	13.30	1.73*	8.76
Rectum, rectosigmoid junction	0	0.00	3	1.32	0	0.00	0	0.00	3	4.10	0.73	-1.00
Rectum	0	0.00	1	0.68	0	0.00	0	0.00	1	2.69	0.37	-1.52
Anus, anal canal	0	0.00	1	5.38	0	0.00	0	0.00	1	0.34	2.93	0.59
Liver	0	0.00	1	3.41	0	0.00	0	0.00	1	0.53	1.87	0.42
Gallbladder	1	6.65	1	3.01	0	0.00	0	0.00	2	0.60	3.32	1.26
Bile ducts, other biliary	1	7.47	0	0.00	0	0.00	0	0.00	1	0.56	1.77	0.39
Pancreas	1	1.23	2	1.06	0	0.00	1	6.35	4	3.44	1.16	0.51
Respiratory system	3	1.00	19	2.49*	4	1.54	0	0.00	26	13.93	1.87*	10.91
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.15	0.00	-0.14
Larynx	0	0.00	1	3.98	0	0.00	0	0.00	1	0.46	2.19	0.49
Lung, bronchus	3	1.05	17	2.34*	4	1.62	0	0.00	24	13.28	1.81*	9.68
Female breast	9	1.28	17	0.98	1	0.17*	2	1.23	29	31.76	0.91	-2.49
Female genital system	1	0.31	8	1.02	3	1.22	2	3.08	14	14.19	0.99	-0.17
Cervix uteri	0	0.00	2	1.98	2	6.53	0	0.00	4	1.82	2.20	1.97
Corpus uteri	1	0.63	3	0.78	1	0.83	2	6.39	7	6.98	1.00	0.02
Ovary	0	0.00	3	1.31	0	0.00	0	0.00	3	4.17	0.72	-1.05
Vagina	0	0.00	0	0.00	0	0.00	0	0.00	0	0.22	0.00	-0.20
Vulva	0	0.00	0	0.00	0	0.00	0	0.00	0	0.67	0.00	-0.61
Urinary system	3	2.45	6	2.06	0	0.00	0	0.00	9	5.32	1.69	3.33
Urinary bladder	2	2.69	3	1.72	0	0.00	0	0.00	5	3.17	1.58	1.65
Kidney parenchyma	1	2.66	3	3.24	0	0.00	0	0.00	4	1.70	2.35	2.07
Renal pelvis, other urinary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.44	0.00	-0.40
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.14	0.00	-0.12
Bone, joints	0	0.00	0	0.00	0	0.00	0	0.00	0	0.11	0.00	-0.10
Soft tissue including heart	0	0.00	0	0.00	0	0.00	0	0.00	0	0.46	0.00	-0.42
Kaposi sarcoma	0	0.00	1	37.81	0	0.00	0	0.00	1	0.05	20.80	0.86
Melanoma of skin	1	2.04	0	0.00	0	0.00	0	0.00	1	2.29	0.44	-1.17
Eye, orbit	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.15
Brain, central nervous system	0	0.00	0	0.00	0	0.00	0	0.00	0	1.15	0.00	-1.04
Thyroid	1	4.10	1	1.61	0	0.00	0	0.00	2	1.14	1.75	0.77
Lymphatic, hematopoietic	4	2.01	7	1.48	4	2.67	0	0.00	15	8.65	1.73	5.74
Hodgkin lymphoma	1	14.16	0	0.00	1	17.81	0	0.00	2	0.31	6.39	1.52
Non-Hodgkin lymphoma	0	0.00	6	2.72	0	0.00	0	0.00	6	4.05	1.48	1.77
Myeloma	2	5.75	0	0.00	0	0.00	0	0.00	2	1.50	1.33	0.45
Leukemia	1	1.50	1	0.65	3	6.50*	0	0.00	5	2.79	1.79	2.00
Acute lymphocytic	1	48.88	1	20.55	1	65.31	0	0.00	3	0.09	33.81*	2.63
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.06	0.00	-0.96
Acute non-lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.98	0.00	-0.88
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.40	0.00	-0.36

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.

Chronic Myeloid Leukemia

Males

Table 17.4.4: Risk of subsequent primary cancers after chronic myeloid leukemia, males, SEER 1973-2000.

Subsequent primary cancer	Years after first primary cancer diagnosis											
	<1 year		1-4 years		5-9 years		≥10 years		Total			
	O	O/E	O	O/E	O	O/E	O	O/E	O	E	O/E	EAR
All subsequent cancers	44	0.94	104	1.05	27	1.02	15	1.86*	190	180.17	1.05	7.37
All excluding same site	44	0.95	104	1.06	27	1.04	15	1.88*	190	178.10	1.07	8.92
Buccal cavity, pharynx	6	4.16*	2	0.65	2	2.45	2	8.36	12	5.57	2.16*	4.82
Lip	0	0.00	2	3.62	0	0.00	0	0.00	2	1.00	2.00	0.75
Tongue	1	3.75	0	0.00	0	0.00	1	19.83	2	1.07	1.87	0.70
Salivary gland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.45	0.00	-0.34
Mouth	4	11.74*	0	0.00	1	5.28	1	18.68	6	1.31	4.59*	3.52
Nasopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.23	0.00	-0.17
Tonsil	0	0.00	0	0.00	1	11.52	0	0.00	1	0.55	1.83	0.34
Oropharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.16	0.00	-0.12
Hypopharynx	0	0.00	0	0.00	0	0.00	0	0.00	0	0.60	0.00	-0.45
Digestive system	12	1.16	14	0.65	3	0.54	3	1.84	32	38.90	0.82	-5.17
Esophagus	0	0.00	0	0.00	0	0.00	0	0.00	0	2.45	0.00	-1.84
Stomach	2	1.62	3	1.20	0	0.00	1	5.64	6	4.52	1.33	1.11
Small intestine	1	7.41	0	0.00	1	11.86	0	0.00	2	0.54	3.68	1.09
Colon	5	1.12	6	0.66	1	0.43	1	1.45	13	16.62	0.78	-2.71
Rectum, rectosigmoid junction	2	1.07	3	0.77	1	1.01	1	3.46	7	7.03	1.00	-0.02
Anus, anal canal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.28	0.00	-0.21
Liver	0	0.00	2	2.29	0	0.00	0	0.00	2	1.59	1.26	0.31
Gallbladder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.33	0.00	-0.24
Bile ducts, other biliary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.83	0.00	-0.62
Pancreas	2	1.70	0	0.00	0	0.00	0	0.00	2	4.42	0.45	-1.81
Respiratory system	9	0.99	24	1.25	3	0.60	1	0.69	37	34.64	1.07	1.77
Nose, nasal cavity, ear	0	0.00	0	0.00	0	0.00	0	0.00	0	0.28	0.00	-0.21
Larynx	0	0.00	0	0.00	0	0.00	0	0.00	0	2.78	0.00	-2.08
Lung, bronchus	9	1.09	24	1.38	3	0.66	1	0.76	37	31.48	1.18	4.14
Male breast	0	0.00	0	0.00	0	0.00	0	0.00	0	0.34	0.00	-0.26
Male genital system	9	0.64	28	0.93	9	1.11	2	0.77	48	54.96	0.87	-5.21
Prostate	9	0.65	27	0.91	9	1.14	2	0.79	47	54.01	0.87	-5.25
Testis	0	0.00	0	0.00	0	0.00	0	0.00	0	0.57	0.00	-0.43
Urinary system	2	0.44	11	1.15	3	1.17	2	2.58	18	17.49	1.03	0.38
Urinary bladder	2	0.60	7	1.01	2	1.10	1	1.85	12	12.59	0.95	-0.44
Kidney parenchyma	0	0.00	3	1.40	1	1.64	1	5.14	5	3.93	1.27	0.81
Renal pelvis, other urinary	0	0.00	1	1.84	0	0.00	0	0.00	1	0.98	1.02	0.01
Ureter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.33	0.00	-0.25
Bone, joints	0	0.00	0	0.00	0	0.00	1	114.91*	1	0.17	5.76	0.62
Soft tissue including heart	0	0.00	2	4.89	0	0.00	0	0.00	2	0.75	2.67	0.94
Kaposi sarcoma	0	0.00	0	0.00	0	0.00	0	0.00	0	0.68	0.00	-0.51
Melanoma of skin	1	0.96	4	1.64	1	1.29	0	0.00	6	4.52	1.33	1.11
Eye, orbit	0	0.00	1	6.89	1	25.17	0	0.00	2	0.26	7.56	1.30
Brain, central nervous system	0	0.00	2	1.91	0	0.00	0	0.00	2	1.91	1.05	0.07
Thyroid	2	11.91*	1	2.60	0	0.00	0	0.00	3	0.71	4.23	1.72
Lymphatic, hematopoietic	3	0.85	11	1.46	4	1.93	3	4.69	21	13.74	1.53	5.44
Hodgkin lymphoma	0	0.00	0	0.00	1	10.99	0	0.00	1	0.57	1.74	0.32
Non-Hodgkin lymphoma	2	1.37	8	2.48*	1	1.07	2	6.78	13	5.92	2.20*	5.31
Myeloma	0	0.00	1	0.81	1	3.05	0	0.00	2	2.25	0.89	-0.19
Leukemia	1	0.75	2	0.73	1	1.40	1	4.67	5	5.00	1.00	0.00
Acute lymphocytic	0	0.00	2	23.31*	1	40.48	1	127.75*	4	0.16	25.22*	2.88
Chronic lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.99	0.00	-1.49
Acute non-lymphocytic	0	0.00	0	0.00	0	0.00	0	0.00	0	1.63	0.00	-1.22
Chronic myeloid	0	0.00	0	0.00	0	0.00	0	0.00	0	0.69	0.00	-0.52

*P < 0.05. Notes: See Appendices for definitions of cancer sites and "all excluding same site." Abbreviations: O = observed number of subsequent (2nd, 3rd, etc.) primary cancers; E = expected number of subsequent primary cancers; O/E = ratio of observed to expected cancers; PYR = person-years at risk; EAR = excess absolute risk per 10,000 person-years = [(O-E)/PYR] × 10,000.