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INTRODUCTION

The diagnosis of cancer in a child or adolescent is a life-changing event for them and their families. Advances in treatment have increased the overall five-year survival rate for childhood cancers in boys and girls to roughly 85% in the United States.[1] With respect to the type of cancer and treatment received, patients who survive past five years may remain at risk of recurrence or progression of their primary cancer and be a risk of developing subsequent cancers, chronic diseases, and life-long impairments.[2] Survivors of childhood or adolescent cancers should undergo routine and continuous monitoring for long-term and late effects.

The current study provides the latest statistics and trends in childhood cancer incidence and mortality in Illinois. An overview of information on risk factors, symptoms, treatment, and important long-term and late-term effects for the most common cancers that occur in this age group is also provided.

METHODS

Childhood cancer cases and deaths were examined by sex, age, race/ethnicity, diagnosis year, and 12 major pediatric site groups using the International Classification of Childhood Cancer (Appendix A).[3] Incidence and death rates are expressed per 1 million children and were age-standardized to the 2000 U.S. Standard population. All cancer cases and deaths were analyzed using SEER*Stat software.[4] Annual percent change (APC) estimates were generated using Joinpoint software.[5] In 2020, public health interventions and hospital resource reallocation during the COVID-19 pandemic influenced the availability and willingness of the public to access health care services. This led to delays and reductions in cancer screening and

diagnosis, and a subsequent drop in the observed case counts for most cancers in Illinois and the Unites States as a whole. The Joinpoint model was not designed to accommodate a one-time anomaly in the rates for the most recent year. Including 2020 in the Joinpoint trends will bias interpretation of the impact of longer-term trends in pediatric cancers. For this reason, Joinpoint analysis was limited to the years 1991-2019.

Childhood cancer incidence data from 1991 through 2020 are from the Illinois Department of Public Health, Illinois State Cancer Registry (ISCR), the only source of population-based cancer incidence data for the state. Identification of cancer cases in the ISCR is dependent upon reporting by hospitals, free-standing clinics, radiation treatment facilities, laboratories, and physician offices, as mandated by state law. Although case reporting is mandated within six months of diagnosis, it has been the ISCR policy to keep database files open for late reporting of cases and to accommodate the two-year lag in case identification of Illinois residents from other state central cancer registries. This practice is consistent with data published nationally. For this report, the database files reflect the status of ISCR as of November 2022 and cover the years 1991 through 2020. Incidence data for the United States were obtained from two sources -- 2020 and 2016-2020 incidence figures are from the Surveillance, Epidemiology, and End Results (SEER) Program, SEER 12 registries;[6] trend data and annual percent change statistics were calculated using the National Cancer Institute (NCI), National Childhood Cancer Registry Explorer.[7] This data source represents 64% of all U.S. children ages 0-39 based on 2018 U.S. populations and includes the cancer registries from California (Greater Bay, Greater California, Los Angeles), Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, New York, Ohio,

Pennsylvania, Seattle (Puget Sound), Tennessee, Texas, Utah, and Wisconsin. Mortality data for Illinois and the United States covering 1991 to 2020 by race and ethnicity were obtained from the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), as provided to the SEER Program of NCI. The data were made available in June 2022.[8]

SELECTED FINDINGS

Pediatric Cancer Incidence and Mortality

In 2020, Illinois had 375 cases of cancer among children (ages 0-14) and 209 cases of cancer in adolescents (ages 15-19). Combined these cancers represent roughly 1% of all cancers occurring in Illinois during 2020. The most common cancers among children and adolescents vary by age (Figure 1). Cancers that are most common in children are leukemia (31.1%), central nervous system tumors (17.9%), lymphomas (12.5%), and neuroblastoma and peripheral nervous cell tumors (7.1%). In adolescents, epithelial neoplasms and melanomas (30%), lymphomas (23.4%), leukemias (13%), germ cell tumors (11.9%), and central nervous system tumors (7.2%) were the five most common cancers.

Gender and racial/ethnic differences are displayed in Table 2. In Illinois children, the rates of cancer incidence and mortality were lower in girls but not to a level of statistical significance. The same held true for adolescents. With respect to race and ethnicity, Non-Hispanic Whites had the highest rates of childhood and adolescent cancer incidence with Hispanic second highest followed by non-Hispanic Asian-Pacific Islander, non-Hispanic Black, and non-Hispanic American Indian and Native Alaskan (latter two groups significantly lower ($p<0.05$) than non-Hispanic White, non-Hispanic Asian-Pacific Islander, and Hispanic

counterparts). Childhood cancer mortality rates were observed to be lowest in Hispanic children and highest in non-Hispanic Black children. The ranking was reversed in adolescent cancer mortality with Hispanics having the highest rate and non-Hispanic Blacks the lowest. No statistically significant differences in child or adolescent cancer mortality rates were observed between racial-ethnic groups.

Reasons for differences in pediatric cancer incidence and mortality by race and ethnicity are not well understood. Unlike many adult cancers, pediatric cancers do not show an association with lower socioeconomic status.[9-11] In general, the incidence of pediatric cancer is higher in industrialized countries compared to developing countries, but international patterns differ by cancer type[12,13] for reasons that are generally unknown.

Figure 1 compares Illinois pediatric incidence and mortality rates to those of the United States. Illinois pediatric cancer rates follow national rates closely and display similar trends over the time period shown. In addition, Figure 2 and Figure 3 display incidence and mortality rates for pediatric cancer in Illinois and the U.S. With the exception of two Illinois rates not being created due to small numbers, Illinois and national rates were very similar by cancer site and cause of death. No statistically significant differences in cancer site or cause of death were observed between Illinois and the United States.

Trends in Pediatric Cancer

The pediatric cancer incidence rate in Illinois has increased from 144.3 per 1 million in 1991 to 199.4 per 1 million in 2019. This represents an average annual percent change (AAPC) of 1.2% per year during this time period (Table 3). Similar trends were seen across sex, age, and

race/ethnicity with all positive AAPCs ranging from 0.7% to 2.2% annually. In addition, four major sites (leukemias, hepatic tumors, soft tissue tumors, and epithelial tumors and melanomas) also exhibited statistically significant and positive APCs ranging from 1.1% to 1.8%. Lymphomas overall exhibited an increasing trend in incidence (AAPC 1.8), but also displayed a brief period of decreasing trend between 1997-2001 before returning to an increasing trend from 2001 to 2019 (Table 4). No tumor sites examined displayed a decreasing AAPC in incidence. Compared to the Unites States, the direction of the incidence trends as well as the magnitude were quite similar up until roughly 2015-2016 . Interestingly, national incidence trends were slowly moving up over most of the time period but shifted to a negative trend beginning around 2015 and 2016 in most of the selected demographics (Table 5). Illinois incidence rates displayed a similar positive trend that was seen nationally; however, Illinois rates did not realize the change in trend direction later in the time period.

The reasons for increasing incidence rates in Illinois and nationally are not known at this time. Changes in how pediatric cancers were coded occurred in 2000 with the introduction of the ICD-O3 classification system, which could influence the direction and magnitude of trends for specific sites impacted by these coding changes. It is possible that changes in environmental or genetic risks could exert influence on this trend.[14] Improved diagnosis and access to medical care over time may also have contributed to the increasing trend, as without medical care some children may die due to complications of their cancer before ever being diagnosed.[15]

Death rates for pediatric cancers, both child and adolescent, declined by an average of 1.6% per year between 1991 and 2019. This trend resulted in a 41% decline in the pediatric mortality rate in Illinois. Demographic subgroups exhibited declines similar to that of the state

as a whole (Table 3). Males displayed larger significant average annual declines (AAPC -2.3, $p<0.05$) as well as children 0-14 (AAPC -2.7, $p<0.05$). An AAPC was not available for all racial-ethnic groups due to small annual counts. Nevertheless, non-Hispanic White, and non-Hispanic Black pediatric populations in Illinois showed declining trends similar in magnitude to that of the state (Table 3). Examination of pediatric mortality by cause of death was largely precluded due to small case counts for many causes of death. AAPC was available for brain and central nervous system cancers and leukemia. Both causes of death displayed declining trends (Table 7). Compared to the United States, Illinois displayed similar trends in pediatric mortality by sex, age, race-ethnicity, and cause of death. While the United States saw steeper declines in pediatric mortality from 1991-1996 those declines contracted in magnitude between 1997-2019 closely resembling that of Illinois. National trends by demographic subgroups (Table 6) and by cause of death (Table 7) were similar to that of Illinois.

Early Detection and Prevention

Unlike adult cancers, a relatively small percentage of childhood cancers have known preventable causes. Ionizing radiation is a well-recognized risk factor for cancer in children and adolescents based on studies of medical and environmental radiation exposure. The association between ionizing radiation exposure received while a child is in utero from diagnostic radiography and the subsequent risk of leukemia and other cancers was demonstrated in the 1950s.[16] As a result, health care providers are encouraged to limit the use of computed tomography scans in children and pregnant women to those circumstances where there is a definite clinical indication and to utilize the lowest possible radiation dose.[17]

Past studies have shown associations between birthweight and pediatric cancers. High birthweight has been associated with acute lymphoblastic leukemia, central nervous system tumors, Wilms tumor, non-Hodgkin lymphoma, and embryonal rhabdomyosarcoma, while low birthweight has been associated with acute myeloid leukemia and some central nervous system tumors.[18-25] Numerous epidemiological studies have investigated potential environmental causes of pediatric cancer. However, aside from ionizing radiation exposure, studies have not found strong or consistent associations between pediatric cancer and specific environmental exposures. The International Association for Research on Cancer has determined that there is sufficient evidence parental smoking increases the risk of hepatoblastoma and limited evidence for an association with acute lymphocytic leukemia.[26] They also found limited evidence for a link between maternal exposure to paint and childhood leukemia.[26] Given the complex process of normal development in utero, it is possible that the development of cancer is an inherent risk associated with that process. Nevertheless, studies have shown that the process of development in immature cells renders them more suspectable to toxic exposures than mature cells.[27] Given the understanding of genetic mutations in some pediatric cancers and the many ways in which exogenous exposures can change cellular development and cause cancer, it is important to minimize exposure to known toxic substances.[27]

Early diagnosis of pediatric cancers is often very difficult due to the similarity of some symptoms to those of more common diseases that occur in childhood.[28] Generally, symptoms of pediatric cancer include an unusual mass or swelling; unexplained fatigue or loss of energy; a new tendency to bruise; persistent localized pain or limping; prolonged, unexplained fever or

illness; frequent headaches accompanied by nausea and vomiting; sudden changes in vision; and excessive rapid weight loss.

Information for Selected Cancer Sites

Leukemia

Originating in the bone marrow and blood, leukemias are the most common pediatric cancer. This group of cancers accounted for 25% of all cancers in Illinois children and adolescents in 2016-2020. The most common types of this cancer in children are acute lymphocytic leukemia and acute myeloid leukemia. Leukemias can cause bone and joint pain, fatigue, bleeding or bruising, fever, weight loss, and other symptoms.[29]

Lymphoma

Lymphomas are cancers that begin in immune cells called lymphocytes. This group of cancers often start in lymph nodes or in lymph tissue, including the tonsils or thymus. Lymphomas made up 16% of cancers in kids ages 19 or younger in Illinois between 2016 and 2020. There are two main types of lymphoma -- Hodgkin lymphoma, and non-Hodgkin lymphoma. Depending upon where in the body a lymphoma originates, the symptoms can include weight loss, fever, sweats, fatigue, lumps under the skin around the neck (swollen lymph nodes), armpit, or groin.[29]

Central Nervous System

Tumors originating in the central nervous system (brain and spinal cord) accounted for roughly 14% of all pediatric cancer in Illinois between 2016 and 2020. There are many different

subtypes of central nervous system tumors and the treatment and prognosis for each is different. Symptoms of these types of tumors include headaches, nausea, vomiting, blurred or double vision, seizures, trouble with walking or handling items, as well as other symptoms.[29]

Epithelial Neoplasms and Melanoma

Epithelial cells are found in the skin, glands, and linings of organs. This group of cancers represented 14% of pediatric cancers in Illinois between 2016-2020. Specific sub-types of cancer in this group include adrenocortical carcinomas, thyroid carcinomas, nasopharyngeal carcinomas, and malignant melanomas. Symptoms of adrenocortical carcinomas include a lump or pain in the abdomen.[30] Thyroid carcinomas do not always cause symptoms but can include swollen lymph nodes in the neck, breathing problems, hoarseness, problems swallowing, or pain when swallowing.[31] Nasopharyngeal cancers or head and neck cancers can manifest symptomatically as a lump in the neck or jaw, a persisting sore in the mouth or throat, difficulty swallowing, hoarseness, ringing or pain in the ears, blocked sinuses, chronic infections that do not resolve with antibiotics, and numbness or paralysis of muscles in the face, chin, or neck.[32] While melanoma symptoms can vary from child to child some of the most common symptoms include a bump that itches and bleeds, a non-pigmented or pinkish wart, an odd looking mole (especially a large one), and a mole that looks different from a child's other moles.[33]

Soft Tissue Tumors

Soft tissue tumors accounted for 7% of all pediatric cancer in Illinois between 2016 and 2020. The most common soft tissue tumor in children 19 and under is rhabdomyosarcoma,

which makes up the majority of soft tissue tumors in this population. Rhabdomyosarcoma starts in cells that develop into muscles and can appear any place in the body. The tumors may cause pain, swelling, and/or a lump.[29]

Neuroblastoma

Neuroblastoma starts in early forms of nerve cells found in children in utero. These types of tumors can develop anywhere in a child's body but are most commonly found in the abdomen and can appear like a lump or swelling in that area. It can induce symptoms like bone pain and fever. Between 2016-2020 neuroblastoma accounted for 5% of all pediatric cancers in Illinois.[29]

Bone Tumors

Cancers that begin in the bones most often occur in older children and teenagers. This type of cancer represented 5% of all pediatric cancer cases in Illinois between 2016 and 2020. Two main types of bone tumors occur in children -- osteosarcoma and Ewing sarcoma. Osteosarcoma is most common in teens and occurs where bones are experiencing quick growth, such as near the ends of leg or arm bones. This cancer can cause bone pain that gets worse with activity or at night and can cause swelling around the affected area. Ewing sarcoma is a less common type of bone cancer and is most often found in the early teens. Common places for this cancer to originate are the hip bones, ribs or shoulder blades, or in the middle of leg bones. Symptoms include bone pain and swelling.[29]

Renal Tumors

These tumors occur in one or both kidneys and are a specific type of tumor called a Wilms tumor. Wilms tumors are most commonly found in children 3-4 years old and can manifest as a lump or swelling in the abdomen and precipitate symptoms such as fever, pain, nausea, or poor appetite. These cancers made up 4% of cancers in Illinois children between 2016 and 2020.[29]

Germ Cell Tumors

Germ cell tumors are tumors that start in the underdeveloped cells that form the ova or eggs in females and the sperm in males. These tumors accounted for 7% of pediatric cancers in Illinois (2016-2020). Germ cell tumors can start in the ovaries or testicles, but they can also begin in the brain, the area between the lungs, the abdomen, and the lower spine. Symptoms of germ cell tumors can include a lump or mass, abdominal pain, chest pain, trouble breathing, trouble with eyesight, pain in the lower back, a need to urinate often, constipation, increased thirst and urination, increased hair growth, vaginal bleeding, no menstrual period, early puberty, and abnormal shape or size of testicles.[34]

Retinoblastoma

Retinoblastoma is a cancer that occurs in the eye and accounted for roughly 2% of pediatric cancer cases in Illinois (2016-2020). These cancers are normally found when a parent or doctor notices a white or pink hue of a child's pupil, instead of red, when shining a light into

the eye (or taking a flash picture). Most commonly found in children around the age of 2 retinoblastoma is seldom found in children older than 6.[29]

Hepatic Tumors

Hepatoblastoma is the most common tumor that originates in the liver in children. Hepatic tumors represented less than 1% of all pediatric cancers in Illinois between 2016-2020. These tumors begin in the child's liver and are usually diagnosed by age 3. Symptoms can include abdominal pain, fatigue, loss of appetite, and anemia.[35]

CHALLENGES AND FUTURE DIRECTIONS

Pediatric cancer is a success story for modern medicine in which effective treatments have been identified for previously untreatable cancers. For many pediatric cancers, large advances have been made using and refining chemotherapeutic agents and treatment regimens to improve disease-free survival while minimizing treatment-related morbidity.[36] While Illinois pediatric cancer incidence has risen over time, it is unclear what factors are at work in this trend as well as the direction and magnitude of these influences. Advances in the detection and diagnosis of pediatric cancers have likely played a role in increasing the incidence of these cancers. At the same time, advances in pediatric cancer treatment have clearly impacted the trends in pediatric cancer mortality for some cancers and led to steady declines in cancer mortality for Illinois children.

Although advances in treatment of pediatric cancer have saved many lives over recent decades, there has been less progress in better understanding the causes and prevention of pediatric cancers. Numerous studies have investigated the causes of pediatric cancers;

however, few strong and consistent associations leading to prevention strategies have been found. Most pediatric cancer studies rely on a case control design and are subject to recall bias (parents of an ill child may recall exposures that parents of a healthy child do not) as well as measurement error (estimates of exposure based on recall are generally less accurate that those based on records or actual measurements). In addition, most prior epidemiological studies did not examine histologic or molecular subtypes of tumors where etiology (how and why a cancer starts) can be different. While current research endeavors, such as the National Childhood Cancer Registry, seek to address some of these limitations, additional studies into pediatric cancer are needed.

REFERENCES

1. SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute; 2023 Apr 19. [updated: 2023 Jun 8; cited 2023 Jul 5]. Available from: https://seer.cancer.gov/statistics-network/explorer/. Data source(s): SEER Incidence Data, November 2022 Submission (1975-2020), SEER 22 registries (excluding Illinois and Massachusetts).
2. Armstrong CT, Liu Q, Yasui y, et al. Late Mortality among 5-year survivors of childhood cancer: a summary from the Childhood Cancer Survivor Study. Journal of Clinical Oncology. 2009;27:2328-2338.
3. Steliarova-Foucher E, Colombet M, Ries LAG, Rous B, Stiller CA. Classification of tumors. In: Steliarova-Foucher E, Colombet M, Ries LAG, Moreno F, Dolya A, Shin HY, Hesseling P, Stiller CA. International Incidence of Childhood Cancer, Volume III. Lyon: International Agency for Research on Cancer, In press.
4. Surveillance Research Program, National Cancer Institute SEER*Stat software (seer.cancer.gov/seerstat) Version 8.4.0, March 31, 2022.
5. Surveillance Research Program, National Cancer Institute Joinpoint software (https://surveillance.cancer.gov/joinpoint) Version 8.4.0.1, April, 2020.
6. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 12 Registries (excl AK), Nov 2022 Sub (1992-2020) - Linked To County Attributes - Time Dependent (1990-2021) Income/Rurality, 1969-2021

Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2023, based on the November 2022 submission.

7. National Childhood Cancer Registry Explore (NCCRE) [Internet]. National Cancer Institute (NCI). [accessed 2022 Nov 8]; Available from: https://nccrexplorer.ccdi.cancer.gov/

8. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality – All COD, Aggregated With State (1969-2019) <Katrina/Rita Population Adjustment> , National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2021. Underlying mortality provided by NCHS.

9. Pan I, Daniels J, Zhu K. Poverty and childhood cancer incidence in the United States. Cancer Causes and Control. 2010;21:1139-1145.

10. Barry M, Auger N, Burrows S. Portrait of socio-economic inequality in childhood morbidity and mortality over time, Quebec, 1990-2005. Journal of Pediatrics and Child Health. 2012;48:496-505.

11. Kroll M, Stiller C, Murphy M, Carpenter L. Childhood leukemia and socio-economic status in England and Whales 1976-2005: evidence of higher incidence in relatively affluent communities persists over time. British Journal of Cancer. 2011;105:1783-1787.

12. Bunin G. Non-genetic causes of childhood cancers: evidence from international variation, time trends, and risk factor studies. Toxicology and Applied Pharmacology. 2004; 199:91-103.

13. Stiller C, Parkin D. Geographic and ethnic variations in the incidence of childhood cancer. British Medical Bulletin. 1996;52:682-703

14. Risk Factors and Causes of Childhood Cancer [Internet]. American Cancer Society, October 2019. Available from https://www.cancer.org/cancer/types/cancer-in-children/risk-factors-and-causes.html.
15. Kroll M, Stiller C, Richards S, Mitchell C, Carpenter L. Evidence of under-diagnosis of childhood acute lymphoblastic leukemia in poorer communities within Great Britain. British Journal of Cancer. 2012; 106: 1556-1559.
16. Doll R, Wakeford R. Risk of childhood cancer from fetal irradiation. British Journal of Radiology. 1997; 70: 130-139.
17. Radiation risks and pediatric computed tomography (CT): A guide for health care providers [Internet]. National Cancer Institute, September 2018. Available from https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/pediatric-ct-scans.
18. Bjorge T, Sorensen HT, Grotmol T, et al. Fetal growth and childhood cancer: a population-based study. Pediatrics. 2013; 132:e1265-e1275.
19. Milne E, Greenop K, Metayer C, et al. Fetal growth and childhood acute lymphoblastic leukemia: findings from the childhood leukemia international consortium. International Journal of Cancer. 2013; 133: 2968-2979.
20. O'Neill K, Bunch K, Murphy M. Intra-uterine growth and childhood leukemia and lymphoma risk. Expert Rev Hematology. 2012; 5: 559-576.
21. Chokkalingam A, Metayer C, Scelo G, et al. Fetal growth and body size genes and risk of childhood acute lymphoblastic leukemia. Cancer Causes and Control. 2012; 23: 1577-1585.
22. MacLean J, Partap S, Reynolds P, Von Behren J, Fisher PG. Birth weight and order as risk factors for childhood central nervous system tumors. Journal of Pediatrics. 2010; 157: 450-455.

23. Rangel M, Cypriano M, de Martino Lee ML, et al. Leukemia, non-Hodgkin's lymphoma, and Wilms tumor in childhood: the role of birth weight. European Journal of Pediatrics. 2010; 169: 875-881.

24. Ognjanovic S, Carozza SE, Chow EJ, et al. Birth characteristics and the risk of child-hood rhabdomyosarcoma based on histological subtype. British Journal of Cancer. 2010; 102: 227-231.

25. Roman E, Lightfoot T, Smith AG, et al. Childhood acute lymphoblastic leukemia and birthweight: insights from a pooled analysis of case-control data from Germany, the United Kingdom and the United States. European Journal of Cancer. 2013; 49: 1437-1447.

26. Cogliano VJ, Baan R, Straif K, et al. Preventable exposures associated with human cancers. Journal of the National Cancer Institute. 2011; 103: 1827-1839.

27. Landrigan PJ, Goldman LR. Children's vulnerability to toxic chemicals: a challenge and opportunity to strengthen health and environmental policy. Health Affairs (Millwood). 2011;30:842-850.

28. Dang-Tan T, Franco E. Diagnosis delays in childhood cancer: a review. Cancer. 2007; 110: 703-713.

29. Types of cancer that develop in children [Internet]. American Cancer Society, October 2019. Available from https://www.cancer.org/cancer/types/cancer-in-children/types-of-childhood-cancers.html.

30. Ilanchezhian M, Varghese D, Glod J, et al. Pediatric adrenocortical carcinoma. Endocrinology. 2022 Oct 31; 13: 961650.

31. Differentiated Thyroid Cancer [Internet]. St. Jude Childrens Hospital, accessed July 2023. Available from https://together.stjude.org/en-us/about-pediatric-cancer/types/thyroid-tumors/differentiated-thyroid-cancer.html.
32. Head and Neck Cancers [Internet]. National Cancer Institute, accessed July 2023. Available from https://www.cancer.gov/types/head-and-neck/head-neck-fact-sheet
33. Childhood melanoma symptoms [Internet]. MD Anderson Cancer Center, accessed July 2023. Available from https://www.mdanderson.org/cancer-types/childhood-melanoma/childhood-melanoma-symptoms.html.
34. Germ cell tumors in children [Internet]. Johns Hopkins Medicine, accessed June 2023. Available from https://www.hopkinsmedicine.org/health/conditions-and-diseases/germ-cell-tumors-in-children.
35. Hiyama E. Pediatric hepatoblastoma: diagnosis and treatment. Translational Pediatrics. 2014; 3(4): 293-9.
36. Green DM, Kun LE, Matthay KK, et al. Relevance of historical therapeutic approaches to the contemporary treatment of pediatric solid tumors. Pediatric Blood and Cancer. 2013; 60: 1083-1094.

TABLES AND FIGURES:

Table 1: Distribution of Childhood and Adolescent Cancer by Site, Illinois, 2016-2020

Children (Ages 0-14)	Adolescents (Ages 15-19)
Leukemias 648 (31.1%)	Epithelial neoplasm and melanomas 326 (30.0%)
Central nervous system 372 (17.9%)	Lymphomas 254 (23.4%)
Lymphomas 261 (12.5%)	Leukemias 141 (13.0%)
Neuroblastoma and peripheral nervous cell 147 (7.1%)	Germ cell tumors 129 (11.9%)
Soft tissue tumors 136 (6.5%)	Central nervous system 78 (7.2%)
Epithelial neoplasm and melanomas 126 (6.0%)	Soft tissue tumors 72 (6.6%)
Renal tumors 111 (5.3%)	Bone tumors 64 (5.9%)
Bone tumors 86 (4.1%)	Other unspecified neoplasms 6 (0.6%)
Germ cell tumors 86 (4.1%)	Renal tumors 5 (0.5%)
Retinoblastoma 52 (2.5%)	Neuroblastoma and peripheral nervous cell 3 (0.3%)
Hepatic tumors 28 (1.3%)	Hepatic tumors 3 (0.3%)
All sites 2,083	All sites 1,087

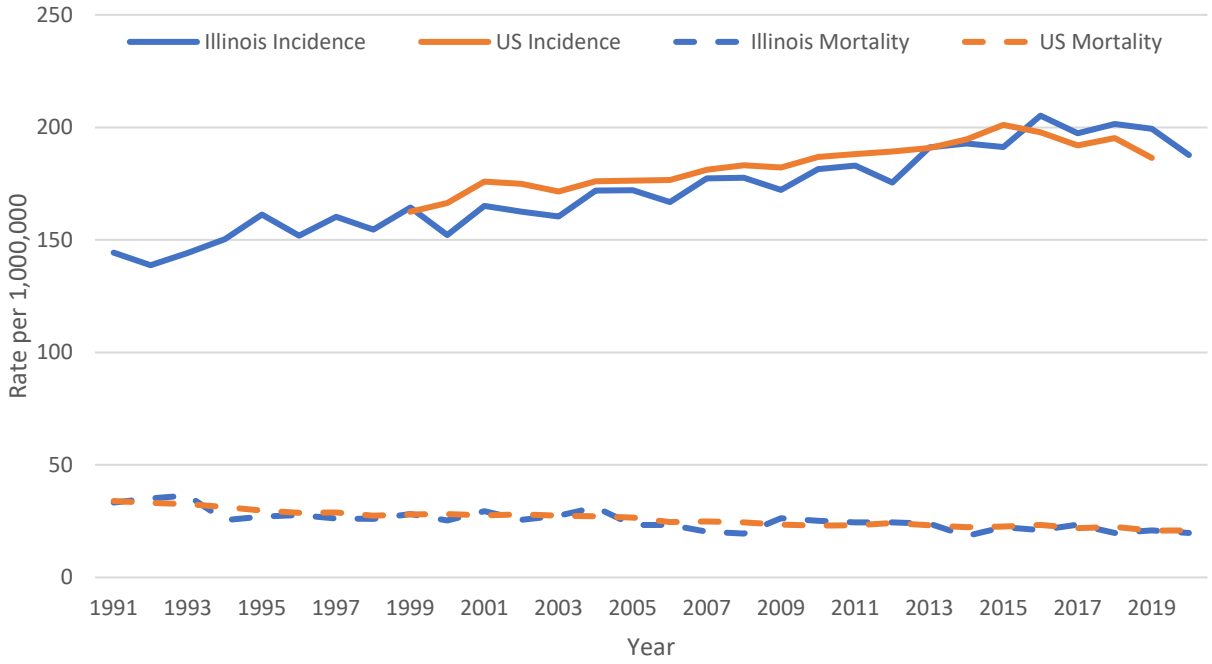
Source: Illinois State Cancer Registry, data as of November 2022

Table 2: Incidence and Mortality Rates for Childhood and Adolescent Cancers by Sex and Race-Ethnicity, Illinois, 2016-2020

	Ages 0-14		**Ages 15-19**	
	Incidence	**Mortality**	**Incidence**	**Mortality**
Sex				
Male	184.7	19.2	272.9	33.5
Female	168.6	17.6	251.3	23.7
Race/Ethnicity				
Non-Hispanic White	183.7	19.7	299.0	28.6
Non-Hispanic Black	141.0	22.0	157.8	21.9
Non-Hispanic Asian/Pacific Islander	173.7	*	240.4	*
Non-Hispanic American Indian/Native Alaskan	131.3	*	0.0	*
Hispanic	178.0	15.6	243.8	33.4

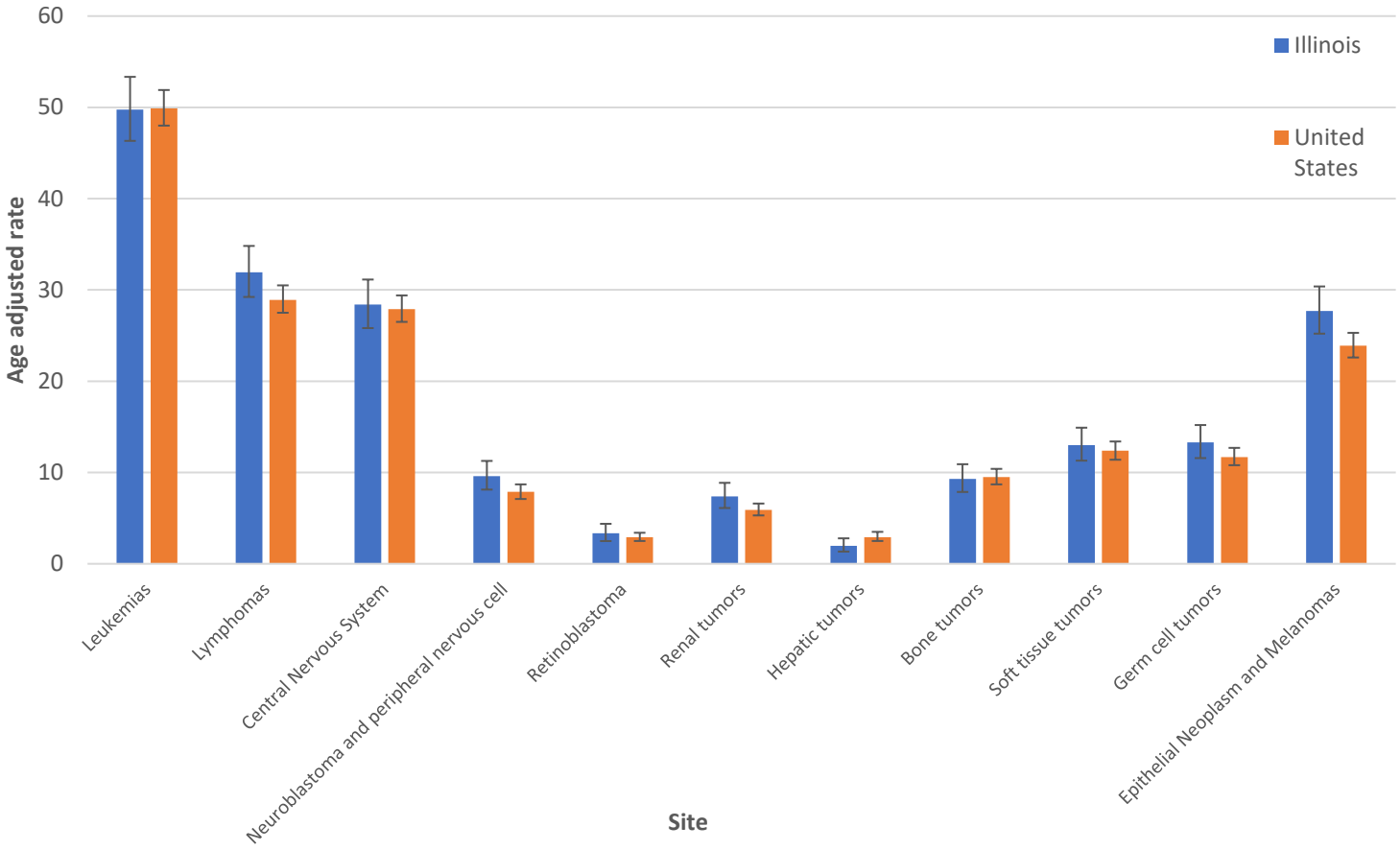
Incidence data source: Illinois State Cancer Registry, as of November 2022
Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
* Statistic not displayed due to fewer than 10 cases.
Rates are per 1,000,000 and age-adjusted to the 2000 U.S. Standard Population.

Figure 1: Pediatric cancer incidence and mortality, Illinois and United States, 1991-2020



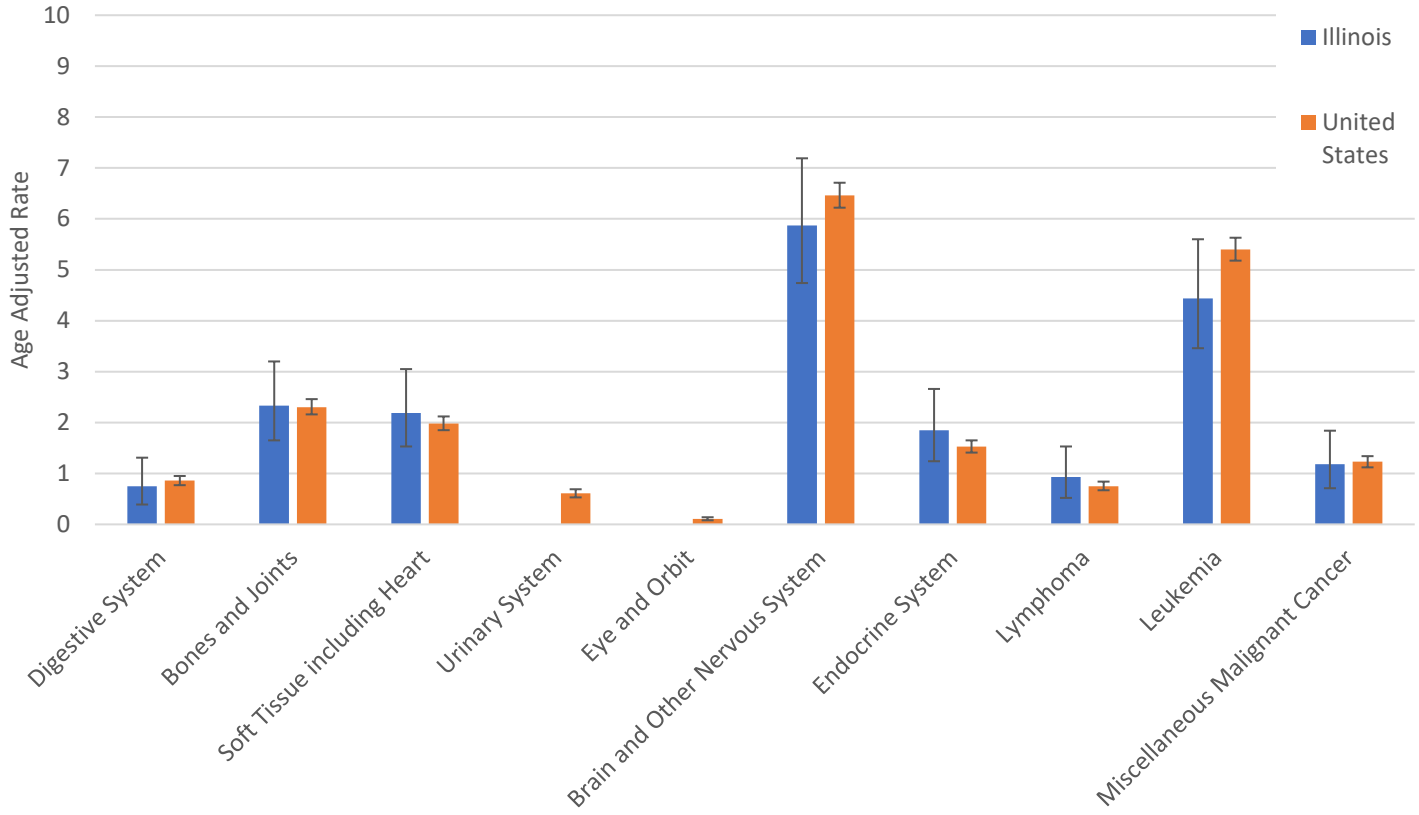
Rates are age adjusted to the 2000 U.S. standard population and shown per 1,000,000.
Data Sources: Incidence - Illinois State Cancer Registry, data as of 11/22, National Childhood Cancer. Registry Explorer (1999-2019). Mortality - National Center for Health Statistics, released June 2022.

Figure 2: Pediatric cancer incidence by site, Illinois and United States, 2016-2020



Note: Rates are age adjusted to the 2000 U.S. standard population and shown per 1,000,000. Error bars represent 95% confidence intervals based on the Tiwari method.
Data Sources: Illinois State Cancer Registry, data as of 11/22, SEER 12 registries, 11/22 submission.

Figure 3: Pediatric cancer mortality by site, Illinois and United States, 2016-2020



Rates are age adjusted to the 2000 US standard population and shown per 1,000,000. Error bars represent 95% confidence intervals based on the Tiwari method.
* Rates not shown due to fewer than 10 deaths
Data Sources: National Center for Health Statistics, released June 2022

Table 3: Illinois Pediatric Cancer Incidence and Mortality Trends Average Annual Percent Change (AAPC) by Select Demographics, 1991-2019

	Years	Incidence AAPC	Mortality AAPC
Illinois	1991-2019	1.2*	-1.6*
Males	1991-2019	1.2*	-2.3*
Females	1991-2019	1.2*	-1.6*
0-14	1991-2019	1.1*	-2.7*
15-19	1991-2019	1.6*	-1.9*
Non-Hispanic White	1991-2019	1.3*	-1.7*
Non-Hispanic Black	1991-2019	0.7*	-1.6*
Non-Hispanic Asian/Pacific Islander	1991-2019	2.2*	^
Non-Hispanic American Indian/Alaskan Native		**	^
Hispanic	1991-2019	1.2*	^

Source: Illinois State Cancer Registry, as of 11/22.

** significantly different from 0 at the p<0.05 level*

*** years with 0 cases precluded creation of annual rate(s) and AAPC*

^ less than 10 cases in individual years precluded creation of annual rate(s) and AAPC

Average Annual Percent Change (AAPC) estimates were created using Joinpoint software v4.9.

Table 4: Illinois Pediatric Cancer Incidence Trends Average Annual Percent Change by Major Tumor Site, 1991-2019

			Trend 1		Trend 2		Trend 3	
	Years	AAPC	Years	APC	Years	APC	Years	APC
Leukemias	1991-2019	1.2*						
Lymphomas	1991-2019	1.8	91-97	5.5*	97-01	-6.5	01-19	2.5*
Central nervous system	1991-2019	0.5						
Neuroblastoma and peripheral nervous cell	1991-2019	0.2						
Retinoblastoma	1991-2019	0.5						
Renal tumors	1991-2019	0.3						
Hepatic tumors	1991-2019	1.8*						
Bone tumors	1991-2019	0.2						
Soft tissue tumors	1991-2019	1.1*						
Germ cell tumors	1991-2019	1.2*						
Epithelial neoplasm and melanomas	1991-2019	3.8*						

Source: Illinois State Cancer Registry, as of 11/22.

** significantly different from 0 at the p<0.05 level*

Average Annual Percent Change (AAPC) and Average Percent Change (APC) estimates were created using Joinpoint software v4.9.

Table 5: United States Pediatric Cancer Incidence Annual Percent Change Trends by Select Demographics, 1999-2019

	Incidence	
	Years	**APC**
United States	1999-2016	1.1*
	2016-2019	-1.8
Males	1999-2016	1.0*
	2016-2019	-2.1
Females	1999-2001	4.2
	2001-2006	0.3
	2006-2015	1.5*
	2015-2019	-1.1
0-14		**
15-19	1999-2019	1.0*
Non-Hispanic White	1999-2005	1.1*
	2015-2019	-2.3
Non-Hispanic Black	1999-2004	2.8*
	2004-2016	0.8*
	2016-2019	-2.3
Non-Hispanic Asian/Pacific Islander	1999-2019	1.0
Hispanic	1999-2019	0.9*

Source: National Childhood Cancer Registry Explorer, https://nccrexplorer.ccdi.cancer.gov/

Annual Percent Change (APC) estimates were created using Joinpoint software v4.9.

** significantly different from 0 at the p<0.05 level*

^ less than 10 cases in individual years precluded creation of annual rate(s) and APC

*** annual percent change was not available for this specific age group*

Table 6: United States Pediatric Cancer Mortality Annual Percent Change Trends by Select Demographics, 1991-2019

	Mortality	
	Years	**APC**
United States	1991-1996	-3.1*
	1996-2019	-1.4*
Males	1991-1996	-3.6*
	1996-2019	-1.4*
Females	1991-2019	-1.4*
0-14	1991-1996	-3.1*
	1996-2019	-1.5*
15-19	1991-2010	-1.9*
	2010-2019	-0.5
Non-Hispanic White	1991-2019	-1.5*
Non-Hispanic Black	1991-2019	-1.4*
Non-Hispanic Asian/Pacific Islander	1991-2019	-1.6*
Hispanic	1991-2019	-1.4*

Source: National Center for Health Statistics, released June 2022.

Annual Percent Change (APC) estimates were created using Joinpoint software v4.9.

** significantly different from 0 at the p<0.05 level*

Table 7: United State and Illinois Pediatric Cancer Mortality Trends Annual Percent Change by Cause of Death, 1991-2019

		Annual Percent Change	
	Years	**Illinois**	**United States**
All Cancers	1991-2019	-1.6*	-1.5*
Digestive System	1991-2019	^	-1.3*
Bones and Joints	1991-2019	^	-0.1
Soft Tissue including Heart	1991-2019	^	-0.2
Urinary System	1991-2019	^	-1.7*
Eye and Orbit	1991-2019	^	^
Brain and Other Nervous System	1991-2019	-0.9	-2.0*
Endocrine System	1991-2019	^	-2.0*
Lymphoma	1991-2019	^	-4.6*
Leukemia	1991-2019	-2.9*	-2.8*
Miscellaneous Malignant Cancer	1991-2019	^	0.3

Source: National Center for Health Statistics, released June 2022.

** significantly different from 0 at the p<0.05 level*

Annual Percent Change (APC) and Average Percent Change estimates were created using Joinpoint software v4.9.

APPENDIX

Site/Histology Recode Based on International Classification of Childhood Cancer, Third Edition (ICCC-3) Based on ICD-O-3 / WHO 2008*^

Main Classification Table

Site Group	ICD-O-3 Site	ICD-O-3 Histology (Type)	ICD-O-3 Behavior	Extended Classification	Main Classification
I Leukemias, Myeloproliferative Diseases, and Myelodysplastic Diseases					
(a) Lymphoid Leukemias					
(a.1) Precursor Cell Leukemias	C000-C809	9835-9836	3	001	011
	C420-C421, C424	9811-9818, 9837			
(a.2) Mature B-cell Leukemias	C000-C809	9826, 9832-9833, 9940	3	002	011
	C420-C421, C424	9823			
(a.3) Mature T-cell and NK Cell Leukemias	C000-C809	9831, 9834, 9948	3	003	011
	C420-C421, C424	9827			
(a.4) Lymphoid Leukemia, NOS	C000-C809	9820	3	004	011
(b) Acute Myeloid Leukemias	C000-C809	9840, 9861, 9865-9867, 9869-9874, 9891, 9895-9898, 9910-9911, 9920, 9931	3	005	012
(c) Chronic Myeloproliferative Diseases	C000-C809	9863, 9875-9876, 9950, 9960-9964	3	006	013
(d) Myelodysplastic Syndrome and Other Myeloproliferative Diseases	C000-C809	9945-9946, 9975, 9980, 9982-9987, 9989, 9991-9992	3	007	014
(e) Unspecified and Other Specified Leukemias	C000-C809	9800-9801, 9805-9809, 9860, 9930, 9965-9967, 9971	3	008	015
II Lymphomas and Reticuloendothelial Neoplasms					
(a) Hodgkin Lymphomas	C000-C809	9650-9655, 9659, 9661-9665, 9667	3	009	021
(b) Non-Hodgkin Lymphomas (except Burkitt Lymphoma)					
(b.1) Precursor Cell Lymphomas	C000-C809	9727-9729	3	010	022
	C000-C419, C422-C423, C425-C809	9811-9818, 9837			
(b.2) Mature B-cell Lymphomas (except Burkitt Lymphoma)	C000-C809	9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9688-9691, 9695, 9698-9699, 9712, 9731-9735,	3	011	022

		9737-9738, 9761-9762, 9764-9766, 9769, 9970			
	C000-C419, C422-C423, C425-C809	9823			
(b.3) Mature T-cell and NK-Cell Lymphomas	C000-C809	9700-9702, 9705, 9708-9709, 9714, 9716-9719, 9724-9726, 9767-9768	3	012	022
	C000-C419, C422-C423, C425-C809	9827			
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(b.4) Non-Hodgkin Lymphomas, NOS	C000-C809	9591, 9760	3	013	022
(c) Burkitt Lymphoma	C000-C809	9687	3	014	023
(d) Miscellaneous Lymphoreticular Neoplasms	C000-C809	9740-9742, 9750-9759	3	015	024
(e) Unspecified Lymphomas	C000-C809	9590, 9596	3	016	025
III CNS and Miscellaneous Intracranial and Intraspinal Neoplasms					
(a) Ependymomas and Choroid Plexus Tumor					
(a.1) Ependymomas	C000-C809	9383, 9391-9394	0,1,3	017	031
(a.2) Choroid Plexus Tumor	C000-C809	9390	0,1,3	018	031
(b) Astrocytomas	C723	9380	0,1,3	019	032
	C000-C809	9384, 9400-9411, 9420-9424, 9440-9442	0,1,3	019	032
(c) Intracranial and Intraspinal Embryonal Tumors					
(c.1) Medulloblastomas	C000-C809	9470-9472, 9474, 9480	0,1,3	020	033
(c.2) PNET	C000-C809	9473	0,1,3	021	033
(c.3) Medulloepithelioma	C700-C729	9501-9504	0,1,3	022	033
(c.4) Atypical Teratoid/Rhabdoid Tumor	C000-C809	9508	0,1,3	023	033
(d) Other Gliomas					
(d.1) Oligodendrogliomas	C000-C809	9450, 9451, 9460	0,1,3	024	034
(d.2) Mixed and Unspecified Gliomas	C700-C722, C724-C729, C751, C753	9380	0,1,3	025	034
	C000-C809	9382	0,1,3	025	034
(d.3) Neuroepithelial Glial Tumors of Uncertain Origin	C000-C809	9381, 9430, 9444	0,1,3	026	034

(e) Other Specified Intracranial and Intraspinal Neoplasms					
(e.1) Pituitary Adenomas and Carcinomas	C000-C809	8270-8281, 8300	0,1,3	027	035
(e.2) Tumors of the Sellar Region (Craniopharyngiomas)	C000-C809	9350-9352, 9582	0,1,3	028	035
(e.3) Pineal Parenchymal Tumors	C000-C809	9360-9362	0,1,3	029	035
(e.4) Neuronal and Mixed Neuronal-glial Tumors	C000-C809	9412-9413, 9492, 9493, 9505-9507	0,1,3	030	035
(e.5) Meningiomas	C000-C809	9530-9539	0,1,3	031	035
(f) Unspecified Intracranial and Intraspinal Neoplasms	C700-C729, C751-C753	8000-8005	0,1,3	032	036
IV Neuroblastoma and Other Peripheral Nervous Cell Tumors					
(a) Neuroblastoma and Ganglioneuroblastoma	C000-C809	9490, 9500	3	033	041
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(b) Other peripheral Nervous Cell Tumors	C000-C809	8680-8683, 8690-8693, 8700, 9520-9523	3	034	042
	C000-C699, C739-C768, C809	9501-9504	3	034	042
V Retinoblastoma	**C000-C809**	**9510-9514**	**3**	**035**	**050**
VI Renal tumors					
(a) Nephroblastoma and Other Nonepithelial Renal Tumors					
(a.1) Nephroblastoma	C000-C809	8959, 8960	3	036	061
(a.2) Rhabdoid Renal Tumor	C649	8963	3	037	061
(a.3) Kidney Sarcomas	C000-C809	8964-8967	3	038	061
(a.4) pPNET of Kidney	C649	9364	3	039	061
(b) Renal Carcinomas	C649	8010-8041, 8050-8075, 8082, 8120-8122, 8130-8141, 8143, 8155, 8190-8201, 8210-8211, 8221-8231, 8240-8241, 8244-8246, 8260-8263, 8290, 8310, 8320, 8323, 8401, 8430, 8440, 8480-8490, 8504, 8510, 8550, 8560-8576	3	040	062
	C000-C809	8311-8312, 8316-8319, 8361	3	040	062

(c) Unspecified Malignant Renal Tumors	C649	8000-8005	3	041	063
VII Hepatic Tumors					
(a) Hepatoblastoma	C000-C809	8970	3	042	071
(b) Hepatic Carcinomas	C220, C221	8010-8041, 8050-8075, 8082, 8120-8122, 8140-8141, 8143, 8155, 8190-8201, 8210-8211, 8230, 8231, 8240-8241, 8244-8246, 8260-8264, 8310, 8320, 8323, 8401, 8430, 8440, 8480-8490, 8504, 8510, 8550, 8560-8576	3	043	072
	C000-C809	8160-8180	3	043	072
(c) Unspecified Malignant Hepatic Tumors	C220-C221	8000-8005	3	044	073
VIII Malignant Bone Tumors					
(a) Osteosarcomas	C400-C419, C760-C768, C809	9180-9187, 9191-9195, 9200	3	045	081
(b) Chondrosarcomas	C400-C419, C760-C768, C809	9210, 9220, 9240	3	046	082
	C000-C809	9221, 9230, 9241-9243	3	046	082
(c) Ewing Tumor and Related Sarcomas of Bone					
(c.1) Ewing Tumor and Askin Tumor of Bone	C400-C419, C760-C768, C809	9260	3	047	083
	C400-C419	9365	3	047	083
(c.2) pPNET of Bone	C400-C419	9363-9364	3	048	083
(d) Other Specified Malignant Bone Tumors					
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(d.1) Malignant Fibrous Neoplasms of Bone	C400-C419	8810-8811, 8823, 8830	3	049	084
	C000-C809	8812, 9262	3	049	084
(d.2) Malignant Chordomas	C000-C809	9370-9372	3	050	084
(d.3) Odontogenic Malignant Tumors	C000-C809	9270-9275, 9280-9282, 9290, 9300-9302, 9310-9312, 9320-9322, 9330, 9340-9342	3	051	084
(d.4) Miscellaneous Malignant Bone Tumors	C000-C809	9250, 9261	3	052	084
(e) Unspecified Malignant Bone Tumors	C400-C419	8000-8005, 8800-8801, 8803-8805	3	053	085
IX Soft Tissue and Other Extraosseous Sarcomas					

(a) Rhabdomyosarcomas	C000-C809	8900-8905, 8910, 8912, 8920, 8991	3	054	091
(b) Fibrosarcomas, Peripheral Nerve Sheath Tumors, and Other Fibrous Neoplasms					
(b.1) Fibroblastic and Myofibroblastic Tumors	C000-C399, C440-C768, C809	8810-8811, 8813-8815, 8821, 8823, 8834-8835	3	055	092
	C000-C809	8820, 8822, 8824-8827, 9150, 9160	3	055	092
(b.2) Nerve Sheath Tumors	C000-C809	9540-9571	3	056	092
(b.3) Other Fibromatous Neoplasms	C000-C809	9491, 9580	3	057	092
(c) Kaposi Sarcoma	C000-C809	9140	3	058	093
(d) Other Specified Soft Tissue Sarcomas					
(d.1) Ewing Tumor and Askin Tumor of Soft Tissue	C000-C399, C470-C759	9260	3	059	094
	C000-C399, C470-C639, C659-C768, C809	9365	3	059	094
(d.2) pPNET of Soft Tissue	C000-C399, C470-C639, C659-C699, C739-C768, C809	9364	3	060	094
(d.3) Extrarenal Rhabdoid Tumor	C000-C639, C659-C699, C739-C768, C809	8963	3	061	094
(d.4) Liposarcomas	C000-C809	8850-8858, 8860-8862, 8870, 8880-8881	3	062	094
(d.5) Fibrohistiocytic Tumors	C000-C399, C440-C768, C809	8830	3	063	094
	C000-C809	8831-8833, 8836, 9251-9252	3	063	094
(d.6) Leiomyosarcomas	C000-C809	8890-8898	3	064	094
(d.7) Synovial Sarcomas	C000-C809	9040-9044	3	065	094
(d.8) Blood Vessel Tumors	C000-C809	9120-9125, 9130-9133, 9135-9136, 9141-9142, 9161, 9170-9175	3	066	094
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(d.9) Osseous and Chondromatous Neoplasms of Soft Tissue	C490-C499	9180, 9210, 9220, 9240	3	067	094
	C000-C809	9231	3	067	094
(d.10) Alveolar Soft Parts Sarcoma	C000-C809	9581	3	068	094

(d.11) Miscellaneous Soft Tissue Sarcomas	C000-C809	8587, 8710-8713, 8806, 8840-8842, 8921, 8982, 8990, 9373	3	069	094
(e) Unspecified Soft Tissue Sarcomas	C000-C399, C440-C768, C809	8800-8805	3	070	095
X Germ Cell Tumors, Trophoblastic Tumors, and Neoplasms of Gonads					
(a) Intracranial and Intraspinal Germ Cell Tumors					
(a.1) Intracranial and Intraspinal Germinomas	C700-C729, C751-C753	9060-9065	0,1,3	071	101
(a.2) Intracranial and Intraspinal Teratomas	C700-C729, C751-C753	9080-9084	0,1,3	072	101
(a.3) Intracranial and Intraspinal Embryonal Carcinomas	C700-C729, C751-C753	9070, 9072	0,1,3	073	101
(a.4) Intracranial and Intraspinal Yolk Sac Tumor	C700-C729, C751-C753	9071	0,1,3	074	101
(a.5) Intracranial and Intraspinal Choriocarcinoma	C700-C729, C751-C753	9100	0,1,3	075	101
(a.6) Intracranial and Intraspinal Tumors of Mixed Forms	C700-C729, C751-C753	9085, 9101	0,1,3	076	101
(b) Malignant Extracranial and Extragonadal Germ Cell Tumors					
(b.1) Malignant Germinomas of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9060-9065	3	077	102
(b.2) Malignant Teratomas of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9080-9084	3	078	102
(b.3) Embryonal Carcinomas of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9070, 9072	3	079	102
(b.4) Yolk Sac Tumor of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9071	3	080	102

(b.5) Choriocarcinomas of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9100, 9103, 9104	3	081	102
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(b.6) Other and Unspecified Malignant Mixed Germ Cell Tumors of Extracranial and Extragonadal Sites	C000-C559, C570-C619, C630-C699, C739-C750, C754-C768, C809	9085, 9101-9102, 9105	3	082	102
(c) Malignant Gonadal Germ Cell Tumors					
(c.1) Malignant Gonadal Germinomas	C569, C620-C629	9060-9065	3	083	103
(c.2) Malignant Gonadal Teratomas	C569, C620-C629	9080-9084, 9090-9091	3	084	103
(c.3) Gonadal Embryonal Carcinomas	C569, C620-C629	9070, 9072	3	085	103
(c.4) Gonadal Yolk Sac Tumor	C569, C620-C629	9071	3	086	103
(c.5) Gonadal Choriocarcinoma	C569, C620-C629	9100	3	087	103
(c.6) Malignant Gonadal Tumors of Mixed Forms	C569, C620-C629	9085, 9101	3	088	103
(c.7) Malignant Gonadal Gonadoblastoma	C569, C620-C629	9073	3	089	103
(d) Gonadal Carcinomas	C569, C620-C629	8010-8041, 8050-8075, 8082, 8120-8122, 8130-8141, 8143, 8190-8201, 8210-8211, 8221-8241, 8244-8246, 8260-8263, 8290, 8310, 8313, 8320, 8323, 8380-8384, 8430, 8440, 8480-8490, 8504, 8510, 8550, 8560-8573, 9000, 9014, 9015	3	090	104
	C000-C809	8441-8444, 8450-8451, 8460-8473	3	090	104
(e) Other and Unspecified Malignant Gonadal Tumors	C000-C809	8590-8671	3	091	105
	C569, C620-C629	8000-8005	3	091	105
XI Other Malignant Epithelial Neoplasms and Malignant Melanomas					
(a) Adrenocortical Carcinomas	C000-C809	8370-8375	3	092	111

(b) Thyroid Carcinomas	C739	8010-8041, 8050-8075, 8082, 8120-8122, 8130-8141, 8190, 8200-8201, 8211, 8230, 8231, 8244-8246, 8260-8263, 8290, 8310, 8320, 8323, 8430, 8440, 8480-8481, 8510, 8560-8573	3	093	112
	C000-C809	8330-8337, 8340-8347, 8350	3	093	112
(c) Nasopharyngeal Carcinomas	C110-C119	8010-8041, 8050-8075, 8082-8083, 8120-8122, 8130-8141, 8190, 8200-8201, 8211, 8230-8231, 8244-8246, 8260-8263, 8290, 8310, 8320, 8323, 8430, 8440, 8480-8481, 8500-8576	3	094	113
(d) Malignant Melanomas	C000-C809	8720-8780, 8790	3	095	114
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(e) Skin Carcinomas	C440-C449	8010-8041, 8050-8075, 8078, 8082, 8090-8110, 8140, 8143, 8147, 8190, 8200, 8240, 8246-8247, 8260, 8310, 8320, 8323, 8390-8420, 8430, 8480, 8542, 8560, 8570-8573, 8940, 8941	3	096	115
(f) Other and Unspecified Carcinomas					
(f.1) Carcinomas of Salivary Glands	C079-C089	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	097	116
(f.2) Carcinomas of Colon and Rectum	C180, C182-C189, C199, C209, C210-C218	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	098	116

(f.3) Carcinomas of Appendix	C181	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	099	116
(f.4) Carcinomas of Lung	C340-C349	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	100	116
(f.5) Carcinomas of Thymus	C379	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	101	116
(f.6) Carcinomas of Breast	C500-C509	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	102	116
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(f.7) Carcinomas of Cervix Uteri	C530-C539	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	103	116
(f.8) Carcinomas of Bladder	C670-C679	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-	3	104	116

		8941, 8983, 9000, 9010-9016, 9020, 9030			
(f.9) Carcinomas of Eye	C690-C699	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	105	116
(f.10) Carcinomas of Other Specified Sites	C000-069, C090-C109, C129-C179, C239-C339, C380-C399, C480-C488, C510-C529, C540-C549, C559, C570-C619, C630-C639, C659-C669, C680-C689, C700-C729, C750-C759	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	106	116
(f.11) Carcinomas of Unspecified Site	C760-C768, C809	8010-8084, 8120-8157, 8190-8264, 8290, 8310, 8313-8315, 8320-8325, 8360, 8380-8384, 8430-8440, 8452-8454, 8480-8586, 8588-8589, 8940-8941, 8983, 9000, 9010-9016, 9020, 9030	3	107	116
XII Other and Unspecified Malignant Neoplasms					
(a) Other Specified Malignant Tumors					
(a.1) Gastrointestinal Stromal Tumor	C000-C809	8936	3	108	121
(a.2) Pancreatoblastoma	C000-C809	8971	3	109	121
(a.3) Pulmonary Blastoma and Pleuropulmonary Blastoma	C000-C809	8972, 8973	3	110	121
(a.4) Other Complex Mixed and Stromal Neoplasms	C000-C809	8930-8935, 8950-8951, 8974-8981	3	111	121
(a.5) Mesothelioma	C000-C809	9050-9055	3	112	121

(a.6) Other Specified Malignant Tumors	C000-C809	9110	3	113	121
	C000-C399, C470-C759	9363	3	113	121
Site Group	**ICD-O-3 Site**	**ICD-O-3 Histology (Type)**	**ICD-O-3 Behavior**	**Extended Classification**	**Main Classification**
(b) Other Unspecified Malignant Tumors	C000-C218, C239-C399, C420-C559, C570-C619, C630-C639, C659-C699, C739-C750, C754-809	8000-8005	3	114	122

* This table was updated for Hematopoietic codes based on *WHO Classification of Tumors of Hematopoietic and Lymphoid Tissues (2008)*.

^ Subject to change based on evolving ICD-O-3 coding rules.