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2001

# 2000 Cancer Care Annual Report

Children's Mercy Hospital

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Children's Mercy Hospitals and Clinics

# 2000 Cancer Care Annual Report

Focus on Osteosarcoma

# Message from the Director of Oncology

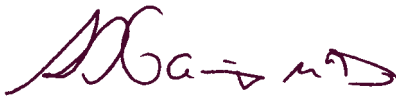
## Dear Colleagues,

Childhood cancer is diagnosed in 12,400 children annually and 2,500 die from cancer each year (SEER data as of 1998). A child born today has a 1 in 300 risk of developing cancer during his or her first 20 years of life. It is the fourth most common cause of death in children, trailing unintentional injuries, homicide and suicide. This year's issue of the Children's Mercy Hospital Cancer Center Annual Report highlights osteosarcoma, a cancer that accounts for about 56% of the bone tumors in children. Bone tumors comprise the fourth most common solid tumor of childhood. Through the efforts of a well-coordinated multidisciplinary team approach we have seen significant improvements in survival. SEER data from 1975-1984 and 1985-1994 show five year survival rates of 42% and 58%, respectively. A comprehensive cancer center is essential to the coordination of the various services involved in the treatment/evaluation of a child being treated for cancer. These services include, but are not limited to, orthopedic surgery, pathology, cytogenetics, radiology, and oncology. As you will see in this year's report we are fortunate to have such a comprehensive center at Children's Mercy Hospitals and Clinics. Children's Mercy is a major institution in the Children's Oncology Group (C.O.G.), the national NIH-funded cooperative clinical trials group for children with cancer. C.O.G. has several trials investigating treatment options to further improve the cure rate and quality of life for children as survivors of osteosarcoma. Children with osteosarcoma at Children's Mercy have access to a comprehensive team of experts from across the country, the latest national trials, and the most current information regarding best treatment options.

Osteosarcoma is a disease primarily of adolescents/young adults, with peak years of risk between 11 and 19 years of age, nearly half occurring between 15 and 19 years of age. This affords me the opportunity to focus on a long-standing problem and one that is even more critical after a recent report was published. A small percentage of adolescents are referred to pediatric cancer centers (A recent analysis demonstrated that >94% of children are treated at a specialized NIH cooperative group site that is associated with a pediatric cancer center. However, only 21% of adolescents between age 15 and 19 are seen at such centers.). Childhood cancer cure rates have dramatically improved over the past several decades, in large part because of the multi-disciplinary, pediatric-focused cancer centers, nearly all associated with the NIH sponsored cooperative trials groups. Adolescents have been the group to receive the least benefit. From 1973 to 1992, death from cancer had the smallest decline in the 15 to 19 year old age group among all children with cancer - 33% compared to 47% for children age 0-9 years. This, in conjunction with the fact that children <21 years of age have demonstrated an increase in the incidence of cancer, nearly 31% in the age group of 15-19 years of age. This is compared to an 8% increase in children of a younger age that further identifies this as a critical problem. Close to our topic is Ewing's sarcoma, the other major bone tumor in children, with outcomes that demonstrate a higher cure rate when treated with pediatric cooperative group trials as compared to those who were not. Clearly, the word must be spread that the adolescent with cancer has the best chance for cure when treated at a pediatric cancer center. This year's focus on osteosarcoma highlights the improved cure rates associated with osteosarcoma and, additionally, the positive impact that a comprehensive pediatric cancer center has on improved survival.

A final note for this year's report would be the development of the Children's Mercy Cancer Center website. It was established this past summer; when fully functional, it will serve our patients/families and our referring physicians/care providers in the community. The focus of this website, but not limited to, is cancer prevention, cancer treatment options, supportive care, as well as resources available to support our community at-large in the treatment of pediatric cancer.

## Sincerely,



**Alan S. Gamis, MD, MPH**
Chairperson - CMH Cancer Care Committee
Director of Oncology, Children's Mercy Hospital

# Message from the President/CEO

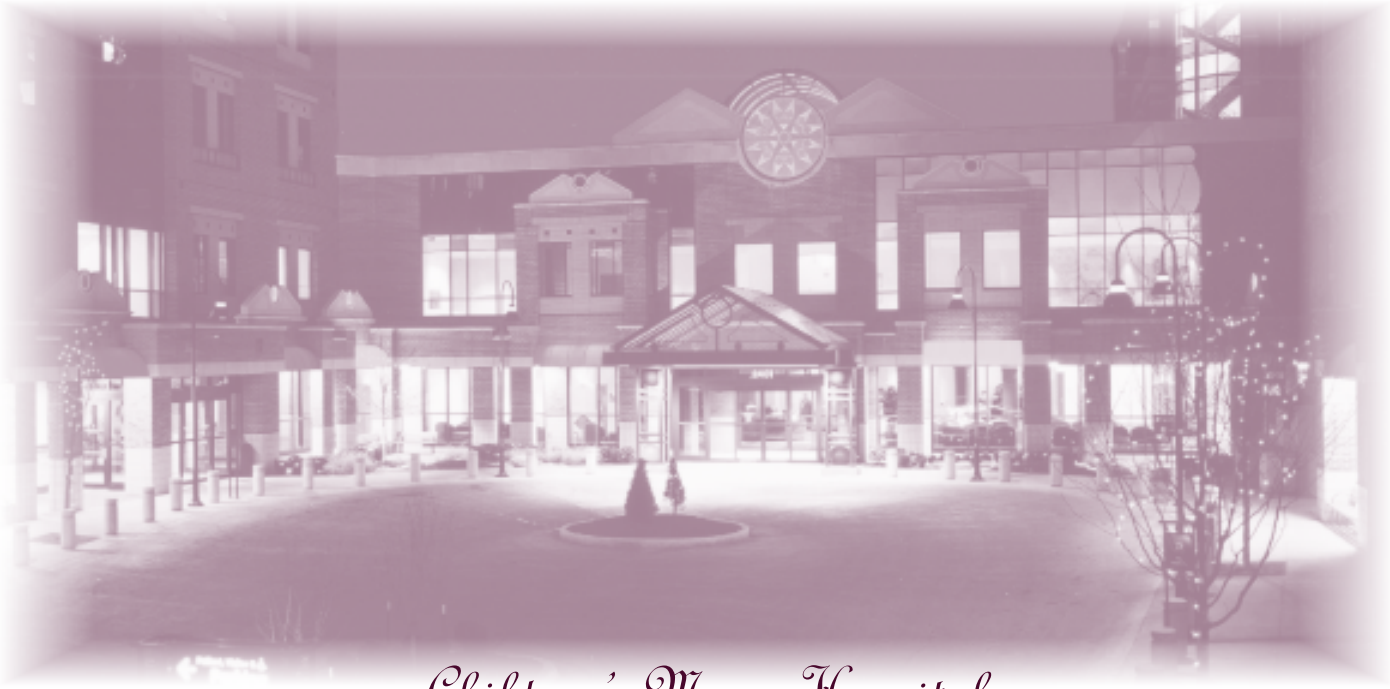
## Dear Colleagues,

Children's Mercy Hospitals and Clinics is proud to be accredited by the American College of Surgeons and to be a nationally recognized cancer center. It has been amazing to see the improvements in treatment regimens, as well as improved outcomes over the years and knowing that Children's Mercy has taken part in this success. We take great pride in honoring the family throughout a course of treatment. The diagnosis of cancer truly impacts the entire family. Thus, a holistic approach is our goal in striving to maintain the healthy dynamics of each family as they progress through this unfamiliar journey.

This report presents information regarding the activity specific to Children's Mercy and, more globally, our relationship to national survival rates. It is our goal to continue to keep you informed of our progress in fighting childhood cancer. The 2000 Annual Report focuses on a bone disease, osteosarcoma, that although seen less frequently than other childhood cancers, poses unique challenges. The unusual aspect of this tumor is that it affects adolescents primarily. This is a population of patients with specific needs very different from children of younger ages. How courageous these adolescents are and what an honor it is to support them. I am pleased to share with you this year's Cancer Care Annual Report.

## Sincerely,

**Randall L. O'Donnell, PhD**
President / Chief Executive Officer



Children's Mercy Hospital

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# Cancer Registry

# Cancer Registry Data

## Objectives

- To collect and maintain data on all patients diagnosed and treated with malignancy and selected benign and borderline tumors at Children's Mercy Hospitals and Clinics.
  - Abstract data which includes information on cancer type and location, stage or extent of disease at diagnosis, treatment received, recurrence, and follow-up information.
- Provide data to physicians, Missouri Cancer Registry, and the National Cancer Data Base for improving the prognosis for cancer patients.
- Participate and organize the approval process for accreditation from the American College of Surgeons Commission on Cancer (ACOS). Accreditation was granted in July 1999.

## Class of Case and Follow-Up (ACOS-COC Classification) - Fig. 2

- During the abstracting process a class of case is assigned according to the criteria set forth by the ACOS.
  - Case 0 includes patients diagnosed at CMH but received all of their first course of treatment elsewhere. In 2000 there were 0 cases reported.
  - Case 1 includes patients diagnosed at CMH and received all of their first course of treatment at CMH. In 2000 there were 77 class 1 cases reported.
  - Case 2 includes patients diagnosed elsewhere and received all or part of their first course of treatment at CMH. In 2000 there were 14 class 2 cases recorded.
  - Case 3 includes patients diagnosed elsewhere who receive their first course of treatment at another site/center. In 2000 1 class 3 case was recorded.
  - Case 0-2 are followed annually to determine survival and disease status.
- Follow-up rate
  - 84 percent of all CMH cancer registry patients had their disease status updated by the end of 2000.

## Benign and Borderline Tumors

- These tumors are included in the registry by agreement of the Cancer Care Committee.
- Determination for inclusion is the location of the tumor (e.g. central nervous system) or its propensity to recur and/or progress to malignancy.
  - Five Benign and Borderline Tumors were reported for 2000 (Fig. 2).

## Reference Date

- The Commission on Cancer (COC) of the American College of Surgeons requires a start date for data collection to begin. This date is controlled by the facility, but approved by the COC. Therefore, the Children's Mercy Hospital Cancer Care Committee commissioned a change in the reference date to ensure data quality.
  - January 1, 1978 was the original reference date at Children's Mercy Hospital.
  - January 1, 1990 is currently the reference date for Children's Mercy Hospital effective April 17, 2001.

## 2000 Registry Statistics: (January 1, 1990 Reference Date)

- 893 patients are abstracted in the cancer registry since 1990.
- 97 patients were added to the registry in the year 2000.
- Frequency of Diagnosis for 2000: (see Fig.1)
  - Five most frequently occurring diagnoses for 2000
    - Leukemia
    - Brain Tumors
    - Lymphomas
    - Wilm's Tumors
    - Osteosarcoma

# Cancer Registry Data

## Children's Mercy Hospital Cancer Registry 2000 Frequency of Diagnosis - Figure 1

| | | | |
|---|---|---|---|
| **Leukemia** | | **24** | **(25%)** |
| ALL | 19 | | |
| AML | 5 | | |
| **Central Nervous System** | | **22** | **(23%)** |
| Astrocytoma | 6 | | |
| Medulloblastoma | 1 | | |
| Anaplastic Benign/Borderline | 9 | | |
| Glioma | 1 | | |
| Ependymoma | 1 | | |
| Germinoma | 1 | | |
| Neuroectodermal Tumor | 3 | | |
| **Lymphoma** | | **16** | **(17%)** |
| Non-Hodgkin's | 9 | | |
| Hodgkin's | 7 | | |
| **Wilm's Tumor** | | **7** | **(7%)** |
| **Osteosarcoma** | | **6** | **(6%)** |
| **Neuroblastoma** | | **4** | **(4%)** |
| **Rhabdomyosarcoma** | | **4** | **(4%)** |
| **Other** | | **14** | **(14%)** |
| Retinoblastoma | 3 | | |
| Carcinoma NOS | 2 | | |
| Desmoplastic Small Round Cell | 1 | | |
| Ewing's Sarcoma | 2 | | |
| Hepatoblastoma | 1 | | |
| Melanoma | 1 | | |
| Clear Cell | 1 | | |
| Germ Cell | 1 | | |
| Nerve Sheath Tumor | 1 | | |
| Rhabdoid | 1 | | |
| **Total Number of Cases for Year** | | **97** | |

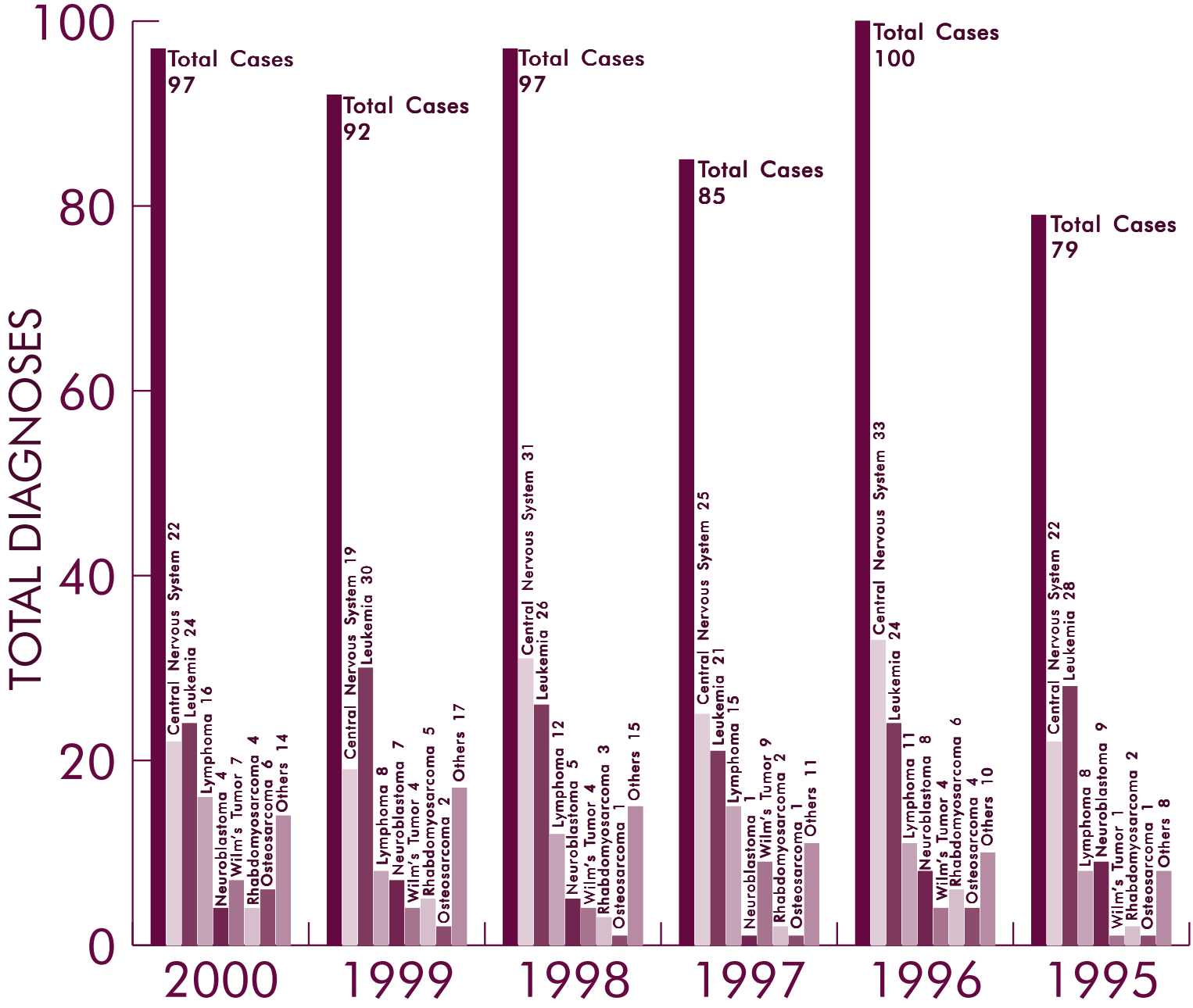
## Class of Case (ACOS-COC Classification) Figure 2

| | | |
|---|---|---|
| Class 0<br>Diagnosed at CMH - received all of first course of treatment elsewhere. | 0 | (0%) |
| Class 1<br>Diagnosed at CMH - received all of first course of treatment at CMH. | 77 | (79%) |
| Class 2<br>Diagnosed elsewhere - received all or part of first course of treatment at CMH. | 14 | (14%) |
| Class 3<br>Diagnosed elsewhere - received all of first course of treatment elsewhere. | 1 | (1%) |
| Benign<br>Included in the Registry due to location (tumor of central nervous system), or because of its propensity to recur. | 5 | (5%) |

## Class of Case (ACOS-COC Classification) Mortality Data - Figure 3

| | | |
|---|---|---|
| Central Nervous System | | 12 |
| Astrocytoma | 2 | |
| Medulloblastoma | 3 | |
| Glioma | 2 | |
| PNET | 4 | |
| Pineoblastoma | 1 | |
| Acute Lymphoblastic Leukemia | | 4 |
| Acute Myeloid Leukemia | | 1 |
| Lymphoma | | 4 |
| Non-Hodgkin's | 3 | |
| Hodgkin's | 1 | |
| Neuroblastoma | | 3 |
| Osteosarcoma | | 1 |
| Rhabdomyosarcoma | | 3 |
| Total Number of Mortalities in 2000 | | 28 |

# A Six-Year Comparison of Most Frequently Occurring Diagnoses at Children's Mercy Hospital



# Osteosarcoma

# Osteosarcoma

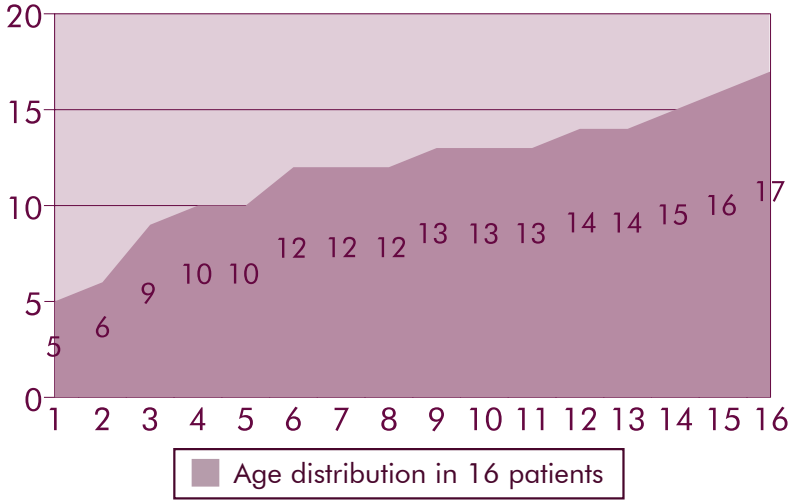
Osteosarcoma is the most common primary malignant bone tumor in adolescence and young adults. The annual occurrence rate in the United States is approximately 5.6 cases per million white children younger than 15 years. The rate is slightly lower among African-American children.

The disease usually occurs in the most rapidly growing segment of the bones (metaphyseal portions) and peaks during puberty, suggesting a relationship between the development of this malignant tumor in rapidly growing bones. Osteosarcoma can occur in any bone, but more than 60% of cases involve the knee area (femur and tibia). Ionizing radiation is the only environmental agent known to cause osteosarcoma.

Patients typically present with bone pain, with or without a soft tissue swelling. The average duration of symptoms is about 3 to 4 months. Imaging studies show a destructive or sclerotic lesion, usually associated with a soft tissue mass and peri-osteal elevation. Almost 20% of patients present with visible lung metastasis, but historical data indicate that the majority of patients have microscopic lung deposits at the time of diagnosis. The diagnosis is established by a biopsy, which shows sarcomatous stroma and osteoid formation. Aggressive resection of pulmonary nodule(s) is a requirement in patients who present with overt metastasis.

It is essential that an orthopedic surgeon, experienced in the management of malignant bone tumors perform the initial biopsy and coordinate the timing and choice of definitive surgery in collaboration with the oncology team. Surgical options include: limb sparing/salvage procedure, arthodesis (fusion of the joint), and rotationplasty (this involves an excision of the femur with preservation of the lower leg, then the lower leg is turned 180 degrees. The foot, which is now facing backward, becomes the knee). Rotationplasty improves functional ability, as this is similar to a below-the-knee amputation and the patient can be fitted with a prosthesis. Dr. Dale Jarka at Children's Mercy Hospital and Dr. Howard Rosenthal at the Mid-America Sarcoma Institute work closely with the oncology team at Children's Mercy Hospitals and Clinics to provide a comprehensive approach to the care of our children and adolescents diagnosed with osteosarcoma (see graph I).

**CMH Patient Demographics — 1991-2001 (16 Patients) - Graph I**

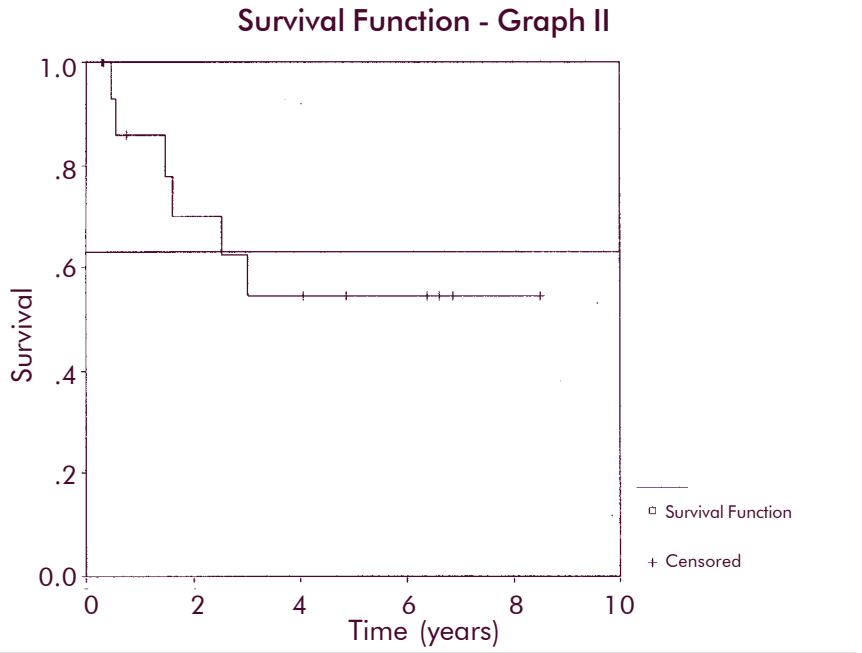



| | |
|---|---|
| Age Range: | 5 to 17 |
| Mean: | 11.9 |
| Median: | 13 |
| Male: | 7 |
| Female: | 9 |
| SEER: M:F | 1.15:1 |
| CMH: | 0.7:1 |
| Limb Salvage: | 12 |
| Amputation: | 3 |
| Missing: | 1 |

Staging is determined as follows:

- Low grade: Stage I
- High grade: Stage II
- Intra-medullary: A
- Extra-medullary: B (majority of patients fall in the category of IIB)
- Distant metastasis: Stage III

Today, 60 to 70% of patients achieve long-term survival. Patients with good prognostic factors (lack of clinically detectable metastasis at diagnosis and tumor kill of more than 98% in response to initial chemotherapy) have a five-year disease-free survival rate of 75-85%. Patients with poor prognostic features (overt metastasis and inferior response to initial chemotherapy) have less than 30% chance of cure. This underscores the obvious advantage of early detection/diagnosis. The outcome is also poor for patients who develop recurrent disease while on therapy or who




Necrosis more than 95% following the initial chemotherapy correlates with survival:
CMH:
>95%: 3 pts
<95%: 5
Not reported: 8
Data pairs are too small to perform log rank analysis

Overall three year disease free survival:
National: 63%
CMH: 54%
CMH survival data was skewed due to a small dataset and the number of patients censored (10). The result however is still within the limits of sampling error.

relapse soon after completion of treatment (see graph II).

Clinical trials in the 1980s established a role for chemotherapy in the management of this disease that traditionally included surgical amputation only. Most centers employ a "sandwich" therapy approach by giving chemotherapy prior to and after the definitive surgery. Few small trials have tried to use an intra-arterial route to deliver the maximum drug dose possible to the primary tumor. Other investigators prefer an up-front surgical resection prior to chemotherapy. Analysis of the results show no significant difference in the outcome of these two patient populations. As a part of the Children's Oncology Group (C.O.G.) we follow approved protocols which utilizes the "neo-adjuvant" method of therapy. This therapy is to administer a 10-12 week of chemotherapy before surgery, aiming to prevent or eradicate any possible metastases, improve the patient's chance for a successful limb sparing operation, and assess the tumor's response to chemotherapy.

## Pathology

The pathologist receives biopsies from patients suspected of having a bone tumor. It is necessary to confirm and identify the tumor through the use of conventional histologic techniques. There are a number of benign and malignant bone tumors that occur in children that must be distinguished from osteosarcoma. Correlation of the histology with the location and radiographic appearance is essential to the conclusion of a confirmed diagnosis when biopsies are small and sampling is limited. Osteosarcomas have a variety of appearances under the microscope that range from relatively well differentiated malignant bone tumors that almost completely recapitulates the appearance of normal bone to tumors that are very poorly differentiated and have almost no resemblance to bone. In between this range are most osteosarcomas, typically comprised of a mixture of malignant cartilage, osteoid and fibrous tissues. Osteosarcomas have a range of aggressive or poor prognostic features such as the rare low grade indolent tumor that arises on the surface of the bone and are well differentiated to the common aggressive tumor that arises within the metaphyseal region of the long bones in the extremities. Vascular invasion by tumor cells is conspicuous and associated with blood-borne metastasis to the lungs, that has already occurred at the time of diagnosis in about 20% of the cases. Osteosarcoma can also rapidly spread through the medullary space, as well as, the external cortex of the bone to infiltrate and destroy the surrounding soft tissue. The pathologist's assessment of the regional extent of spread and therapeutic response of the tumor to chemotherapy through careful analysis of amputation and more limited limb-sparing resection biopsies is important information used to determine appropriate "post-resection" treatment. Appropriate portions of the tumor may also be submitted to research laboratories for special studies.

## Cytogenetics

Osteosarcoma (OS), a primary bone tumor derived from primitive bone-forming mesenchyme, arises from a stem cell capable of differentiating toward a fibrous tissue, cartilage, or bone, and shares many features with chondrosarcomas and firbrosarcomas.

A genetic predisposition to OS is suggested in families with several members who have developed OS. The strongest pediatric predisposition to OS is found in patients with hereditary retinoblastoma (RB). The risk of developing a secondary tumor for patients with hereditary RB is estimated to be 8-90% at 30 years. The majority of second malignancies are sarcomas, and almost 50% are osteosarcomas.

Amanda
7 years old. Osteosarcoma.
Completed therapy in 2001.

In hereditary RB, OS occurs 2000 times more frequently in the skull after radiotherapy and 500 times more frequently in the extremities than in the general population. RB is a childhood tumor that arises as a result of recessive genetic mutations at a gene on chromosome 13 at band q14 (13q14). The gene is names RB1 because of its role in the pathogenesis of retinoblastoma. It is a tumor suppressor gene (TSG) and as such, both copies of the gene must be lost or mutated for a tumor to manifest. The RB1 gene is also implicated in the generation of osteosarcoma even in patients with no history of retinoblastoma.

TP53 is another TSG implicated in the pathogenesis of OS. Germline mutations of the p53 gene are responsible for the hereditary Li Fraumeni syndrome (LFS). Individuals with LFS are predisposed to multiple tumore types, including OS. Three to four percent of children with OS have gerline mutations of p53. Cytogenetic analysis of the tumor cells from osteosarcoma typically shows a very complex picture with structural abnormalities of many chromosomes. While there is no recurring diagnostic chromosome abnormality in OS, about 30% of tumors show loss of chromosome 13, deletion of chromosome 13 band q14, or re-arrangement of band 13q14. Loss of chromosome 17 or re-arrangement if the short arm of chromosome 17 (location of the p53 tumor suppressor gene) is found in 25% of osteosarcoma. Amplification of oncogenes MDM2 or c-myc is seen approximately 20% of OS. If present, gene amplification is associated with a more aggressive disease process with higher risk.

## Radiology

The diagnosis of osteosarcoma is typically made on the basis of an X-ray examination. CT and MRI scans are often done following the diagnosis to determine the extent of the tumor and identify any potential sites for metastises. A CT scan of the chest is necessary to determine whether or not the tumor has spread to the lungs. A nuclear medicine bone scan helps determine whether or not there are additional tumors in the skeleton. Patients with osteosarcoma will visit the radiology department frequently during the course of the treatment and following to determine their response to the treatment regimen and to identify any other complications.

# Hematology/ Oncology Section Support Services

## The Section of Hematology/ Oncology

The Section of Hematology/Oncology at Children's Mercy Hospitals and Clinics has four distinct services that support the care of children with malignant or hematologic disorders. The Regional Hemophilia Center supports seven sites in a five state region to provide comprehensive treatment for both adult and pediatric patients with bleeding disorders, as well as coagulation/thrombosis disorders. The Sickle Cell Disease Service offers specialized care to this unique population of patients in an effort to effectively treat acute and chronic pain, as well as long term sequelae related to sickle cell disease. The Bone Marrow Transplant Service provides hematopoeitic stell cell rescue to patients receiving ablative therapy and requiring marrow rescue. This is done utilizing umbilical stem cells, matched-related donor cells, and matched-unrelated donor cells. This service participates in a national marrow search program and have cells available to them from all across the world. The Oncology Service is dedicated to the treatment of malignant disorders. Each service has a designated director of service and the section has a section chief and a section manager who oversee the medical, nursing, research, and operations. The section is comprised of approximately 145 faculty/staff.

*Jerad*
*18 years old. Osteosarcoma. Continuing therapy in 2001.*

## Oncology Services/Sites

The Oncology Service consists primarily of an outpatient clinic and an inpatient unit. In addition, care is provided in collaboration with home care providers. The Hematology/Oncology clinic served approximately 7900 patients in 2000 with visits ranging from routine laboratory studies to complex treatments. The inpatient unit, 4 Henson, had a modal census of 20.5 per day in 2000 with a total bed capacity of 25. These beds are allocated with 20 dedicated to hematology/oncology patients and five dedicated primarily to bone marrow transplant. The unique feature of this unit is the entire unit is equipped with an advanced hepa-filtration air handling system. In addition, there is a small infusion area designed to provide treatments after hours and weekends. In addition to the physicians the staff include physician's assistants, advanced practice nurses, nurse clinicians, specially trained staff nurses, clinical pharmacists, nursing assistants, Access Representatives, social workers, child life therapists, music therapist, a registered dietician and nutrition technician, chaplain, and a child psychologist. This comprises a unique multidisciplinary team dedicated solely to hematology/ oncology.

The outpatient clinic is located in the outpatient building at Children's Mercy Hospital on the second floor and the inpatient unit is located on the fourth floor of the newly named Henson Tower. The Oncology Service provides a partnership patient care management model which includes one attending, one case manager (advanced practice nurse/nurse clinician) and one social worker who oversee a clearly defined group of patients. The Bone Marrow Transplant Service utilizes the support of physician's assistants. The model utilized by the oncology services has demonstrated an effective approach to providing a continuum of care for patients and their families who encounter numerous health care providers during the course of their treatment. As a teaching hospital residents are actively involved in the care of the oncology patients, as well. In addition, there is a discharge coordinator whose role is to streamline a more efficient discharge for the patient being discharged from the inpatient area. Parent satisfaction surveys convey a high correlation between satisfaction and a care model that supports a clearly defined care team.

All staff nurses in both the inpatient and outpatient areas are PALS certified, have advanced central line management training, intense preparation/training in the handling/administration of chemotherapy. Caregivers undergo a competency validation for the support of conscious sedation to support the need to

perform invasive procedures in accordance with The American Academy of Pediatrics. The oncology service performs between 50-60 procedures each month. There are times when general (deep) sedation is required to achieve optimal outcomes and these procedures require the support of an anesthesiologist and must be done in the controlled setting of the CMH Procedure Room. Sedation must be customized to each patient in order to effectively address the patient's anxiety and discomfort. Staff participate in research through the collection of laboratory specimens, the collection of data, and the provision of treatment that coincides with a well-defined protocol/study. Research/data management is a major focus of the oncology service which requires the support of research coordinators and data collection/management experts. Our goal is to ensure all regulatory standards are followed and the most current, up-to-date treatment options are offered to our patients.

In an effort to continually address the needs of our patients and their families we conduct satisfactions studies. In 2000 a time study was conducted in the outpatient clinic that conveyed a less than 10 minute interval from the time of registration to the placement of a patient in an exam room. Numerous studies were conducted to evaluate patient/family education which resulted in new programs to address the educational needs of the newly diagnosed oncology patient. These include a "Parent Handbook," a "Know To Go" questionnaire to identify whether a patient/family could safely care for their child upon discharge to home, and a "Family Education Hour" was developed which provides a classroom setting for patients/families to learn together.

A satellite pharmacy was implemented in 2000 to improve administration/delivery times for medication, as well as, promote safe medication delivery; i.e. decentralization and a central location for the preparation of chemotherapy. Our ultimate mission continues to be to provide each patient and family with a plan of care that meets their individual needs in a holistic atmosphere.

Our ultimate mission continues to be to provide each patient and family with a plan of care that meets their individual needs in a holistic atmosphere.

## Pediatric Hematology/Oncology Fellowship Program

The fellowship program at Children's Mercy Hospital trains the future pediatric hematology/oncology specialists to conduct patient care and research. Pediatric hematology/oncology fellows at Children's Mercy are fully trained pediatricians who dedicate a minimum of three years of training in hematology/oncology medicine and research. The first year is dedicated primarily to clinical care and becoming familiar with procedures. The subsequent two years are dedicated heavily to clinical and laboratory research. Karen Lewing, MD, our first fellow from 1996-1999, began research with the enzyme, "thiopurine methyltransferase" and has continued working with the Children's Cancer Group on research projects. Dr. Lewing is now an attending with the Hematology/Oncology Section. Children's Mercy Hospital currently has funding for three fellowship positions.

## The Children's Mercy Hospital Cancer Care Committee

The Children's Mercy Hospital Cancer Care Committee is a standing medical staff committee that is charged with overseeing the Oncology services within the hospital. It is chaired by the Director of Oncology and has both physician and non-physician members (see member listing). Numerous associated specialties that also participate in the care of oncology patients are represented on the committee. It meets quarterly and reviews the patient acuity, programmatic efforts and

needs, and quality assurance efforts that are related to Oncology services.

## The Children's Mercy Tumor Board

The Children's Mercy Tumor Boards represent discussions about newly diagnosed, recurrent, and unusual oncology patients. All patients diagnosed at Children's Mercy Hospital are discussed in this conference. The conference consists of a review of the patient's history, physical findings at diagnosis, laboratory values, radiological exams, surgical interventions, and pathology findings. This is followed by a review of the patients therapeutic options, current therapy, response to therapy, and anticipated prognosis. This is attended by physicians including specialists from oncology, surgery, radiology, pathology, orthopedic surgery, otolaryngology, neurosurgery, ophthalmology, neurology, neuro-psychology, rehabilitation medicine, endocrinology, and radiation therapy. Additionally, nurse specialists, floor and clinic nurses, nutritionists, pharmacists, child life, chaplaincy, social workers, and other members of the patient's multidisciplinary team are in attendance. This provides a forum for general review, education, and invited input and enhances the multidisciplinary team approach for children with cancer utilized at Children's Mercy Hospital. These tumor boards are conducted in compliance with the American College of Surgeon's accreditation requirements.

*Jaime*
*13 years old. Osteosarcoma.*
*Completed therapy in 2001.*

## Psychologist

A psychologist works intimately with the Oncology Service and is a member of the CMH Section of Developmental and Behavioral Sciences. There are a variety of services offered to these patients and their families which include support to the patient, parents, and siblings. The psychologist can assist the child and family in learning how to cope with the medical diagnosis, hospitalization, and with ongoing treatment and medical procedures. In addition, the psychologist can provide information to parents on age-appropriate ways to talk to the patient and/or siblings about the diagnosis and treatment. In 2000, our regimen for promoting better oral intake of medications was developed and implemented utilizing the expertise of the psychologist. Taking "PO" medications can be a stressor for parents.

## Parent-To-Parent Program

A program designed to connect parents who have been through the cancer experience with parents of newly diagnosed children. The support one parent can give another is immeasurable. The program focuses on the initial phase of the cancer experience; however, many of these parents develop strong, long-lasting relationships as they journey through the cancer experience together. These volunteer parents provide a mission statement "To offer comfort and compassion to all oncology families, from the comfort and compassion that we ourselves received." This program has a social worker who devotes 20 hours each week to designing supportive activities, as well as fun events to allow some distraction from these everyday challenges. These include: "Pumpkin Patch Run," "Movie Night Out," "Bowling Night Out." In addition, there is an annual

picnic in the summer and a holiday party at Christmas time to all patients/families. Many parents volunteer with these events, as well.

## Social Work and Community Services

There are four full-time and two part-time social workers dedicated to the Hematology/Oncology Section. The primary focus of this team is to assist the patient and family in understanding the impact the diagnosis of cancer will have on their family dynamics and life style. Social workers are skilled in counseling patients, parents, and siblings with issues of grief, anger, and overall well-being. They have a fundamental knowledge of pediatric hematology/oncology which provides them with the framework to support the family in comprehending the diagnosis and treatment plans, and, as important, the non-medical ramifications associated with the treatment of childhood cancer. The social workers, as well as, other health care team members assist the families in recognizing their role as partners in the care of their child and in recognizing the community support available to them. The utilization of this community support is crucial to the success of any treatment plan.

## Child Life Therapist/Music Therapist

One of the greatest challenges of working with children is the ability to reach them at their developmental and cognitive level. The impact of play and music has been demonstrated to have a positive effect in the treatment of childhood cancer. The Section of Hematology/Oncology is provided two full-time child life therapists and 10 hours each week of a music therapist. This talented group work with patients, parents, and siblings to aid in the adjustment and ongoing support associated with the diagnosis and treatment of childhood cancer and hematological disorders. Each of these therapists are master's prepared and assist family members and health care team members on effective strategies/interventions that allow patients to make choices and allow them a sense of self-expression. Medical play utilizing art, story telling, and music are important elements in effectively educating and preparing the pediatric patient for invasive and traumatic procedures utilizing age-appropriate measures. Sibling support is an important part of the day to day activities of these therapists, as well. The sibling can be instrumental in assisting the pediatric patient through the coping process. Both Child Life and Music therapists are available in the outpatient and inpatient areas and they are capable of continuing an intervention beyond the hospital admission.

The impact of play and music has been demonstrated to have a positive effect in the treatment of childhood cancer.

## Chaplaincy

One full time chaplain is assigned to the hematology/oncology section to support the spiritual needs of the patients and their families and there is a chaplain available 24 hours a day to all patients. The diagnosis of osteosarcoma can present significant religious/spiritual questions for the patient and family which can lead to a crisis of faith as families try to sort out the questions and emotions that accompany a diagnosis of cancer. Personal faith and the faith of the community can be a tremendous source of hope and strength during this challenging time. In addition to supporting the patient and family, the chaplain is an integral part of the support system for the staff who, too, can struggle with spiritual/religious and ethical issues. Children's Mercy Hospital strives to support all religious affiliations.

# Support Services

## Psychology

Children's Mercy Hospitals and Clinics believes that the physical and emotional aspects of a child's care are tightly connected, particularly when diagnosed with childhood cancer. A full-time psychologist supports the hematology/oncology section in providing support to the patient, parents, and siblings. This support ranges from strategies for coping with a new diagnosis to interventions to improve medication palatability/intake, which is extremely challenging in the pediatric patient population. This psychologist is a member of the hematology/oncology team and the Section of Developmental and Behavioral Sciences at CMH. The Children's Mercy Cancer Center provides funding to support this position. The majority of psychological services are provided on an outpatient basis. The developmental and behavioral sciences section supports the mentoring/education of psychology students, as well. Outpatient appointments are available by calling (816) 234-3674.

*In Memory of Lindsey.*
*Lindsey (left) was 15 years old.*
*She passed away October 7, 2001*

## Nutrition Services

Nutrition and patient outcomes related to pediatric oncology have been linked closely over the years. Nutrition is an important component to aid in the prevention and correction of nutritional deficiencies, thus improving the overall well-being of the child undergoing the treatment of cancer. There is one full-time and one part-time registered dietician and a nutrition technician who support the Section of Hematology/Oncology. This includes nutritional assessments, interventions, as well as participation in nutrition focused research/data collection. The nutrition service provides support in all service areas to include inpatient, outpatient, and home care.

## CMH Connection

This is a unique program designed to support the physicians and staff who care for the patients and families diagnosed with childhood cancer and blood disorders. This program is offered three times each year which includes eight one-hour sessions. The focus of these sessions is promoting the well-being of the staff that provide care to children and families with chronic, life-threatening diseases, as well as, coping with death and dying. The overall goal of this program is to take care of the caregivers who take care of the patients and families.

## Pharmacy

The decentralization of pharmacy to the patient care area demonstrates a strong multidisciplinary approach to patient care. The Section of Hematology/Oncology is supported by two clinical pharmacists, one satellite pharmacist, and one pharmacy technician. Each of these staff is trained in the safe and proper handling of chemotherapy in accordance with current safety regulations. A satellite pharmacy was developed in 2000 to support the unique needs of the hematology/oncology patient population and to integrate pharmacy more closely into the team. This integration is closely linked to improved medication delivery/administration outcomes. This satellite is located on 4 Henson Tower and supports both the inpatient and outpatient service sites.

# Children's Mercy Research

| CMH IRB No. 7-2-01 | Study | |
|---|---|---|

## CHILDREN'S ONCOLOGY GROUP STUDIES

### Acute Lymphoblastic Leukemia

| | | |
|---|---|---|
| P96 10-64 | 1961 | Treatment of Patients with ALL with Unfavorable Features |
| P00 07-55 | 1991 | Escalating Dose of Intravenous Methotrexate Without Leucovorin Rescue vs Oral Methotrexate and Single vs Double Delayed Intensification for Children with Standard Risk ALL |

### Acute Mylogenous Leukemia

| | | |
|---|---|---|
| P96 10-65 | 2961 | A Phase III Study in Children with Untreated AML or MDS |
| P99 08-96 | A2971 | Treatment of Children with Down Syndrome and Acute Myeloid Leukemia, Myelodysplastic Syndrome and Transient Myeloproliferative Disorder |
| P00 07-69 | C9710 | Phase III Randomized Study of Concurrent ATRA and Chemotherapy with or without Arsenic Trioxide for Patients with Untreated Promyelocytic Leukemia |

### Biopathology

| | | |
|---|---|---|
| P96 12-85 | B942 | Detection of Minimal Residual Disease in Children Receiving Therapy for AML or MDS |
| P95 03-22 | B944 | Biology Studies in Childhood Hodgkin's and Non-Hodgkin's Lymphoma |
| P98 11-88 | B945 | The Genetic Epidemiology of 11q23 Leukemia in the Young |
| P94 10-63 | B947 | Protocol for Collection of Biology Specimens for Research Studies |
| P98 05-36 | B951 | Pharmacological Studies of L-Asparaginase in Pediatric Patients with ALL or Lymphomas |
| P99 01-07 | B957 | Genetic Etiology of Acute Leukemia in Down Syndrome |
| P98 11-90 | B961 | Prognostic Significance of Ki-67 Proliferative Index Utilizing the MIB-1 Antibody in Low Grade Gliomas in Young Children |
| P98 11-90 | B971 | Molecular Cytogenetic Determination of Prognostic Parameters in Childhood Primitive Neuroectodermal Tumor |
| P98 05-37 | B9710 | Gene Therapy for Ph+ ALL |
| P98 11-89 | B972 | Immune Status and Activation in Children Participating in CCG 2961, A Phase II Trial in Children with Untreated AML or Myelodysplastic Syndrome |
| | B974 | Prevalence and Clinical Implication of Chromosome Band 1p36 Deletion and the Role of Imprinting in Neuroblastoma |
| P99 05-75E | B975 | Molecular Markers of Malignant Gliomas of Childhood |
| P99 03-37 | B9804 | Clinical and Biological Predictors of Therapy Related Leukemia |
| P99 04-47 | D9902 | A Group Wide Protocol for Collecting and Banking Pediatric Center Research Specimens |
| P99 10-116 | P9851 | Biology Studies in Osteosarcoma |

### Brain Tumors

| | | |
|---|---|---|
| P98 11-84 | CCG 99701 | An Intergroup Pilot Study of Concurrent Carboplatin, Vincristine and Radiotherapy |

| | | |
|---|---|---|
| | | Followed by Adjuvant Chemotherapy in Children with Newly Diagnosed, High Risk Central Nervous System Embryonal Tumors |
| P98 11-85 | CCG 99703 | A Pilot Study of Intensive Chemotherapy with Peripheral Stem Cell Support for Infants with Malignant Brain Tumors |
| P97 06-31 | A9952 | Chemotherapy for Progressive, Low Grade Astrocytoma in Children Less than Ten Years Old |

**Experimental Therapeutics – New Agents**

| | | |
|---|---|---|
| P94 02-06 | 0923 | A Trial of Carboxypeptidase-G2 for the Management of Patients with Intrathecal Methotrexate Overdose |
| P99 12-120 | 0954 | A Phase I Study of Gemcitabine in Children with Refractory Solid Tumors |
| P97 06-30 | 0962 | A Phase II Study of Docetaxel in Children with Recurrent Solid Tumors |
| P99 03-35 | 09709 | A Phase I Study of Fenretinide in Children with High Risk Solid Tumors |
| P99 06-80 | 09713 | A Phase II Study of Continuous 21 Day Infusion of Topotecan in Children with Relapsed Solid Tumors |
| P99 02-26 | 09714 | A Phase II Study of Oral Topotecan in Relapsed Acute Childhood Leukemia |
| P99 06-81 | 09716 | A Phase II Trial of the Combination of Carboplatin and RMP-7 in Childhood Brain Tumors |
| P99 04-46 | 09717 | A Phase I Study of TPO Plus G-CSF Following I.C.E. in Children with Recurrent or Refractory Solid Tumors |
| P00 05-42 | A0003 | A Phase I Trial and Pharmacokinetic Study of Arsenic Trioxide in Pediatric Patients with Refractory Leukemia or Lymphoma |
| P98 11-83 | A09705 | A Phase II Evaluation of Intravenous Navelbine in Recurrent or Refractory Pediatric Malignancies |
| P00 10-88 | ADVL0011 | A Phase I Study of Temozolomide and CCNU in Pediatric Patients with Newly Diagnosed Incompletely Resected Non-Brainstem High-Grade Gliomas |
| P99 12-121 | P9423 | A Phase I Cooperative Agreement trial of Mitroxantrone, Etoposide and PSC-833 In Patients with Relapsed and Refractory Acute Leukemia |
| P97 11-77 | P9673 | A Phase II Study of Compound 506 in Patients with Refractory T-Cell Malignancies |
| P99 12-138 | P9761 | A Phase II Trial of Irinotecan in Children with Refractory Solid Tumors |
| P00 08-73 | P9962 | A Phase II Study of Topotecan in Patients with Refractory Meningeal Malignancies |
| P00 09-83 | P9963 | A Phase II Trial of Rebeccamycin Analogue in Children with Solid Tumors |
| P00 02-15 | P9970 | A Trial of Irinotcan and Cisplatin in Children with Refractory Solid Tumors |
| P00 09-84 | P9971 | A Trial of Irinotecan Plus Vincristine in Children with Solid Tumors |
| 01 03-24 | P9972 | A Phase I Study of ET-743 in Pediatric Refractory Solid Tumors |
| P00 04-34 | P9973 | A Phase I Study of STI571 Ph+ Leukemia |

**Epidemiology**

| | | |
|---|---|---|
| P99 08-87 | A0026 | A Case Control Study of Risk Factors for Wilms' Tumor |
| P98 05-38 | AE23 | Epidemiology of Down Syndrome-Leukemia and Down Syndrome |

| | | |
|---|---|---|
| P99 08-86 | AE24 | Epidemiology of Infant Leukemia |
| P99 05-67 | AE25 | Pesticide Exposure and Markers of VDJ Recombination in Children with Lymphoma |
| P90 10-39 | E13 | Case Control Study of Hodgkin's Disease in Children |
| P96 12-87 | E22 | Epidemiology of Malignant Germ Cell Tumors in Children |

**Ewing Sarcoma**

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|---|---|---|
| 01 03-25 | AEWS0031 | Trial of Chemotherapy Intensification Through Interval Compression in Ewing Sarcoma and Related Tumors |

**Germ Cell Tumors**

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|---|---|---|
| P00 07-68 | P9749 | Pilot Intergroup Study of High-Dose Cisplatin, Etoposide and Bleomycin Combined With Amifostine in Children with High-Risk Malignant Germ Cell Tumors |

**Hepatic Tumors**

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|---|---|---|
| P99 05-66 | P9645 | Phase III Intergroup Protocol for the Treatment of Children with Hepatoblastoma |

**Late Effects**

| | | |
|---|---|---|
| P96 11-72 | CCG 4941L | National Wilms' Tumor Late Effects Study |
| P99 08-88 | CCG L9714 | Quality of Life Following Successful Therapy of AML: A Comparison of Marrow Transplant and Chemotherapy |

**Hodgkin/Non-Hodgkin Lymphoma**

| | | |
|---|---|---|
| P98 11-87 | A5962 | A Pilot Study of Peripheral Blood Stem Cell Transplantation following CBV Preparative Therapy in Children with Relapsed or Primarily Refractory HD & NHL |

**Relapsed Leukemia**

| | | |
|---|---|---|
| P98 03-16 | CCG 2951 | AML Salvage Therapy for Patients in First Relapse or Who Fail to Achieve Initial Remission or Who Develop AML as a Second Malignant Neoplasm |

**Neuroblastoma**

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|---|---|---|
| P00 04-36 | A0935A | A Phase I Study of ch14.18 with GM-CSF and IL-2 in Children with NBL and Other GD2 Positive Malignancies Immediately Post ABMT or PBSC Rescue |
| P98 05-34 | A3961 | Treatment for Infants and Children with Intermediate Risk Neuroblastoma |
| P00 09-85 | ANBL00B1 | Neuroblastoma Biology Studies |
| P96 12-84 | P9462 | Randomized Treatment of Recurrent Neuroblastoma with Topotecan Regimens |
| P98 05-35 | P9641 | Primary Surgical Therapy for Biologically Low-Risk Neuroblastoma |

**Non-Hodgkin Lymphoma**

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|---|---|---|
| P00 07-70 | A5971 | A Randomized Phase II Study for the Treatment of Newly Diagnosed Disseminated |

Lymphoblastic Lymphoma or Localized Lymphoblastic Lymphoma

**Osteosarcoma**

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|---|---|---|
| P99 10-115 | P9754 | Protocol for Patients with Newly Diagnosed, Non-Metastatic Osteosarcoma |

**Diagnostic/Imaging**

| | | |
|---|---|---|
| P98 03-17 | CCG R9701 | Use of Thallium Scintigraphy in Assessing Therapeutic Response to Pediatric Ostoegenic Sarcoma to Chemotherapy |

**Wilms'/Kidney Tumors**

| | | |
|---|---|---|
| P95 10-76 | 4941 | National Wilms' Tumor Study V – Therapeutic Trial and Biology Study |
| P99 03-38 | 4942 | National Wilms' Tumor Study 5 – Treatment of Relapsed Patients |

**Soft Tissue Sarcoma/Rhabdomyosarcoma**

| | | |
|---|---|---|
| P99 10-112 | D9602 | Actinomycin D and VCR with or without CPM and RT for Newly Diagnosed Patients with Low Risk Embryonal/Botryoid Rhabdomyosarcoma |
| P99 10-114 | D9802 | A Phase II Study of CPT-11 Followed by Multimodal, Multiagent Therapy for Patients with Newly Diagnosed Stage 4/Group IV Rhabdomyosarcoma |
| P99 12-136 | D9803 | Randomized Study of VCR, Actinomycin-D and CPM vs VAC Alternating with VCR, Topotecan, and CPM for Patients with Intermediate Risk Rhabdomyosarcoma |

**Second Malignancies**

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|---|---|---|
| P99 05-53 | AS9801 | A Study of Second Malignant Neoplasms Following Childhood Cancer |

**Supportive Care**

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|---|---|---|
| P99 05-52 | AS973 | Randomized Comparison Between Antibiotics Alone and Antibiotics Plus G-CSF in Pediatric Patients with Chemotherapy Induced Febrile Neutropenia |

**SPONSOR STUDIES – ONCOLOGY**

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|---|---|
| P00 03-26 | Dose-Ranging Trial Utilizing a Recombinant Urokinase in the Treatment of Occluded Central Venous Catheters Primarily in Oncology Subjects |
| P00 10-97 | Cord Blood Transplantation Study (COBLT): Unrelated Donor Umbilical Cord Blood as an Alternate Source of Stem Cells for Transplantation |
| P96 04-33 | Compassionate Release for Erwinia L-Asparaginase |
| P99 09-99 | A Study to Assess the Safety, Dose Conversion and Titration of DuragesicÒ (fentanyl transdermal system) in Pediatric Patients with Chronic Pain Requiring Opioid Therapy |
| P99 12-119 | An Open Label, Non-Comparative Study of FK463 for the Treatment of Invasive Aspergillosis |
| P00 07-58 | A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Effect of Weekly |

| | |
|---|---|
| | ProcritÒ on Anemia and Quality of Life in Children with Malignant Solid Tumors or Hodgkin's Disease Undergoing Myelosuppressive Chemotherapy |
| P00 07-57 | A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Effect of Weekly ProcritÒ on Anemia and Quality of Life in Children with Acute Lymphocytic Leukemia or Non-Hodgkin's Lymphoma Undergoing Myelosuppressive Chemotherapy |
| P99 02-20 | Compassionate Use of SR29142 for Prevention or Treatment of Hyperuricemia |
| P99 02-23 | An Open Label, Non-Comparative Protocol for the Emergency Use of Voriconazole in patients with Life Threatening Invasive Mucoses who are Failing on Currently Available Antifungal Agents |

**BONE MARROW TRANSPLANT STUDIES**

| | |
|---|---|
| P97 10-71 | Dual Cycle High-Dose Chemotherapy with Peripheral Blood Stem Cell Rescue for Patients with Recurrent and Progressive Brain Tumors |
| P96 09-58 | Treatment of Lysosomal and Peroxisomal Inborn Errors of Metabolism by Bone Marrow Transplant |
| P99 10-106E | Biology of Chronic Graft versus Host Disease |
| P96 05-44 | High-Dose Thiotepa, VP-16 and Cyclophosphamide with Stem Cell Rescue for Pediatric Patients with High-Risk, Malignant Solid Tumors |
| P95 07-48 | Use of Umbilical Cord Blood as a Source of Progenitor Cells for Myeloablative Therapy Rescue |
| P99 | Preemptive Use of Aerosolized Ribavirin in the Treatment of Asymptomatic Marrow Transplantation Patients Testing Positive for RSV |
| P00 06-49 | Ex Vivo T-Cell Depletion for GvHD Prophylaxis in Related Haplo-Identical Allogeneic Stem Cell Transplant Recipients |
| P99 12-125 | Cytokine Mobilized Allogeneic Peripheral Stem Cell Transplantation in Children |
| P00 10-97 | Cord Blood Transplantation Study (COBLT): Unrelated Donor Umbilical Cord Blood as an Alternative Source of Stem Cells for Transplantation |

**STUDIES AWAITING CMH INSTITUTIONAL REVIEW BOARD APPROVAL** (as of 7-01)

Quality of Life Among Childhood Leukemia Patients

| | | |
|---|---|---|
| COG | A3973 | A Randomized Study of Purged vs Unpurged Peripheral Blood Stem Cell transplant Following Dose Intensive Induction Therapy for High Risk Neuroblastoma |
| COG | ADVL0017 | A Phase I Study of Flavopiridol in Patients with Relapsed or Refractory Solid Tumors or Lymphomas |
| COG | ADVL0022 | A Phase II Study of Gemcitabine in Children with Relapsed ALL or AML |
| COG | AHOD00P1 | A Pilot Study of re-Induction Chemotherapy with Ifosfamide and Vinorelbine in Children with Relapsed or Refractory Hodgkin Disease |
| COG | P9934 | Systemic Chemotherapy, Second Look Surgery and Conformal Radiation Limited to the Posterior Fossa And Primary Site for Children Greater than 8 months and less than 3 years with Non-Metastatic Medulloblastoma |

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# Introducing Our New Logo

The Children's Mercy Cancer Center was founded in 1988 to care for children with cancer and their families by providing support for their physical, emotional, and environmental needs. The slogan has always been "Tough Fight! Tough Kids!" to symbolize what patients are going through and what they are. In 2001, it was time for a new look. So we decided to give Children's Mercy Hospital's beloved Mercy Bear a new, tougher look that would fully represent the mission of the Cancer Center. We hope our new look will be an inspiration to our patients, families and friends for many years to come!

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