

based teacher to help inpatients keep up with school.

By the end of December, Samantha had completed her chemotherapy. Still in remission, she's back in school, in dance class...in life. "Unlike more slowly growing tumors, if a Burkitt's lymphoma does not recur in six to 12 months it is unlikely to do so at all," says Kamen. "We all breathe a sigh of relief with each day off therapy after six months."

Statistically, only 3 or 4 percent of adults with cancer in the U.S. participate in clinical trials. In contrast, approximately 85 percent of children with cancer enter studies. CINJ, in addition to being the only National Cancer Institute-designated clinical center in the state, is also part of a national consortium, the Children's Oncology Group. "This gives us the latest information on clinical trials

across the country," says Kamen.

CINJ's primary goal of applying basic research to patient care is one of the reasons Kamen came to RWJMS in the spring of 1999. Drawn to research all his life, he is one of only nine American Cancer Society clinical research professors nationwide — and the only pediatrician. His laboratory at CINJ is directly above the treatment areas, giving him quick access to his patients. He is there to bring them the newest therapies.

Kamen is currently using aminopterin in clinical trials to treat patients with acute leukemia in relapse. Leukemia accounts for approximately 30 percent of all newly diagnosed cases of cancer in children each year. Acute lymphoblastic leukemia (ALL) is the most common cancer in pediatrics, typically striking children between 1 and 9 years of age. Acute myeloid leukemia (AML) occurs in all age groups.

Aminopterin came into use 50 years ago as a chemotherapeutic agent. It is the predecessor of methotrexate, a mainstay of modern chemotherapy. Powerful and effective, aminopterin also has serious side effects. Because it mimics folic acid, just like methotrexate, it can cause a deficiency in this nutrient, resulting in increased levels of plasma homocysteine. This is associated with a risk of vascular disease and cognitive disorders. In children, methotrexate can cause long-term learning disabilities, seizures and an unpleasant, "zoned out" feeling.

The physician's interest in pharmacology has led him in some interesting directions. He has found that dextromethorphan, the "DM" in the popular cough suppressant Robitussin, blocks some of the toxic effects of increased homocysteine levels. By giving dextromethorphan to children who are also receiving methotrexate or

aminopterin, he hopes to reduce learning and neurological problems.

Seventeen-year-old Katie Andryca of Colts Neck was diagnosed with acute myeloid leukemia (AML) on December 31 — New Year's Eve. "It wasn't exactly the way I wanted to start the new millennium," she jokes. Katie's symptoms, which began in September, included stomach pains, fatigue, weakness and headaches. "I couldn't play gym. I couldn't even walk fast," says Katie.

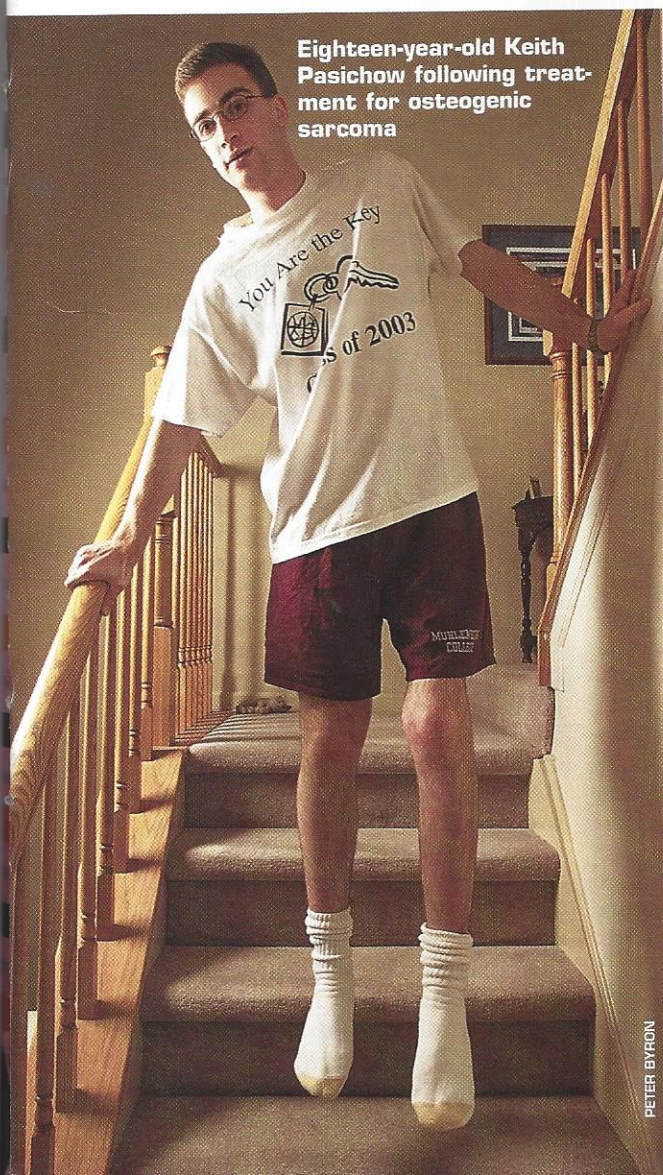
Katie is a vegetarian, and her physician at first blamed her symptoms on her diet, saying she wasn't eating enough protein. After taking a series of blood tests, he referred her to a hematologist. Puzzled by Katie's abnormally low white count, the hematologist recommended a bone marrow biopsy. "Katie postponed it for a month because she was so frightened," says her mother Beth. "In December, we finally convinced her to go ahead with it."

A few days later the hematologist called and advised the family to see Roger Strair, MD, PhD, associate professor of medicine at RWJMS, without delay. In fact he'd already made them an appointment. When Strair informed Katie and her parents that she had AML, the three cried. "He recommended that Katie see Dr. Kamen," says Beth. "I agreed, even though Katie hadn't seen a pediatrician in years. She may be 17, but she's fully grown, a young woman."

Beth Andryca's initial reaction is not surprising, says Kamen. "We aren't reaching as many teenagers as we should," the physician states. "Many are referred to adult oncologists when they should be coming to us. They may have adult bodies, but they're still kids, with kids' needs." Treated as children rather than adults, teens have a statistically higher chance of entering a clinical trial, which may offer greater hope for a cure than the standard regimens.

Just after her first chemotherapy treatment, Katie cut her long blond hair and shaved her head. "I didn't want to deal with losing my hair, so I cut it off myself," she says. In a gesture of solidarity her friend cut her hair too. The girls donated their hair to Locks for Love, a nonprofit organization that makes wigs *continued*

Eighteen-year-old Keith Pasichow following treatment for osteogenic sarcoma



HOPE for CHILDHOOD CANCERS

available for cancer patients who can't afford them.

Katie has just finished her fourth cycle of chemotherapy, which included daunomycin and cytosine arabinoside, with one more cycle remaining. Though she has been in and out of the hospital with fevers and infections, she says she is starting to feel stronger.

A primary goal of the new therapies, says Kamen, is a maximum cure rate with minimal toxicity. "We're trying to eliminate 'no pain, no gain' from our vocabulary," he says. Another goal is decreasing time spent in the hospital. For leukemia patients, hospital admission is usually required only for the first chemotherapy treatment. Later treatments are generally given on an outpatient basis.

"We are also coordinating our efforts with other specialties to develop more organized treatments," he continues. "In treating bone tumors, for example, the highest cure rates are achieved through the use of intensive chemotherapy, surgery and sometimes radiation." The chemotherapy aims to shrink the tumor, in many cases allowing for limb-salvaging procedures rather than outright amputation.

Bone cancer strikes more frequently in childhood and adolescence than adulthood. Some 50 percent of these tumors affect the area of the knee. This type of cancer — osteogenic sarcoma — accounts for some 250 pediatric cases annually in the U.S.

Eighteen-year-old Keith Pasichow of East Brunswick was one of them. In 1996 the teenager noticed pain and swelling in his left knee while away at summer camp. He assumed it was caused by playing too much tennis, but saw the camp doctor anyway. "He had no idea what it was, but didn't think it was serious," Keith recalls.

By the end of the summer, there was a grapefruit-sized lump in Keith's lower thigh, just above the knee. He was referred to a pediatric orthopedist, who made a tentative diagnosis of osteogenic sarcoma and referred him to Joseph Benevenia, MD, associate professor and vice chair of the Department of Orthopedics at UMDNJ-New Jersey Medical School and a specialist in musculoskeletal

oncology. A biopsy confirmed the diagnosis.

"When I learned I had cancer, my mind went completely blank, and then I started to cry," says Keith. "I was so afraid I was going to die."

Keith began a year of chemotherapy, entering a clinical trial using methotrexate as well as other drugs. He received his diagnosis just before the beginning of his senior year of high school, and only attended one day. After that, he was home-tutored.

In December, 1996 Keith came to UMDNJ-University Hospital in Newark for surgery. Benevenia removed a 25-centimeter section of

them short-term pain," he notes. "They cope with the pain, and then forget about it. On the other hand, teenagers know about mortality, as well as morbidity. Death scares them."

Keith has made a good recovery. Now in remission, he's a freshman at Muhlenberg College, majoring in theater and business. However, he has developed a strong interest in medicine and is considering switching majors to pre-med. He plans to work in Kamen's lab in the summer.

Despite extensive physiotherapy, Keith has not regained full range of motion in the knee. This spring, he had additional surgery to replace his knee with a prosthesis.

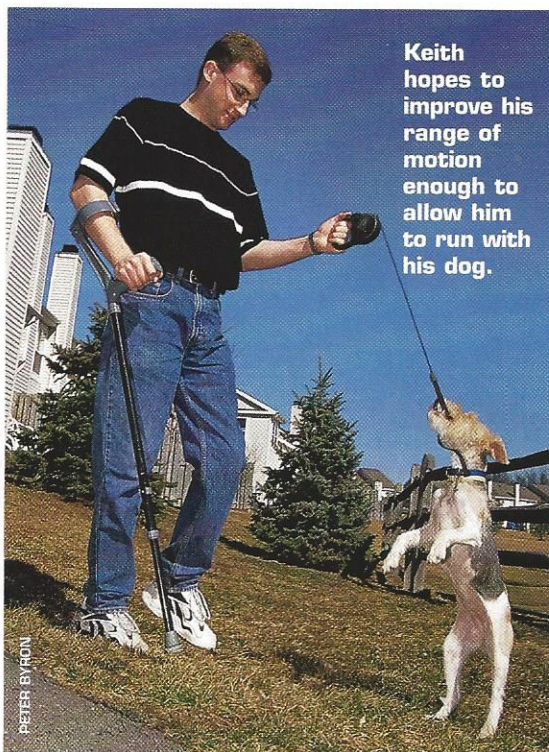
Since Kamen has been at CINJ, the number of pediatric patients has doubled. Plans include recruitment of three additional faculty members for the hematology/oncology division. However, he says his mission is more than providing the best possible care. "With certain diseases, the best available therapies are just not good enough. So what we are trying to do here is write the book, rather than just following the recipe," he says.

Among Kamen's goals is to develop strategies for identifying patients who relapse. "Why do some patients with leukemia survive for the long-term while others do not? We're trying to find differences in cells and patients so we can make accurate predictions." Another goal is to improve treatment for more resistant cancers. "We've greatly improved the cure rate for ALL,

but we have a long way to go in treating brain tumors," he says.

With more patients surviving, an important initiative is the program's Long Term Survivors Clinic, which provides care and support to children and adolescents who have been successfully treated for malignancies. "Once you're off therapy for four or five years, the cancer isn't likely to come back, but other issues arise," says Kamen. "Are you insurable? Can you join ROTC in high school or college if you want to? Has your renal function been affected by chemotherapy? Are you at increased risk for early breast cancer? We can help answer those questions."

It just takes a little magic. HS



Keith hopes to improve his range of motion enough to allow him to run with his dog.

PETER B. IRON

Keith's tumor and replaced it with a cadaver allograft. Following the surgery, Keith returned home to recuperate and continue his chemotherapy.

"In three months I lost 20 pounds," says Keith. "The combination of nausea and depression completely took away my appetite." Eventually he received anti-depressants and was taught self-hypnosis and visualization techniques by counselor Christine Call-Sternberg. "She taught me to relax and concentrate on the food going down into my stomach. It sounds new-age, I know, but it really helped."

Kamen says depression is not uncommon among teens with cancer. "Three- and four-year-olds perceive their cancer as something that causes