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Promise

is a quarterly publication of the Department of Public Relations St. Jude Children's Research Hospital 262 Danny Thomas Place Memphis, Tennessee 38105-3678



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A publication of St. Jude Children's Research Hospital Winter 2011



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On the cover: Patient Jordyn Boucher and Jennifer Aniston. Photo by Seth Dixon.

Produced by the St. Jude departments of Public Relations and Biomedical Communications. Public Information: 1-866-2STJUDE (278-5833), ext. 3306

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Highlights



Finding a new pathway

Hongbo Chi, PhD, Immunology, is senior author of research that reveals a new pathway that regulates immune balance and offers a promising target for drug development. He and his colleagues identified a pathway that helps control the immune balance through reciprocal regulation of specialized T lymphocytes. Investigators also found that two drugs working in different ways target this new mechanism. The drugs dampen the inflammatory response in patients with multiple sclerosis or following organ transplantation. Further research might lead to new medications to block other autoimmune disorders or to new anti-rejection drugs. A report on this work appeared in the journal *Nature Immunology*.

Scientists explore role of Six3 gene

New research led by St. Jude investigators adds to evidence that the *Six3* gene functions like a doorman in the developing brain and visual system, safeguarding the future retina by keeping the region where the eye is forming free of a signaling protein capable of disrupting the process. This is the first described model in which retina specification is specifically disrupted.

Results of this study help build a foundation for the next generation of therapies using cell-replacement strategies to restore vision lost to the retinal degeneration associated with glaucoma, diabetic retinopathy and age-related macular degeneration.

The findings underscore the pivotal role *Six3* plays in the developing nervous system as a key regulator of the Wnt family of signaling proteins and expands on earlier work from the laboratory of Guillermo Oliver, PhD, of Genetics. Oliver is senior author of the research published in the *Journal of Clinical Investigation*.

What happens when DNA is damaged?

St. Jude investigators have identified a novel structure in cells that serves as a control switch in the body's system for eliminating damaged cells. This finding also offers new therapeutic potential for cell damage caused by irradiation, chemotherapy, heart attacks or stroke.

The findings provide insight into the machinery at work as cells ramp up production of p53 protein following DNA damage. The p53 protein plays a critical role in how cells respond to the stress that damages DNA. The gene that carries instructions for making p53 protein is the most commonly mutated gene in human cancers.

Investigators also identified potential molecules that disrupt the system and reduce p53 protein levels in cells damaged by irradiation or chemotherapy. These molecules helped cells growing in the laboratory to survive better after they were damaged. The findings were published in the journal *Genes & Development*.

The work lays the foundation for a new approach to protecting healthy tissue using small molecules to reduce p53 protein levels in cells following damage caused by a wide range of factors, including the radiation and chemotherapy used to treat cancer or accidental exposure to dangerous chemicals or radiation, said the paper's senior author, Michael Kastan, MD, PhD, Comprehensive Cancer Center director. The same approach might also help ease the tissue damage that occurs as blood flow and oxygen are restored following a heart attack or stroke.



Regenerating hair cells essential for hearing

Researchers are using genetic tools developed at St. Jude to learn about the system animals use to restore hearing.

Located in the inner ear, hair cells convert sound into electrical signals the brain relies on for hearing. Replacing hair cells damaged by chemotherapy, noise and other factors is considered a first step in hearing restoration. When animals such as chicken and fish damage their hair cells, the surrounding supporting cells divide, differentiate and serve as replacements for the lost hair cells. For decades, researchers have unsuccessfully attempted to replicate the system in mammals.

Genetic tools developed recently mean it is now possible to manipulate specific genes in certain mammalian cells in hopes of controlling both cell division and specialization, a process known as transdifferentiation.

Jian Zuo, PhD, Developmental Neurobiology, and his colleagues recently reported that deleting the *Rb* gene from certain supporting cells in the inner ear prompted those cells to resume dividing and to make multiple new cells. The findings marked the first time in mammals that supporting cells were coaxed into dividing after birth.

The work to transdifferentiate supporting cells into hair cells is occurring in collaboration with Martine Roussel, PhD, Genetics and Tumor Cell Biology. To develop drugs that mimic the genetic manipulations, Zuo is collaborating with Richard Kriwacki, PhD, Structural Biology, and Taosheng Chen, PhD, Chemical Biology and Therapeutics. He is also working with Mary Relling, PharmD, Pharmaceutical Sciences chair, and Jun Yang, PhD, Pharmaceutical Sciences, to better understand how the anti-cancer drug cisplatin damages hearing.



Building a healthier future through education

Aubrey Van Kirk of St. Jude International Outreach instructs students at the Memphis Health Careers Academy as part of the hospital's Cancer Education Community Outreach Program, also known as Cure4Kids for Kids. This program teaches students, parents and teachers about cancer while dispelling common misconceptions. The curriculum emphasizes healthy lifestyle choices that can reduce the risk of developing cancer in adulthood. St. Jude coordinators also hope the program will encourage students to pursue science and health-related careers.

St. Jude has spirit

St. Jude recently received the 2010 Omar N. Bradley Spirit of Independence Award from the Independence Bowl Foundation. The award is given to an American organization or citizen that symbolizes the spirit of freedom and independence on which the U.S. was founded.

The award was presented in December at the AdvoCare V100 Independence Bowl. The hospital's founder, the late entertainer Danny Thomas, received the award in 1983.

"It is gratifying to receive this external recognition from the Independence Bowl Foundation, acknowledging the unwavering commitment of St. Jude to our mission of finding cures and saving children," said Dr. William E. Evans, St. Jude director and CEO. "Receiving the Omar N. Bradley Spirit of Independence Award caps off a landmark year for St. Jude, and to have the hospital receive an award given to our founder 27 years ago is a testament that his legacy continues full speed ahead."

Highlights



St. Jude teen artists unveil artwork

Twenty-two new pieces of art created by 19 talented adolescent patients were unveiled during the 2010 Teen Art Show. The artwork is displayed in a hospital corridor that has been transformed permanently into the Teen Art Gallery. The gallery walls feature brightly colored, powerful photography, group projects, drawings, sculptures and poetry created by teen patients. "Teenagers can have deep and often conflicting emotions, especially if they have cancer," said Kelly Anderson, Child Life specialist. "This allows patients to share feelings and experiences concerning their illness in an artistic fashion." Artist Maggi Cupit (foreground) is cheered by (from left) her mom, Eleanor; Julie Morganelli, RN, of the Solid Tumor Clinic; patient Miguel Betances Lee; and Maggi's sister, Flinn.

XSCID gene therapy moves a step closer

Like a coach shuffling players in the starting lineup, St. Jude investigators have revamped a retrovirus vector and have reported early preclinical success using it as a delivery vehicle for the genetic material needed to correct a devastating immune disorder.

The research, led by Brian Sorrentino, MD, director of Experimental Hematology, brings effective and safe gene therapy a step closer for patients with X-linked severe combined immunodeficiency (XSCID). About one in 50,000 male newborns inherit the mistake in instruction for assembling a key immune system signaling protein, leaving them unable to mount an effective immune defense. The findings appeared in a recent issue of the scientific journal *Blood*.

Planning is underway at St. Jude for a clinical trial of newly diagnosed XSCID patients using the re-engineered retrovirus, known as the XSCID lentivirus vector. This work is being organized with Mary Ellen Conley, MD, Immunology. The backbone of the new vector was developed in the laboratory of Arthur Nienhuis, MD, Hematology. Tests in the lab have demonstrated normal immune development was safely restored following treatment with the new vector.

Drug combo targets tumor blood supply

Combination therapy significantly slowed the growth of human neuroblastoma tumors in laboratory studies by targeting the tumor's blood supply, St. Jude investigators reported recently.

Used in tandem, the drug rapamycin and the cytokine interferon-beta dramatically altered the architecture of the blood vessels feeding the tumors. Researchers reported the tumors were left with fewer but better-fortified blood vessels that were unable to expand to meet the increasing needs of a progressing tumor, thus limiting the cancer's ability to grow or spread.

Together, the two compounds had a more powerful impact than either working alone. The findings reinforce hope that combination therapy aimed at disrupting a tumor's blood supply will prove as powerful a weapon against cancer as the combination chemotherapy that is a foundation of modern cancer care.

"Most, if not all, solid tumors, and possibly some hematologic malignancies, depend on angiogenesis, or new blood vessel formation, to grow and spread. That makes angiogenesis an attractive treatment target," explained the study's senior author, Andrew Davidoff, MD, Surgery chair. The work was published in the *Journal of Pediatric Surgery*.

Combination therapy that disrupts a tumor's blood supply may prove to be a powerful weapon against cancer. "Quality improvement is a continuous process at St. Jude."

Wilms research pinpoints new risk factor

Even low-dose radiation therapy leaves female survivors of Wilms tumor at increased risk of developing pregnancyinduced high blood pressure years later, according to the largest study yet of pregnancy outcomes among survivors of the childhood kidney tumor.

The hypertension risk rose along with the radiation dose and was greater for women who received higher levels of flank irradiation than for those treated with lower doses. But the study's lead author, Daniel Green, MD, Epidemiology and Cancer Control, said even women who received relatively low doses of radiation were more likely to develop high blood pressure during pregnancy than female survivors who received no radiation.

Green said the findings underscore the importance of high-risk obstetrical care for women whose Wilms tumor treatment included flank radiation. Green was the lead author of earlier research linking such radiation with a higher risk of premature labor and other pregnancy complications among female Wilms tumor survivors. This report expands that list to include pregnancy-induced high blood pressure, which is associated with a variety of serious complications. Both studies were published in the *Journal of Clinical Oncology*.



Tops in patient satisfaction

St. Jude recently received a first-place Path to Excellence award for high ratings in patient satisfaction. Presented by NRC Picker, a division of the National Research Corp., the award is given to pediatric hospitals based on patients' rankings of their overall hospital experience. "Quality improvement is a continuous process at St. Jude," said Carl Cross, RN, EdD, Quality Management director. Pictured at the award presentation are (from left) Sheri Spunt, MD, Oncology; Joseph Laver, MD, clinical director and executive vice president; Pam Dotson, RN, senior vice president of Patient Care Services and chief nursing officer; Cross; and Stacy Nelson of NRC Picker.

Protein misstep linked to rare disease

Research led by St. Jude investigators linked the muscle weakness and other symptoms of a rare neurodegenerative disease to a misstep in functioning of a normal protein, rather than its build-up inside cells. The finding offers insight into the mechanism driving common nervous system disorders such as Parkinson's and Alzheimer's diseases.

The work advances understanding of how the inherited mistake at the heart of spinobulbar muscular atrophy leads to the death of neurons in the brain and spinal cord. Investigators showed that the underlying mutation caused an amplification of the protein's normal function. The work appeared in the scientific journal *Neuron*.

"The idea that toxicity is mediated by the native, or normal, function of the protein itself is a departure from conventional wisdom. This research adds to growing evidence that the principle applies broadly in other neurodegenerative disorders, including Alzheimer's and Parkinson's diseases," said the paper's senior author, J. Paul Taylor, MD, PhD, Developmental Neurobiology.

Highlights



How bacteria cope with environmental change

Stephen White, DPhil, (at left) Structural Biology chair, Charles Rock, PhD, Infectious Diseases, and their colleagues recently demonstrated how a transcription factor functions like a rheostat of gene expression, allowing some bacteria to tweak the lipid composition of their membranes to cope with environmental change. Transcription factors are proteins that bind to specific locations on the DNA to turn genes on and off. The findings appeared in the journal *Nature Structural and Molecular Biology*. Researchers used X-ray crystallography to provide the first detailed look at the structures of the molecules involved. Investigators then developed mutant forms of the transcription factor to confirm the actions involved in the process. "Understanding how these factors work will help us figure out how some of these pathogens can grow and survive despite extremes of heat and cold as well as survival in the human host," Rock said.

NK cells kill bone, soft tissue cancer cells

A St. Jude study of activated donor natural killer (NK) cells has been expanded to include children with Ewing sarcoma and rhabdomyosarcoma after investigators showed that the powerful immune cells effectively kill those tumor cells. Ewing sarcoma is the second most common bone cancer in children and adolescents. Rhabdomyosarcoma, a tumor of the soft tissue, is found in about 350 individuals annually in the United States.

"This research advances NK cells as a potential treatment for solid tumors, particularly Ewing sarcoma," said Dario Campana, MD, PhD, Oncology and Pathology.

In experiments that pitted cells from five different Ewing sarcoma tumors in a one-to-one ratio with specially treated NK cells from healthy donors, investigators reported it took the NK cells just four hours to destroy nearly all the Ewing sarcoma cells growing in the laboratory. In similar studies with cells from four types of rhabdomyosarcoma tumors, NK cells were nearly as effective.

When researchers then combined the activated NK cells with radiation therapy to treat mice carrying Ewing sarcoma tumors, survival increased dramatically. The findings were reported in the journal *Clinical Cancer Research*.

Marker may help scientists thwart flu viruses

Investigators working to understand why some influenza viruses are so dangerous have linked a protein common to 20th-century pandemic flu strains to an exaggerated inflammatory response and greater lung damage. The research identified a molecular marker of dangerous new flu viruses. Scientists hope the discovery will enable officials to focus on worrisome new flu strains more quickly.

Versions of the protein PB1-F2 are found in all influenza A viruses. But St. Jude scientists showed that differences in the protein are associated with dramatically different immune responses.

Working with genes from seven different strains of influenza A, including the 1918, 1957 and 1968 pandemic viruses, scientists tracked the dangerously heightened inflammatory response to viruses that made a full-length version of PB1-F2.

"For the first time, we have identified a likely virulence factor that contributes to making pandemics worse," said Jon McCullers, MD, Infectious Diseases, senior author of a report that appeared in the journal *PLoS Pathogens*. "We think the threat is the full-length avian version of the PB1-F2 protein."

"For the first time, we have identified a likely virulence factor that contributes to making pandemics worse."

The Pleasure of Giving

A charitable gift annuity enables MARVIN FRIED to give to St. Jude while receiving a regular income for life.

By Janice Hill

eaving a legacy that will help children is important to Marvin Fried, but so is watching his gifts at work. That is why he has established six charitable gift annuities since 2002 in support of St. Jude Children's Research Hospital.

"I don't have any heirs, so I want to leave what I have to others. But I get a lot of pleasure from giving and want to do it while I can enjoy it," says the former businessman who sold his company and retired 12 years ago. "Charitable gift annuities are made to order for me because they allow me to give to my favorite charities while I am still alive and receive a regular income for as long as I live."



Here is how a St. Jude Charitable Gift Annuity works: A donor transfers cash or securities to St. Jude to establish the annuity; in turn, St. Jude pays fixed payments for life to the donor, or up to two annuitants named by the donor. At the time of the last annuitant's death, the principal goes to support the lifesaving mission of St. Jude. The donor may receive several tax benefits, including an immediate income tax deduction for a portion of the gift. Annuity payments are treated as part ordinary income, part capital gains income in the case of securities (15 percent) and part tax-free income.

"I like annuities because they allow me to make a major gift while I'm alive, and that gives me a good feeling," Marvin says.

Committed to helping children and animals, Marvin says he is particularly dedicated to St. Jude because he loves what the hospital does to help patients and their families cope with catastrophic pediatric diseases. He is keenly aware of the importance of this work, having lost his only child to a catastrophic illness. His son, Scott, underwent surgery at another hospital for a benign brain tumor when he was 2. Although the operation was a success, a severe complication left him extremely disabled. He died of pneumonia nearly seven years later. A plaque in tribute to Scott will soon be placed in the hospital in recognition of Marvin's generous gifts.

Marvin remains devoted to children today and enjoys close relationships with great nieces and great nephews. A Boston native, he lived and worked half of his adult life in West Hartford, Connecticut.

"My whole life's dream was to live on the water with my boat right outside the door, so when I retired I moved to Mystic, Connecticut, and lived on the river," he says. Although he was able to sail his boat every day, he missed close friends. To be closer to them, he and his 13-year-old cat recently moved back to West Hartford.

You might say Marvin understands what is truly valuable in life—the pleasure of being with friends and family and the good feeling of giving to others.

To learn more about St. Jude Charitable Gift Annuities, visit www.stjudelegacy.org or call 800-395-1087. ●

MIRACLE in the MAKING

When doctors gave up hope, Jordyn Boucher's family found it again at St. Jude.

By Elizabeth Jane Walker



In the fall of 2009, doctors at another hospital told Jordyn Boucher's parents that her days were numbered. Soon after, Jordyn's mom, Tracey, wept when she saw a St. Jude TV spot featuring actress Jennifer Aniston with a patient. "Why can't my daughter have that hope?" she said. One year later, Jordyn is a St. Jude patient, and her disease is in remission. She recently appeared in a *Thanks and Giving* fundraising spot with the famous actress. Jordyn and Aniston are flanked by Tracey (at left) and Jordyn's older sister, Taylor.

"It's amazing to have a child. It's equally special to save one."

here's nothing more that we can do," the leukemia specialists intoned. "Your daughter's bone marrow is packed with leukemia cells."

"How long does she have?" choked out Jordyn Boucher's mom.

"Could be days; could be weeks; could be months," the doctors solemnly replied.

Jordyn's parents looked at one another in horror. Their beautiful and charismatic 8-year-old had fought so long and so courageously. How could her battle end like this?

"I don't even know if the human body is capable of processing the emotions you have when you hear something like that," recalls Jordyn's dad, Brian Boucher.

Brian looked at the three oncologists. Perhaps, he thought, there might be a treatment elsewhere that could help his daughter.

"Is there anything on this planet that is available to help Jordyn live?" he pled.

"There's nothing that we know of," the doctors replied.

A long journey

When Brian Boucher and Tracey Sukduang faced that grim panel of physicians in November of 2009, their daughter had already been fighting acute lymphoblastic leukemia (ALL) for more than seven years.

Soon after Jordyn's first birthday, bruises had appeared on her tiny body. The baby had become sluggish and had developed a persistent cough. Repeated trips to the pediatrician yielded nothing.

"They just thought I was a

panicky mother because I was there every single week for a couple of months, saying, 'Something's wrong with my baby,'" Tracey recalls. "Jordyn became so lethargic that she would kind of pass out and then come to and pass out and come to again. Finally, I said, 'I'm not leaving until you do something.""

The couple expected blood tests to reveal a minor problem.

"We never thought it would be cancer," Brian says.

By the time the disease was discovered, Jordyn was in danger of heart failure. Because of her young age and the late diagnosis, she was classified as a high-risk case. At a Maine hospital, Jordyn spent a couple of weeks fighting for her life in the intensive care unit. She then underwent cranial irradiation and two years of chemotherapy. Her disease finally went into remission.

"She was doing so well through her initial treatment that I think we honestly believed that was going to be it," Brian says.

Then, at age 5, Jordyn relapsed. The day after her sixth birthday, she underwent a bone marrow transplant. The disease remained in remission until Labor Day of 2009. For a couple of months, doctors attempted to induce another remission, but they realized that Jordyn's body had become resistant to the chemotherapy. In November, Jordyn returned to her home in New Hampshire with palliative care.

As the holiday season approached, TV stations began airing spots for St. Jude Children's Research Hospital. Tracey watched

Wing Leung, MD, PhD, director of the Bone Marrow Transplantation and Cellular Therapy program, offered hope to Jordyn's parents. "I want you to envision your daughter with hair," Leung told them. "I want you to envision your daughter on a plane flying home healthy, cancer free. I want you to envision her getting married, having her own family. And don't ever lose sight of that. I'll take care of the cancer for you; that's my job. You just make sure you give her the optimism and support that she needs."

one that featured actress Jennifer Aniston and a St. Jude patient.

"I just bent over and cried," Tracey recalls. "I said, 'Why can't my daughter have that hope? She's been fighting for so many years and has been so strong.' I didn't want to sit there anymore and just watch her slip away. I thought in my heart, "There's one more thing to do.""

Brian, who works for Target Corp., had learned about St. Jude through online research as well as through his company's longtime partnership with the hospital. He approached one of Jordyn's physicians and asked for a referral to St. Jude. Soon, he and Tracey were on a conference call with Wing Leung, MD, PhD, director of the hospital's Bone Marrow Transplantation and Cellular Therapy program.

Sudden hope

Leung explained that Jordyn's genetic makeup caused her to have the most aggressive form of childhood ALL. Jordyn has a translocation of chromosomes 4 and 11, which portends a poor prognosis and makes the disease resistant to traditional treatments. But Leung had exciting news: St. Jude had opened a clinical trial designed specifically for children like Jordyn.

"All of a sudden there was a doctor who was giving us hope rather than giving up hope," Tracey says. "Dr. Leung said that Jordyn would have about a 30 percent chance of survival if she participated in the protocol. To us, that was huge. We had a zero percent chance of survival at that point. If Jordyn fell within that 30 percent, then that was 100 percent for her."

For Jordyn's parents, the decision was easy.

"Dr. Leung told us, 'You have two options," Brian recalls. "You can do what you're doing today, which is nothing, or you can get on a plane tomorrow morning and let me take care of your daughter.'

"We chose option B," Brian says.

St. Jude staff immediately made airline reservations, and Jordyn and her parents arrived in Memphis the next day. After meeting with hospital staff and learning more about the protocol, Brian asked Leung, "What do Tracey and I need to do? How can we help?"

"I want you to envision your daughter with hair," Leung told them. "I want you to envision your daughter on a plane flying home healthy, cancer free. I want you to envision her getting married, having her own family. And don't ever lose sight of that. I'll take care of the cancer for you; that's my job. You just make sure you give her the optimism and support that she needs."

"We've never lost sight of that—ever," Brian says. "And that's due to the team of doctors and nurses and employees at St. Jude who support that message."

Only at St. Jude

At St. Jude, Jordyn enrolled in a new transplant protocol designed for children who have relapsed after undergoing bone marrow transplants. The trial's non-radiation-based conditioning regimen features a drug called clofarabine.

"To my knowledge, we are the only center that is doing clofarabine regimen the way we are giving it," Leung explains.

The transplant Jordyn would undergo is also unique. Clinicians collect cells from a parent, process them and infuse healthy natural killer (NK) cells into the patient. St. Jude is pioneering the use of NK cells as a cancer treatment. Blood tests indicated that Brian would be the best donor for his daughter.

"Selecting the most optimal NK cell donor is essential for the success of this protocol," Leung says. "In this case, Brian was a good match with high amounts of the NK cells in his blood. After he was chosen as the donor, we collected stem cells from him and got rid of the T cells so that

Brian and Jordyn Boucher pause in front of the elephants at Target House. "I thank God for Dr. Leung, I thank God for St. Jude, and I thank God for this trial—every second of every day," Brian says. Jordyn (pictured during a past remission) underwent a transplant of NK cells donated by her dad. Her disease is now in remission. "So far, so good," her mother says. "It's been a miracle in the making. All those people who didn't believe in miracles and who saw this happen now know that you don't give up until the end. There's no giving up."

there would be little risk of graftversus-host disease."

Leung understands why doctors at the other institution initially offered no hope to Jordyn.

"Nobody else in the country would have given her a transplant, because all other centers require the disease to be in remission first," he says. "When Jordyn arrived at St. Jude, her bone marrow contained basically leukemic cells. Most hospitals require less than 5 percent leukemic blasts in the bone marrow before they will consider a transplant. Some centers may lift the bar a little and allow up to 25 percent. Nobody else, as far as I know, would consider a transplant with more than 25 percent blasts in her bone marrow."

Leung says the protocol used to treat Jordyn cannot currently be duplicated elsewhere because of the expertise and resources available only at St. Jude.

"The donor-typing techniques were developed in our lab during the past several years and were not available elsewhere," he explains. "The laboratory support necessary to remove the bad donor cells and leave behind the good cells is also not readily available. It can be done, but it's not easy."

Leung emphasizes that the most important advantage of St. Jude is its highly trained employees.

"In order to do this kind of highrisk trial with a lot of sophisticated laboratory techniques, you really need excellent general supportive care and lab support," he says. "We have an outstanding pathology lab, blood bank, donor room, cell processing lab and microbiology lab. The knowledge and experience of our transplant team would be difficult to emulate. For instance, our nurse practitioners on average have more than 10 years of experience doing extremely high-risk transplants. That kind of knowledge and experience is invaluable.

"You can have the best machinery and resources available, but you would not have the same transplant results if not for the team that we have at St. Jude."

Birth and rebirth

When Jordyn arrived in Memphis in mid-December of 2009, St. Jude staff leapt into action.

"There was no time to lose," Leung explains. "A day for her was like a year. So we did all of her workups in parallel instead of in sequence." Jordyn's transplant occurred on New Year's Day 2010.

Brian was honored to serve as his daughter's donor.

"To be told that my cells would be the medicine that would help her was powerful to hear," he says. "The day she received her cells, it was like she was born all over again. It's amazing to have a child. It's equally special to save one."

Jordyn's disease remains in remission. "So far, so good," her mother says. "It's been a miracle in the making. Our daughter has touched more lives in her nine years than I will probably ever touch. All those people who didn't believe in miracles and who saw this happen now know that you don't give up until the end. There's no giving up."

"Jordyn's doing very well now," Leung observes. "It's amazing."

Jordyn and her family know firsthand the value of hope and the power of gratitude.

"I thank God for Dr. Leung, I thank God for St. Jude, and I thank God for this trial—every second of every day," Brian says. ●

Counting on St. Jude

A new trial at St. Jude helps children with chronic ITP, a rare bleeding disorder marked by low platelet counts.

By ELIZABETH JANE WALKER

ike most teenage boys in his rural community, Wesley Tice-Gray loves to hunt, fish and roar through the woods on an all-terrain vehicle. Three years ago, he ended up in the hospital after one such jaunt. Ironically, Wesley's injury occurred while the vehicle was stationary.

"I was just getting off the four-wheeler when my foot slipped and the handlebar caught me in the stomach," Wesley recalls. "A big bruise came up."

By late afternoon, the bruise was larger than a softball and as ominous as a thundercloud. Concerned, his family took Wesley to the doctor and then to the hospital. Blood tests indicated that the teen's platelet count was dangerously abnormal. Produced by the bone marrow, platelets are small cells that help the blood clot. Instead of having 150,000 to 450,000 platelets per microliter of blood, Wesley had only 2,000.

Doctors discovered that Wesley had immune thrombocytopenia, or ITP, a bleeding disorder that affects about 3,000 children each year in the United States. Wesley's immune system was waging war on his platelets—coating them with antibodies and marking them for destruction. Without an adequate number of platelets, Wesley was at risk for bleeding, bruising and other more serious complications.

In retrospect, Wesley's family realized that the symptoms of ITP had been present for years.

"I had started noticing bruises when he was in about the third grade," says his grandmother, Becky Tice. "But I thought he was just being a typical kid."

"He has always been active," adds Wesley's aunt, Susan Bing. "Most kids are clumsy. We thought, 'He's just being a boy, out playing and running into things."

Children with ITP usually have an acute form of the disorder, which resolves after a few weeks or months. But Wesley had chronic ITP, a form that rarely affects children or adolescents and can persist for years. The clinicians immediately referred him to St. Jude Children's Research Hospital, where hematologists could provide the specialized treatment he required.

Nation's first

At St. Jude, Wesley met hematologist Jenny McDade, DO, and Hematology Chair Russell Ware, MD, PhD. Ware and McDade explained that antibodies in Wesley's body were adhering to newly formed platelets, incorrectly flagging them as foreign invaders. As part of its quest to eliminate disease-causing cells, the spleen recognized the antibodies as signs of enemy infiltration and eradicated the platelets.

In addition to large bruises, many children with ITP have nosebleeds, blood in the urine and small pink dots called petechiae on their skin. Their gums may bleed when they brush their teeth, and a head injury that would be minor for most children can be life threatening.

Most traditional ITP treatments typically improve platelet counts for several weeks, but do not cure the underlying disease process. The side effects can be significant, commonly including headache, fever, chills, nausea and vomiting. Rarely, more serious side effects can occur. Children undergoing treatment often require hospital admission.

Patients like Wesley with chronic ITP are forced to live with the limitations and lifestyle changes that accompany extremely low platelet counts.

"Unless children develop bleeding symptoms, we typically don't expose them to the potential side effects of the available treatments, because we know the effect will wear off within a few weeks," McDade explains. "Basically, traditional treatments don't stop the development of antibodies or the coating of platelets with those antibodies. Rather, the medications just

temporarily prevent the antibody-coated platelets from being destroyed."

Researchers have been seeking a way to encourage the bone marrow to increase platelet production so that more platelets would circulate through the blood. One such drug recently received FDA approval for adults with chronic ITP. McDade and Ware were excited. Would this medication also help children with the disorder?

About a year ago, St. Jude obtained access to the new medication, called eltrombopag, through participation in an international clinical trial. Through the study, eltrombopag would be offered to 70 children worldwide. This study would be the first pediatric trial for the agent. The protocol would be open to children who had failed traditional therapies for chronic ITP and who still had dangerously low platelet counts.

Wesley leapt at the opportunity to take eltrombopag for his chronic ITP.

"I was the first kid in the U.S. and the second in the world to get the new drug," Wesley brags. "Some kid in Europe beat me to it, or I'd have been the first."

"Wesley was really excited to be the first child in the country to take this medicine," McDade says. To date, St. Jude has enrolled seven patients in the study.

Rising platelet counts

One year into the trial, McDade is encouraged by the response of St. Jude patients. "So far, our patients have not encountered any significant side effects," she says. "It appears to work in about 75 percent of children who take it. The preliminary results are promising, because it seems to be a safe and easy-to-tolerate medicine."

Children take the medication by mouth once a day, instead of receiving a several-hour infusion every few weeks, which has been the typical treatment for chronic ITP in children. McDade is quick to point out that the medication does not cure ITP, and it works only if the patient takes it regularly.

"This medication is just stimulating the body to make more platelets to compensate for the ones that are being destroyed," she explains. "It's a nice alternative, because the children can take a medicine once a day, achieve a stable platelet count and do the types of activities that might otherwise be limited."

With his platelet count vastly improved, 15-year-old Wesley has returned to most of his regular activities. The only inconvenience is that he cannot eat dairy products within four hours of taking the medication. "I'm forgetful sometimes," admits Wesley, who has the typical teenage addiction to cheese pizza and ice cream. But that's a small price to pay for the ability to do normal activities, such as running road races and serving as the coach's assistant for his high school's football team. His family no longer worries incessantly about internal bleeding as a result of minor bumps or accidents.

"I want Wesley to feel as normal as possible and to experience the fun things that occur during high school," his aunt says. "There's always the chance that a rare accident could happen. But if it does, I know that this medication could make the difference in saving his life." •

Wesley Tice-Gray was the first child in the United States to receive eltrombopag for chronic ITP. The medication enables him to lead a normal life, interrupted only by regular checkups with his physician assistant, Susan Parker (center), and hematologist Jenny McDade, DO.

By Joyce M. Webb

Hope on the Horizon

One family traveled nearly 9,000 miles to find the best brain tumor treatment for their son.

> wo-year old Yeshaai Govender is curious about clinicians who enter his room clad in colorful scrubs and white jackets.

"Do they help babies?" Yeshaai asks his mother. "Yes, love," replies Sinola Rajaram, MD.

Nine months ago, Yeshaai was a healthy and vivacious toddler surrounded by the fervent love of family, friends and his puppies, Sumo and Fufoo. On Easter weekend 2010, at his home in Johannesburg, South Africa, Sinola and her husband, Desmond, noticed that their son's head tilted to the left as he played. This continued for several days, as did the redness in one of his eyes.

Sinola scheduled an appointment with Yeshaai's pediatrician and several specialists to get answers. His ophthalmologist noticed that the nerve in the brainstem that controls eye movement caused a slight deviation in Yeshaai's eye. After a series of diagnostic tests, doctors pinpointed a diagnosis.

"The neurologist said the words 'space-occupying lesion.' As a physician, I obviously knew what that meant: brain tumor," Sinola says. "I remember screaming and saying, 'I cannot conceive this world without Yeshaai.""

The news was equally shocking to Desmond.

"I don't think any parent can receive worse news about their kid," he says. "It was even worse knowing that we had a healthy child before and that now we had to make a choice to do brain surgery."

As doctors delivered the news of their son's brain tumor, an innocent and jovial Yeshaai dashed through the corridor and leapt into his parents' outstretched arms. The encounter shifted their world completely and marked the beginning of a personal crusade to save Yeshaai's life.

Amar Gajjar, MD, St. Jude Oncology co-chair, enrolled Yeshaai in the hospital's risk-adapted protocol for newly diagnosed brain tumor patients 3 years old and younger. The study is the first and most advanced protocol for patients Yeshaai's age that stratifies treatment based on patients' disease risk.

Searching the world for hope

Fearful, yet determined, Sinola immediately phoned friends and medical colleagues for help with locating the top neurosurgeons in Johannesburg and assembled a medical team to remove the malignant tissue from Yeshaai's brain. After 15 hours of surgery, surgeons successfully removed 100 percent of the tumor. Nevertheless, more had to be done.

Two days later, the neurosurgeon told Sinola and Desmond that Yeshaai had medulloblastoma, a rare, malignant brain tumor found in children.

"Now we need to find, quickly, the best treatment on the planet for our boy," Sinola told her husband.

As Yeshaai recuperated in the Intensive Care Unit, Sinola set up her laptop just outside his room and searched the Internet for everything she could find on medulloblastoma survivors.

A blog written by the parent of a patient at St. Jude Children's Research Hospital caught her eye; their sons' stories were markedly similar. Sinola continued reading, then clicked on a link to the St. Jude website and immersed herself in details about the hospital's advancements and successes in medulloblastoma research and treatment. She also learned that St. Jude is home to the nation's largest research-based pediatric brain tumor program and is the host site for the Pediatric Brain Tumor Consortium, a clinical trials collaboration that includes the National Cancer Institute and seven research centers across the country.

After several e-mail exchanges to the brain tumor program, Sinola learned that Yeshaai met the eligibility requirements for admission to St. Jude. Within days, the family and Yeshaai's medical escort were on a 23-hour flight to Memphis for treatment.

"We won the greatest opportunity on the planet. Desmond and I were shocked, silent and tearful because for us it meant that our son had a chance," Sinola says.

On to Memphis

Yeshaai's specialized team of physicians and supportive care clinicians was intact the moment he arrived at St. Jude. This multidisciplinary team would remain with him throughout his treatment and guide his family through the uncertain months ahead.

"When we arrived at St. Jude, everyone we spoke to said this was a place where miracles happen. That was encouraging," Desmond says.

St. Jude brain tumor experts ordered scans and lab work to ensure the cancer was completely removed and tested Yeshaai's tumor sample to confirm the diagnosis. They discovered that his cancer was a desmoplastic subtype of medulloblastoma instead of the classic subtype identified in Johannesburg. In addition, diagnostic tests revealed a suspicious spot on his spine. Because of this, his case was classified as high risk.

Amar Gajjar, MD, St. Jude Oncology co-chair, enrolled Yeshaai in the hospital's risk-adapted protocol for newly diagnosed brain tumor patients 3 years old and younger.

"Medulloblastoma therapy for children in this age group requires a different approach than in older children," Gajjar says. "Instead of craniospinal radiation therapy, these patients are given combination chemotherapy and focal radiation therapy to the tumor bed or chemotherapy alone based on the type of tumor and other risk features. The main thrust is to avoid irradiation as much as possible to allow their developing brains to mature fully."

The study is the first and most advanced protocol for patients Yeshaai's age that stratifies treatment based on patients' disease risk.

Early findings from another St. Jude study of older patients with the disease have moved investigators closer to understanding the biology of medulloblastoma and toward a trend of developing more targeted therapies for treating these tumors. For instance, a Phase I trial tested the ability of an experimental drug to attack the tumor by blocking a molecular pathway that is linked to approximately 20 percent of medulloblastomas. Gajjar and his team have reported that the drug can be safely administered to children and are making plans to open a Phase II study of the drug soon.

"We've learned that medulloblastoma is not a single disease; it's a compendium of at least four different diseases," Gajjar explains. "Our approach is to understand the biology of these tumors in young children and use targeted treatment for each of the specific subtypes as the drugs are developed."

Home on the horizon

Yeshaai's desmoplastic medulloblastoma subtype has responded well to treatment. He has completed six courses of combination chemotherapy and has courageously endured the side effects of his treatment.

"Gowns..." Yeshaai interjects, while listening to his mother recall the nearly five months of intermittent hospital isolation that was necessary to protect his weakened immune system from infection.

"No gowns needed, love," she responds.

"He thinks we're still in isolation," she adds.

Yeshaai must undergo his third phase of treatment: six months of oral maintenance chemotherapy aimed at maintaining remission and preventing relapse.

Back at home, a host of family and friends are anxious for his

return. Yeshaai's puppies await the day when he chases them from room to room again.

"In my son's horizon is his home—with his health intact, his faith enforced and him being loved," Sinola says. "We came to St. Jude in our greatest hour of need with faith, a bag of clothes, a sick child and hope that someone would help us save our son. We believe in this medication and in Dr. Gajjar and his team."

"It was very difficult from an emotional perspective when we first came to St. Jude," Desmond says, "but we have no doubt that Yeshaai is going to be fine because he's at St. Jude. He's a fighter like all of the patients at St. Jude." ●

"We came to St. Jude in our greatest hour of need with faith, a bag of clothes, a sick child and hope that someone would help us save our son," says Sinola Rajaram, MD. "We believe in this medication and in Dr. Gajjar and his team."

Mom First, Physician Second

A physician, researcher and public health specialist who has done work in emergency medicine, epidemiology, bioethics and biostatistics, Sinola Rajaram, MD, has worked in both private and public health care systems. When cancer struck, Sinola searched the globe to find the place that would offer her son the best chance at life. Here's what she discovered:

When I started looking for a place for Yeshaai's treatment, I wanted to find an oncologist who was a researcher and who had extensive experience in dealing with medulloblastoma. I came across Dr. Amar Gajjar, who was well published and had excellent reviews and results. Medulloblastoma seemed to be his personal nemesis.

I quickly learned that the St. Jude support structure is critical to the hospital's success. A team of dietitians, nutritionists, rehabilitation specialists, surgeons, oncologists, social workers and other staff members collaborate to provide the best outcome for patients. As a physician, I am impressed with St. Jude and its doctors and staff. Everyone is respectful and hopeful, and they have allowed us to be part of the team effort for our child. It's absolutely phenomenal that St. Jude has managed to achieve this level of holistic treatment for its patients. That is the brilliance of the St. Jude system; it is the kind of holistic plan that doctors like me dream about.

I am a mom first, and all I have to do at St. Jude is hold my son and be by his side on this journey. My husband, Desmond, and I have a home-away-from-home at Target House, where we live comfortably and take care of our children. One cannot imagine our level of gratitude for the support available at St. Jude.

Our son is a hero. With unfaltering grace and patience, he accepts that these days and challenges are part of his journey toward a healthier body. I once read about Saint Jude being the patron saint of impossible causes. We arrived at the hospital with hope and with the belief that this impossible cause of our child was going to be attended to. We have not been disappointed.

attention to detail

Many childhood cancer survivors experience attention problems. St. Jude is making progress in fighting these late effects of their disease and treatment.

By Mike O'Kelly

igh school freshman Catherine Gensler remembers a time when paying attention in class was nearly impossible. Thoughts fleeted across her mind and faded just as quickly. Before long, Catherine's parents, Lawrence and Missy, pulled her out of the classroom and opted to home school their struggling daughter.

Catherine had not always struggled so mightily. At

age 7, she was found to have a primitive neuroectodermal tumor (PNET), a rare brain tumor that is usually found in children younger than 10 years old. After undergoing nine months of radiation, high-dose chemotherapy and four stem cell transplants at St. Jude Children's Research Hospital, Catherine's tumor went into remission. Not long afterward, the first signs of attention problems surfaced.

"I was thinking about other things all the time when

I was in class," says Catherine, now 15. "My mind was elsewhere."

Catherine's troubles were not unlike those suffered by other young survivors of brain tumors and acute lymphoblastic leukemia (ALL). Among childhood cancer survivors, these two groups most typically experience cognitive late effects as a combined result of their disease and targeted treatment.

Investigators at St. Jude have spent a decade examining the best options for helping childhood cancer survivors overcome cognitive deficits. The institution spearheaded a recently completed multicenter trial, which revealed that methylphenidate, a medicine widely used to treat attention-deficit/hyperactivity disorder (ADHD), also provides long-term relief from the attention and

Heather Conklin, PhD, of Psychology and her

colleagues discovered

that a drug used

to treat ADHD also

benefits childhood

as Deanna Bantel

(at right). Deanna

participated in a

cancer survivors such

yearlong clinical trial

for children who suffer

attention and behavior

problems as a result of cancer treatment.

behavior changes that affect many childhood cancer survivors.

"We found that methylphenidate improves both attention and social skills and that these benefits are maintained," says the study's first author, Heather Conklin, PhD, of the St. Jude Department of Psychology.

When the Genslers received a letter from St. Jude asking for Catherine to participate in the trial, they jumped at the chance. According to Conklin, childhood cancer survivors such as Catherine who took part in the study were experiencing three main problems: inattention and distractibility; difficulty with executive functions such as planning, organizing and strategizing; and a reduced efficiency in completing tasks. As time goes

on, the academic achievement gap widens between these students and their peers, causing self-esteem problems as well.

Although methylphenidate has been used successfully for decades to treat ADHD in healthy children, Conklin says that did not ensure the drug would benefit children whose symptoms followed a cancer diagnosis. Children who had ADHD before their cancer was discovered were excluded from the study. The

yearlong trial consisted of two groups-a control group of 31 brain tumor and 23 ALL survivors who did not receive methylphenidate and the experimental group of 35 brain tumor and 33 ALL survivors who received the drug.

The group that was given methylphenidate scored better on tests of sustained attention at the end of the trial. Parents, teachers and the survivors also noted that their attention levels appeared to improve. In addition, parental ratings of social skills and behavior problems also showed a benefit. In the control group, only parental ratings of attention and social skills improved during the same period. Neither teacher, self-report nor computerized tests indicated changes in attention for this group.

"We believe this may indicate that parents acclimate to their child's deficits over time, whereas teachers have other classmates as a benchmark for change," Conklin explains.

Although the drug did not lead to a significant gain in measured academic skills, many parents reported that their children's grades improved because the children did a better job of managing tasks like planning ahead for projects or remembering to complete and turn in assignments.

"She is now so self-motivated," Missy says of Catherine. "This medicine has made such a difference in her life because she is able to succeed in school. It has given her so much confidence."

Catherine, who continued taking the drug after the trial was finished, recently made her school's honor roll. She takes a dose each morning on weekdays and on weekends when she needs to complete a big assignment.

can actually concentrate on what I'm doing and what the subject is. I'm not everywhere in my mind."

While the use of methylphenidate is a viable option to consider, Conklin says that the pursuit of other approaches to treating cognitive late effects is still important.

"We are moving forward with research into new strategies to benefit more survivors and their families," says Conklin.

In addition to conducting research, Conklin also sees cancer survivors in clinic once a week.

"I do discuss methylphenidate as one of the options for a child when we find that attention problems are an area of difficulty," she says, "but we are also working with schools to educate teachers about cognitive late effects, what they look like and strategies they might be able to use."

"I see a huge difference now," Catherine says. "I

More Medicine

They dispense more than a half-million doses of medications each year, but that's just the beginning for the dedicated professionals in the St. Jude Pharmacy.

By Carrie L. Strehlau

he next time you grab your daily vitamin, special medication or prescription, stop and think about the team of people who diligently work behind the scenes to make sure that what you take is safe and of the highest quality.

At St. Jude Children's Research Hospital, the list of a child's daily medications can seem a mile long. A dedicated team of pharmacists and technicians collaborate to ensure that not only are the correct doses given, but that the drugs safely interact with each other with the lowest number of side effects.

"Almost all of the drugs we have at St. Jude are high risk, so the steps we take in the Pharmacy before they ever reach the patient are crucial," says Chief Pharmaceutical Officer William Greene, PharmD. "Our goal is to achieve the desired therapeutic outcome with the least risk possible for our patients. This can be challenging, because we are often using investigational drugs or drugs that have a very limited track record in children."

True teamwork

In a year's time, the Pharmacy at St. Jude is responsible for approximately 500,000 doses of medication dispensed to children in the Medicine Room, clinics and procedures areas—and an additional 80,000 prescriptions for ambulatory outpatients.

"When people think of a pharmacy, that's what they think of—the dispensing of medication. But we do much more at St. Jude," Greene says.

"A lot of what we do is dispense medication information. Moreover, we must focus on detail. We refine our day-to-day activities to attempt to do it right 100 percent of the time for all of our patients and to do everything we can to maximize the quality of services, the safety and the outcomes of medication therapy that's offered."

About 100 employees work in Pharmaceutical Services.

"The areas of responsibility we cover include purchasing, storage and inventory; collaboration in prescribing and administration; preparation and dispensing; monitoring and modification; quality management; translational and clinical research. All of this leads to improving therapeutic outcomes," Greene explains.

Those 100 people work in a checks-and-balances structure that encompasses areas from basic pharmacy operation and clinical services to medication outcomes and safety, and pharmacy information services.

"We recently conducted a review of the steps or decisions that a pharmacist at St. Jude must make in handling a single chemotherapy order," Greene says. "We identified 12 major decision points and 42 sub-points for a

total of 54 different checks—all for one order. And we have staff who interface at every point."

For the patients

When new patients and their families come to St. Jude, they meet with one of the hospital's outpatient pharmacists. An integral part of the patient care team, the pharmacist wants to be sure each patient and family understands how the pharmacy works, how to take medication safely and anything else related to their daily medication needs.

"We want to ensure that the patient feels comfortable asking questions about their drug dosages, medication interactions, side effects and even how nutrition plays a role," says Clinical Pharmacist Cyrine Haidar, PharmD. "And, when they go home, they need to understand what to take, how to take it and how often. We are here to assist them along the way."

Pharmacists also offer tools for patients such as medication cards, which are offered in the hospital's pharmacy locations. Each card contains a brief description of a specific drug, special instructions and a list of some of its possible side effects.

"It's important that our patients, and especially their parents, learn as much as they can about their medications," says Clinical Pharmacist Shane Cross, PharmD. "Knowing more will help them take their medicines exactly as they are prescribed and be aware of common side effects to watch for. By using the medication cards, we are arming them with information."

A pharmacist is assigned to each patient care area and is incorporated into all patient care teams. The pharmacist reviews results of plasma drug-level and pharmacogenetic tests

Clinical Pharmacist Shane Cross, PharmD, meets with 7-year-old Anna Pike during a recent clinic visit. "It's important that our patients and parents learn as much as they can about their medications," he says.

and works with the patient's care team to make sure the right changes in drug dosages are made, if needed.

Optimizing outcomes

Pharmaceutical Services employees also work hand-in-hand with other clinical and research staff to assure optimal medication outcomes.

"Work completed in the Pharmaceutical Sciences labs, for example, is being translated into how we can better design our drug therapy in the clinical setting to achieve the outcome and minimize the risks," Greene says.

For example, there are more than 15 drugs in the Total XVI protocol. The Total XVI protocol is the most comprehensive treatment plan developed to date for acute lymphoblastic leukemia, detailing the management of foreseeable complications of the disease or its therapy. Pharmacodynamic and pharmacogenetic principles are applied to optimize therapy. That is where the Pharmacy comes into play.

"Science from the research lab interfaces with the Clinical Pharmacokinetics Laboratory and with the practice of pharmacy. The pharmacists serve as the primary interface between the laboratory and patient care," Greene says. "It's one step to describe it in a lab; it's another step to make it happen routinely and properly interpret the information and adjust the dosing."

Work in the lab that affects how and when certain patients are exposed to specific drugs could affect prescribing, monitoring and follow-up.

"The integration of science and practice at St. Jude allows us to quickly take what is learned in the lab and apply it in the clinical setting. That makes St. Jude different from most other hospitals and community pharmacies," Greene says.

"Some of the research done is based on the idea that you can monitor drug concentrations in patient samples, estimate how patients differ from each other using pharmacokinetic tools and, based on characteristics of a patient and the lab results you gather, you can adjust the dose to achieve a certain outcome," he says. "As the patient's status changes, we might have to reassess the drug concentrations."

The clinical pharmacist's role is to engage directly with the patient care team about what is being done with the drugs and medications.

"The lab results are communicated to the clinical pharmacists and the clinical pharmacists either make a recommendation to the doctor or modify the dosage if necessary," Greene explains.

During the last few years, the United States has experienced an increasing number of drug shortages, which affect many of the medications that are important for St. Jude patients. The hospital is countering this issue by carefully monitoring the situation and proactively investigating at the first sign of a potential problem. Because of the team's diligence, shortages that have been severe at other hospitals have had little or no impact on St. Jude patients.

Chief Pharmaceutical Officer William Greene, PharmD, assists Certified Pharmacy Technician Kimberly McClelland as she obtains an item in the Pharmacy. "We are focused on being collaborative on all levels and want the best for our patients," Greene says.

"We are careful to communicate the latest information about drug shortages to all St. Jude clinicians," says Medication Outcomes and Safety Officer James Hoffman, PharmD. "There is a lot we have to think through from a safety standpoint, since alternative drugs are being used in some cases."

"Due to our proactive efforts to manage drug shortages, significant clinical delays in therapy have not occurred at this time for St. Jude patients," Hoffman adds.

Beyond clinic and lab

Pharmacy staff members are integrated into multiple areas far beyond the hospital's walls. They interface with state and national professional pharmacy groups, hold faculty positions outside of St. Jude and provide teaching and training for pharmacy students and clinical residents.

St. Jude pharmacy professionals also monitor state and federal regulatory requirements, provide support for the implementation of clinical protocols and serve on many institutional committees. In addition, Pharmaceutical Services employees provide decision support for the electronic medical record, program devices such as automatic medication dispensing machines, track and provide supplies to all areas of the hospital and provide administrative support.

Through the diligent work of Pharmacy staff, along with support from the hospital's legal and administrative teams, St. Jude also saved more than \$1.5 million in drug costs during the past year.

In 2009, the Pharmacy experienced a renovation that expanded the main area to more than twice the space it previously had, enhancing the Pharmacy's ability to dispense drugs safely and to educate patients. This year, it is expanding to provide "specialty" pharmacy services, providing home infusion and certain high-cost agents directly to outpatients. This expansion will result in savings for the hospital and more comprehensive care for its patients.

"As a department, we really look at the whole picture," Greene says. "Staff members are on call, work weekends and are engaged at all times. We are focused on being collaborative on all levels and want the best for our patients."• HOLDING the LINE

Against Deadly Childhood Diseases

"I played a long time in the NFL and have played with and seen a lot of tough and courageous individuals, but nobody can match the courage and determination of these wonderful children at St. Jude."

—Terry Bradshaw

While filming a FOX Sports segment, on-air personalities (from left) Howie Long, Michael Strahan and Terry Bradshaw share a lighthearted moment with patients Max Duzan, Anna Pike and Markell Gregoire.

he No. 1 sports network in the country teamed up with the No. 1 children's cancer hospital during the 2010–2011 NFL season to help tackle cancer and other diseases that threaten children's lives.

FOX Sports selected St. Jude Children's Research Hospital as part of its FOX Sports Supports charitable initiative, which raises funds and awareness and spurs volunteer efforts for health charities selected by FOX

By Amanda McGee Robbins

Sports employees. The season-long partnership included public service announcements, on-air mentions during pre- and post-game shows and FOX Sports employee participation in St. Jude events, such as the Give thanks. Walk.TM fundraiser in Los Angeles.

"I played a long time in the NFL and have played with and seen a lot of tough and courageous individuals, but nobody can match the courage and determination of these wonderful children at St. Jude Children's Research Hospital," said broadcaster Terry Bradshaw, a member of the NFL on FOX Sports' on-air team.

Bradshaw, Michael Strahan, Howie Long, Jimmy Johnson, Troy Aikman, Curt Menefee, Joe Buck, Pam Oliver, Jay Glazer and the rest of the NFL on FOX Sports broadcast team visited St. Jude in August and filmed three public service announcements. They also learned about the hospital's groundbreaking research, treatment and patient care, and met several St. Jude patients and their families.

"I was awed by their spirit, attitude and determination," Bradshaw said after the visit. "And everyone at FOX Sports will do whatever it takes this season and beyond to help them conquer their battle against cancer."

Bill Wanger, executive vice president of FOX Sports, asked his team to help rally America's football fans in support of the St. Jude mission.

"Using our unmatched on-air talent, brand and reach, our goal is to raise awareness for St. Jude so they can continue to fight for all the courageous children and families affected by these terrible diseases," Wanger said.

Richard C. Shadyac Jr., CEO of ALSAC, said St. Jude was honored to have been selected by FOX Sports employees as their partner during the NFL season.

"We've been finding cures and saving kids for nearly 50 years, and this opportunity helps us recruit millions of football fans to join our team in the fight against deadly diseases like cancer," Shadyac said.

Football fans and St. Jude supporters also had the opportunity to participate in a new program, Game Day. Give Back. This program provided numerous ways to support St. Jude, including hosting parties to watch the big game, attending watch parties at Fox and Hound locations nationwide or participating in virtual watch parties. You can still support this program by visiting *www.stjude.org/giveback* and making a donation.

To learn more about the partnership with FOX Sports, visit *www.stjude.org/foxsports*.

Perspective

By Josh Pastner

Cheering for the St. Jude Team

When we support the St. Jude team, everyone wins.

had heard of St. Jude before I arrived in Memphis in 2008, but it wasn't until I toured the hospital recently that I learned the magnitude of the great work being done there.

I came away thinking that the hospital was really a team atmosphere, where everyone works together and is willing to tackle any job. At practice, we talk about outworking our opponent, working harder than our competition. It's a mentality of identifying our opponent and then resolving to beat them. Everyone has to roll up their sleeves, put on their work boots and hard hats and get to work.

Obviously, we are not dealing with life and death on the basketball court, but the clinicians and researchers at St. Jude have this same mentality in their fight against cancer and other catastrophic diseases. No job is too big for anyone there—and that's how I believe a hospital, a business or even a college basketball program should be run. Everyone's on equal playing ground. At the University of Memphis, our common goal is what's best for the student-athlete. At St. Jude, it's what's best for the patient.

In college basketball, coaches look for players with elite-level talent to join their program. St. Jude offers elitelevel talent in its staff, which contains some of the world's best scientists and physicians. These staff members are like the Michael Jordans of their field; they are the best at what they do.

Touring St. Jude would be

beneficial for anyone because it helps put things in perspective. I tell my players that there is no more rewarding experience than giving back and making a difference in other people's lives. I explain to them that looking back on your life, it won't matter how many points you scored or how many rebounds or assists you had. What is lasting is the direct relationship you have with people through giving back, and it can be as simple and rewarding as giving to St. Jude.

The kids at St. Jude are our future—there could be a President of

the United States, a scientist, doctor or even a future athlete walking those corridors.

Visiting St. Jude was an eyeopening experience for me. I realized how important the hospital is to one day beating cancer, but in the meantime, giving children opportunities to live somewhat normal lives. My wife, Kerri, and I recently welcomed a new addition to the family, a little girl named Payten. We are thankful for her health, but it's comforting to know that a place like St. Jude exists.

Josh Pastner is in his second season as the head coach of the University of Memphis Tigers men's basketball team. Before becoming the Tigers' head coach in 2009, he served as an assistant at Memphis for one season and the University of Arizona from 2002–2008. She was given more than hope. She was given another chance.

In 1962, Danny Thomas fulfilled a promise and a dream with the opening of St. Jude Children's Research Hospital*. He was determined to change the way the world treats cancer.

Thanks to support from donors around the world, Danny's dream has become reality and given patients like Haley another chance to dream, too. St. Jude has grown into one of the world's premier pediatric cancer research centers. Our patient care is unsurpassed, and because our groundbreaking research is freely shared, it can reach children in communities around the world.

You can help St. Jude continue its lifesaving mission and make the difference of a lifetime. Create your own legacy with your bequest, will or a gift. Your wishes will be honored to help ensure that St. Jude never stops looking for cures that save children. Call us at 1-800-395-1087, visit us online, or complete the enclosed postage paid envelope today.

To learn more about Haley's story and how your gift helps children like her, visit www.stjudelegacy.org. St. Jude patient Haley

www.stjudelegacy.org

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CHANGE SERVICE REQUESTED

During a recent visit to St. Jude, Matt Lauer of NBC's *TODAY* show joined the hospital's National Outreach Director Marlo Thomas at a rollicking pajama party for patients. The children of St. Jude provided the pair with gaily decorated PJs to wear to the festivities. Lauer's report on his visit appeared on *TODAY* during Thanksgiving week, as the hospital kicked off its seventh annual *Thanks and Giving®* campaign.

Finding cures. Saving children.