2007

Research Annual Report 2006

Children's Mercy Hospital

2006 Research Annual Report

Creating a Healthier World for Our Children

Children's Mercy
HOSPITALS & CLINICS
www.childrensmercy.org

Contents

Dear Friends

Why do we do pediatric medical research? There are a myriad of reasons, but they all culminate in one simple and crucial outcome: creating a healthier future for our children. Whether it's identifying an improvement in treatment for a particular disease which can be implemented at the bedside immediately, or looking for links and new discoveries which may lead to a cure in years to come, research is at the very heart of the mission of Children's Mercy Hospitals and Clinics.

As you will see in the following pages, 2006 was a year of reinvestment and expansion of the infrastructure, scope and quality of our research program. We hope you will take a few minutes to review this annual report, which highlights the development of new programs and the establishment of a new intra-institutional clinical trial network, as well as features some of the specific projects currently underway at Children's Mercy.

We are proud of the Children's Mercy physicians, nurses and scientists who are conducting important research in so many areas of pediatric medicine, and we are grateful to the generous donors in our community whose vision recognizes the important role that today's research plays in creating a healthier future for tomorrow's children. We are pleased to share these stories with you.

Randall L. O'Donnell, PhD

President and CEO

Gregory L. Kearns, PharmD, PhD

Division Chief, Clinical Pharmacology and Medical Toxicology

The Marion Merrell Dow/Missouri Endowed Chair in Medical Research

Professor, Pediatrics and Pharmacology, University of Missouri-Kansas City

Chairman, Department of Medical Research

REASON #985

WE'RE PRESCRIBING NEW COMMUNITY-WIDE APPROACHES TO PREVENTING CHILDHOOD OBESITY.

Weight Management

More than 30 percent of America's children are overweight or obese. In growing numbers, children are suffering from conditions that used to occur only in adults: type 2 diabetes, high blood pressure and high cholesterol. Unfortunately, overweight kids tend to become overweight adults and remain at risk for these debilitating health conditions.

"This is not only a community issue, but a global issue," says Sarah Hampl, MD, a pediatrician with an emphasis in youth obesity. "We're taking the lead in developing effective, research-based childhood obesity prevention and treatment." Research by Dr. Hampl and associates, published in the Archives of Pediatrics and Adolescent Medicine, quantified that health care utilization and expenses are significantly higher for overweight and obese children than their healthy-weight peers.

The hospital's efforts pair industry-leading research with community education. The Promoting Health in Teens and Kids program (PHIT Kids), funded by the Katherine Berry Richardson Endowment and the Health Care Foundation of Greater Kansas City, offers a 24-week, family-based education program that has already demonstrated results in helping kids and parents lose weight and improve overall health.

Children's Mercy is one of only 17 health systems nationwide chosen to be part of the American Hospital Association's Youth Obesity Learning Collaborative funded by the Centers for Disease Control to develop best practices and national guidelines aimed at preventing and reducing youth obesity.

These efforts are just the beginning of a long-term commitment to developing solutions to the child obesity epidemic. The hospital has partnered with University of Kansas to establish the Don Chisholm Center for Childhood Obesity, where Children's Mercy will lead research initiatives addressing childhood obesity.

Sarah Hampl, MD

The reality of the pediatric obesity problem was one that Sarah Hampl, MD, General Pediatrics at Children's Mercy and Assistant Professor of Pediatrics, University of Missouri-Kansas City School of Medicine, could see in her own practice.

"A few patients really stood out," says Dr. Hampl. "I knew they were heading down the path to an early death. But I was also struck by the complexity of the issue. It is not like you can take a pill and cure it."

Dr. Hampl's interest in motivational interviewing, a goal-directed counseling process developing patient-centered solutions to problems, has changed the approach to addressing patients' weight issues. It's also led to partnerships with other hospitals, schools and community-based groups.

"We cannot solve this problem on our own," says Dr. Hampl. "Our vision is to be leaders and advocates with the community and physicians."

REASON #647

OUR INNOVATIONS HAVE LED TO SAFER MEDICATIONS FOR ALL CHILDREN.

Medication Safety

When it comes to medicine, one size does not fit all, especially in pediatrics, where patients come in all shapes and sizes. Prescribing guidelines are currently based on weight or age. But what if it was possible to tailor medication doses to fit each individual?

That possibility is exactly what drives the research of J. Steven Leeder, PharmD, PhD, Section Chief of Developmental Pharmacology and Experimental Therapeutics.

Dr. Leeder's vision is to create a therapeutic environment of personalized drug treatment, where physicians and pharmacologists adjust medication and doses to achieve maximum benefit to each individual patient based on his or her genetic profile. The first step is to determine why patients experience adverse drug events and how to minimize the potential risks associated with drug therapy.

"Our ultimate goal is to provide the absolutely most effective dose of medication to each patient," says Dr. Leeder. "Personalized pediatrics will allow us to tailor prescriptions fully for each child."

A personalized pediatrics program would especially benefit patients who don't respond to — or don't have the anticipated response to — the average recommended treatment.

Adverse events can result from incorrect dosing, but in some cases, reactions may be the result of characters unique to one individual – in other words, genetics. Dr. Leeder and his team are studying how specific genes relate to their environment, with the goal of predicting the right treatments and doses for each patient.

J. Steven Leeder, PharmD, PhD

J. Steven Leeder, PharmD, PhD, Section Chief of Developmental Pharmacology and Experimental Therapeutics at Children's Mercy and Professor of Pediatrics and Pharmacology at the University of Missouri-Kansas City School of Medicine, has been studying adverse drug reactions (ADRs) for more than 20 years.

Dr. Leeder's interest in ADRs began during his PhD work at The Hospital for Sick Children in Toronto, where he participated in a study of rare but severe ADRs related to anti-seizure medications.

Since then, Dr. Leeder has continued to study ADRs with a focus on pediatrics. Over the course of his ten years at Children's Mercy, scientists have begun to understand what factors are involved in better managing the use of medications in children.

For Dr. Leeder, the possibility of personalized pediatrics is a direct way to apply his pharmacology expertise to clinical care for children.

"We have all the pieces to develop a personalized pediatrics program," says Dr. Leeder. "Now, we have to make them work together to benefit the children."

REASON #286

WE'RE HELPING REDUCE ANTIMICROBIAL USE NOW IN ORDER TO PRESERVE AND IMPROVE ITS EFFECTIVENESS IN THE FUTURE.

Antimicrobial Stewardship

Within one year of the first use of penicillin, Staphylococcus aureus resistance appeared. More than 60 years later, Staphylococcus aureus and several other bacteria are resistant to many antimicrobial agents.

Such antimicrobial-resistant organisms are a major cause of hospital-acquired infections. Excessive use of antibiotics can cause resistance among certain pathogens, while controlled use might curb this resistance. Pediatric infectious disease specialist Jason Newland, MD, joined Children's Mercy in 2006 to lead initiatives to study antimicrobial use, referred to as antimicrobial stewardship.

In the first phase of his study, Dr. Newland is looking at the current levels of antimicrobial utilization at Children's Mercy. This data will be compared to data from the other children's hospitals as well as The Children's Hospital of Philadelphia and Hospital of the University of Pennsylvania, which currently employ an antimicrobial stewardship program.

The second phase will include monitoring the use of certain broad-spectrum antibiotics. With the assistance of a dedicated antimicrobial stewardship clinical pharmacist, recommendations about the appropriate antibiotic, dose and length of therapy will be provided.

Children's Mercy patients will benefit through safer care, fewer hospital-acquired infections and less buildup of resistant organisms.

"If we do not act now to appropriately use these antimicrobial agents, the bacteria could win," says Dr. Newland. "Hopefully, by using antimicrobials more appropriately we will decrease the rate at which resistance develops."

Jason Newland, MD

The careful use of antimicrobial medications is essential; overuse could lead to bacterial resistance and decreased effectiveness of current antibiotics.

Jason Newland, MD, Director of the Antimicrobial Stewardship Program at Children's Mercy and Assistant Professor of Pediatrics at the University of Missouri-Kansas City School of Medicine, became interested in studying the prescription patterns of antimicrobial medications during his training at The Children's Hospital of Philadelphia, where he participated in their antimicrobial stewardship program to ensure the continued efficacy of medications.

Dr. Newland's experience in Philadelphia served as the motivation for his interest in developing a similar program at Children's Mercy Hospital.

"By demonstrating that an antimicrobial stewardship program can be effective, we hope other institutions will take notice of the need for this type of program," explains Dr. Newland. "As more institutions take part, we hope to slow the rate of resistance to available antibiotics and continue the ability to treat common childhood infections."

REASON #1356

OUR SURGICAL TEAM IS AMONG THE TOP THREE MOST EXPERIENCED PEDIATRIC MINIMALLY INVASIVE SURGICAL TEAMS IN THE NATION.

Surgical Advances

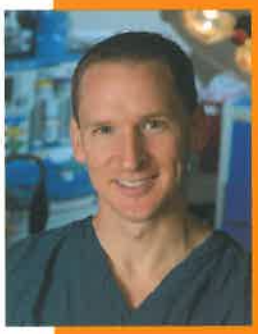
The discipline of pediatric surgery has followed well behind adult surgery in performing prospective randomized trials (PRTs) to gather evidence on the appropriateness and effectiveness of surgical techniques.

The Children's Mercy Center for Prospective Clinical Trials, led by Shawn St. Peter, MD, is the first surgery program in the country dedicated to PRTs in infants and children. The center's researchers gather data from past surgical cases to discover differences in surgical techniques or management styles.

"PRTs have lagged behind in surgery where many procedures have been considered more of an art with too much surgeon variability," says Dr. St. Peter. "My vision is to create studies that will provide definitive answers for controversial clinical questions and improve minimally invasive techniques and care for children."

The center is currently evaluating data on pain management following surgery to repair a chest deformity called pectus excavatum. The current protocol is to use epidural analgesics, although there's almost no published data on their effectiveness to manage pain in children who have undergone this surgery. Dr. St. Peter has initiated a PRT to evaluate the effectiveness of epidurals versus the use of pain medication administered through an intravenous (IV) system.

If the PRT results support the use of epidurals, Dr. St. Peter and his team will develop a standardized protocol to encourage consistency in its application and improve success. If the study supports the use of IV pain management, new recommendations will be drafted and communicated to the pediatric community.



Shawn St. Peter, MD

When Shawn St. Peter, MD, Director of the Center for Prospective Clinical Trials at Children's Mercy and Assistant Professor of Surgery at the University of Missouri-Kansas City School of Medicine, began his pediatric surgery fellowship at Children's Mercy, he saw an opportunity to organize and increase clinical research efforts in pediatric surgery.

He believes that in addition to skills and experience, pediatric surgeons should perform procedures following protocols shown to lead to the best outcomes. Unfortunately, in most cases, scientific information needed to develop these protocols doesn't exist.

Dr. St. Peter immediately began the clinical studies to develop a body of evidence. During his first year of fellowship in the Department of Surgery, he performed several retrospective studies and began a prospective randomized trial. His research continues to expand and yield great dividends for patients by providing sound evidence for surgical procedures critical for infants, children and adolescents.

REASON #531

TECHNOLOGY DEVELOPED BY OUR SCIENTISTS IS LEADING TO FASTER AND MORE ACCURATE DIAGNOSES AND TREATMENT OF CHILDHOOD ILLNESSES.

Genetic Technology

Finding the proverbial needle in the haystack when it comes to genetic causes of disease is getting easier thanks to research scientists at Children's Mercy.

Heather Newkirk, PhD, Director of the Genomics Research Laboratory, is leading a team of scientists who are at the forefront of developing technologies to better detect genetic diseases in children.

Dr. Newkirk's team has made new discoveries in identification procedures and submitted patents for technologies that allow scientists to more quickly view highly specific segments of DNA and pinpoint where abnormalities occur. "The more quickly we can help physicians pinpoint the genetic causes of a disease or illness, the more efficiently and effectively treatment can be altered and personalized for that patient," says Dr. Newkirk.

Genomic research has also led to the development of new microtechnology that improves on a current industry technique called fluorescent in situ hybridization (FISH). FISH provides researchers a way to visualize and map the genetic material in an individual's cells, including specific genes or portions of genes. This is important for understanding a variety of chromosomal abnormalities and other genetic mutations. The new technique allows scientists to more efficiently view smaller segments of chromosomes, providing more accurately pinpointed diagnoses.

Based on this research, Children's Mercy has initiated licensing agreements with several companies to make these new technologies available globally.

"This is technology we are using for research at Children's Mercy now," says Dr. Newkirk. "We are creating technology and developing tools to improve research and, ultimately, patient care throughout the world."

Heather Newkirk, PhD

In a field of study often dominated by men, Heather Newkirk, PhD, Director of the Genomics Laboratory, has always stood out.

Dr. Newkirk's interest in science – and genetics in particular – started in the eighth grade with a genetics unit in science class. She quickly came to understand that genetics is all about identifying the root cause of diseases, and there she saw opportunity to make a difference in people's lives.

"I realized the greatest impact I could make as a scientist was not in curing diseases, but in helping to prevent and diagnose them," says Dr. Newkirk.

At Texas A&M University, Dr. Newkirk studied the major histocompatibility complex, a gene family that plays a role in the immune and reproductive systems. This piqued her interest in mapping disease-related genes. When she graduated, she was the only female that semester earning a PhD in genetics.

"At Children's Mercy we are solving problems and developing tools that can be used by hospitals everywhere to more accurately diagnose disease and improve treatment," says Dr. Newkirk.

REASON #877

OUR RESEARCH HELPS PHYSICIANS WORLDWIDE BETTER UNDERSTAND SERIOUS FUNGAL INFECTIONS THAT OCCUR IN INFANTS AND CHILDREN.

Fungal Infections

Tinea capitis, better known as ringworm, is the most common fungal disease of children in the United States, affecting as many as one in 10 children. Nearly a half billion dollars are spent each year on ringworm treatments that can take weeks or months to work and are effective in only 50 to 75 percent of children.

Susan Abdel-Rahman, PharmD, Clinical Pharmacologist, is leading research to better understand Trichophyton tonsurans, the most common cause of pediatric dermaphytoses such as ringworm. Dr. Abdel-Rahman hopes that by comparing the genetic blueprint of this organism with other closely related fungi, she can discover why Trichophyton tonsurans has become such a pervasive infection in children, knowledge that is crucial to the development of better treatments.

Dr. Abdel-Rahman has developed unique methods to look at the fungus and made a surprising discovery: a degree of biochemical and genetic diversity within the species that is larger than has ever been seen with similar pathogens. This discovery is now driving the study of how different genetic strains of Trichophyton tonsurans affect children. This micro-level of knowledge of the effects could lead to improved data and more tailored treatment.

The scientific model developed through this research is being used to study other, more deadly, fungal infections. "The methods we have developed here are being used around the world," says Dr. Abdel-Rahman. "We are leading the way in approaching how to evaluate this type of infection. Ultimately we want to develop strategies to prevent, treat or eradicate it."

Susan Abdel-Rahman, PharmD

Susan Abdel-Rahman, PharmD, Clinical Pharmacology at Children's Mercy and Associate Professor of Pediatrics and Pharmacy at the University of Missouri-Kansas City School of Medicine, started looking at tinea infection when doing her post-doctoral fellowship at Ohio State University, although she admits she wasn't particularly drawn to it until she interacted with one child who was experiencing a severe infection.

The child's caregiver would not allow him to play with other children, including his own sister, for fear of infecting her. After talking to other mothers, Dr. Abdel-Rahman discovered that for many, having tinea capitis was not just an infection, but a way of life.

"I was compelled by the pervasive nature of the disease and the fact that nobody else was looking at it," says Dr. Abdel-Rahman.

That interaction has led Dr. Abdel-Rahman down a groundbreaking path that is linking what is seen clinically and what is seen in the lab, and redefining how fungal infections are studied and treated all over the world.

REASON #623

OUR SPECIALISTS ARE ADVANCING RESEARCH TO BETTER UNDERSTAND HOW YOUNG BONES GROW AND REPAIR AFTER INJURY.

Orthopaedic Surgery

Children with severely shortened limbs due to congenital deformities, growth plate injuries, trauma or infection have few options in the form of treatment. However, one avenue of treatment is distraction osteogenesis.

Distraction osteogenesis is the process in which a bone is surgically split in two segments and moved apart slowly so new bone can form between the segments. When this process works well, it can help the patient developmentally and socially. However, complications can include severe pain and improper healing, which can cause the bone to fracture easily.

The mechanism behind this process is not completely understood, and Donna Pacicca, MD, Pediatric Orthopaedic Surgeon, is using a mouse model to help her understand why and how new bone forms during this process.

Dr. Pacicca's research focus is the role of blood supply in new vessel formation, which is key to new bone formation. She hopes to identify the origin of cells at the distraction site. Once Dr. Pacicca understands the process better in the lab, she can apply those principles clinically to possibly lessen the pain associated with this procedure and to lessen the likelihood of other complications.

Because distraction osteogenesis can be quite painful, it is currently reserved for children with significant difference in limb length.

"This life-altering procedure gives children the ability to keep up with their peers and function more normally," explains Dr. Pacicca. "Through understanding the underlying processes, we can perform surgeries more safely and effectively."

Donna Pacicca, MD

Donna Pacicca, MD, Pediatric Orthopaedic Surgeon and Professor of Orthopaedic Surgery at the University of Missouri-Kansas City School of Medicine, is passionate about her research in distraction osteogenesis, which she has been studying for more than ten years.

As a fellow at Brown University/Rhode Island Hospital, Dr. Pacicca used a rat model of distraction osteogenesis to determine whether weight bearing increased bone formation during distraction. That project led to more questions and her current research.

Her interest in orthopaedics and sports medicine is a natural progression of her past athletic career and her role as the "ankle taper" on her soccer team. However, that was not the prime motivation for her to become an orthopaedic surgeon.

"I like taking care of pediatric athletes because I can relate to them, they to me," says Dr. Pacicca. "I also help educate them about staying fit to prevent further injuries once they get better."

REASON #791

OUR RESEARCH IS BRINGING HOPE TO PATIENTS WITH CRANIOFACIAL DEFECTS.

Neonatal Development

Approximately three of every 1,000 babies are born with defects of the face or skull. A child born with a cleft lip or palate generally requires surgery, dental care and speech therapy, provided over a span of several years. More severe craniofacial birth defects, such as skull malformation, can interfere with brain development. Craniofacial defects can put a devastating burden on individuals and families, as well as on the health care system.

Facial formation occurs very early in the developmental stages, and defects are often not revealed until after birth. Research conducted by Kristin Melton, MD, Children's Mercy Neonatologist, is focused on gaining a better understanding of the causes of these defects – why in some instances development doesn't follow the normal processes that occur in facial formation.

Dr. Melton is studying how the cells that form the bones and tissues of the face work together with blood vessels in normal development. Once this process is fully understood, work can begin to identify what goes wrong in craniofacial development to cause malformations.

"By understanding the normal early developmental processes, the possibility of being able to intervene in the disease process becomes an achievable goal," says Dr. Melton.

With these new genetic tools comes more rapid progress in the study of early embryonic development, providing a real possibility for breakthroughs in reducing the occurrence of craniofacial defects. Dr. Melton works closely with the experts at the Stowers Institute for Medical Research to take advantage of these new opportunities in genetic research by studying early mouse embryo development as it relates to human disease.

Kristin Melton, MD

During her medical rotations, Kristin Melton, MD, encountered hospitalized infants who sparked her interest in the study of early developmental defects. Congenital defects were surprisingly common, and there were still many aspects of the human development process that science doesn't understand.

Dr. Melton, a Neonatologist at Children's Mercy and Assistant Professor of Pediatrics at the University of Missouri-Kansas City School of Medicine, says, "With decoded genomes and continuous advances in genetic understanding, now is a fantastic time to be involved in genetic research."

Dr. Melton finds Children's Mercy Hospital the ideal atmosphere for her to practice medicine while also performing research. Its proximity to the Stowers Institute for Medical Research, where she performs her laboratory work, allows her to experience firsthand the clinical applications of research.

Dr. Melton's early craniofacial development research is funded by a grant from the National Institutes of Health.

REASON #428

WE'RE DISCOVERING NEW WAYS TO REDUCE CHRONIC PAIN IN CHILDREN.

Pain Management

Recurrent headaches are a common complaint among children and can be a precursor to debilitating headaches as an adult. Despite advances in pharmacologic treatments, approximately two million children in the United States experience chronic headaches.

Mark Connelly, PhD, Developmental and Behavioral Sciences, is a leader in studying the link between the mind and body in treating children's pain. Dr. Connelly developed and tested an interactive computer program called "Headstrong" to teach patients ages seven to 12 about headaches, including how to self-manage their pain using research-supported psychological strategies such as relaxation techniques, cognitive coping skills and behavior management.

In clinical trials, children using Headstrong had significant reductions in headache frequency, duration and intensity. Fifty-three percent had a clinically significant (greater than 50 percent) reduction in headache activity by the end of the first month versus 20 percent of children who received standard medical care.

Now, Dr. Connelly is taking his pediatric headache research a step further to determine if the positive effect on pain can be attributed to the headache education or to the psychological interventions used in the program.

Dr. Connelly has also developed a self-management program for systemic lupus erythematosus, and he's partnering with other clinical experts at Children's Mercy to research the efficacy of psychological pain interventions for other conditions and in other age groups.

"The pain experienced by children when they are young has lasting effects on how they experience pain when they get older," says Dr. Connelly. "If not treated properly, the child could actually become more sensitized to pain, leading to a lifetime of medical treatments and expenses."

Mark Connelly, PhD

A clinical psychologist, Mark Connelly, PhD, became interested in the link between the mind and body in relation to pain during a rotation while attending graduate school at the University of Kansas.

Dr. Connelly pursued that interest and successfully defended his dissertation on cognitive-behavioral interventions for recurrent pediatric headache. He then completed his post-doctoral fellowship with the Duke University Pain Prevention Center, where he continued to study pain and its impact on quality of life for children.

"The physical and the psychosocial are linked," says Dr. Connelly, Co-Director of Integrative Pain Management at Children's Mercy Hospital and an Assistant Professor of Pediatrics at the University of Missouri-Kansas City School of Medicine. "Ultimately, I want to better understand this link through what happens functionally and structurally to the brain in the context of pain and its management."

Dr. Connelly's research has been funded by the National Institutes of Health, as well as other federal, state and private funding.

REASON #2090

THE WORK OF OUR RESEARCH SCIENTISTS AND FACULTY IS RECOGNIZED BOTH LOCALLY AND INTERNATIONALLY.

Kreamer Award

Susan Abdel-Rahman, PharmD, has been awarded the 2006 John and Marion Kreamer Research Excellence Award. Dr. Abdel-Rahman is spearheading research to discover why Trichophyton tonsurans, the most common cause of ringworm, has become such a pervasive infection in children. With this knowledge, scientists can turn their focus to discovering methods to prevent and treat the condition.

The key to Dr. Abdel-Rahman's research was the development of a new scientific model that is being used to study other, more deadly fungal infections. Dr. Abdel-Rahman and Children's Mercy have been recognized internationally for this significant contribution to health care research.

In recommendations to the Awards Committee, Dr. Abdel-Rahman was praised for her expertise in the application of advanced data analysis methods in the study of absorption, distribution and metabolism of drugs. Her methodology has been widely published in peer-reviewed journals.

Dr. Abdel-Rahman sits on the Board of the American Society for Clinical Pharmacology and Therapeutics and the Drug Utilization Committee for the State of Missouri.

Henson Award

The Paul Henson Pediatric Immunology Research Award is presented yearly to a Children's Mercy researcher to further promising, ongoing research in pediatric immunology. The 2006 Henson Award recipient was Susan Abdel-Rahman, PharmD, Clinical Pharmacology at Children's Mercy and Associate Professor of Pediatrics and Pharmacy at the University of Missouri-Kansas City School of Medicine.

William Randolph Hearst Endowment

The top-rated project in the hospital's internal competitive grants program each spring and fall is supported by the William Randolph Hearst Endowment at Children's Mercy. The 2006 William Randolph Hearst designees were Roger Gaedigk, PhD, Chengpeng Bi, PhD and Heather Newkirk, PhD.

Roger Gaedigk, PhD
William Randolph
Hearst Endowment

Chengpeng Bi, PhD
William Randolph
Hearst Endowment

Heather Newkirk, PhD
William Randolph
Hearst Endowment

REASON #3497

OUR COLLABORATIVE APPROACH TO RESEARCH ACCELERATES IMPROVED CARE FOR CHILDREN.

Bridges to Create Knowledge and Translate it to Care

As in past years, researchers at Children's Mercy have continued their active collaboration with biomedical scientists worldwide. Investigations in drug-induced birth defects, treatments for children with kidney disease, genetics of both common (autism) and rare pediatric diseases, developmental pharmacology, immunology of asthma, diabetes, neonatal lung disease and sickle cell disease represent a small but critical piece of the Children's Mercy research portfolio, where national and international collaboration drives scientific discovery and the translation of this new knowledge into clinical practice.

In 2006, Children's Mercy re-focused and markedly expanded its academic research efforts by actively partnering with Kansas City Area Life Sciences Institute organizations. With the University of Missouri-Kansas City School of Medicine, our investigators in pharmacogenomics, genetics and immunology are developing new academic programs in the field of Bioinformatics. Together, we are creating a Genomics Center to serve translational science initiatives in both pediatric and adult medicine. In conjunction with Kansas University-Lawrence, University of Missouri-Kansas City School of Medicine and Kansas University Schools of Medicine, Truman Medical Centers and Kansas City University of Medicine and Biosciences, Children's Mercy is expanding its programs in the treatment and prevention of childhood obesity. And plans are on the drawing board with Kansas University Medical Center to establish a Diabetes Research Institute and a National Cancer Institute-designated Cancer Center. Most recently, a new collaboration emerged between research scientists at the Stowers Institute and faculty members within the Children's Mercy program in Orthopaedic Surgery that will examine and characterize fundamental biologic factors which contribute to abnormal development of the spine.

Kansas City Area Life Sciences Institute

Children's Mercy Hospital

Kansas City University of Medicine and Biosciences

Kansas State University

Midwest Research Institute

St. Luke's Health System

Stowers Institute

University of Kansas-Lawrence

University of Kansas Medical Center

University of Missouri-Columbia

University of Missouri-Kansas City School of Medicine

REASON #348

WE HAVE A SOLID FOUNDATION – AND THE PASSION – FOR ADVANCING RESEARCH THAT DISCOVERS CURES AND SAVES LIVES.

Department of Medical Research Staff

Back Row: Amy Fox, Candy Schmoll, Vicki Parker, Robin Rusconi

Front Row: Jaylene Weigel, Sandy Galvin, Anna Roberts

Investing in Research Infrastructure

The ultimate success of any research program is determined by the quality of the researchers, the technology and the science at the root of each investigation. The roots run deep and strong at Children's Mercy, where some of the nation's leading researchers dedicate their careers to discovering, testing and developing new ways to prevent and treat diseases that affect children.

To expand the scope, quantity and quality of research at Children's Mercy, we significantly reinvested in our infrastructure to:

- *expand the clinical trials framework for centralized study coordination, project development and networking*
- *use grantsERA™ to develop a true, "real time" program for all aspects of project development, management and complete conversion from paper to electronic submission for NIH grants*
- *conceptual development of a scientific incubator*
- *develop an intra-institutional program for the training of clinical research coordinators and clinical investigators*
- *revamp and restructure the Children's Mercy Research Web site for use as a development tool to expand the scope of sponsored clinical investigations*
- *form an intra-institutional clinical trial network for phase I and II clinical investigations*
- *expand the intramural research program through enhanced scientific review and scope of funding*

Research Infrastructure

Office of Research and Grants Administration

The Children's Mercy Institutional Review Board

The Office of Research Integrity

Investigational Drug Pharmacy

Clinical Research Coordinator Pool

Clinical Research Unit

Bioinformatics & Research

- Bioinformatics Education Classes

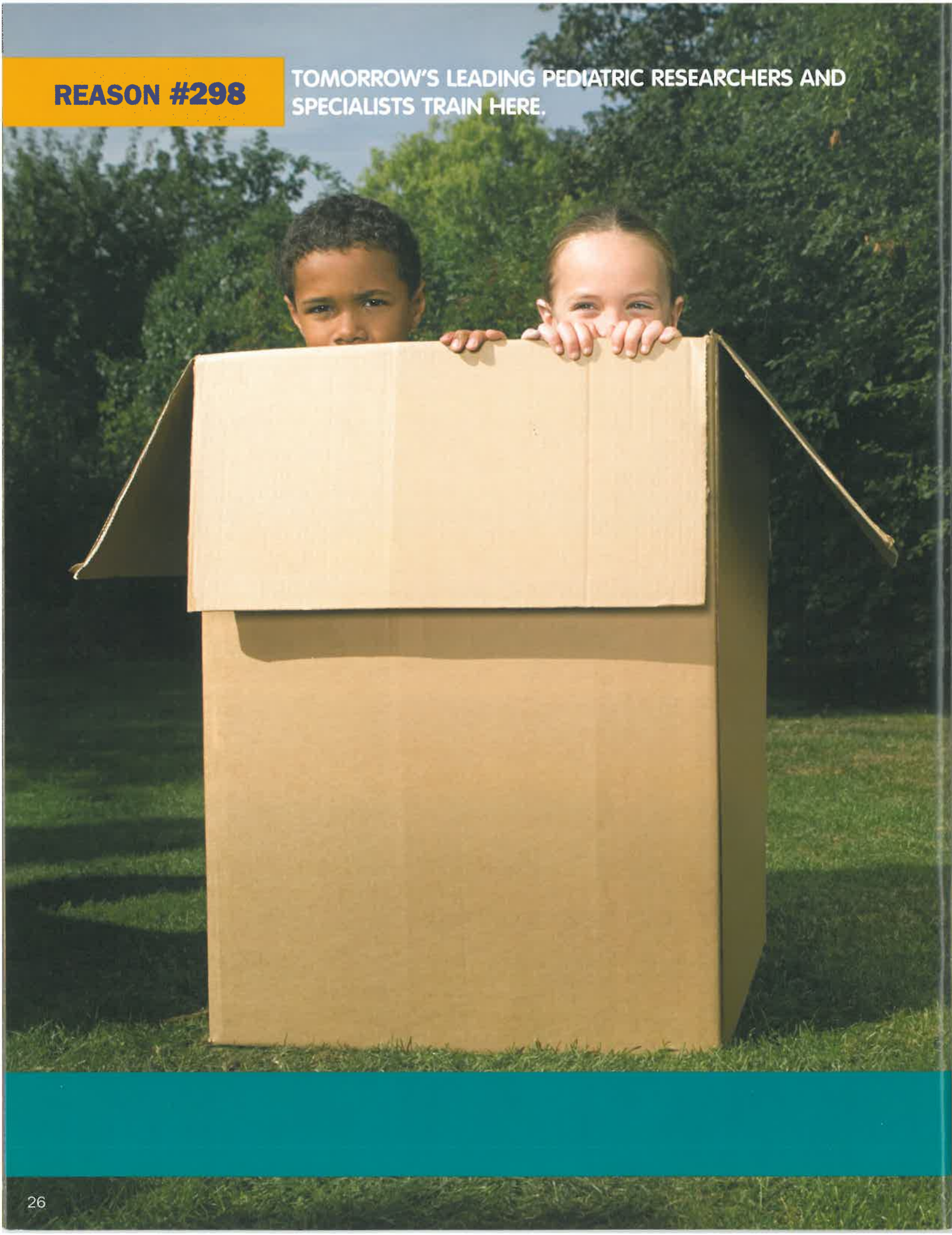
Computing

- grantsERA™ upgraded
- Internet II
- Apple Xserve
- Linux Cluster and Server
- Mac OS X Operating System
- iNquiry
- ROCKS cluster linux OS
- Apple Cluster with Bioinformatics Programs Including a GUI Interface

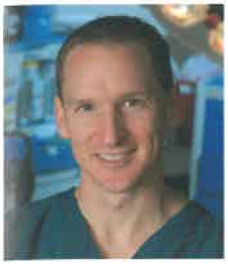
Statistical Support and Education

Pediatric Research Center

- Microarray System
- DNA Sequencers
- Proteomics
- Specialized Microscopy
- Tissue/Cell Culture


REASON #298
TOMORROW'S LEADING PEDIATRIC RESEARCHERS AND SPECIALISTS TRAIN HERE.

Research Days Award Winners



Shawn St. Peter, MD

Pyloric stenosis is one of the most common surgical conditions in infants, affecting about three in 1,000 babies. Pyloric stenosis causes the muscles in the lower part of the stomach to become enlarged so that food cannot pass to the intestines. The condition is treated surgically in a procedure known as pyloromyotomy. The surgery may be performed as an "open" procedure or laparoscopically. Research comparing the two methods has been retrospective and has reported mixed results.

Dr. St. Peter's research offered the first large prospective, randomized comparative study of open versus laparoscopic pyloromyotomy to correct the condition. His study concluded that there is no difference in operating time or length of recovery between the two techniques; however, the laparoscopic technique results in less post-operative pain, reduced post-operative emesis, fewer complications and superior cosmetic outcomes.

Husam Kayyali, MD

Difficult decisions must be made by parents and physicians following a submersion trauma (near drowning). With that in mind, Husam Kayyali, MD, led a retrospective research study to evaluate the validity of outcomes predictors in pediatric submersion victims. Literature review revealed several studies that identified lack of pupil reflex, high initial glucose level and male gender as predictors of poor outcomes – death or vegetative state – in these patients. Dr. Kayyali initiated a study to determine the reliability of these factors.

Patient records were reviewed of 41 children admitted at Children's Mercy during the past 10 years. The review found that lack of pupil reflex and high initial glucose level were highly reliable indicators of a poor outcome. Gender was not found to be significant. He also found that all children who were comatose had poor outcomes, while those who were non-comatose had good outcomes. Dr. Kayyali's research was accepted for a poster presentation at the national Child Neurology Meeting in October 2006.

Summer Scholars

During the past summer, the Children's Mercy Hospital Summer Scholars Program hosted nine college students from around the country. Through this program, coordinated by Charles Barnes, PhD, Director, Allergy/Immunology Laboratory, we help students gain valuable experience in pediatric research. The 2006 Summer Scholars were:

Luke Amos, Kenyon College

Jacob Brown, Creighton University

Serena Chan, Yale University

Kelsey Flynt, Rice University

Dexter Johnson, University of Missouri-Kansas City

Joseph Pacheco, Northwest Missouri State

Alyssa Morse, Missouri State

Brandon Brewer, Washburn University

Kate Swain, Kansas State University

Areas of Clinical Research

Children's Mercy has been conducting clinical investigations since its inception more than 100 years ago. We have participated in industry-sponsored clinical trials for more than 25 years. During this time, we have worked with nearly 60 top pharmaceutical sponsors in the areas listed below.

Acid Reflux Disease
Adrenal Gland Disorders
Allergies and Allergic Rhinitis
Anemia
Anti-Emetic Therapy
Anti-Fungal Treatment
Antigen Challenge Testing
Asthma
Attention Deficit Hyperactivity Disorder
Autism
Bladder Disorder
Bone Marrow Transplant
Bronchiolitis
Catheter Flow
Childhood Cancers
Chronic Abdominal Pain in Children
Chronic Lung Disease
Chronic Pain
Coagulation Disorders
Constitutional Delay of Growth & Puberty
Cystic Fibrosis
Cytogenetics
Device Studies
Diabetes Mellitus Types I & II
Diagnostic Imaging
Diagnostic Kits
Dialysis
Dietetics
Digestive Disorder
Drug Metabolism
Dyspepsia
Eczema
Endocrinology
Epilepsy
Fecal Retention
Gender Differences in Systemic Lupus
Genetic Disease
Genetics
Genotyping
Glaucoma
Graft vs. Host Disease
Growth Factors
Growth Hormone Deficiency
Gynecomastia
Hemophilia
Hepatitis
Hormone Deficiency
Hypertension
Ideopathic Nephrotic Syndrome
Immune Tolerance Induction
Infectious Diseases
Influenza
Intra-Ocular Lens
Iron Metabolism
Irritable Bowel Syndrome
Juvenile Rheumatoid Arthritis
Lymphomas
McCune Albright Syndrome
Meningitis
Metabolic Disorders
Migraine
Muscular Dystrophy
Neonatal Nutrition
Obesity
Organ Transplantation
Otitis Media
Pain Treatment, Post Surgical
Partial Liquid Ventilation
Pharmacogenetics
Pharmacokinetics
Pneumonia
Psychiatry and Behavioral Disorders
Pulmonary Disease in Critical Care Patients and Newborns
Pulmonary Hypertension in Newborns
Quality of Life Scale
Rehabilitation & Physical Therapy
Renal Disease
Renal Transplantation
Respiratory Disease in Newborns
Respiratory Tract Infections
Sedation in Critical Care Patients
Seizure Disorder
Sepsis
Sickle Cell Disease
Skin and Soft Tissue Infections
Turner Syndrome
Ulcerative Colitis
Visual Acuity

Patent and Licensure Overview & IRB

As our scientists and physicians continue their pursuit of medical and scientific knowledge, novel discoveries are unveiled and revealed. To protect these ideas, patents and licensing agreements are pursued to ensure the invention or technology is shielded from loss of intellectual property rights. Children's Mercy Hospital currently has more than 20 inventions that have been patented, are currently awaiting patent approval or are under protection by other means.

The research road from discovery to marketing a new product takes many years. During this time Children's Mercy Hospital works with other constituents and consulting firms to assist us with the marketing of these ideas which will further the inventor's vision of improving the lives of children. These companies come from different avenues... biotechnology, pharmaceutical, software and venture capital investments. With the growth of research at Children's Mercy Hospital, the growth of patents and future industry collaborations will continue to mature and develop.

A Vision for a Healthier Future

Our vision for creating a healthier future for all children encompasses the health, safety and general welfare of every child we see at Children's Mercy. As we approach research with a view for improving and advancing care for all children, we are always respectful of the patient's and family's present needs and wishes.

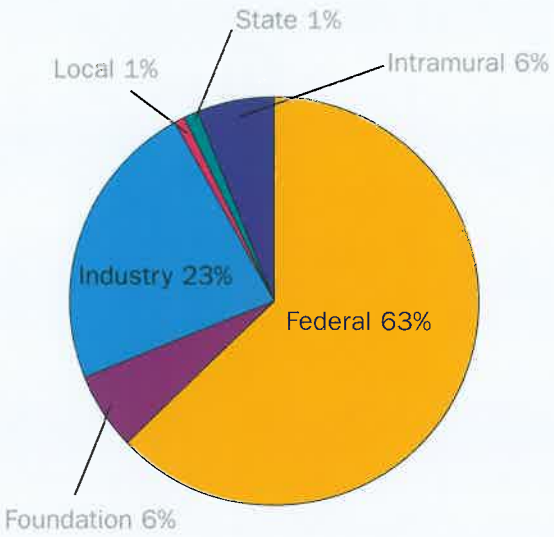
To ensure that the safety and welfare of children are always at the forefront, all research studies involving the participation of children are reviewed, approved and monitored by our multidisciplinary Pediatric Institutional Review Board (IRB). In 2006, the IRB approved 200 new studies and conducted 862 actions pertaining to ongoing studies and other research-related activities.

Additional protection of patient privacy rights also is afforded by the Office for Research Integrity (ORI), which serves as the primary office on matters relating to the protection of human research subjects, education for the responsible conduct of research, research misconduct, laboratory animal welfare, radiation, and bio-safety in research. The ORI functions to promote and assure the ethical conduct of research in conformance with federal regulations and institutional policies.

IRB Activity CY 2006:	
New Projects	200
Continuing Oversight	862
Total Reviews	**1,062**

Research Financials

Source of Sponsored Research Funds - 2006



Publications and Presentations

198 peer journal articles

41 book chapters

177 posters, abstracts, presentations and other

416 - Total for 2006

Visit our Web site at www.childrensmercy.org/research for additional information and complete listings of publications and presentations.

Research Expenditures from External Funding

	2006
Federal	*5,107,282*
Foundation	*508,387*
Industry	*1,871,145*
Local	*122,380*
State	*88,759*
Intramural	*480,778*
Total	*$8,178,731*

Endowed Chairs

The Marion Merrell Dow/Missouri Chair in Medical Research
Gregory L. Kearns, PharmD, PhD
Est. 1995

The Joseph Boon Gregg/Missouri Chair in Pediatric Cardiac Surgery
Gary Lofland, MD
Est. 1997

The William R. Brown/Missouri Chair in Medical Genetics and Molecular Medicine
Merlin Butler, MD, PhD
Est. 1997

The Dee Lyons/Missouri Chair in Pediatric Immunology Research
Lanny Rosenwasser, MD
Est. 1998

The Thomas Holder-Keith Ashcraft Chair in Pediatric Surgical Research
Vacant
Est. 2000

The Sosland Chair in Neonatal Research
William Truog, MD
Est. 2001

The Marion Merrell Dow Chair in Pediatric Pharmacogenomics
J. Steven Leeder, PharmD, PhD
Est. 2002

The Joyce C. Hall Endowed Chair in Pediatrics
Kevin J. Kelly, MD
Est. 1967

The Katharine B. Richardson Chair in Pediatric Surgery
G. Whitfield Holcomb III, MD
Est. 1973

The Jerry A. Smith Chair in Pediatrics
Robert T. Hall, MD
Est. 1985

The Dr. Rex and Lillian Dively Chair in Pediatric Orthopedic Surgery
Bradley Olney, MD
Est. 1989

The Ernest L. Glasscock, MD, Chair in Pediatric Education and Research
Stanley Hellerstein, MD
Est. 1990

The Marion Merrell Dow/Missouri Chair in Pediatric Clinical Pharmacology
Vacant
Est. 1995

Research Council Members

Randall L. O'Donnell, PhD
President and CEO
Research Council Chairman

Kim Brown
Director, Audit and Advisory Services

V. Fred Burry, MD
Executive Vice President
Executive Medical Director
Professor of Pediatrics, UMKC

Cathy Carroll, PhD
Director, Patient Care Services Research
Chair, Hospital Education and Research Committee

Karen Cox, RN, PhD
Executive Vice President, Patient Care Services
Co-Chief Operating Officer
Assistant Dean for Clinical Partnerships, UMKC School of Nursing

Andrea Gaedigk, PhD
Pediatric Pharmacology and Medical Toxicology

Joe Galeazzi
Vice President, Medical Administration

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Chairman, Department of Medical Research

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Pediatrician-in-Chief
The Joyce C. Hall Endowed Chair in Pediatrics
Professor and Chair, Department of Pediatrics
Associate Dean, UMKC School of Medicine

Carol Kemper, RN, MSN, CPHQ
Senior Director, Quality Management

Gary Pettett, MD
Chairman, Institutional Review Board
Director, Office of Research Integrity
Associate Dean, Academic Affairs, UMKC School of Medicine
Professor of Pediatrics, UMKC

William E. Truog, MD
The Sosland Endowed Chair in Neonatal Research
Director, Neonatology Fellowship Program
Chair, Medical Staff Research Committee
Professor of Pediatrics, UMKC

Bradley Warady, MD
Nephrology Section Chief
Director of Dialysis and Transplantation
Professor and Vice-Chair, Department of Pediatrics, UMKC

Hospital Overview

Children's Mercy continues to grow in reputation and in service. During 2006, we provided 277,667 outpatient visits, 115,718 emergency and urgent care visits, 15,711 surgical procedures and 14,046 inpatient admissions.

CHILDREN'S MERCY HOSPITAL

- 260 licensed inpatient beds
- More than 40 pediatric subspecialty clinics
- Inpatient and outpatient surgery
- Area's only Level I Pediatric Trauma Center
- 60-bed Level IIIc intensive care nursery
- Pediatric intensive care unit
- Neonatal and pediatric critical care transport services
- Liver, kidney, and blood and marrow transplant programs
- More than 48,000 square feet of dedicated research space

CHILDREN'S MERCY SOUTH

- Pediatric subspecialty clinics
- Outpatient surgery
- 54 beds on two inpatient units
- Radiology
- Laboratory
- Urgent Care Center

CHILDREN'S MERCY NORTHLAND

- Pediatric subspecialty clinics
- Urgent Care Center
- Radiology
- Laboratory

CHILDREN'S MERCY WEST CORDELL D. MEEKS, JR. CLINIC

- Primary care pediatric practice in underserved area of Wyandotte county
- Opening August 2007

OTHER

- Children's Mercy Home Care is the region's only pediatric home care provider
- Our three primary care clinics offer routine medical care for tens of thousands of children and teens in the Kansas City metropolitan area
- More than 20 outreach clinics in 10 cities throughout Missouri and Kansas extend the reach of our services to children throughout the region

Acknowledgements

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Children's Mercy Hospitals and Clinics
Randall L. O'Donnell, PhD, President and CEO

V. Fred Burry, MD, Executive Medical Director and Executive Vice President
Professor of Pediatrics, University of Missouri-Kansas City School of Medicine

Medical Research
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Office of Research Integrity
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Kathy Johnson, RN, Manager

Department of Pediatrics
Kevin J. Kelly, MD, Pediatrician-in-Chief
Joyce C. Hall Distinguished Professor of Pediatrics
Professor and Chair, Department of Pediatrics
Associate Dean, University of Missouri-Kansas City School of Medicine

Amy Leavell, Administrative Assistant

Patient Care Services
Karen Cox, RN, PhD, Executive Vice President and Co-Chief Operating Officer
Assistant Dean for Clinical Partnerships, University of Missouri-Kansas City School of Nursing

Sally Bailey, Administrative Assistant

Community Relations
Shawn Arni, Director of Marketing

Ruth Dubyel, Physician Marketing Coordinator

We also acknowledge the researchers, physicians, nurses, other health care professionals and staff of Children's Mercy Hospitals and Clinics for their support of a research environment and their commitment to providing world-class pediatric care to all children. Special thanks also to the donors, corporations, government agencies and civic leaders that have demonstrated their support of our research and improving medical care for all children.

For more information, contact:
Community Relations: (816) 346-1371
Medical Research: (816) 234-3961
Web Site: www.childrensmercy.org/research

2006 Research Annual Report: Creating a Healthier World for Our Children

www.childrensmercy.org

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ANCC MAGNET RECOGNITION

In Academic Affiliation with University of Missouri-Kansas City School of Medicine.

AA/EOE