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Discovery

Childhood Cancer Treatment and Brain Development

By Jan Rosemergy



COURTESY OF MONROE CARELL, JR. CHILDREN'S HOSPITAL AT VANDERBILT

Stress is the focus of Bruce Compas's research program—and it's difficult to imagine many things more stressful than a child having cancer. More children are surviving than ever before, but there's evidence that the aggressive treatments necessary to save lives are affecting children's long-term cognitive development. Compas is working with other Vanderbilt Kennedy Center researchers to investigate the effects of cancer treatment on cognitive function, to understand the processes underlying neurocognitive effects, and to develop interventions to ameliorate those effects.

Compas, Ph.D., is Patricia and Rodes Hart Professor of Psychology and Human Development and professor of pediatrics.

Cancer is a wide range of diseases with varied prognoses. In children, a common form is leukemia, in which cancer cells are formed in the bone marrow and appear in the bloodstream. Also common are solid tumor cancers, e.g., of the bone or brain. Survival rates have improved dramatically. For example, in leukemia, the survival rate has improved from about 50% to 80-90% in the last 15 years, Compas said.

Earlier, Compas studied stress in adults receiving cancer treatment. In a meta-analysis of studies of effects of chemotherapy on cognitive function in adults, he found that significant effects were demonstrated in roughly 20 different studies. Now Compas is working with researchers in the Vanderbilt-Ingram Cancer Institute and the Vanderbilt Institute of Imaging Science to investigate the effects of pediatric cancer treatment on neurocognitive function.

Continued on page 2

Reading & Down Syndrome

By Courtney Evans Taylor

The field of special education is divided about whether students with Down syndrome are able to benefit from phonics-based reading instruction, arguably the most effective method to teach reading. Some research has suggested that these children are incapable of developing phonological awareness and are better served by "sight word" approaches. Though this view is commonly held, many claim that the effectiveness of auditory approaches has not been adequately tested, and that there are few comparative studies.



FAM GRU

Explorers Unlimited campers made progress learning to read in a pilot research study using a phonics instructional approach.

This summer, a pilot study was conducted at the Vanderbilt Kennedy Center for Excellence Explorers Academic Camp to test the effectiveness of phonics-based reading instruction for 10 campers with Down syndrome, ages 7-16. The project was funded by a Hobbs Discovery Grant. *Continued on page 3*

Director's Message

National Summit on America's Children



Pat Levitt, Ph.D.

VKC Director Pat Levitt was invited by U.S. House of Representatives Speaker Nancy Pelosi to address House members during the National Summit on America's Children, May 2008. Excerpts of his testimony follow.

As scientists, we are working to understand the neuroscience behind the remarkable abilities that children develop, and to identify the most powerful influences on building brain architecture that are responsible for skill development and productivity over a lifetime. *Continued on page 3*

Childhood Cancer Treatment from page 1

Led by doctoral student Laura Campbell, Compas and colleagues recently published a second meta-analysis establishing the pronounced effects of cancer treatments on children's neurocognitive function.

Treatment and Cognition

Longitudinal studies of children with brain tumors show that treatment not only affects cognitive function during treatment but also results in continued decline in long-term survivors.

"Surprisingly, there also is a demonstrable effect on brain function in children with leukemia," Compas said.

In leukemia, survival rates increased after clinicians developed intrathecal chemotherapy, in which powerful drugs are injected into the cerebral spinal fluid in order to protect the brain and spinal fluid from cancer cells.

"The downside is that it has a significant effect on the development of brain tissue and on children's cognitive function," Compas said.

A related treatment issue is the delivery of high doses of synthetic steroids, which help manage side effects of chemotherapy as well as growth of cancer cells. A separate line of research has shown that natural steroids, in particular cortisol, are produced at high levels in people who are chronically stressed. Findings indicate that high levels of cortisol over prolonged periods have adverse effects on brain development and function.

"If synthetic steroids at high doses are being administered directly to the brain, that may be as much the culprit as chemotherapy in adversely affecting cognitive function," Compas suggested.

The largest national study of the long-term effects of treatment is the Childhood Cancer Survivorship Study (CCSS), a 13-year multi-institutional collaboration.

"Children survive, but they struggle with academic performance and later with work and stressors of daily living," Compas said. "We think one of the reasons is the adverse cognitive effects of treatments."

Understanding the Neurobiology

Compas is trying to determine whether the regions of the brain affected by chemotherapy are the very regions that help persons manage emotions and cope. His goal is not only to understand and manage the cognitive effects of pediatric cancer treatment but also to better understand how the brain functions in coping with stress.

With funds provided by the Vanderbilt-Ingram Cancer Institute, Compas and colleagues, including psychologists Deborah Van Slyke and Frances Niarhos from the Department of Pediatrics, are investigating the neurocognitive function of pediatric leukemia survivors, compared with matched healthy children. Included are



Bruce Compas, Ph.D.

neuroimaging studies to explore where, how, and to what extent brain regions are affected by chemotherapy.

The studies focus on "executive functions"—higher-order, complex thinking and emotion management that require the integration of more basic cognitive functions. The underlying neurobiology of executive function develops during adolescence and continues into early adulthood.

One hypothesis is that chemotherapies cause adverse neurocognitive effects by affecting the growth of neurons, or by causing cell death. Another hypothesis is that treatments are affecting cell myelination—the coating of neurons with a myelin sheath produced by glial cells, making cells more efficient and improving cognitive processing. Continued myelination is thought to be important in the development of executive function. The unique property of chemotherapies is that they identify and kill any rapidly growing cell.

"If glial cells are growing and functioning all the way through adolescence, potentially those cells are getting clobbered by chemotherapy at the same time that synthetic steroids may be affecting grey matter," Compas said.

Pilot Neurocognitive Studies

Compas and Campbell recently completed neurocognitive testing on about 30 pediatric cancer survivors and a matched group of healthy children. Once again, cancer survivors showed problems in neurocognitive function.

Now Compas and Adam Anderson, Ph.D., associate professor of biomedical engineering and radiology, along with doctoral students Kristen Robison and Erin Rodriguez and undergraduate Honors student Kate Livesay, are using brain imaging methods to investigate neurocognitive function in 12 cancer survivors with poor cognition and 12 matched healthy children.

Children do tasks involving aspects of executive function while their brains are being scanned, using functional magnetic resonance imaging. Included are working memory and inhibition tasks, both of which also provide insight into stress management.

A third task explicitly targets coping with stress. Participants are shown an emotionally arousing

video clip and then are instructed to think about it in a different way. Compas expects that children with typical cognitive function will be able to reappraise the clip in a way that is calming, while cancer survivors may show impairment in emotion management.

The brain imaging studies also include measures of cell myelination and connectivity among brain regions, using diffusion tensor imaging.

"Having a great imaging science institute with cutting-edge technology allows us to pose important clinical questions, which they have the expertise to help us answer," Compas said. "It's a great collaboration."

Related Studies

One of the most difficult things a parent faces is communicating a cancer diagnosis to a child and the possibility of dying. Building on work supported by a VKC Discovery Grant, Compas has received a 5-year grant from the National Cancer Institute with the goal of helping families communicate and cope. VKC investigators Meg Saylor, Ph.D., assistant professor of psychology, and Mary Jo Gilmer, Ph.D., associate professor of nursing, are collaborating with Compas.

"We're examining basic language development in the context of this very stressful life experience and then looking at how neurocognitive development may affect it," Compas explained.

A line of research with patients with dementia and aging adults provides evidence that regular aerobic exercise positively affects cognitive function and helps deter cognitive decline. Compas plans to test an exercise intervention for pediatric cancer survivors.

Ultimately, Compas and his colleagues are striving to develop better programs for children with cancer and their families to help them cope emotionally and to help rehabilitate the neurocognitive effects of treatment. At the same time, they are working to understand the neurobiology of stress and to develop effective clinical interventions.

Related Readings

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. (2001). Coping with stress during childhood and adolescence: Progress, problems, and potential. *Psychological Bulletin*, 127, 87-127.

Campbell, L. L., Scaduto, M., Sharp, W., Dufton, L., Van Slyke, D., Whitlock, J. A., & Compas, B. E. (2007). A meta-analysis of the neurocognitive sequelae of treatment for childhood acute lymphocytic leukemia. *Pediatric Blood and Cancer*, 49, 65-73.

Compas, B. E. (2006). Psychobiological processes of stress and coping: Implications for resilience in childhood and adolescence. *Annals of the New York Academy of Sciences*, 1094, 226-234. ●

Director's Message from page 1

The brain is built to serve its principal role as an information-gathering machine, making sense of information in the environment, allowing a person to respond appropriately.

All behavior, from learning and memory to mood and emotions, is mediated through the brain. You don't use your liver to learn, and you don't use your heart to fall in love. All of that resides in brain architecture. "Brain architecture" describes how billions of nerve connections organize to perform skills and functions.

Message #1: Both genes and environment play an enormous role in building brain architecture. Nerve cells communicate through use of chemicals called neurotransmitters, and this brain chemistry is assembled by an interaction of both genes and the environment. Unlike the BBQ grill, brain architecture and chemistry do not come fully assembled in the infant. The experiences of a child greatly influence the assembly process, which is initiated prenatally.

Message #2: Brains are built over time and are shaped by powerful events in our children's environment. We know from animal studies, for example, that severe stress in early childhood, or deprivation, causes impaired brain development and reduced nerve connections. This process has parallels in children.

The foundation for skill development is brain architecture, which is laid down early, in the mother's womb. Genes play a major role in laying the foundation, somewhat like the basic plans for a house. Like connecting houses in a neighborhood via phone lines to communicate with each other, the long cables that interconnect brain areas that are specialized to perform specific tasks are formed. Thus, the eye connects to the brain centers that allow us to see, and those brain centers begin to connect with other centers that provide *meaning* to what we are seeing.

Message #3: While genes play an important role in the early processes of brain development, they are greatly influenced by mom's health and nutrition. Even if all is well in establishing the basic architecture, it by no means is the end.

Message #4: A child's brain requires experiences to mold brain architecture and to modify brain chemistry to complete development. Nerve cells begin to make basic connections and grow them at astronomical rates. While this begins in the last trimester, the vast majority of nerve connections,



called synapses, are built in the first 3 years of life, at a rate of 700 connections per second.

During the first 3 years, the brain overproduces connections. Like in a garden in which you plant extra seeds to have a better chance for some to flower, pruning allows the strongest to flourish. In the brain, *experience* helps sculpt mature connections by strengthening those that are used most effectively and eliminating those that are inefficient.

The building of connections, like skills, must occur by establishing the most fundamentally sound architecture able to handle the world's complex challenges. Early experiences are powerful because

they are used by the infant/toddler brain to incorporate information from the outside world, which is used to continue the building process. These experiences change the brain's architecture and even its chemistry. My own basic research has shown that disrupting the environment in which animals are raised not only increases their risk for developing severe anxiety as adults, but also permanently changes brain chemistry essential for continued brain wiring.

Message #5: The development of physical and cognitive skills depends upon the healthy development of our emotional and social brain circuits. The most effective learning takes place in a social context. High-quality learning experiences go hand in hand with *positive* relationships for young children. The part of our brain responsible for making complex decisions, the frontal lobe, continues to develop through puberty, whereas our circuitry that oversees our five senses are mature as toddlers.

Message #6: Earlier is better than later. Providing positive environmental experiences and reducing detrimental ones are the most effective and least costly means for promoting healthy brain architecture and early childhood development. The brain does not pay attention *only* to positive experiences. Negative experiences can be just as powerful in sculpting brain architecture and strengthening synapses, because these circuits may be needed for survival.

Message #7: For the most part, there are no absolute timeframes of "critical periods" outside of which learning and change cannot take place, but our ability to learn new things, or to change well-established habits, is difficult to remediate. Even if one can effect some change in brain architecture to improve a skill or eliminate a problem, the currency needed to impact change is far greater, and the impact will be far less robust than providing the healthiest experiences early, when the brain is primed for the best that we can provide. ●

Reading from page 1

Co-principal investigators were professors of special education Doug Fuchs, Ph.D., Paul Yoder, Ph.D., Lynn Fuchs, Ph.D., Donald Compton, Ph.D., and Robert Hodapp, Ph.D., along with Chris Lemons, doctoral student and project coordinator.

The study spanned 6 weeks and consisted of 30 hours of 1-to-1 tutoring for each camper. A second group of 20 students with Down syndrome will receive tutoring this fall.

"This pilot study has several goals," said Lemons. "First, it asks if phonics is a feasible approach. Second, it looks at what kind of growth these students have over the course of the study. Third, it asks if there are certain characteristics the students have prior to the intervention that predicts their growth over time in relation to the intervention."

A typical day of tutoring at the camp consisted of two 30-minute sessions. In the first session, the

camper and tutor worked on blending and segmenting (hearing the sounds in words and saying them). They played a game "Guess My Word" and then received direct instruction on hearing the sounds that letters make.

Next, the tutor and camper looked at words, sounded them out, and then blended the sounds of the words and read them quickly. This was followed by another round of "Guess My Word," as well as word-reading exercises.

In the second daily 30-minute session, campers reviewed letter sounds and decodable words learned in the first session and tried to read a story.

Preliminary data on the first 10 students indicated improvements in reading abilities.

"The kids left knowing more letter sounds and more words," Lemons reported. "There is reason to be optimistic that the intervention works. In terms of phonological awareness skills such as segmenting (being able to say each of the sounds in a word) and blending (combining sounds to say the word), many students showed improvements."

Speech and articulation also appear to have improved. Some parents reported that their children's speech therapists observed more rapid growth. Many parents reported that their children have been looking at books and attempting to read words more often. This feedback serves as anecdotal evidence that the campers' interest in reading is improving.

Although this study will be the largest on this subject in the research literature, Lemons, Fuchs, and colleagues hope to do a larger study comparing sight word versus phonics-based approaches. Eventually, this group hopes to do a study of Aptitude by Treatment Interaction (ATI) to better tailor the reading interventions to students with Down syndrome.

"You have to teach kids in different ways depending on what they bring to the table," Fuchs said. "The pilot study is a modest study. It's not the kind of ATI study that we would like to do someday, but it's a building block."

For information, contact Gretchen Herbert, (615) 322-8529, x. 3. ●

Vanderbilt Kennedy Center for Excellence in Developmental Disabilities

Training Opens the Disability World to Students

By Nick Williams

At the heart of any university's mission is the training of students, the next generation of professionals in a variety of fields. Through the Vanderbilt Kennedy University Center for Excellence in Developmental Disabilities (VKC UCEDD), students from a wide range of university disciplines are gaining new exposure, awareness, and skills in working with persons with disabilities and their families.

The emphasis of most such training is the VKC UCEDD's expanding program of preservice training. Preservice training programs involve college students who are formally enrolled in degree granting programs. Regardless of whether students are at the undergraduate, graduate, or postdoctoral level, their experiences with individuals with disabilities and family members provide life-changing perspectives. Moreover, their activities assist the UCEDD in realizing its mission to improve the lives of people with developmental disabilities.

Incorporating UCEDD training into academic curriculums is an effective way to introduce positive change into the community. To the students, it offers exposure to the issues that people with disabilities face, and gives them an awareness of how small changes can make a big difference in people's lives.

"Everybody wants to be loved, have a job, have their own space, have control over their lives, and have a good quality of life. That's what we're aiming at. That's how we develop our programs," explained Terri Urbano, Ph.D., M.P.H., R.N. Urbano is the director of training at the VKC UCEDD. She chairs the Interdisciplinary Training Council, which includes the principal investigators of major training programs associated with the Vanderbilt Kennedy Center.

Preservice trainees represent disciplines as diverse as adult medicine, pediatrics, nursing, psychology, psychiatry, special education, human and organizational development, occupational health, and related disciplines.

Community Health Nursing

The Community Health Nursing rotation at the Vanderbilt Kennedy Center is one of a variety of programs in and around Nashville in which nursing students from the Vanderbilt School of Nursing can log clinical experience hours to meet their nursing school requirements.

During the rotation at the Vanderbilt Kennedy Center, each student is introduced to a family who has a member with Down syndrome. They visit the family's home three times.



Vanderbilt School of Nursing student Amanda Ruiz and Edward Nesbitt work on a health education activity at Camp Shriver.

They converse with the family and ask questions in order to compose a family assessment, an initial phase of the nursing process that assesses the specific needs of the patient. In this case, the students are taught to consider the patient to be the family as a whole.

"They need to understand the impact that a disorder or disease has on the whole family and on someone's life," Urbano explained, "and how you can help that individual and family to have as normal a life as possible."

After completing the visits, the students design intervention plans for the families. The plans address the issues highlighted in the family assessments by providing information and resources.

Katie Beesley, a first-year nursing student at the Vanderbilt School of Nursing, did a rotation at the Vanderbilt Kennedy Center.

"This was a really good learning experience for me," she said, "because I really hadn't worked with very many people with disabilities."

In their second semester's experience, nursing students worked with youth and young adults with developmental disabilities who participated in Camp Shriver Transitions and Sports Camp, a VKC UCEDD summer camp. The camp included experiences related to health and fitness, educational interventions, sports, and job skills.

Access Nashville

"What is interesting from the UCEDD perspective is that for many students, this is a degree of exposure that opens their eyes to new things that they had never before thought about," said Dr. Robert Hodapp, Ph.D., professor of special education, co-director of the VKC Family Research Program, and VKC UCEDD director of research.

Hodapp is one of several professors in nursing, special education, and psychology who recently have required students to participate in Access Nashville, a VKC UCEDD program that provides accessibility awareness and training so that persons who use wheelchairs or persons who have other disabilities can make comfortable choices about where to dine in Nashville.

Hodapp has included Access Nashville in the coursework of his Family Intervention class, a course that explores some of the common issues that families with disabilities face. A large issue, Hodapp explained, is that families are not able to find out where they are able to go or what they are able to do when they want to go out into the community.

Founded 3 years ago by the Tennessee Council on Developmental Disabilities and a number of community organizations, Access Nashville makes accessibility information for local restaurants more available to those who need it. Participants are trained to go to local restaurants and complete an accessibility survey. In exchange, the owners are offered Braille menus, free advertising, and disability awareness training. Upon receiving permission, the surveys are completed and posted on the Access Nashville website (www.accessnashvilleonline.org), which is linked from the Accessibility page of the Nashville Convention and Visitor's Bureau website.

In previous years, Access Nashville trained volunteers at community service events, but now it exclusively focuses on training college students from nearby universities.

Carole Moore-Slater, M.S., UCEDD co-director of community service and technical assistance and Tennessee Disability Pathfinder director, helped found the program. She now conducts the Nashville training sessions. Moore-Slater notes that incorporating the training into the academic setting is less expensive, more time-efficient, and provides the program with more trainees.

"It's great hands-on experience for the college students," Moore-Slater said. "The response from the students has been amazing. It really makes sense because they're going to be the ones who improve the laws, change the building codes, and advocate in the community." (Access Nashville website: kc.vanderbilt.edu/accessnashville)

That is what preservice training is all about—exposing university students to the world of disabilities, helping them gain a greater awareness of the needs, and providing the knowledge and skills to make a difference in people's lives. ●



Treatment and Research Institute for Autism Spectrum Disorders

Understanding Dietary Supplements for ASD Treatment

By Dana Christina

Parents of children with autism spectrum disorders (ASD) often face the question of whether or not they should give their child over-the-counter vitamins or dietary supplements. More than 30,000 products are currently available without a prescription, and approximately 1,000 new products are introduced each year.

Given the number of available products, it is quite difficult to evaluate the potential impact that each drug or supplement may have on a child with ASD. At the same time, the possibility that there might be value in adding vitamins and supplements to children's diets is a strong drive in the growth of this market.

"The question of which supplements are effective, and in what doses, can only be answered by understanding metabolic processing in persons with ASD," said BethAnn McLaughlin, Ph.D., assistant professor of neurology.

Scientists have solid evidence that diet can significantly impact brain development. For example, prenatal vitamins are the standard of care for pregnant women, in part to ensure that women



have the folic acid necessary for the development of the baby's spinal cord and brain.

On the other hand, many of these products are expensive, not subject to the same standards as over-the-counter medicines, and can do harm in some people.

Although it is clear that diet and nutrition are critical for appropriate development, there is less scientific evidence that dietary supplements provide an "added benefit" to a healthy lifestyle.

One type of dietary supplement that has received attention recently is designed to reduce "oxidative stress." Oxidative stress, or production of damaging products of inefficient metabolism, occurs to some extent in all people, but it can be exacerbated in some diseases or disorders. Supplements that alter the way cells deal with oxidative stress include omega-3 fatty acids, Vitamin E, and ascorbate.

McLaughlin is conducting a study to determine if oxidative stress contributes to autism spectrum

disorders. This study will examine the metabolic processing in cells of children with and without ASD to determine if these responses are altered by environmental stress.

McLaughlin is heading a team of researchers from Vanderbilt Kennedy Center, TRIAD, and the Departments of Neurology, Pediatrics, Dermatology, and Radiology and Radiological Sciences in this effort. Researchers will collect skin cells from children with ASD to learn how these cells produce and maintain energy.

"Although these experiments are very preliminary," McLaughlin said, "Vanderbilt has an excellent research infrastructure, and we have a great team to help identify biological markers of autism that will lead to improved therapeutic techniques."

For this study, researchers are currently recruiting children with autism spectrum disorders between the ages of 4 and 12 years who do not have epilepsy, Down syndrome, or other diagnosed neurological conditions. Over the course of up to four visits, patients will be prescreened for various medical conditions and evaluated for ASD by a TRIAD psychologist, after which a small skin sample will be taken by a dermatologist. Parents interested in this research may contact the Vanderbilt Autism Research line at (615) 322-5840. ●

Insistence on Sameness in ASD

By Craig Boerner

VKC autism researcher James Sutcliffe, Ph.D., has received a subproject within the new Autism Center for Excellence (ACE) in the Midwest led by the University of Illinois at Chicago (UIC; Edwin Cook, M.D., UIC ACE director) and funded by a 5-year grant from the National Institute of Child Health and Human Development.

The UIC is one of five centers receiving funds in 2007 to study autism spectrum disorders (ASD). The Midwest Center will focus on investigating the underlying causes of and potential treatments for an insistence on sameness, a common behavioral feature seen in autism that is part of a broad pattern of repetitive-restricted behaviors.

The UIC ACE will focus on genetic factors, brain chemicals, and brain functions that could account for the repetitive behaviors and will test to see if genetic differences influence how individuals respond to certain

medications intended to reduce these behaviors.

Sutcliffe, Vanderbilt associate professor of molecular physiology and biophysics and psychiatry, will collaborate with Cook and his team by studying the role of common and rare alleles in genes that encode the (neurotransmitter) serotonin system in autism. Previous research has shown that selected serotonin reuptake inhibitor medications, also known as SSRI drugs, are effective and can dramatically improve quality of life in some persons with repetitive behaviors or obsessive compulsive disorder.

The project and core principal investigators funded under the UIC ACE are Cook, John Sweeney, Michael Ragozzino, Thomas Owley, Robert Gibbons, Bennett Leventhal, and Jeff Salt at UIC; Sutcliffe at Vanderbilt; and Nancy Cox at University of Chicago.

For information on taking part in the Vanderbilt subproject, contact amy.g.nicholson@vanderbilt.edu, (615) 343-9648. ●

APRIL 22, 2008

**MARI Scientific Symposium
Environment and Autism Etiology**

8:30 a.m.-6:30 p.m.

Vanderbilt Student Life Center

The Marino Autism Research Institute announces a day-long symposium to discuss the role of environment in increasing autism risk and impacting the diversity of behavioral and medical symptoms. Basic scientists, clinicians, and trainees are encouraged to attend. To register or to submit poster proposals, see kc.vanderbilt.edu/kennedy/marisymposium.

Participant Notice: This symposium is a scientific conference for basic researchers, clinicians, and graduate and postgraduate trainees. Participants will be required to have academic or institutional affiliation as a part of registration. Given the interest by community members, families, and media in this topic, the VKC will make a webcast of the symposium available online, will disseminate a meeting summary, and will work with media to provide expert opinion and commentary.

Leading the Vanguard of Discovery



ROGER COLBRAN, PH.D.

Professor and Interim Vice-Chair of Molecular Physiology and Biophysics
Vanderbilt Kennedy Center Investigator
Joined Vanderbilt Kennedy Center 2000

Research Interests

A wide range of neurological and psychiatric disorders involve alterations in synaptic communications, particularly at excitatory synapses that use glutamate as the neurotransmitter. These alterations include changes in the activities of postsynaptic neurotransmitter receptors and ion channels that mediate synaptic communication, as well as defects in the architecture/morphology of neuronal dendrites. We are interested in understanding the fundamental biochemical processes that control synaptic communication and morphology, and how these mechanisms go awry in disease states. Our focus is the role of calcium in controlling phosphorylation of synaptic proteins with key roles in these processes. Ongoing studies revolve around the unique biochemical properties of calcium/calmodulin-dependent protein kinase II in neuronal dendrites. We are investigating the mechanisms that allow this abundant protein to discretely regulate individual neuronal synapses, and how these processes are disrupted in disease states that span early development to aging individuals, including conditions such as intellectual disability, autism, schizophrenia, and Parkinson's disease.

Principal Investigator

- Mechanisms of CaM kinase II signal transduction, National Institute of Mental Health
- Modulation of dendritic CaMKII by dopamine, National Institute of Neurological Disease and Stroke

National Service and Awards

- Established Investigator of the American Heart Association, 1994-1999
- Editorial Board, *Journal of Biological Chemistry*, 1995-1999
- Reviewer of research and/or fellowship grants for National Institutes of Health, National Science

Foundation, Veterans Administration, Howard Hughes Medical Institute International Research Scholars, Medical Research Council (United Kingdom), Biotechnology and Biological Sciences Research Council (United Kingdom), German-Israeli Foundation for Scientific Research and Development, National Parkinson Foundation.

Selected Publications

- Sikes, S., Honse, Y., Lovinger, D. M., & Colbran, R. J. (2005). CaMKII enhances the desensitization of nr2b-containing NMDA receptors by an autophosphorylation-dependent mechanism. *Molecular Cellular Neuroscience*, 29, 139-147.
- Brown, A. M., Deutch, A. Y., & Colbran, R. J. (2005). Dopamine depletion alters phosphorylation of striatal proteins in a model of Parkinsonism. *European Journal of Neuroscience*, 22, 247-256.
- Robison, A. J., Bass, M. A., Jiao, Y., MacMillan, L. B., Carmody, L. C., Bartlett, R. K., & Colbran, R. J. (2005). Multivalent interactions of calcium/calmodulin-dependent protein kinase II with the postsynaptic density proteins NR2B, Densin-180 and -actinin-2. *Journal of Biological Chemistry*, 280, 35329-35336.

Education

B.S., 1982, Biochemistry, University of Bristol, United Kingdom

Ph.D., 1986, Biochemistry, University of Newcastle, United Kingdom

Attraction to Developmental Disabilities Research

Developmental problems during differentiation and maturation of the brain result in some of the most heartbreaking disabilities in modern society. The precise molecular basis for most developmental diseases of the brain is not well understood, despite robust efforts from many investigators in recent years that have identified key molecular players. We hope that our studies will illuminate the basic mechanisms underlying these processes, suggesting novel therapeutic approaches to prevent, or at least ameliorate, the devastating symptoms of developmental disabilities.

Reasons for Kennedy Center Membership

Traditional unidisciplinary approaches struggle to identify and correct problems associated with many developmental disabilities. The complexity of these diseases demands multidisciplinary approaches that integrate the efforts of talented investigators using a broad array of techniques and approaches. The Vanderbilt Kennedy Center is among the leading examples in the nation of approaches to fostering interactions among the many schools and departments that comprise the Vanderbilt neuroscience community. I am delighted to be surrounded by this diverse collection of successful and collegial investigators with common overall interests. ●

VKC Joins Rare Diseases Network

By Courtney Evans Taylor



The Vanderbilt Kennedy Center has joined the National Institutes of Health Rare Diseases Clinical Research Network (RDCRN), a group of academic medical centers, patient support organizations, and clinical research centers dedicated to developing more effective and individualized treatments of persons with rare genetic disorders.

The VKC now serves as the site for the RDCRN consortium on Angelman and Prader-Willi syndromes. The site is directed by Marshall Summar, M.D., associate professor of pediatrics and molecular physiology and biophysics, who has wide-ranging experience working with pediatric patients with both syndromes.

Other key personnel include Elisabeth Dykens, Ph.D., professor of psychology, VKC associate director, and VKC UCEDD director, and Terry Jo Bichell, R.N., M.P.H., VKC visiting scholar. Dykens has done extensive research on Prader-Willi syndrome. Bichell is conducting research on educational interventions for children with Angelman syndrome.

The VKC site builds on active affiliations with the national family support organizations, the Angelman Syndrome Foundation and the Prader-Willi Syndrome Association USA. Initial plans are to enroll children and adults in the Natural History Studies for both syndromes, and eventually to enroll them in clinical trials for new treatments as they are developed and implemented.

Prader-Willi syndrome is a genetic disorder of the 15th chromosome. It is associated with severe overeating, obesity, and behavior problems, including compulsive behaviors. Many people with the syndrome also have unusual strengths in their abilities to solve jigsaw and word search puzzles, and in their personalities.

Angelman syndrome is a genetic disorder that causes developmental delay and neurological problems. Seizures often begin between 2 and 3 years of age. Most individuals with Angelman syndrome will have severe developmental delays, speech limitations, and motor difficulties. ●

Accolades



Edward Conture, Ph.D.

Edward Conture, Ph.D., professor and director of graduate studies for hearing and speech sciences, has been awarded the **Honors of the American Speech, Language and Hearing Association (ASHA)**. The Honors is ASHA's highest recognition. He also received the **2007 Distinguished Alumni**

Award of the Department of Speech Pathology and Audiology, University of Iowa. In addition to accepting the award, he presented "Developmental (Childhood) Stuttering: One Size (Explanation) May Not Fit All," which describes his recent research.

Ashley Coulter, disability resource specialist and activities coordinator for Tennessee Disability Pathfinder, earned the title of **Certified Information and Referral Specialist (CIRS)** at the Alliance of Information and Referral Systems (AIRS) Conference in Jacksonville, Florida, in May.

The Wayne County TN Early Reading First Program, a preschool program supported by **Dale Farran**, Ph.D., professor of education and psychology, and Mark Lipsey, Ph.D., director of the Center for Evaluation Research and Methodology, was included in the **U.S. Department of Education's "Doing What Works in Early Childhood"** series this fall. The series will be posted on the department's website at www.ed.gov. The Wayne County program brings research done at Vanderbilt and elsewhere into the classroom to improve reading instruction.

Melissa Fortson, information and referral specialist and program coordinator for Tennessee Disability Pathfinder, has been **elected secretary to the Board of Directors for the Tennessee Disability Coalition**. In addition to her duties as secretary, she also will serve on the Board's Executive Committee. She was a presenter at the **Tennessee Conference on Social Welfare** in April.

Steve Graham, Ed.D., Currey-Ingram Chair in Special Education, has authored a **meta-analysis of writing instruction for adolescent students** published as the lead article in the August issue of the **Journal of Educational Psychology**. The report, co-authored by Dolores Perin, Teachers College, Columbia University, and funded by the Carnegie Corporation of New York, outlines 11 strategies for improving adolescent writing instruction.

Craig Anne Heflinger, Ph.D., associate professor of human and organizational development (HOD), won the **Best Research Poster Award** at the annual meeting of the **National Association for Rural**

Health held in Anchorage, Alaska. The poster, prepared with Mike Pullmann, a graduate student in the Community Research and Action Program, was titled "Rural Determinants of Substance Use Referrals for Youth in Juvenile Justice" and was based on research funded by the National Institute on Drug Abuse. Heflinger and Robert Saunders, HOD research associate, were honored for "**Best Abstract**" submission in a section of the **Academy of Health 2007 Annual Research Meeting**.



Craig Anne Heflinger, Ph.D.

Vanderbilt Kennedy Center faculty and staff were **presenters at the Administrative Law Judges Special Education Training** held August 27-31. The training is geared toward judges assigned to hear cases addressing special education law and issues. Presenters were **Robert Hodapp**, Ph.D., professor of special education, co-director of the Family Research Program, and director of research for the University Center for Excellence; **Elizabeth Roof**, M.A., Vanderbilt Kennedy Center research coordinator; **Caresa Young**, M.A., coordinator of the Vanderbilt Kennedy Reading Clinic; and **Evan Lee**, Ph.D., associate professor of pediatrics and Vanderbilt Kennedy Center psychological assessment coordinator.

Carolyn Hughes, Ph.D., professor of special education, was named the **Spring 2007 Professor of the Semester** by the **Vanderbilt Panhellenic Council**.

Craig Kennedy, Ph.D., professor and chair of special education, and associate professor of pediatrics, has been **elected to the Board of Trustees for the Society for the Experimental Analysis of Behavior**, which oversees the publication of the *Journal of Applied Behavior Analysis* and the *Journal of the Experimental Analysis of Behavior*.



Craig Kennedy, Ph.D.

Elise McMillan, J.D., has been appointed **co-director for the Vanderbilt Kennedy University Center for Excellence on Developmental Disabilities (UCEDD)**. As the former UCEDD associate director and Vanderbilt Kennedy Center director of community outreach, McMillan has worked successfully for over a

decade with community and State partners to develop a host of programs that serve persons with disabilities and their families. The VKC was awarded the UCEDD in Fall 2005, funded by the Administration on Developmental Disabilities, U.S. Department of Health and Human Services.



Elise McMillan, J.D.

Dan Reschly, Ph.D., professor of education and psychology, **delivered the Annual Legends Award General Session address** at the annual convention of the **National Association of School Psychologists** held in New York City on March 29.

Several Vanderbilt Kennedy Center investigators contributed to the **International Association for Cognitive Education and Psychology (IACEP) 11th Biennial Conference** held in Knoxville, Tennessee, in July. **Dan Reschly**, Ph.D., professor of education and psychology, presented the keynote address "Improving Results in General, Remedial and Special Education with Response to Intervention." **David Lubinski**, Ph.D., professor of psychology and human development, presented the conference's second plenary address on the topic of mathematically precocious youth. **H. Carl Haywood**, Ph.D., professor of psychology, emeritus, and **Penelope H. Brooks**, Ph.D., professor of psychology, emerita, presented a 4-day preconference workshop, "Bright Start: Cognitive Curriculum for Young Children," first developed at the Susan Gray School. Haywood also gave a 4-hour mini-workshop on tests he has developed or translated and adapted for use in dynamic assessment. IACEP, comprising around 350 members in 18 countries, was founded in 1988 by Haywood and Marilyn Samuels, professor of psychology, University of Calgary.



Terri Urbano, Ph.D.

Mary Theresa (Terri) Urbano, Ph.D., M.P.H., R.N., clinical professor of pediatrics, director of training and health program for the University Center for Excellence, is a **reviewer for the Journal of Pediatric Nursing**.



Susan Gray School *Where Knowledge Meets Nurture*

Peabody College of Vanderbilt • Vanderbilt Kennedy Center

Volunteering—A Great Experience for All

By Courtney Evans Taylor



Liz Story

Volunteering at the Susan Gray School opens up worlds of possibilities. Each year, the School coordinates up to 60 volunteers who do anything from leading story time in the classrooms to running to the kitchen to retrieve milk. The volunteers come from a variety of backgrounds and age groups. Some are Peabody College Special Education graduate students. Others walk across the street from the University School of Nashville. Sometimes Susan Gray School graduates return to give back where they themselves received, and others still are siblings of current Susan Gray School students.

"We even get corporate volunteers from the community who come as a group to help us with a big project," noted Amy Jones, who coordinates volunteers at the School.

"Most people who come to volunteer initially tell us that they want to work with the children," said Tracy Tatum, office assistant at the School. "But we explain that anything they do for the School helps the children, and we have volunteer opportunities in many different areas. In addition to playing with the children, we use volunteers to help teachers prepare classroom materials to clean and refresh a classroom center. We use volunteers to help us in the kitchen and with the laundry. We've even had volunteers paint murals on our walls and help with keeping the School looking bright and cheerful."

Liz Story is a 19-year-old volunteer who started volunteering at the Susan Gray School when she was a senior at Nashville Christian High School. She loved it and the administrative staff loved and appreciated her so much that Liz was hired as a part-time employee after she graduated. She now works 10 hours a week and volunteers 10 hours a week as well.

"I split my time in different classrooms doing whatever the teachers in each classroom need," said Liz. "I also do the laundry and help get kids to sleep at naptime. That's one of the hardest jobs. They play this sleepy music, and I get so tired when I hear it that I want to take a nap!"

Liz knew she wanted to work with and for kids. She found the School through her mother, a Vanderbilt faculty member, and decided to volunteer and to explore her aspirations of becoming a teacher.

"It has been a really good experience, and it will look good on my college applications," said Liz. "People pay attention to these kinds of things. Volunteering and working here has been really good. It makes you feel good to know that you are helping."



Kyle Tatum

Kyle Tatum, age 11, began volunteering at the School after his mother, Tracy Tatum, the School's office manager, was ill for 2 months. During her recovery, Kyle proved to be quite the caretaker and developed an interest in becoming a paramedic. When his mother returned to work,

Kyle asked if he could come with her and be a summer volunteer because he wanted to learn more about helping people.

"I thought it was great that he wanted to volunteer," recalled Tatum. "I wanted to make this a formal learning experience for him, so I had him go through the interview process. I remember how nervous he was. He had been in and out of the School for years and knew the director, but he had never experienced an interview with her. He did well, though, and was formally accepted as a volunteer. I have been so proud watching him grow as a person. The other day I saw him in the hallway, and one of the little girls with a disability reached up and took his hand, and he held her hand, and they walked down the hallway together. What a precious moment for a mom!"

Kyle wears a walkie-talkie and a SGS staff t-shirt when he volunteers. Whenever a teacher needs something, the teacher can just call him on his walkie-talkie, and he will run for the milk, photocopy the lesson, or assist in getting a child to take a nap.

One child Kyle assists can be rambunctious at naptime, but Kyle has a way of helping him settle down and go to sleep.

"I would first help him lie down and get covered with a blanket," said Kyle. "Then I would pat him on the back to the beat of the music. I just kept doing that until he fell asleep."

When the summer ended, Kyle received a letter of recommendation from Ruth Wolery, Ph.D., the School's director, boasting of his efforts and successes while volunteering. He considers this to be an important perk.

"Kyle knows the letter is a great thing to have," Tatum said. "Kids his age usually don't last the entire summer. Many kids his age don't have an opportunity to have a job interview under their belt. He will put the letter Dr. Wolery gave him in his portfolio and when he goes after that first job, he will have something that showed his character as a child."

Volunteers like Liz and Kyle make a big difference at the Susan Gray School. Moreover, volunteer opportunities at the School are an example of how the School serves not just preschoolers, but adolescents and young adults as well.

If you or someone you know is interested in learning more about volunteer opportunities at Susan Gray School, contact Amy Jones at (615) 322-8200. ●

Making the Drive to Camp Shriver

By Courtney Evans Taylor

“Every year we drive 9 hours from Summerville, South Carolina, to Nashville so that Vicky can come to camp,” said Vicky’s mother Pat Krisel. “It’s a long drive, but it’s worth it. Vicky doesn’t always have a lot of opportunities, so when she does have them, we go for it. A lot of parents will just let their kids stay in their rooms and do nothing, but Vicky wasn’t given to us to just let her sit. It’s a responsibility we were given. So, we make the drive.”

Pat and Vicky have been making the drive to the Vanderbilt Kennedy Center for Excellence summer camp, Transitions, since 2005. However, when Vicky arrived this year, Transitions Camp looked a little different.

Transitions Camp is now the Camp Shriver Transitions and Sports Camp. The camp still serves students with developmental disabilities between the ages of 16 and 22, and offers practical tools to guide campers toward self-empowerment and the realization of life goals. What is different is the addition of an emphasis on sports and fitness as a means toward self-empowerment.



Jennifer Gilliam, Counselor, at Camp Shriver training at home of Sargent and Eunice Kennedy Shriver

Shriver Sports Camp

Camp Shriver had its roots in 1962 when Eunice Kennedy Shriver, executive vice president of the Joseph P. Kennedy Jr. Foundation, invited a group of children with developmental disabilities to her home to spend the day playing in a variety of sports and physical activities. Camp Shriver became an annual event and grew to more than 300 camps between 1963 and 1968.

In July 2006, Mrs. Shriver once again hosted Camp Shriver, which has now become a model for sports training and for building lasting

relationships between and among people with and without intellectual disabilities.

VKC Camp Shriver

In May 2007, Elise McMillan, J.D., co-director of the Vanderbilt Kennedy Center for Excellence, and Jennifer Gilliam, camp counselor, traveled to Eunice Kennedy Shriver’s home along with 25 other groups to receive training to establish and facilitate a Camp Shriver. Over the course of the weekend, McMillan and Gilliam were instructed on curriculum, staffing, and learning outcomes that make a Camp Shriver a success.

An especially exciting aspect of Camp Shriver is the emphasis placed on building social relationships. Volunteers, who are typically developing age-appropriate peers, are paired with campers to create support systems. The counselors and the volunteers are encouraged to continue the friendships that are formed at camp long after the summer comes to an end.

“Jennifer, one of the counselors, is programmed into my cell phone,” said Krisel. “Whenever Vicky wants to call her, she can just press a button. Jennifer calls her too. It isn’t just a one-way relationship. I think that’s something really special about this camp. The counselors and volunteers are doing more than just their jobs, you know? They really care about the campers. It’s like a ministry.”

Sports Experience

The fitness focus of Camp Shriver has allowed campers to explore physical activities such as basketball, kickball, and calisthenics. The campers learn the basics of each sport they undertake, and they practice over the summer so that they might take those skills back and use them on teams in their own community programs. This encourages more opportunities for them to engage in activities with typically developing peers. Many returning campers commented positively on the new sports aspect of camp.

“I like to play sports,” said Vicky after coming off the basketball court. “I do Special Olympics like basketball and softball. I like it.”

Work Experience

Vicky’s mom reports that Vicky likes being employed at camp as well. Not only do the campers learn about fitness, they also maintain jobs throughout the course of the camp.

This year campers earned money working for the Vanderbilt Student Recreation Center cleaning gym equipment, canoes, and cargo vans. The jobs are an important experience for the campers because it gives them an



Vicky Krisel at Camp Shriver Transitions and Sports Camp

opportunity to learn necessary life skills.

Campers also learned about budgeting the money they earned. They bought bus tickets, filled out timesheets, and received paychecks that they deposited into bank accounts. They ordered and paid for their own lunches and learned how to balance their checkbooks.

“Last year Vicky took drinks around and offered them to people in the offices at the Vanderbilt Kennedy Center,” remembered Krisel. “It was good because she had to learn how to interact with people she didn’t know. She learned how to say “good morning” and “thank you” and to practice conversational skills. This year, she cleaned the gym, and she liked that too. Vicky doesn’t mind working. In fact, she has been offered a job at her school once she graduates. She will be using the skills there that she has learned here.”

Recognizing Accomplishments

On the final day of Camp Shriver, an awards ceremony took place. Campers received certificates and honors to celebrate their summer accomplishments. Vicky won “Most improved in kickball,” “Best dribble,” and “Best form in bocce ball.” She also won the much coveted “Camper of the Year” award. Counselors commented on her enthusiasm, her work ethic, and her willingness to put others before herself. Vicky is a true team player, and it is campers like her that truly make Camp Shriver Transitions and Sports Camp well worth the drive.

For information on 2008 Vanderbilt Kennedy Center summer camps, contact (615) 322-8529 x. 3. ●



VANDERBILT KENNEDY CENTER
FOR EXCELLENCE IN DEVELOPMENTAL DISABILITIES

Spotlight

Working from the Heart

ANNE NESBITT

By Courtney Evans Taylor

Anne Nesbitt sits at the table a bit embarrassed. She laughs, looks down at her hands, and says with sincerity, “You don’t want to interview me. I’m not sure what I can offer this article.” The truth is she has a lot to offer—especially to the Vanderbilt Kennedy Center Leadership Council.

Nesbitt has been involved with and aware of the Vanderbilt Kennedy Center and its programs since 1985, when her son, Edward, was just an infant. Edward was born with Down syndrome, and the Nesbitts were quick to investigate and to take advantage of the opportunities available for him. Their experiences with the Center are an invaluable asset to her role as a Leadership Council member. She brings a first-hand perspective to her responsibilities that translates into how she is able to represent the Center in the community.

“We had very positive experiences with the therapists who worked with Edward,” Nesbitt



Anne Nesbitt and Edward Nesbitt

comments. “I loved them, and their help was wonderful. I know how important the services were for us, so I am glad to help spread the word. I am glad to help.”

Nesbitt helps not only with the Vanderbilt Kennedy Center, but also serves as president of the parent association at Ensworth School and is on the vestry at St. George’s Episcopal Church. Her husband, Tom, is a urologist at St. Thomas Hospital. Anne and Tom have four children. The youngest, Jack, is in sixth grade. Molly is 17 and is a senior at Ensworth. Dede attends classes at “Ole Miss” (University of Mississippi). Edward is the

oldest at 21 and currently holds a job at the Green Hills YMCA while taking courses two days a week getting help with his academic work.

This summer, Edward took part in the Vanderbilt Kennedy Center’s Camp Shriver Transitions and Sports Camp where he was able to show off his Special Olympics basketball experience on the court. He received the “Best Male Camper” award along with numerous other honors. At the awards ceremony, each time the announcer called his name for an award, he accepted with dignity and grace, and with sincere surprise that he was being recognized. Like his mother, Edward is modest, polite, and at work in the world acting from the heart.

Nesbitt cites the lectures and the workshops held at the Vanderbilt Kennedy Center as being of major importance to the disability community. Last May she took part in a conference on postsecondary education that was held to explore college options for students with intellectual disabilities after they graduate from high school.

“It was a great conference, and I learned so much about what exists currently,” says Nesbitt. “Edward is very interested in going to college, and I would love for him to have that opportunity. I feel true appreciation for the Vanderbilt Kennedy Center for exploring this area. The Center’s lectures and workshops are fantastic opportunities for families to become educated about the latest research and programs. I am thrilled to be involved.” ●

Kennedy Center Donors

Nicholas Hobbs Society Members
New since May 15, 2007
(\$1,000 and above annually)
A complete list is found at
kc.vanderbilt.edu/kennedy/giving/give2hobbs.html

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Through their gifts, Hobbs Society members advance groundbreaking research in human development.

For information about joining the Nicholas Hobbs Society or making Honor or Memorial gifts, contact (615) 343-5322.

Every effort has been made to ensure the accuracy of this report, which reflects Honor and Memorial gifts **May 15-September 10, 2007**. If an error has been made, we offer our sincerest apology and ask that you bring it to our attention by contacting (615) 343-5322. ●

Vanderbilt Best Buddies —Best in World



Bernadette Resha and Jessi Solomon

In July 2007 at the Best Buddies International Leadership Conference, the Vanderbilt Best Buddies Chapter was named the Overall Outstanding University Chapter of all college Best Buddies chapters in the world. Over 1,400 buddies attended the conference representing 19 countries and every state. Receiving the award were Jessi Solomon, Vanderbilt College Buddy director (president) and Vanderbilt Ingram Scholar, and Bernadette Resha, Buddy director. Elise McMillan, J.D., VKC UCEDD co-director, is advisor to the Vanderbilt Chapter.

Contributing to Discovery

By Jan Rosemergy



TOMMY LAWSON

Wendy, Ashley, and Linda Brooks

Discovery. In a word, discovery is the mission of the Vanderbilt Kennedy Center.

“What many people don’t realize is that we need more than great scientists to make discoveries,” said Linda Brooks, a founding member of the Vanderbilt Kennedy Center Leadership Council. “It also takes families working with scientists, helping them ask the important questions whose answers can be life-changing for families touched by disability. It takes families who will invest their time to take part in research studies. And it takes individuals and corporations and foundations that will make gifts to support innovative research.”

Nicholas Hobbs Donor Society

“The late Nicholas Hobbs, the Center’s founding director, was a passionate advocate for our nation’s children,” said Pat Levitt, Ph.D., Center director. “He recognized the critical role that discovery must play to meet our goal of improving the lives of individuals with disabilities. When the founding Leadership Council members recommended formation of a donor society for the Center, they chose to honor a true visionary.”

Members of the Nicholas Hobbs Donor Society are individuals who donate \$1,000 or more annually to the Vanderbilt Kennedy Center or to one of its programs.

“Through their gifts, donors recognize the exceptional position of the Vanderbilt Kennedy Center as a leader in developing the best in innovative research and services that make a difference in the lives of individuals with disabilities and their families,” said Cathy Brown, Leadership Council chair. “Through their gifts, Hobbs Society members are helping to advance groundbreaking research.”

Discovery Grants

Since 1998, donations of Hobbs Society Members have been used annually to fund Discovery Grants. These awards, available to Vanderbilt University investigators, provide vital seed money to create new research. The awards enable Center researchers to conduct innovative, multidisciplinary preclinical or clinical pilot studies in preparation for submitting competitive grant

applications to federal agencies or substantial applications to private foundations. A typical Discovery Grant provides \$25,000 in pilot funds, and this seed funding may lead to a federal research grant of \$500,000 or more.

“Vanderbilt Kennedy Center Discovery Grants have yielded a 30:1 return on every dollar with new research grants,” Levitt said. “Not many investors can boast of that kind of return. But real return is the difference made in families’ lives.”

Named Discovery Grants

Gifts of \$25,000 or more are acknowledged by a Discovery Grant named as the donor requests.

“For 2007-2008, two donors—Linda Brooks and Monroe Carell, Jr.—have made new gifts at this exceptional level,” Brown said. “We are grateful for their extraordinary generosity.”



COURTESY OF MONROE CARELL, JR., CHILDREN'S HOSPITAL AT VANDERBILT

Monroe Carell, Jr.

The Brooks Family Discovery Grant. Linda Brooks, her late husband Sam Brooks, and their children Ashley, Wendy, and Dan, have been part of the Vanderbilt Kennedy Center family since the 1970s. Wendy, who has Down syndrome, was enrolled in the Infant-Toddler Learning Project in the Center’s Experimental School (now the Susan Gray School). Today, Wendy is living in Texas, working and pursuing wide-ranging interests, including writing poetry.

In 2002, the Brooks Family provided a lead gift to create a fully accessible toddler playground for the Susan Gray School.

In 2003, the Brooks Family endowed the Brooks Family Discovery Fund to support initiatives to advance research and treatment in development

and disability. This wonderful gift has helped to establish the VKC Family Outreach Center and to support the Vanderbilt Kennedy Reading Clinic and Behavior Analysis Clinic, programs that exemplify translating innovative research into practice.

The Mr. and Mrs. Monroe Carell, Jr. Discovery Grant. The Carell family name is virtually synonymous with caring about children. Carell and his wife, Ann, provided the lead gift and led the successful fundraising efforts that helped build the new Monroe Carell Jr. Children’s Hospital at Vanderbilt, named in his honor to acknowledge his tireless efforts and generosity.

As a Vanderbilt University graduate, Carell has spent much of his time giving back to the Vanderbilt community. He currently chairs the *Shape the Future* Campaign, the most ambitious, comprehensive campaign in Vanderbilt’s history. Under Carell’s leadership, the original \$1.25 billion goal was surpassed two years ahead of schedule. Anticipating the Campaign’s success, he recommended to the Board of Trust that the goal be increased to \$1.75 billion, which the Trustees approved. The *Shape the Future* Campaign will continue through December 2010.

Carell is a long-time member and past chair of the Children’s Hospital Board of Directors and is a member of the Vanderbilt Board of Trust.

The Carells are passionate supporters of undergraduate scholarships at Vanderbilt and currently have nine scholars on campus.

Carell is the founder and former CEO and Executive Chairman of Central Parking Corporation, until he sold his interests in the company this past summer.

This Discovery Grant is the Carell Family’s second major gift to the Vanderbilt Kennedy Center. Their 2006 gift to the TRIAD Parent Support and Education Program enabled the Center’s autism specialists to help more families of young children with autism.

Being Extraordinary

At the 2006 Leadership Dinner, Levitt emphasized the crucial role of the Center’s donors and supporters: “When Vanderbilt Kennedy Center scientists make seminal research discoveries, we expect to impact families and the community—not 20 years from now, but now! This begins with all of you, the contributors to the Nicholas Hobbs Society. But it extends beyond, to friends and neighbors in the community who need to know how very special the Vanderbilt Kennedy Center truly is, and the wonderful opportunities that you have for supporting what we do now, and what we want to do in the future. We thank all of you for being part of our extended family that has enabled us to reach beyond the ordinary, to strive to be extraordinary.” ●

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Opry Dreams Come True

Singers and musicians in the Vanderbilt Kennedy Center 2007 Music Camp for persons with Williams syndrome and alumni campers had dreams come true when they performed live on the Grand Ole Opry, June 29, singing "Keep on the sunny side" to a standing ovation. Backstage after the performance are alumni campers Andrew Hamilton, Marn Kalman, Seth Link; 2007 campers Sean Tuck and Marnie Meister with VKC director Pat Levitt and associate director Elisabeth Dykens, who directs the Music Camp. Campers stay in a Vanderbilt dorm, have music sessions at Blair School of Music, and take part in research to better understand the genetic disorder.



CHRIS HOLLO, HOLLOWPHOTOGRAPHICS, INC.
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Discovery is a quarterly publication of the Vanderbilt Kennedy Center designed to educate our friends and the community, from Nashville to the nation. The Center is committed to improving the quality of life of persons with disabilities of thinking, learning, perception, communication, mood and emotion caused by disruption of typical development. The Center is a university-wide research, training, diagnosis, and treatment institute. It is a national Developmental Disabilities Research Center funded by the National Institute of Child Health and Human Development, and a University Center for Excellence in Developmental Disabilities (UCEDD) funded by the Administration on Developmental Disabilities.

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Calendar of Events

Unless otherwise noted, events are free and open to the public. Events are subject to change.

Please check the calendar on our website kc.vanderbilt.edu or contact (615) 322-8240 or toll-free (1-866) 936-VUKC [8852].
For disability-related training and other events statewide and nationally see Pathfinder Disability Calendar www.familypathfinder.org.

October

OCTOBER 15

Lectures on Development and Developmental Disabilities Of Monkeys and Men: What Can the Former Tell Us About Perceptual Development and Experience in the Latter?

David Lewkowicz, Ph.D., Professor of Psychology, Florida Atlantic University
Monday 4:10 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building

OCTOBER 24

Vanderbilt Kennedy Center Leadership Dinner

Wednesday 6:30-9 p.m.
Proceeds support Discovery Grants
Loews Vanderbilt Hotel
By invitation
Contact kc@vanderbilt.edu
(615) 343-5322

November

NOVEMBER 7

Developmental Disabilities Grand Rounds The Sounds of Emotion

Jo-Anne Bachorowski, Ph.D., Associate Professor of Psychology
Co-Sponsor Center for Child Development, Pediatrics
Light breakfast provided
Wednesday 8 a.m. Room 241
Vanderbilt Kennedy Center/MRL Building

NOVEMBER 7

Third Annual Conference—Disability Services & Hispanic Community

Sponsors—TN Disability Pathfinder, VKC UCEDD, TN Council on Developmental Disabilities
\$15 fee at conference to cover box lunch and conference expenses
Wednesday 8:30 a.m.-2 p.m.
Knowles Senior Center, 174 Rains Avenue
Registration required—see kc.vanderbilt.edu/registration or call (615) 322-8529 x 11



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NOVEMBER 12

Lectures on Development and Developmental Disabilities Functional Imaging of Social Communication in Autism

Susan Y. Bookheimer, Ph.D., Associate Professor of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles
Monday 4:10 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building

NOVEMBER 15

Vanderbilt Kennedy Center Special Lecture Everyday Life and Health as an Intelligence Test—Throughout Evolution

Linda S. Gottfredson, Ph.D., Professor of Education, Co-Director of Delaware-Johns Hopkins Project for the Study of Intelligence and Society, University of Delaware
Thursday 4:10 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building

NOVEMBER 27

Vanderbilt Kennedy Center Science Day Research Poster Sessions Panel: Discovery Through Interdisciplinary Collaboration

Panelists include Doug Fuchs, Ph.D., Lynn Fuchs, Ph.D., Sasha Key, Ph.D., Adam Anderson, Ph.D., Pat Levitt, Ph.D., Bruce Compas, Ph.D.
On-line registration required kc.vanderbilt.edu/registration
Tuesday 8:15 a.m.-1:15 p.m.
Student Life Center—Ballrooms A & B

NOVEMBER 29

Research Ethics Grand Rounds Confidentiality in Research

Lunch provided
On-line registration request kc.vanderbilt.edu/registration
Thursday 12:00 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building

NOVEMBER 30

Community Advisory Council Meeting

Includes presentation by Ann Turnbull, Ed.D., Distinguished Professor of Special Education, Director of Beach Center on Disability, University of Kansas, Lawrence
For details contact (615) 936-5118

December

DECEMBER 5

Developmental Disabilities Grand Rounds The Role of Inborn Errors of Metabolism in Developmental Disabilities

Marshall Summar, M.D., Associate Professor of Pediatrics
Co-Sponsor Center for Child Development, Pediatrics
Light breakfast provided
Wednesday 8 a.m. Room 241
Vanderbilt Kennedy Center/MRL Building

January

JANUARY 9

Developmental Disabilities Grand Rounds
Speaker and Topic to be announced
Co-Sponsor Center for Child Development, Pediatrics

Light breakfast provided
Wednesday 8 a.m. Room 241
Vanderbilt Kennedy Center/MRL Building

JANUARY 14

Lectures on Development and Developmental Disabilities

Agonistic Stress and Hypertension Risk in Urban Youth: How Social Power Threats Damage Health

Craig Ewart, Ph.D., Professor of Psychology, Syracuse University
Monday 4 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building



JANUARY 31

Special Lecture

Prenatal and Postnatal Medical Support: Capturing the Sentiments of Parents Who Have Children with Down Syndrome

Brian Skotko, M.D., M.P.P., Children's Hospital Boston and Boston Medical Center
Co-Sponsor Vanderbilt Departments of Obstetrics & Gynecology and Pediatrics
Thursday 4 p.m. Room 241
Vanderbilt Kennedy Center/MRL Building

Arts & Disabilities

Vanderbilt Kennedy Center Exhibits

Monday-Friday 7:30 a.m.-5:30 p.m., Lobby
Vanderbilt Kennedy Center/MRL Building

OCTOBER 8- JANUARY 25

Creative Expressions XIII

Co-sponsor Mayor's Advisory Committee for People With Disabilities

SibSaturdays

OCTOBER 27, DECEMBER 15

A Vanderbilt Kennedy Center for Excellence in Developmental Disabilities program for siblings of children with special needs, ages 5-7 and 8-13 years

Games, friends, conversation

\$10/child or \$20/family

Financial assistance available

Advance registration required

Contact (615) 936-5118

roxanne.carreon@vanderbilt.edu,

Saturdays Room 241

Vanderbilt Kennedy Center/MRL Building

Community Events

OCTOBER 16

2007 Division of Mental Retardation Services Nashville Town Hall Meeting

Tuesday 7:00-9:00 p.m.

Westminster Presbyterian Church, 111 North Wilson Blvd., Nashville

ASMT Events

Autism Society of Middle Tennessee

www.autismmidtenn.org

ASMT event information (615) 385-2077

Registration is requested for all events

ASMT members free; nonmembers \$5/family

OCTOBER 16

12th Annual Spooky Scramble Charity Golf Tournament

President's Reserve, Hermitage Golf Course

OCTOBER 25

Off the Couch and Into the Workplace (Part II – Private/Non-Profit Offerings)

6:30-8:30 p.m. Room 241

Vanderbilt Kennedy Center/MRL Building

NOVEMBER 8

Parenting Stress and Coping Using Positive Psychology

Elisabeth Dykens, Ph.D., Director, Vanderbilt Kennedy Center for Excellence in

Developmental Disabilities, and **Elizabeth**

Roof, M.A., Research Coordinator

6:30-8:30 p.m. Room 241

Vanderbilt Kennedy Center/MRL Building

NOVEMBER 15

Autism Orientation: A Parent-Professional Collaboration

6:30-8:30 p.m. Room 241

Vanderbilt Kennedy Center/MRL 241

Reservations required

DSAMT Events

Down Syndrome Association of Middle Tennessee

www.dsamt.org

DSAMT event information (615) 386-9002

OCTOBER 20

DSAMT Buddy Walk

OCTOBER 25

Grandparents' Support Group

Take Part in Research

StudyFinder

Children and adults, with and without disabilities, are invited to take part in research.

See kc.vanderbilt.edu/studyfinder

Contact Lynnette Henderson (615) 936-0448;

toll-free (1-866) 936-VUKC [8852]

Phone, web, print resources

www.familypathfinder.org

English (615) 322-8529

Español (615) 322-8529 ext. 11

Toll-free (1-800) 640-INFO [4636]

tnpathfinder@vanderbilt.edu

Disability Pathfinder

Disability Calendar

Internet calendar of training and other disability-related events

kc.vanderbilt.edu/tnpathfinder/calendar.html

Statewide Directory

2007-2008 Disability Services and Supports

Published in 3 volumes:

West, Middle, and East Tennessee

\$25 per directory

To order, contact (615) 322-8529 ext. 15

ashley.coulter@vanderbilt.edu

Project of Vanderbilt Kennedy Center for Excellence in Developmental Disabilities and Tennessee Council on Developmental Disabilities

Survey TN Adult Siblings

Survey of Adult Siblings of Individuals With Disabilities in Tennessee

We would like to know more about the relationship between individuals with disabilities and their adolescent or adult brothers or sisters. If you are 18 or older and have a brother or sister with disabilities who lives in Tennessee, we invite you to complete a survey.

The survey takes 25-30 minutes to complete. All your answers are private. You may be interviewed later, if you are willing. The online version of the survey is at <https://kc.vanderbilt.edu/SiblingResearch>

Paper copies also are available. Call tollfree (1-888) 322-5339 or email SiblingResearch@vanderbilt.edu.

The survey is being conducted by the Vanderbilt Kennedy Center for Excellence in Developmental Disabilities with funding by the Tennessee Council on Developmental Disabilities.