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INSIDE THIS ISSUE

Transcatheter Amplatzer ASD device Closure of Large Pulmonary Arteriovenous Aneurysm

by Hala Agha, MD; Howaida El-Said, MD; Mohamed Abd El Rahman, MD; Mario Carminati, MD and Seif Abaza, MD
~Page 1

Camp Odayin—A Camp for Children with Heart Disease

by Sara Meslow, Executive Director
~Page 6

Scientific Conference – A Roman Adventure for Grassroots Screening Program

by Sharon Bates, Anthony Bates Foundation
~Page 7

DEPARTMENTS

Medical News, Products and Information

~Page 8

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18, 19

TRANSCATHETER AMPLATZER ASD DEVICE CLOSURE OF LARGE PULMONARY ARTERIOVENOUS ANEURYSM

By Hala Agha, MD; Howaida El-Said, MD;
Mohamed Abd El Rahman, MD; Mario
Carminati, MD; and Seif Abaza, MD

occluded with the use of Amplatzer ASD
occluder device.

Abstract

We report a rare case of a child who had a large localized pulmonary arteriovenous malformation with aneurysm that resulted in arterial desaturation after the surgical ligation of a patent ductus arteriosus (PDA). The excessive flow of intrapulmonary shunt was successfully eliminated by an Amplatzer ASD occluder device that provided a sustained improvement of the oxygen saturation of the child. The work was carried out at the Pediatric Department, Children Hospital, Cairo University, Egypt.

Introduction

Pulmonary arteriovenous malformations (PAVMs) are direct connections between a branch of a pulmonary artery and a vein, creating a right-to-left shunt and leading to dyspnea, fatigue, and cyanosis. Serious neurologic complications such as stroke, transient ischemic attack, and cerebral abscess have been reported in 37% of patients [1,2]. The authors present a case of a localized huge PAVM successfully



Figure 1. Chest x-ray showed right upper and middle lung zone irregular opacities, mid-line trachea and heart, and preserved costophrenic angles.

Case Report

The patient was a 2-year-old boy with severe cyanosis. This severe desaturation was discovered immediately after surgical ligation of PDA. This finding was unexplained till chest X-ray showed right upper and middle zone lung irregular opacities (Figure 1). This was followed by Tc 99m-

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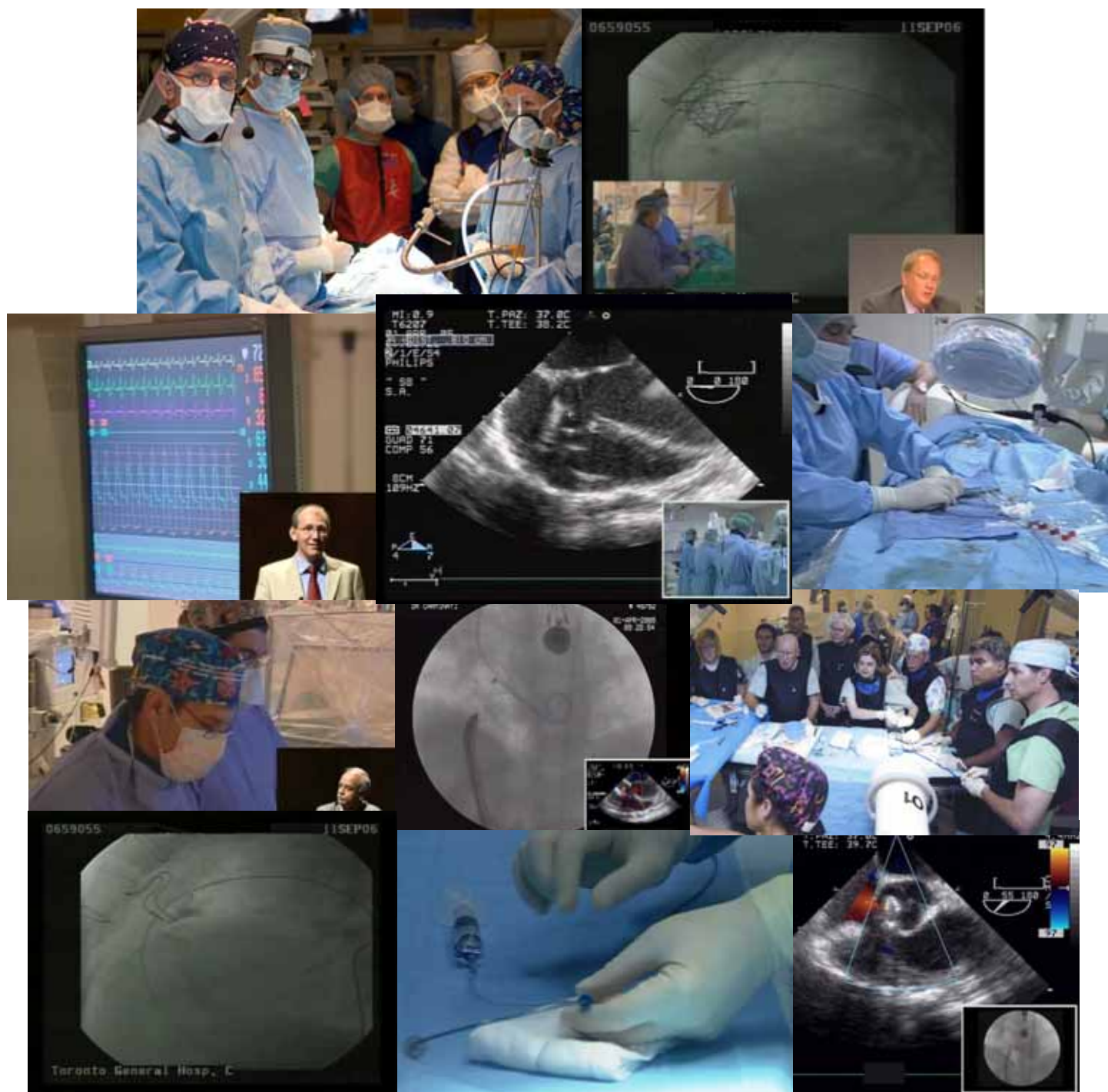
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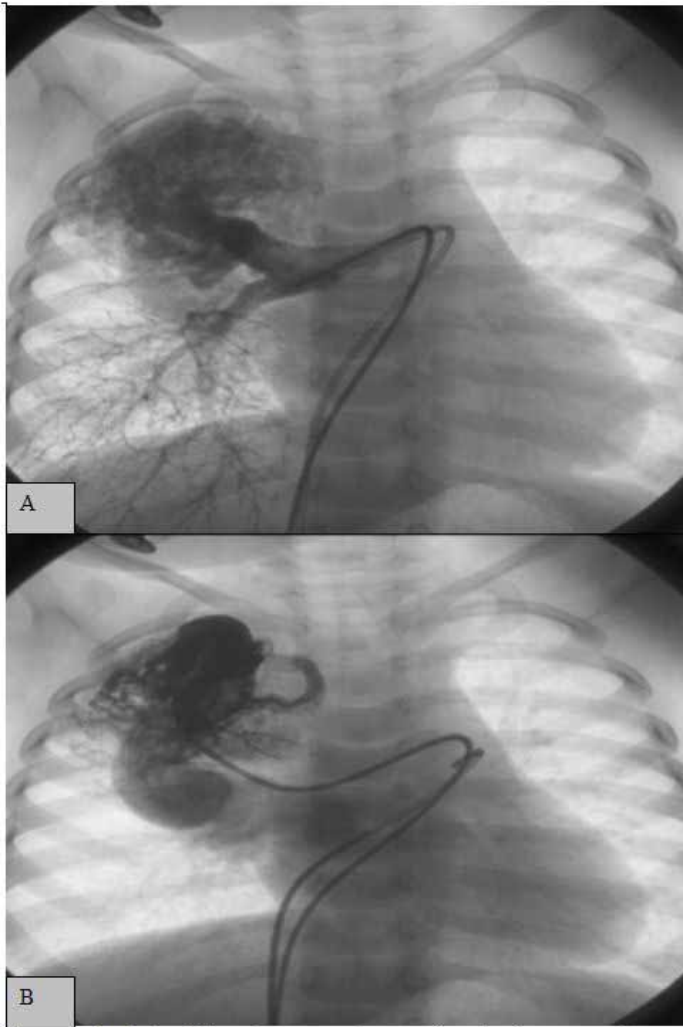


Figure 2. (A, B): Right pulmonary angiogram showed pulmonary arteriovenous malformation localized in the upper and middle zone. (A): There were multiple feeding vessels originating from right upper pulmonary artery. (B): There was aneurysmal dilatation in pulmonary venous return to the left atrium.

perfusion lung scan that revealed an abnormality of tracer uptake in the upper and middle right lobes. A gross pulmonary arteriovenous malformation was delineated by MRI. Conglomerate serpiginous and tortuous vessels were evident in right upper and middle zones. The distal venous end showed aneurysmal dilatation before entering the left atrium. The initial hemodynamic study during catheterization revealed normal pressures on the right heart struc-

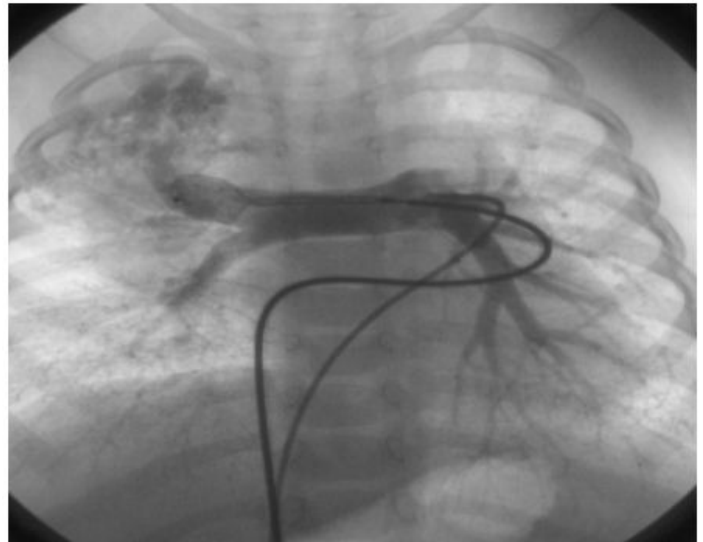


Figure 3. Pulmonary angiogram showed that the left atrial disc of the Amplatzer Septal Occluder was deployed.

tures and the oxygen saturation was 72%, then, bilateral pulmonary arteriography was performed. Left pulmonary arteriography was normal, while right pulmonary angiogram confirmed the MRI findings (Figure 2 - A, B). Amplatzer ASD occluder device (AGA Medical Corporation, Minneapolis, MN) [3] was used to occlude right upper pulmonary artery and its branches. Under general anaesthesia, bilateral venous cannulations were done by 6 F sheaths. A 6 F multipurpose catheter was inserted on the right side while a 6 F NIH catheter was placed on the left for angiographic information during manipulation of the device. The patient received a 50-U/kg bolus of heparin and an exchange 260cm J-tipped guidewire was advanced through the multipurpose catheter. The catheter was then exchanged for a 100-cm 8-F Mullins sheath (Cook, Bloomington, IN) for deployment of the Amplatzer device. The correct position of the delivery sheath was verified by a test injection of contrast medium. Amplatzer device (12mm) was screwed to the tip of the delivery cable, immersed in normal saline and drawn into the loader. The loader with the collapsed device was then advanced into the guiding catheter by pushing the delivery cable. Under fluoroscopic guidance, the left atrial disc was deployed, using gentle tension on the delivery cable (Figure 3); the sheath was pulled back and the right atrial disc was deployed. Once its position was optimal, the device was released by counterclockwise

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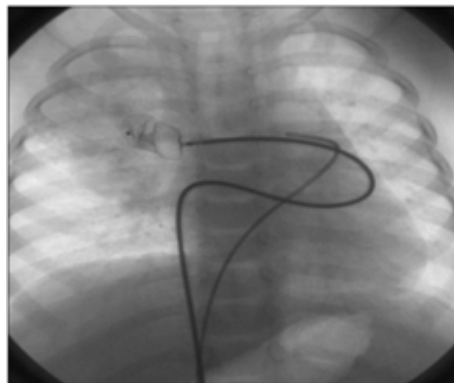


Figure 4. Under fluoroscopic guidance the ASD Amplatzer Septal Occluder device was released in its optimal position.

rotation of the delivery cable (Figure 4). Ten minutes after release of the Amplatzer, a pulmonary angiogram was done by NIH catheter placed on the left side to detect any residual leak. There was still minimal leak from the fistula (Figure 5), but the arterial saturation rose to 90% and remained stable during 24 hours. Over 6 months of follow-up, the patient's arterial saturation remained 90% and he was scheduled for MRI and possible treatment of his remaining smaller PAVMs.

Discussion

We postulated that the presence of the patent ductus arteriosus mitigated the patient's cyanosis because of increased blood flow through normal lung segments. Then, by interrupting the ductal flow, and as PAVMs are high-flow, low-resistance vascular shunts [4]; the full pathophysiological picture of this malformation became evident with a significant right to left intrapulmonary shunt. Transcatheter occlusion of congenital vascular malformations with a variety of occluding devices has been well described in both the pediatric and adult literature [5]. Very large PAVMs present technical problems and may be difficult to occlude with standard coils or detachable balloons [6]. Occluding the right upper pulmonary ar-

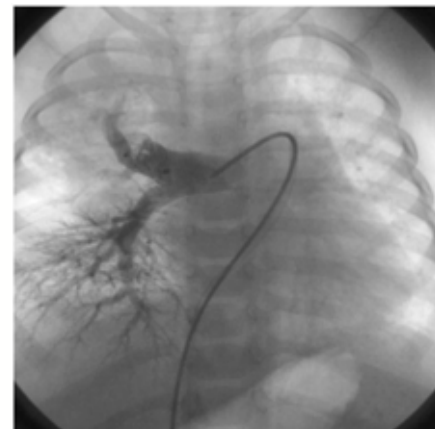


Figure 5. Pulmonary angiogram 10 minutes after release of Amplatzer ASD occluder device showed small residual leak from the right PAVM.

tery branch that supplied the diseased zone was decided because of the multiplicity of the feeding vessels of the PAVM and aneurysmal formation of the venous return. By this procedure, provocation of pulmonary infarction was intended in this upper right diseased lobe. Based on our center experience with Amplatzer ASD occluder device, the 12mm occluder device was selected as a useful treatment option because of its large size and, therefore, its presumably low embolization risk. Amplatzer ASD device occlusion of PAVM proved to be technically easy and well tolerated without any complications. The procedure necessitated the use of an 8-F sheath, which may be important when treating small patients. According to our review of the literature, this is first reported case of PAVM occluded by Amplatzer ASD device, while Bi-alkowski et al, reported that large PAVMs were successfully occluded by the Amplatzer duct occluder (ADO), designed for the occlusion of patent duct arteriosus [7]. Although the risk of complications using the Amplatzer device cannot be ruled out, we believe that this procedure carries significantly reduced risk



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of paradoxical device embolization, especially in the setting of large lesions and because of the size and configuration of this device. Our patient had sustained improvement of his symptoms, arterial saturation, and exercise tolerance during six months of follow-up after Amplatzer ASD occluder of this huge PAVM with aneurysm.

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~CCT~

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CAMP ODAYIN—A CAMP FOR CHILDREN WITH HEART DISEASE

By Sara Meslow, Executive Director



In the Midwestern United States, there was no camp for children with heart disease until Camp Odayin was formed in 2001. Unfortunately, children with special medical needs often go through childhood without experiencing the magic of summer camp because most camps are not equipped to handle their unique needs. Camp Odayin is working hard to change that. In an atmosphere designed to enhance self-esteem and



My Favorite Place in the World by Allie, Camp Odayin Camper

Everyone has a favorite place,
Yours is not like mine at all,
We sing songs when together,
We have lots of fun when together,
And no tears shed at all.

Everyone has a favorite place,
Yours is not like mine at all,
We go swimming, fishing and banana
boat riding,
We do activities during the day and at
night,
In the morning we wake up early, and
go to bed late.

Everyone has a favorite place,
Yours is not like mine at all,
We sing our cheers to Mr. Sprit, and
earn the spirit beads,
And have different themes during the
night,
Some may have games outside; other
may be inside.

Everyone has a favorite place,
Yours is not like mine at all,
We don't worry about what we have,
This is our lucky week!

Everyone has a favorite place,
Yours is not like mine at all,
When the week is over we give friends
a last call,
And say see you back here next year,
At our favorite place Camp Odayin!

acceptance of themselves and others, campers have the opportunity to "come alive" emotionally and physically in ways they never dreamed possible.

Camp Odayin provides athletic, creative, and outdoor activities in a safe and medically supervised environment with highly trained pediatric cardiologists, cardiac nurses, and camp counselors. Participation in Camp Odayin's residen-

tial camps (ages 8-17), day camp (ages 6-7), and family camp (all ages) – costs only a \$25 registration fee, thanks to the support from generous donors, fundraisers and grants from many companies and foundations.



"Children who have heart conditions often feel isolated," said Dr. Charles Baker, Pediatric Cardiologist at Minneapolis Children's Heart Clinic and Medical Director for camp. "Camp Odayin allows these children to meet other kids with diseases similar to their own. They feel a true sense of belonging at camp and make lifelong friends. I am thrilled to be a part of such a special organization."

To learn more about Camp Odayin, visit www.campodayin.org or call 1.866.9.ODAYIN (1-866-962-2946).

~CCT~

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SCIENTIFIC CONFERENCE – A ROMAN ADVENTURE FOR GRASSROOTS SCREENING PROGRAM

By Sharon Bates, Founder; Anthony Bates Foundation

As the director of The Anthony Bates Foundation (ABF), I was invited to speak at the Scientific Conference sponsored the Antonio Valentino Foundation (AVF) near Rome, Italy this past December. Peirluigi Valentino, Antonio's brother & founder of AVF, created this conference to facilitate and improve interaction for families who have lost young people to Sudden Cardiac Arrest.

There have been many studies and journal reports written about the effectiveness of the athletic cardiac screening programs in Italy. As described in the recent JAMA report, the Italian doctors have reported a reduction of Sudden Cardiac Death on their playing fields by an astounding 89%. They attribute this reduction in deaths to heart screenings for their athletes. Now the doctors want to do more for their fellow Italians and introduce heart screenings to the general population.

My presentation in Rome was intended to share my vision for creating a Community Cardiac Screening Program for young people in the US. My initial goal in communicating with the Italian doctors was to connect ABF to more compassionate US doctors. Many US doctors have recently been reaching out to the Italian doctors with interest to make this a reality in the US. Dr. Antonio Pelliccia, Chief Cardiologist at the Institute of Sports Medicine, shared his hope that we would continue making strides in this cause, and offered his support in any way possible.

During the conference, I was introduced to many Italian-based non-profit groups, families, and distinguished Italian cardiologists. Presenters from Rome included Dr.

Camillo Autore (La Sapienza University of Rome), Dr. Antonio Pelliccia (Institute of Sports Medicine), and Dr. Federica Re (Forlanini Div. of Cardiology). Dr. Domenico Corrado came from the University of Padova, northern Italy. Dr. Stefano Nistri arrived from Veneto Medicine in Venice. Dr. Nicoletta Salviato traveled from the Pediatric Cardiology hospital in Palermo, Italy. Each doctor was there to present a different aspect of the fight to reduce Sudden Cardiac Arrest.

Although many of the doctors speak and understand English, the entire program was in Italian for the benefit of the attending families. Fortunately, the host graciously provided an interpreter for me. The doctors presented scientific information to the audience on subjects ranging from "Pregnancies & Heart Conditions like HCM" by Dr. Camillo Autore, "Cardiomyopathy & Drugs" by Dr. Federica Re, "ICD Determinations" by Dr. Domenico Corrado, "Family Screening for Cardiomyopathy" by Dr. Stefano Nistri, to "Sports Activities with Heart Condition" by Dr. Antonio Pelliccia, and "Cardiomyopathy in Young People" by Dr. Nicoletta Salviato.

There was also a question and answer period, during which the audience could ask questions of the doctors. The event was the first of its kind in Italy. Many of the participants had heard about heart disease only after the sudden death of a young person in their family. Almost half of the Antonio Valentino Foundation-supported families were present. With such a good turnout, the conference organizers declared they would do it again next year to strengthen and support more families.

Following the scientific presentations, the non-profit groups highlighted their efforts to increase education, awareness and preven-

tion through cardiac screening and placement of AEDs on the playing fields throughout Italy. Our host, Peirluigi Valentino was very gracious in his support and words to the audience describing our US efforts.

Due to the USA cardiac screening programs that exist today (*Anthony Bates Foundation, A Heart for Sports, The Chad Foundation, The Robie Foundation, Austin Heart* and several others), awareness has been raised in the public and medical communities.

In Italy, the realization that cardiac screening for young people is available has made the Italian doctors more visible. The Italian doctors and families are working together to stamp out Sudden Cardiac Death on their playing fields and beyond. Now the Italian doctors are getting much of their well deserved recognition for years of study, research and expert programs that already exist in Italy.

Through our connections in Italy we have identified many US doctors and medical professionals interested in starting programs across the US. The Anthony Bates Foundation is dedicated to partnering with medical professionals to build a Community Cardiac Screening Program in your area. If you'd like to aid our efforts, please visit our website (www.anthonybates.org), and help stamp out Sudden Cardiac Arrest in your community.

~CCT~

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MEDICAL NEWS, PRODUCTS AND INFORMATION

ACC 2007 Distinguished Service Awards

In the February issue of 'Cardiology,' – the ACC (American College of Cardiology) presented its Distinguished Service Awards. They are:

Distinguished Scientist (Basic)

Jeffrey A. Towbin, MD, FACC, has been and continues to be one of the most significant figures in congenital heart disease, pediatric cardiology and heritable cardiovascular disease. His scientific work has been foundational on many different fronts, particularly with respect to myocarditis and dilated cardiomyopathy and the genetics of QT syndrome and Brugada syndrome. For example, he and his laboratory discovered the first genetic cause for dilated cardiomyopathy. Towbin has been a tenured professor of pediatric cardiology since 1998 and the chief of one of the largest pediatric congenital heart centers at the Baylor College of Medicine. He currently serves as a reviewer for 55 journals, is an editor for 15 journals and has written numerous articles and book chapters. He is known as a truly inspiring mentor, who works with, and inspires up-and-coming physician scientists from many institutions, not just his own.

Distinguished Fellow Award

Ralph G. Brindis, MD, MPH, FACC, who will receive the American College of Cardiology Distinguished Fellow Award at ACC.07 in New Orleans, has a long and distinguished record of service to the ACC. During the past dozen years, he has served in more than 40 official ACC capacities.

However, he is probably best known for his success in creating and leading the ACC's National Cardiovascular Data Registry (NCDR™). Today, the NCDR™, which has expanded to four registries, is now one of the most successful clinical databases in the world with thousands of participating hospitals, and millions of patient records. It serves as tangible proof of the ACC's noble commitment to genuine quality improvement and is a lasting testament to Brindis's extraordinary vision, steady leadership and hard work. There are several secrets to Brindis' phenomenal success as an ACC leader. He is a gracious leader who is quick to acknowledge and encourage the participation of others. He is also particularly respectful of others' efforts. He possesses uncommon good judgment and an enormous capacity for hard work and has a wonderful sense of humor and positive attitude that is infectious. Given Brindis' long and distinguished career of ACC service, his singular record of success in forwarding the ACC's mission and his role as a mentor for future ACC leaders, he is truly a deserving recipient of the Distinguished Fellow Award.

Distinguished Scientist (Clinical)

The major impact made by Jane W. Newburger, MD, MPH, FACC, on clinical science and clinical trials in the Congenital Heart Disease field, began with her early study, Functional Outcomes of Cardiovascular Disease and Cognitive Function in Post-Operative Children, followed by her seminal work in the multicenter trials of Kawasaki disease therapy, one of the first large pediatric cardiology trials. Because of her leadership and research, she has improved the cardiovascular outcomes and cognitive function in a generation of children with

heart disease. She also played a major role in the Pediatric Heart Disease Clinical Research Network and its governance and guidance, and has served on an National Heart, Lung and Blood Institute Advisory Council and task forces on pediatric cardiovascular disease. Over the years, her message has been about the value of rigorous, well-controlled studies. Newburger has served a tremendous role not only in changing and formulating clinical care in pediatric cardiology, but also in the mentoring of young clinician scientists.

Distinguished Service

Bernard J. Gersh, MB, ChB, DPhil, FCRP, FACC, is well-known in the cardiovascular community for his enormous and sustained clinical research contributions in the field of cardiovascular medicine that have had a major and direct impact on cardiologists and their patients. As a clinical investigator, he is one of the preeminent thought leaders in cardiovascular disease, and he has been at the cutting edge of clinical research in the fields of coronary artery disease, atrial fibrillation and heart failure. A prolific writer, he has authored or co-authored more than 450 manuscripts, 11 books and 98 book chapters. His investigator talents are only transcended by his ability to communicate his knowledge and ideas skillfully to a wide variety of audiences, including students and laypersons. Gersh has generously contributed his time to the cardiovascular community as a whole, especially the international community, and he is known for his caring skills as a mentor of younger physicians. He is one of the dominant figures in clinical

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cardiology as an educator, clinical and investigator, and is clearly deserving of the ACC Distinguished Service Award.

Gifted Teacher

When Gabriel Gregoratos, MD, FACC, retired from the military medical corps as a colonel in 1976, he began his career as an outstanding, innovative and compassionate teacher in cardiology. He served as full-time faculty in cardiology at the University of California, San Diego; Pacific Medical Center, San Francisco and the University of California, Davis. In 1997, he joined the faculty of the University of California, San Francisco, as a professor of medicine and Director of the Cardiology Consult Service. Today he is Emeritus Professor of Medicine there. He has taught hundreds of students, residents, fellows and faculty, many of whom refer to him as one of the most talented and effective clinicians and teachers they ever encountered. Anecdotes shared by past fellows speak of fellows on other rotations leaving their work to join his cardiology consult rounds because he was such an outstanding communicator.

Gifted Teacher

Ami E. Iskandrian, MD, FACC, has dedicated his life to advancing the field of nuclear cardiology and incorporating its techniques into the tools available to clinical cardiologists. He has used his knowledge base of nuclear physics and cardiovascular imaging and his passion for clinical cardiology to stimulate and challenge the faculties and house staffs of the medical schools of the University of Alabama, University of Pennsylvania, and Medical College of Pennsylvania/Hahnemann University. With the title Distinguished Professor of Medicine, Iskandrian currently serves as professor of radiology and Director of the Nuclear Cardiology Division of the University of Alabama at Birmingham. His devoted personal interactions with medical students, residents and fellows have made him the most celebrated teacher in that institution's history in a brief period of only seven years, and he has been recognized with institutional teaching awards 15 times in his 30 years of teaching.

Master of the American College of Cardiology

Rolf M. Gunnar, MD, FACC, a 1949 graduate of Northwestern School of Medicine and currently Emeritus Professor of Medicine, Loyola University Stritch School of Medicine, has been one of this country's leading cardiologists for the past 50 years. He enjoys international recognition as a consummate clinician, teacher and investigator. He has fulfilled major leadership roles in the American College of Cardiology as a member of 27 years. He was recognized with the ACC Distinguished Service Award in 1997. His leadership activities extended to the American Heart



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DEAR PARTICIPANT

We are delighted to welcome you to the 3rd Annual Toronto Symposium, *Contemporary Questions in Congenital Heart Disease*. After two extraordinarily successful meetings in 2005 and 2006, the topic of our 2007 meeting will be *The Left Heart*. Once again, we have invited a world-class faculty of scientists, physicians, surgeons, and allied professionals to participate with the Toronto team in a "state of the art" conference.

The Toronto Symposium aims to be a little different from the usual medical meeting. The title of each lecture, no matter whether addressing issues of basic science or clinical management, is framed as a topical question. Consequently we expect that the answers will be of direct relevance to your practice. This meeting will be suitable for anyone working in the field of congenital heart disease, but please note that we are limited to just 250 places, and have been sold-out prior to both previous meetings. So register early to avoid disappointment!

While there are some concurrent sessions, be assured there is no need for you to miss anything. Each of the lectures will be recorded, and each participant will receive a DVD shortly after the meeting. Again, this is a little out of the ordinary, showing both a video of the lecturer in real time, and the simultaneous PowerPoint presentation. An example of the format can be seen on our symposium website at www.sickkids.ca/cardiacsymposium. Copies of the DVD's from previous symposia can be purchased by e-mailing the Symposium organizer at cardiac.symposium@sickkids.ca.

We are looking forward to a focused, detailed, and rewarding meeting. Toronto's weather is glorious in early June, and the downtown location of our venue could not be better. We do hope you will be able to join us.

Sincerely, The Toronto Team

COURSE OBJECTIVES

To bring together experts in the field of left heart diseases in children and adults.

To explore the contemporary understanding of left heart development, physiology and pathophysiology in congenital and acquired heart disease.

To encourage a multidisciplinary approach to the fetal, preoperative, perioperative and late postoperative management left heart problems.

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SATELLITE MEETING: NEW DEVELOPMENTS IN FETAL CARDIOLOGY

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8:30 BREAKFAST AND REGISTRATION

NEW IMAGING TOOLS

9:00 Implementation of 3D/4D ultrasound during routine fetal cardiac screening
Dr. Roza Bataeva

9:30 Application of 3D/4D ultrasound during advanced fetal echocardiography
Dr. Gerald Tulzer

10:15 The power of power Doppler imaging
Dr. Shi-Joon Yoo

10:35 Discussion

10:45 BREAK

11:00 Tissue Doppler imaging in the fetus
Dr. Edgar Jaeggi

11:30 The use of fetal magnetocardiography in the diagnosis of fetal arrhythmias
Dr. Janette Strasburger

12:00 Discussion

12:15 LUNCH

FETAL INTERVENTION AND OUTCOMES

1:30 Fetoscopic interventions: indications, imaging, techniques and results
Dr. Thomas Kohl

2:30 Fetal cardiac interventions: The Boston experience
Dr. Audrey Marshall

3:15 Advances in non-cardiac interventions
Dr. Greg Ryan

4:00 Discussion

INVITED FACULTY

Dr. Roza Bataeva (Russia)

Dr. Thomas Kohl (Germany)

Dr. Audrey Marshall (USA)

Dr. Greg Ryan (Canada)

Dr. Janette Strasburger (USA)

Dr. Gerald Tulzer (Austria)

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Registration includes all conference materials, refreshments and meals as indicated.

Pediatric Cardiology



The Division of Pediatric Cardiology at Loyola's Ronald McDonald Children's Hospital is expanding and has an immediate opening for a 4th BE/BC pediatric cardiologist at the assistant or associate professor level. The position requires strong clinical skills in general pediatric cardiology. Subspecialty interest or training is preferable but not required. The position is for approximately 40% outpatient and 60% inpatient duties with emphasis on echocardiography, fetal echo, TEE, etc., as well as other non-invasive procedures. The cardiology division is a growing academic program with a growing cardiac surgical program. The current faculty includes cardiac critical care as well as interventional expertise. Electrophysiology and RF ablation procedures are done on site in a dedicated EP lab that is among the busiest in the region. Faculty will also have important roles in pediatric student and resident education and are encouraged to conduct research.

Based in the western suburbs of Chicago, Loyola University Health System is a quaternary care system with a 72-acre main medical center campus and 17 off-site facilities in Cook, Will, and DuPage counties. Loyola's Ronald McDonald Children's Hospital is a "hospital-within-a-hospital" and is comprised of a busy pediatric inpatient and outpatient service, 14 bed state of the art pediatric intensive care unit, and 50 neonatal intensive care beds. The hospital is staffed by a full complement of pediatric subspecialty services and a 50-member residency and fellowship program.

The Stritch School of Medicine has research institutes in neuroscience, cardiovascular, oncology, burn/shock/trauma and bioethics and health policy. Housed in the John & Herta Cuneo Center, Stritch occupies 110,000 square feet of state-of-the-art classrooms, basic research labs and clinical research areas. More than 500 medical students and 500 residents are taught by more than 1,200 full and part time salaried faculty.

Please send CV's to: Peter Varga, MD, Director of Pediatric Cardiology, Department of Pediatrics, Loyola University Medical Center, 2160 South First Ave., Maywood, IL 60153.

The Loyola University Health System is an affirmative action/equal opportunity educator and employer. The University undertakes affirmative action to assure equal employment opportunity for underrepresented minorities, women, and persons with disabilities.



Association and the American College of Physicians also. In addition to serving as Governor for Illinois within the ACC, he was a member of the Board of Trustees and chair of several committees, including the ACC/AHA Task Force on Early Management of Acute Myocardial Infarction published in 1990 and the first ACC/AHA guideline to address a disease entity.

Master of the American College of Cardiology

Robert Roberts, MD, FACC, who is president and chief executive officer of the University of Ottawa Heart Institute in Ottawa, Ontario, Canada, has led a career that personifies the M.A.C.C. award. The recognition of M.A.C.C. is given to individuals with an extensive track record of service to the ACC and to the cardiovascular profession and whose contributions have enhanced the ACC's mission and prestige. Distinguished in cardiovascular education and research, he has served on a number of prominent and influential ACC committees and on the Board of Trustees. Under his leadership of the Young Investigator Committee, awards were increased from one to three categories. As chair of the ACCF Research Fellowship Awards Committee from 2002 – 2006, Roberts successfully obtained support from other companies, enabling an increase in these awards also. Clearly, his many contributions to the ACC have enhanced its image and the development of future clinical scientists.

Master of the American College of Cardiology

Roberta G. Williams, MD, FACC, who is Vice President for Pediatrics and Academic Affairs at Children's Hospital in Los Angeles, and chair of the department of pediatrics at the University of Southern California, has a long record of service to the ACC and to the field of congenital heart disease. She has served on numer-

ous committees for the ACC and on the Board of Trustees. In 2002 she received the ACC Gifted Teacher Award. Williams was co-chair of the Bethesda Conference #25 on Future Personnel Needs for Cardiovascular Healthcare, and also for the Bethesda Conference #32 on Adult Congenital Heart Disease. She recently served as chair of the National Heart, Lung and Blood Institute Working Group on Research in Adult Congenital Heart Disease, the recommendations of which were published in the Journal of the American College of Cardiology in 2006. Williams' record of service to the ACC is matched by similar accomplishments and service to the American Heart Association, the American Academy of Pediatrics and the American Society of Echocardiography.

For more information, see 'Cardiology' – February 2007 issue, pages 18 and 19, American College of Cardiology

Most Children in U.S. Hospitals Receive Medicine Off-Label

Nearly four out of five hospitalized children receive medications that have been tested and approved only for adults, according to a study of hundreds of thousands of patient records. This so-called "off-label" use of drugs was thought to be especially common in children, and the new research, the largest-ever U.S. pediatric study, confirms this.

"We measured the magnitude of off-label use of drugs in children," said study leader Samir S. Shah, MD, a pediatrician specializing in infectious diseases at The Children's Hospital of Philadelphia. "Given the nature of the available data, we could not evaluate safety and effectiveness of those medications, although those are important concerns. However, only a small number of drugs have been formally tested in children."



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Once the U.S. Food and Drug Administration (FDA) approves a drug for any indicated use, physicians may legally prescribe the drug for different conditions and for patients in other age groups. This study measured off-label use only as defined by age, not by indicated conditions.

"With nearly 80% of children receiving off-label medications during hospitalizations, we need to focus our attention on the process by which medications are approved for pediatrics," said senior author Anthony D. Slonim, MD, DrPH., Executive Director of the Center for Clinical Effectiveness at Children's National Medical Center. "It is imperative that we thoroughly review this process to ensure that children are being treated with the safest, most effective therapies."

Researchers in the Pediatric Health Information Systems Research Group, representing various medical centers, analyzed patient records from 31 major U.S. children's hospitals for the entire year of 2004. At least one drug was used off-label in 79% of the more than 355,000 children requiring hospitalization. Off-label use accounted for \$270 million, some 40% of the total dollars spent on children's medication according to the study, which appears in the March issue of the Archives of Pediatrics and Adolescent Medicine.

Off-label prescribing is relatively common among adult patients as well, but it has long been recognized that a large proportion of drugs used in pediatrics have never been tested in children. Over the past decade, federal regulations providing financial incentives to pharmaceutical companies have helped increase the number of drugs tested and approved for children. However, said Dr. Shah, "there was little information on the extent of off-label use among children, the types of drugs used off-label, and the characteristics of hospitalized children receiving those drugs."

All previous studies of off-label drug use in hospitalized children were performed outside the United States, often limited to specific conditions or to patients in single medical centers. This current study focused on 90 drugs that were either administered frequently to children or were recommended for further pediatric study by the FDA.

The drugs most likely to be used off-label in children were those approved for use on the central nervous system or autonomic nervous system, in addition to nutrients and gastrointestinal agents. For instance, 28% of the patients in the database received morphine, although the FDA has not approved it for use in children. Anti-cancer drugs were the least likely to be used off-label, possibly because such drugs are more likely to have been tested in pediatric cancer patients, that frequently participate in clinical trials.

Children were more likely to receive drugs off-label if they underwent surgery, were older than 28 days and had more severe ill-



PEDIATRIC CARDIOLOGIST CORPUS CHRISTI, TX

Driscoll Children's Hospital is actively recruiting for Board Certified/Eligible Pediatric Cardiologists with expertise in Echocardiography, Perinatal Echocardiography, cardiac MRI/CT and Electrophysiology. The center has a new catheterization laboratory, ten satellite clinics, two cardiothoracic surgeons, and six pediatric cardiologists.

Driscoll Children's Hospital is a not-for-profit two hundred bed tertiary care hospital serving over 33 counties of South Texas. The hospital shares an affiliation with the Texas A&M University Health Science Center and maintains a large Pediatric residency. The Cardiology service actively participates in a variety of teaching activities within the training Program.

Driscoll Children's Hospital is located in Corpus Christi, which is located on the Texas Gulf Coast. Corpus Christi enjoys some of the finest weather and outdoor activities in the United States and is the 2nd most popular vacation destination in the state of Texas. The city is nestled behind the barrier islands of Mustang and Padre and is the gateway to Padre Island National Seashore, a short 15-minute drive from downtown.

Please contact:

Tim Hanners
Tel: (361) 694-4759
email: tim.hanners@dchstx.org
Driscoll Children's Hospital
3533 S Alameda Street
Corpus Christi, TX 78411
www.driscollchildrens.org



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Adult Congenital Heart Disease Specialist

The Division of Pediatric Cardiology of Sanger Clinic and Levine Children's Hospital in Charlotte, NC is recruiting an adult congenital heart disease (ACHD) specialist to help direct a busy and growing service. The successful applicant should be board certified/eligible in pediatric cardiology and preferably have completed a specialty fellowship in ACHD. The successful applicant will join a rapidly growing practice of seven pediatric cardiologists and two cardio thoracic surgeons. The Sanger Clinic also has a large and busy adult cardiology practice with several adult cardiologists involved in the ACHD service. The candidate should have excellent interpersonal skills and ideally an interest/expertise in imaging, particularly magnetic resonance imaging.

The Sanger Clinic is the largest congenital heart center in North Carolina performing three hundred surgeries and three hundred cardiac catheterizations per year. The practice is affiliated with Carolinas Healthcare System, the fourth largest hospital authority in the country, but operates much like a private practice with very competitive compensation and benefits. The hospital authority is poised to open Levine Children's Hospital in the fall of 2007, an eighty-five million dollar state-of-the-art facility. Interested applicants should fax or e-mail their CVs to Dr. Stern.

Herbert J. Stern, MD, FACC
Director, Division of Pediatric Cardiology
Sanger Clinic and Carolinas Heart Institute
hstern@sanger-clinic.com

Fax# 704-543-0018

nesses. "Critically ill children may have failed to respond to conventional therapies and may receive drugs off-label because they have no approved options," said Dr. Shah.

The authors point out that, while physicians may sometimes have no alternatives to treating children with off-label medications, the practice is not risk-free. "Using drugs that have been insufficiently studied in children has contributed to adverse outcomes, which have been documented in the medical literature," said Dr. Shah. "We hope that by better defining the magnitude of off-label drug use, our study may help encourage greater cooperation among industry, academia and government in carrying out studies to better protect children."

In addition to his position at The Children's Hospital of Philadelphia, Dr. Shah is a Senior Scholar at the Center for Clinical Epidemiology and Biostatistics at the University of Pennsylvania School of Medicine. Dr. Shah and Dr. Slonim's co-authors, from several other universities and medical centers, were: Matthew Hall, PhD.; Denise M. Goodman, MD, MS; Pamela Feuer, MD; Vidya Sharma, MBBS, MPH; Crayton Fargason, Jr., MD; Daniel Hyman, MD, MMM; Kathy Jenkins, MD, MPH; Marjorie L. White, MD; Fiona H. Levy, MD; James E. Levin, MD, PhD; and David Bertoch, MHA.

The Children's Hospital of Philadelphia: For more information, visit www.chop.edu. Children's National Medical Center: Children's National Medical Center. For more information, visit www.dccchildrens.com.

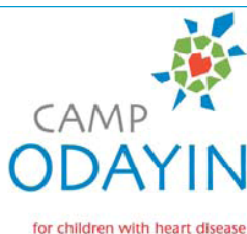
Fetal Heart-Cell Enzyme and Onset of Heart Failure

In almost all forms of heart failure, the heart begins to express genes that are normally only expressed in the fetal heart. Researchers have known for years that this fetal-gene reactivation happens, yet not what regulates it. Now, investigators at the University of Pennsylvania School of Medicine have discovered that an enzyme important in fetal heart-cell development regulates the enlargement of heart cells, known as cardiac hypertrophy, which is a precursor to many forms of congestive heart failure (CHF).

The study, which paves the way for new targets for treating cardiac hypertrophy and heart failure, appeared in a recent edition on the online publication of Nature Medicine.

"It's as if old programs are being reactivated in a sick heart," explains senior author Jonathan A. Epstein, MD, the W.W. Smith Endowed Chair for Cardiovascular Research at Penn. "In an adult heart, stresses such as high blood pressure induce the reexpression of a fetal gene program."

The investigators found that by inhibiting the enzyme HDAC in adult mice the fetal-gene program can be prevented from restarting. "We found that in various mouse models of cardiac hypertrophy and heart failure, treatment with chemical HDAC inhibitors or genetic deletion of HDAC2 prevented the beginning of the downward slide to progressive heart failure," says Epstein.



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HDAC is an enzyme switch that regulates how DNA is packaged inside the cell, and therefore how large groups of related genes are turned on and off. During development HDAC normally regulates proliferation of heart cells in the embryo. "This makes sense if a molecular pathway in which HDAC has a major role is re-expressed--the adult heart instead makes the cells it already has bigger since it is unable to make more cells very easily."

The researchers also found that HDAC works in the heart in part by regulating expression of another enzyme called Inpp5f, which is involved in a pathway that controls the growth and multiplication of cells. Inpp5f is also related to tumor-suppressor genes involved in cancer.

"HDAC and Inpp5f give us new targets for regulating cardiac hypertrophy," says Epstein. "Inhibitors of HDAC may warrant testing for cardiac disease to stop the hypertrophy that accompanies the re-expression of the fetal-gene program." HDAC inhibitors are already in trials for cancer and one, valproic acid, has been used for years to treat seizures. Most CHF medications are aimed at regulating blood pressure, but very few are targeted at the heart-muscle cells themselves. About 5 million Americans are living with CHF today, according to the American Heart Association.

"To understand how to better treat heart disease at the cellular level is an important next step," says Epstein.

This study was funded by the National Institutes of Health. Co-authors in addition to Epstein are Chinmay M. Trivedi, Yang Luo, Zhan Yin, Maozhen Zhang, Wenting Zhu, Tao Wang, Thomas Floss, Martin Goettlicher, Patricia Ruiz Noppinger, Wolfgang Wurst, Victor A. Ferrari, Charles S. Abrams, and Peter J. Gruber.

Remote Device Allows Cardiologist to Monitor Patients Daily at their Homes

An easy-to-use in-home monitoring device for patients is changing the way doctors monitor the health of patients with implanted defibrillators. Rush University Medical Center is participating in a pilot study of the LATITUDE® Patient Management system to determine if the wireless home monitoring system can decrease hospitalizations for heart failure.

A mini-antenna built into the implanted defibrillator sends data to a wireless system placed in the patient's home. The data is automatically transmitted to a secure Internet server where the physician can access this medical information anytime, from anywhere.



Pediatric Cardiologist

FLORIDA - The Department of Pediatrics at the University of Florida, College of Medicine-Jacksonville AND Wolfson Children's Hospital in Jacksonville are recruiting a full-time faculty member to the Division of Pediatric Cardiology. Candidates require a MD degree and Florida medical license eligibility. Applicants must be BE/BC in pediatric cardiology and have a primary focus on non-invasive imaging. This individual should have expertise in all aspects of echocardiography, including TEE, fetal, three-dimensional and is expected to direct the non-invasive imaging program of the University of Florida, College of Medicine-Jacksonville. The appointment will be at the non-tenure accruing level of Assistant Professor/Associate Professor/Professor depending upon experience.

Deadline for accepting applications will be August 1, 2007 with an anticipated negotiable start date of September 1, 2007. Academic rank will be commensurate with qualifications and salary is negotiable.

Forward letter of intent, curriculum vitae, and three letters of recommendation to:

Mobeen H. Rathore, MD

Professor and Assistant Chairman

Department of Pediatrics

653-1 West Eighth Street

Jacksonville, FL 32209

Tel: 904-244-3050, and/or fax 904-244-3028

e-mail: mobeen.rathore@jax.ufl.edu

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Unlike other remote devices which only transmit data if certain parameters are out of range, the LATITUDE system uploads health information that can help physicians monitor the day-to-day changes in patients. In addition to the data stored before, during and after an arrhythmia, the system employs a wireless weight scale and blood pressure monitor to record vital statistics crucial for the management of cardiac failure patients. An abrupt change in weight could indicate worsening heart failure.

"This sophisticated system allows physicians to manage the patient much more closely. The same information that would normally require a visit to the office every few months can now be downloaded to the physician at anytime without the patient ever leaving home," said Dr. Kousik Krishnan, a cardiac electrophysiologist at Rush.

According to Krishnan, the LATITUDE system provides added peace of mind for the patient. The physician can remotely check if the defibrillator is working correctly and assess battery life. If the patient feels the defibrillator activate, he or she can transmit the rhythm information immediately. The physician can quickly analyze the data and determine if the shock was appropriate or if the patient needs to go to the hospital.

"Now with patient information available weekly, or even daily if needed, we can better monitor our patients," said Dr. Krishnan. "We can pick up abnormalities sooner and act on those before they become serious."

Rush is one of only 18 centers in the country participating in the LATITUDE Inductive Pilot Program which offers remote monitoring for all Boston Scientific/Guidant devices. In addition, Rush is one of the leading enrollers in the DECODE Trial to determine if the LATITUDE monitoring system is resulting in decreased hospitalizations. Heart failure has an annual direct cost of more than \$26 billion in the U.S. and is the number one reason for hospitalizations.

The Beat Goes On! A Book for Young Adults Living with a Pacemaker or ICD



"*The Beat Goes On! A Book for Young Adults Living with a Pacemaker or ICD*" is a 40 page paperback book in an 8 1/2" X 10" size format. Nothing's better for dancing feet than a great beat — and hearts are no different! "*The Beat Goes On!*" is about living with the pacemaker or ICD that keeps that surgically-repaired heart in-step. This book is no two-step! *The Beat Goes On!* takes the young adult with a congenital heart defect step-by-step through:

1. the heart and how it works
2. abnormal heart rhythms
3. types of devices and what they do
4. caring for a device.

The Beat Goes On! answers many everyday questions about having a device that may leave some patients off the beat. Your patients will groove to *The Beat Goes On!* The cost of the book is \$2.95 each (plus shipping and handling).

The reviewers and contributors include: William A. Scott, MD; Teresa A. Lyle,

RN, MN, CPNP; Nancy S. Winn, RN, BSN; and Wendy M. Book, MD. The book is published by Pritchett & Hull Associates, Inc., 3440 Oakcliff Rd NE, Ste 110, Atlanta, GA 30340-3079. To order or more information call 800-241-4925 or visit the website at: www.p-h.com.

New Digital Grid will Link Heart Researchers Worldwide

Supported by an \$8.5 million federal grant, leading researchers at three universities, including Johns Hopkins, are creating an ambitious digital network that will allow cardiovascular researchers worldwide to easily exchange data and expertise on heart-related illnesses. The project, called the Cardiovascular Research Grid, is expected to be a boon to the large community of heart researchers who will use these digital tools to find new ways to prevent, detect and treat life-threatening cardiac ailments. To launch this effort, the National Heart, Lung and Blood Institute, part of the National Institutes of Health, has approved an \$8.5 million grant to be allocated over a four-year period that began March 1st. The digital project will be based at the Institute for Computational Medicine at Johns Hopkins, in collaboration with the Department of Biomedical Informatics at Ohio State University College of Medicine and the Center for Research in Biological Systems, University of California, San Diego. The project teams will develop open, grid-based software tools that will enable other research groups to become a "node" in the new grid. Once connected to the grid, researchers will be able to access and share experimental data, data analysis tools and computational models relating to heart function in healthy people and those with cardiac disease. To protect privacy, none of the heart data will carry information identifying patients from whom it was obtained. "There had never been a simple

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FACULTY/ADMINISTRATIVE POSITION IN PEDIATRIC CARDIOLOGY

The University of Utah, Department of Pediatrics, is seeking a pediatric cardiologist with an academic orientation to serve as Chief of the Division of Cardiology.

The successful candidate will have a faculty appointment in the Dept of Pediatrics, School of Medicine at the Associate or Full Professor level depending upon academic experience. The candidate will join the 16 members of the Division of Pediatric Cardiology based at Primary Children's Medical Center, the tertiary referral center for a three state area.

The successful candidate will provide the leadership for the mission of the Division, a mission that will include the opportunity for individual career development. The Division has a very active clinical research program and is one of the participating centers in the NIH funded Pediatric Heart Disease Clinical Research Network. In addition, studies of the basic biology of cardiac development are a focus for the division with NIH-supported research in conjunction with the Departments of Anatomy and Genetics as well as the Huntsman Cancer Research Institute. The division also has an active accredited fellowship program attracting excellent candidates nationally.

Primary Children's Medical Center is located on the hills overlooking Salt Lake City. The area offers an excellent quality of life with numerous cultural and recreational opportunities that are remarkably available.

The applicant should hold an M.D., be board-certified in pediatrics and pediatric cardiology by the American Board of Pediatrics, and have experience in academic administration.

Interested candidates should contact: J. Ross Milley, MD, PhD, Search Committee Chair for Peds' Cardiology Div Chief and Chief, Division of Neonatology, University of Utah School of Medicine, PO Box 581289, Salt Lake City, Utah 84158-1289 or e-mail at: ross.milley@hsc.utah.edu.

The University of Utah is an Equal Opportunity Employer and welcomes applications from minorities and women and provides reasonable accommodations to the known disabilities of applicants and employees



DIRECTOR OF PEDIATRIC HEART TRANSPLANT/ HEART FAILURE PROGRAM

The Division of Pediatric Cardiology at the University of Utah School of Medicine is recruiting a pediatric cardiologist to be Director of the Pediatric Heart Transplant/Heart Failure Program.

This candidate should have a strong clinical background in all areas of pediatric cardiology with expertise in children with heart failure and those awaiting and undergoing heart transplantation. The candidate ideally should have additional training in the area of pediatric heart transplantation and heart failure and should be an experienced individual in treating patients with acute and chronic heart failure. The candidate should also have experience in management of patients preoperatively with heart failure awaiting heart transplantation, with particular expertise in the immunologic issues related to pre- and post-transplant care.

The candidate will join a 16-member Division of Pediatric Cardiology with one pediatric cardiologist and one pediatrician currently involved with the Heart Transplant Program.

The successful candidate will receive a faculty appointment at the University of Utah. There will be protected time for clinical research with mentoring available within the Division for clinical research. The Division also has a very active clinical research program and is one of the participating centers in the Pediatric Heart Disease Clinical Research Network funded by the NIH.

The Pediatric Cardiology Division is based at Primary Children's Medical Center, a tertiary referral center for a three-state area located on the hills overlooking Salt Lake City. The area offers an excellent quality of life with immense cultural and recreational opportunities close and available.

Interested individuals should contact Robert E. Shaddy, Professor of Pediatrics, Division Chief of Pediatric Cardiology, University of Utah School of Medicine, at (801) 662-5400.

The University of Utah is an Equal Opportunity Employer and welcomes applications from minorities and women and provides reasonable accommodations to the known disabilities of applicants and employees.



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and direct way for cardiovascular researchers to share, analyze and model this important data," said Raimond Winslow, Director of the Institute for Computational Medicine at Johns Hopkins and principal investigator in the project. "Now, there will be." Winslow, who also is a professor in the Department of Biomedical Engineering, added, "This is the direction in which biomedical research is heading in the 21st Century. In the past, biomedical research was mainly done in individual labs. The Cardiovascular Research Grid will enable us to assemble large, geographically distributed research teams and bring together the leading experts in the world to focus on a common problem, regardless of their location. This grid will enable experimentalists to share their data with computational scientists, who will analyze and model the data. The computational scientists will then share their results with their experimental colleagues who use it to refine their experiments. In this fashion, we believe the creation of the Cardiovascular Research Grid will accelerate the discovery of new approaches for treating heart disease." In deciding to fund the new grid, the National Heart, Lung and Blood Institute recognized the important contribution that bioinformatics can now make in developing a deeper understanding of the mechanisms of heart disease and

in the development of new therapeutic approaches. During the first year of funding, the organizers of the new grid plan will deploy the initial infrastructure and software that will enable researchers to begin sharing and analyzing information. To accomplish this, Joel Saltz, chair of the Department of Biomedical Informatics and the Davis Endowed Chair of Cancer at Ohio State University, and his team will develop the software infrastructure that ties together resources on the grid. "The CardioVascular Research Grid will allow experts from different disciplines to combine their insights and to coordinate their efforts," Saltz said. "The ability to bring together many types of biomedical information will have a tremendous impact on the pace of progress in cardiovascular research." The Johns Hopkins team will focus on development of standardized vocabularies for describing biomedical data, models and data analysis applications. In addition to Winslow, the team will include faculty members Michael I. Miller and Tilak Ratnanather from the Department of Biomedical Engineering; and Donald Geman, Daniel Naiman and Laurent Younes, all from the Department of Applied Mathematics and Statistics. Mark Ellisman, Director of the National Center for Microscopy and Imaging at the University of California, San Diego,



Arkansas Children's Hospital, Little Rock, AR
PEDIATRIC TRANSPLANT CARDIOLOGIST



The Department of Pediatrics, Section of Cardiology, of the University of Arkansas for Medical Sciences College of Medicine located at Arkansas Children's Hospital in Little Rock, Arkansas, seeks candidates for an Assistant Professor (tenure track) position in the clinical-scientist pathway. M.D. degree and board eligibility/board certification in Cardiology is required. The position is available immediately, starting date is negotiable.

Cardiology offers state-of-the-art procedures and comprehensive post operative care to patients from Arkansas and the region. The Cardiac Catheterization team performs a variety of procedures including atrial septal defect closure, angioplasty with stent implantation, and blade and balloon atrial septostomy. Inpatient Cardiology and Intensive Care provides attending coverage of the cardiac intensive care service including post-operative care. The Cardiac Transplant program is recognized at one of the leading cardiac transplant programs in the United States. Cardiology Clinics and Outreach conduct monthly patient clinics in Fayetteville, Fort Smith, Texarkana, and Jonesboro.

The UAMS Department of Pediatrics employs over 195 faculty members and 75 residents. Arkansas Children's Hospital is among the largest children's hospitals in the United States. Located in the foothills of the Ozark Mountains, Little Rock offers Midwestern family values combined with the friendliness of the South, affordable housing, quality school options, a mild climate, excellent cultural and artistic venues, professional minor league sports, world class hunting, fishing and other outdoor recreational opportunities plus extraordinary natural beauty. With a population in excess of 500,000, Greater Little Rock offers the most desirable features of large cities without sacrificing ease of access and convenience. For more information, please see our website: www.uams.edu/pediatrics.

Interested individuals should contact:

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and his team will be responsible for developing effective and intuitive ways for users to interact with the Cardiovascular Research Grid. "Developing and deploying cyber-infrastructure to capitalize on emerging technologies to promote better collaboration and accelerate research is a core focus of our Center's efforts," said Ellisman, who also is director of UCSD's Center for Research in Biological Systems. "With a track record of developing scalable cyber-infrastructure to foster interdisciplinary investigations among teams of researchers in microscopy, neuroimaging and the environmental health sciences, CRBS is eager to collaborate with the John Hopkins team on developing the Cardiovascular Research Grid. We're looking forward to implementing an infrastructure that will effectively pool the diverse expertise, applications and instrumentation of the cardiovascular research community into a unified knowledge base—one that will enable researchers to tackle cardiac disease studies of greater scope and complexity." The Cardiovascular Research Grid will be headquartered in the 79,000 sq. ft. Computational Science and Engineering Building, now under construction on the Homewood campus of Johns Hopkins. The building is expected to open this summer.

Related Links: Institute for Computational Medicine at Johns Hopkins: www.icm.jhu.edu/ Johns Hopkins Department of Biomedical Engineering: www.bme.jhu.edu National Heart, Lung and Blood Institute: www.nhlbi.nih.gov.

April Conference Correction:

On page 11 of the April issue under the June Symposium Focus sidebar the, "Second International Symposium on Heart Disease (ISHAC)" should have been listed as the, "International Symposium on the Hybrid Approach to Congenital Heart Disease (ISHAC)."

For more information go to www.hybridsymposium.com

PEDIATRIC CARDIOLOGIST

Pediatric Cardiology Associates of Central New York, LLC in Syracuse, New York is seeking to add a fifth full-time Pediatric Cardiologist with experience in fetal, transthoracic, and transeophageal echocardiography as well as clinical pediatric cardiology.

The applicant should be Board Eligible/Board Certified in Pediatric Cardiology.

We constitute the Division of Pediatric Cardiology of the Department of Pediatrics at the Upstate Medical University and provide all teaching for medical students, residents in pediatrics/family medicine, and internal medicine cardiology fellows. We work in conjunction with Dr. George Alfieri, the congenital heart surgeon for the combined Syracuse and Rochester regions. An active catheterization lab offers comprehensive interventional and ablation procedures.

Our group's private practice model affords competitive salaries and benefits.

Interested parties are encouraged to call Ms. Pamela Lonergan, business manager, or any of the physician members (Drs. Craig Byrum, Frank Smith, Daniel Kveselis, and Nader Atallah) at 315-214-7700.

Pediatric Cardiology Associates, LLC
Division of Pediatric Cardiology
Department of Pediatrics
SUNY Upstate Medical University



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