Lung Transplant Program Brings Needed Services to Arizona and the Southwest

St. Joseph’s Hospital and Medical Center has launched a lung transplant program, and the hospital’s first lung transplant may be as soon as this summer. Throughout 2006, the hospital recruited a team of lung transplant specialists – thoracic and lung transplant surgeons Ross Brenner, MD, PhD, John Nigro, MD, Michael Smith, MD, and transplant pulmonologists Tony Hodges, MD, and Rajat Walia, MD, and skilled support staff to build a thoracic center as part of the hospital’s Heart & Lung Institute (HLI).

Brandi Krushelinski, RN, is transplant coordinator; social worker Kathy Lam, LCSW, MSW, and Liza Estrada, financial coordinator, are also a part of the team.

“Lung transplantation is a viable treatment option for patients with end-stage lung diseases,” says Dr. Hodges, medical director of the Center for Thoracic Transplantation at HLI. “Lung transplants are among the most complicated procedures, and patients require a lifetime of care. Lung-transplant patients must receive lifelong care after the transplant, which includes daily medications to prevent organ rejection and regular check-ups with lung transplant specialists. “This is a community of more than four million people, who until now, had no lung transplant program.

“The fact is that 75 percent of Valley residents in need of lung transplants go out of state for care,” says Ross Brenner, MD, PhD, surgical director of the Center for Thoracic Diseases. “Last year several lungs from Phoenix donors were transplanted into patients in California, and a number of Valley residents received lung transplants there.”

St. Joseph’s has been providing post-transplant care to patients for several months. The HLI is currently evaluating patients who may qualify for the lung transplant program, including those with advanced COPD (chronic obstructive pulmonary disease), pulmonary fibrosis, cystic fibrosis, bronchiectasis, pulmonary arterial hypertension, Lymphangioleiomyomatosis (LAM), and Langerhans cell histiocytosis (eosinophilic granuloma).

Disease Conditions Treated with Lung Transplantation and Referral Guidelines:

- End-stage chronic obstructive pulmonary disease (COPD)/emphysema due to any cause including Alpha-1-Antitrypsin deficiency
  - Refer when BODE Index > 5 or when FEV1 < 30%
- Pulmonary fibrosis (idiopathic and other etiologies like sarcoidosis, hypersensitivity pneumonitis, pneumoconiosis)
  - Refer when histologic or radiologic evidence of usual interstitial pneumonia (UIP) regardless of Vital Capacity, or
  - Histologic evidence of fibrotic non-specific interstitial pneumonitis (NSIP)
- Cystic fibrosis
  - Refer for FEV1 < 30% predicted, PO2 < 55, pCO2 > 45; severe hemoptysis; frequent and severe exacerbations; declining lung function despite maximal therapy; severe weight loss
- Bronchiectasis
  - Similar to cystic fibrosis
  - Refer when failing medical therapy and developing hypoxemia/hypercapnia
- Pulmonary arterial hypertension
  - Refer for NYHA Class III or IV irrespective of ongoing therapy; or
  - Rapidly progressive disease
- Lymphangioleiomyomatosis (LAM)
  - Refer when NYHA Class III or IV
  - Patients develop hypoxemia or hypercapnia; decreased exercise tolerance
- Langerhans cell histiocytosis (eosinophilic granuloma)
  - Same as LAM
cicular operating rooms for cardiac pediatric patients will be located on the second floor. The third floor will be renovated to house Cardiac Diagnostics; the fourth floor will have new cardiothoracic operating rooms and a cardiothoracic ICU. Floors six and seven will be HLI medical and surgical beds. Work begins this spring on transformation of the existing Patient Tower’s seventh floor to house the Pediatric Cardiothoracic Intensive Care Unit.

Our research initiative on lung cancer brings Keith Coon, PhD, to work with Dr. Ross Bremner in his lab at the Translational Genomics (TGen) Research Institute in Phoenix. One exciting project involves a collaborative study with TGen that looks at predictors of therapy response in adenocarcinoma of the lung.

The Cardiovascular Center is embarking on enhanced innovative procedures including endoscopic radial artery harvesting for coronary artery bypass graft (CABG), and rigid fixation of the sternum to decrease sternal instability and wound healing complications following CABG or valve surgery.

I hope you enjoy this issue of our HLI Newsletter, which features articles on many of the initiatives that I have mentioned.

David Cleveland, MD
Executive Director, HLI
Patients will be on immunosuppressive medication, which starts at the time of surgery. Once patients are off the respirator, medication teaching starts to familiarize patients with their new medications.

**Discharge and Follow-Up**

“After discharge, patients are followed in the lung transplant clinic twice a week initially, and then less frequently depending on their clinical course,” says Tony Hodges, MD, transplant pulmonologist. “Patients have blood work, PFTs and chest X-ray at every clinic visit. They are required to participate in a rehabilitation/exercise program after the surgery.”

**The Lung Transplant Team at St. Joseph’s Heart & Lung Institute (HLI)**

**Transplant Pulmonologists**

Tony Hodges, MD, is the medical director of lung transplantation, Center for Thoracic Transplantation, HLI. He is a nationally recognized for his expertise in issues related to pneumonia syndromes, lung transplantation, advanced lung disease, and infectious complications of transplantations. Dr. Hodges was the medical director of the lung transplant program and the lung volume reduction program at the University of Southern California (USC) prior to joining the faculty at St. Joseph’s. He also served as the associate medical director of the lung transplant program and lung volume reduction program at the University of Colorado Hospital from 1998-2002.

Rajat Walia, MD, is associate medical director of lung transplantation in the Center for Thoracic Transplantation, HLI. Dr. Walia completed a fellowship in lung and heart-lung transplantation at Stanford and then was an assistant professor of medicine in the Division of Pulmonary & Critical Care Medicine at the University of Florida. He also served as the associate director of the Adult Cystic Fibrosis Program at the University of Florida prior to his arrival at St. Joseph’s.

**Transplant Surgeons**

Ross Bremner, MD, PhD, is the surgical director, Center for Thoracic Diseases, HLI. He completed his general surgery and cardiothoracic training at the University of Southern California, Los Angeles, where he also completed his PhD. Dr. Bremner was also an assistant professor of cardiothoracic surgery at USC where he was director of the Hastings Thoracic Oncology Laboratory. His main clinical interests are minimally-invasive thoracic surgery, thoracic oncology, and lung transplantation. Dr. Bremner also directs a research lab located at the TGen facility in Phoenix.

Michael Smith, MD, is associate chief of thoracic surgery in the Center for Thoracic Diseases, HLI. He completed his general surgery and thoracic surgery training at Washington University School of Medicine in St. Louis, Missouri. During his general surgery training he was awarded a National Research Service Award from the U.S. Public Health Service and a Thoracic Surgery Foundation Research Fellowship Award for research in lung transplantation. Dr. Smith also was director of lung volume reduction surgery and surgical director of lung transplantation at the University of Southern California prior to coming to St. Joseph’s. His clinical interests are thoracic oncology, lung volume reduction surgery, lung transplantation and esophageal tumors.

John Nigro, MD, is a cardiothoracic surgeon in the Center for Thoracic Transplantation, HLI. Dr. Nigro completed fellowships in pediatric cardiothoracic surgery and transplantation at Children’s Hospital of Los Angeles. Dr. Nigro is also director of the Scott and Laura Eller Congenital Heart Center at the HLI.

**Transplant Coordinator**

Brandi Krushelniski, RN, BSN, received her bachelor of science in nursing from San Diego State University. She then worked as an organ procurement coordinator at Lifesharing in San Diego. Brandi has worked as a lung transplant coordinator at the University of North Carolina, Chapel Hill, and at the University of Southern California. She has over nine years of experience working with organ transplantation.

Social Worker, Kathy Lam, LCSW, and Financial Coordinator, Liza Estrada, also are part of the team.

For information, or to refer a patient call 602-406-4000 and ask for the Lung Transplant Coordinator. To fax a referral, please send to 602-798-9884, Attention: Brandi.
Center for Thoracic Disease and TGen Collaboration Focus Studies on Personalized Lung Cancer Therapies, Genome Analysis

Clinical and translational science, also known as “bench to bedside” or “personalized medicine” is the result of new research initiatives aimed at bridging basic science and the clinical arena. Ross Bremner, MD, PhD, surgical director, Center for Thoracic Diseases, and Keith Coon, PhD, research associate, Division of Thoracic Oncology, hope their collaborative laboratory Phase I study with the Translational Genomic Research Institute (TGen) in Phoenix, *Predictors of Therapy Response in Adenocarcinoma of the Lung*, will enable them to answer questions about whether or not chemotherapy alone or with additional targeted “personalized” therapies inhibit or reverse the cascade of gene expression changes that promote further tumorgenesis.

“This project involves analyses of genomic changes (via gene expression profiles) that occur in lung cancer tumors as a result of standard chemotherapy with/without additional targeted therapies,” says Dr. Coon. Gene expression profiles are the result of microarray analyses that give the breakdown of the switching on and off of certain genes. “In this study, we are looking at genomic profiles of lung tumors at biopsy then proceeding with standard chemotherapy with/without additional targeted therapies, followed by subsequent further genomic profiling of the tumor at the time of operative resection,” adds Dr. Bremner.

Primary tumors resected from patients with adenocarcinoma of the lung will be multiplied *in vitro*, i.e., cell culture, and then re-injected subcutaneously into rats. Gene expression profiles will be taken at the time of tumor formation, followed by treatment with an array of drugs alone or in combination, and subsequent genomic profiling of the tumor (as well as standard morphological, pathological, and molecular assessments) will be carried out. “This will help characterize novel drugs that can be used to facilitate tumor reversion in adenocarcinoma of the lung,” says Dr Coon. “We believe that findings will demonstrate the efficacy of known anticancer agents, alone and in combination, on these particular types of tumors as well as potentially identify new anticancer drugs/drug cocktails,” adds Dr. Bremner.

Other studies under way by Drs. Bremner and Coon include an investigation of:

- **Circulating tumor cells** — a collaborative study with a biotech company using a new technique to detect rare circulating cancer cells. The study involves a flow cytometry-based negative enrichment protocol that eliminates other cell types (red blood cells, leukocytes, lymphocytes, etc.) and leaves a pure population of circulating tumor cells that can be accurately quantified and subsequently analyzed. This technology has the potential to provide prognostic data and may be an indicator of early recurrent disease. It is hoped that this test will be able to detect cancer at a stage before it can be seen by standard radiographic studies.

- **Peri-operative COX-2** (the enzyme associated with inflammatory process) modulation to decrease metastatic potential of non-small cell lung cancer (NSCLC). An *in vitro* model with established cancer cell lines will be treated with various COX-2 inhibitors, and standard invasion and motility assays to note the characterization of metastases will be performed. Additionally, *in vivo* human subjects will be randomized to receive either peri-operative celecoxib or placebo, and surrogate markers of metastatic promotors will be investigated.

- **Gene dosage patterns in unique subsets of lung cancer** — In this collaborative study with TGen, the focus is on identifying gene dosage patterns in unique subsets of lung cancer, e.g., female non-smokers. This study will utilize the technique of array genomic comparative hybridization (aCGH) to look for chromosomal changes that cause disease in unlikely subsets of lung cancer patients.

The Cardiovascular Center Launches Minimally-Invasive Endoscopic Artery Harvesting

In an effort to improve the outcomes from coronary artery bypass grafting, some surgeons have recently shown increased interest in the aggressive use of arterial grafts. “Clinical data has unequivocally demonstrated improved patency rates as well as long-term freedom from angina, re-intervention and survival with arterial grafting,” says Lishan Aklog, MD, director, The Cardiovascular Center at St. Joseph’s Heart and Lung Institute and chief, cardiovascular surgery. “Based on this data we feel that the optimal bypass operation in 2007 includes at least two arterial grafts to left circulation, and we strive to provide this to the majority of our patients.”

The radial artery, harvested from the forearm, is an excellent conduit that — in appropriate patients — has been shown to be superior to vein grafts. The traditional method of harvesting the radial artery includes a nine-inch incision on the arm from the wrist to the elbow. A minimally-invasive approach using newly developed endoscopic instruments now permits the artery to be harvested through a one-inch incision at the wrist (see photos next page).

The Cardiovascular Center is one of only a few centers in the nation (and the only in the Valley) that routinely uses endoscopic radial artery harvesting (ERAH). Dixie Patterson PA-C, chief physician assistant at the Center, is one of only a handful of physician assistants in the United States that has the specialized skills to perform ERAH. Ms. Patterson also performs endoscopic harvesting of the saphenous leg vein, which has eliminated the need for the long, painful leg incision often seen with traditional techniques.
“Minimally-invasive endoscopic harvesting of the leg vein is arguably one of the biggest advances in cardiac surgery in the past decade,” says Dr. Aklog. “Now we are able to apply the same techniques with the same benefits to radial artery harvest.” “This broadens our ability to aggressively utilize arterial grafting and apply these long-term benefits to many of our patients,” says Brian J. deGuzman, MD, associate chief of cardiovascular surgery. “Patients are not only satisfied with the improved cosmetic results, but have less pain and improved healing,” adds Ms. Patterson. “I’m extremely happy and excited that we can offer this procedure to our patients.”

The endoscopic harvesting technique, in both the arm and leg, has the following patient benefits:

- Decreased trauma to surrounding tissues
- Dramatically less scarring and improved cosmetic results
- Decreased surgical recovery time
- Decreased pain
- Decreased wound infection rates

Dr. deGuzman notes, however, that not all patients are good candidates for radial artery grafting including those with coronary artery blockages of less than 70 percent, insufficient ulnar artery flow to the hand, Raynaud’s disease, and those with dialysis fistulas on the same side.

Rigid Fixation Being Used for Closure of the Sternum

The majority of cardiac surgical procedures require at least a partial sternal opening that must be securely closed at the completion of the procedure to avoid very serious, complications of poor sternal healing and sternal wound infection. “Even patients with well-healed sternums occasionally have chronic pain symptoms related to their mobility because of their sternal incision,” says Lishan Aklog, MD, director of The Cardiovascular Center, the HLI at St. Joseph’s and chief, cardiovascular surgery. “Despite the potential problems, the sternum is now one of the few bones in the body that is still typically closed using twisted steel wires, a technique developed well over 50 years ago.” In contrast, the technology of bone fixation has progressed dramatically over the past 20 years, and rigid fixation using metallic plates and screws is now standard of care for most bones in the body.

Surgeons at The Cardiovascular Center of The HLI have begun to apply this technology in conjunction with traditional sternal wires in many patients undergoing cardiac surgery. “Using titanium rigid fixation plating of the sternum (see photo) provides significantly greater bone stability, which we think will increase patient comfort and decrease the risk of sternal wound infection,” says Dr. Aklog. “In addition, we believe that rigid fixation can decrease the hospital length of stay and may allow patients to return to strenuous upper body activity (such as lifting and golf) much more rapidly,” adds Brian deGuzman, MD, associate chief of cardiovascular surgery.

Currently, pre-operative and intra-operative risk factors are considered in selecting patients for this technique. Individuals with chronic obstructive pulmonary disease (COPD), diabetes, renal failure, osteoporosis, previous chest radiation or those on chronic steroid therapy are at increased risk for sternal wound problems and now routinely undergo rigid sternal fixation. “With increased experience and improved technology, we expect to broaden rigid fixation use to almost all patients in the future,” adds Dr. Aklog.

For more information about either endoscopic radial artery harvesting or rigid sternal fixation being used, contact either Dr. Aklog or Dr. deGuzman at 602-406-4000.

Team Highlights

St. Joseph’s CVOR Perfusionists Provide Complex Critical Services

Perfusionists are vital members of the cardiovascular operating room (CVOR) surgical team because they are responsible for running the cardiopulmonary bypass (heart-lung) machine. The heart-lung machine diverts blood away from the heart and lungs, adds oxygen to the blood, and returns the blood to the body without the blood having to go through the heart. Rick Sowell, CCP, chief perfusionist, along with with David Brad Sanders, CCP, and Barry Steinbock, CCP, comprise the St. Joseph’s team.

During surgery, perfusionists use the heart-lung machine to maintain blood flow to the body’s tissues and regulate levels of oxygen and carbon dioxide in the blood. In addition, perfusionists are also responsible for measuring selected laboratory values (such as blood cell count) and monitoring circulation. Under the direction of the anesthesiologist and surgeon, perfusionists may also administer medicines through the cardiopulmonary bypass circuit.

“Our perfusionists at St. Joseph’s carry out a complex, challenging and extremely responsible job, and we are fortunate to have exceptional, highly experienced perfusionists,” says Lishan Aklog, MD, director of The Cardiovascular Center at the HLI and chief, cardiovascular surgery.
New HLI Faculty

Lourdes Guerrero-Tiro, MD, is a pediatric cardiologist joining the Scott & Laura Eller Congenital Heart Center. Before joining the HLI, she was in private practice serving greater Phoenix since 1992. Prior to that, she served as director of the Pediatric Critical Care Unit, and director of Pediatric Echocardiography at Rush Presbyterian St. Luke’s Hospital in Chicago. Dixie Patterson, PA-C, joined the Cardiovascular Center as Chief Physician Assistant. Barry Steinbock, CCP, is a new perfusionist with the cardiovascular operating room team. Keith Coon, PhD, is a new researcher working with Dr. Ross Bremner at TGen.

The Fetal Cardiology Program: Offering Comprehensive Care for Tiny Hearts

As part of the Scott and Laura Eller Congenital Heart Center within the HLI at St. Joseph’s, the Fetal Cardiology Program offers evaluation, diagnosis and management of pregnancies at-risk for fetal structural heart defects and rhythm disturbances. Early detection of these congenital heart anomalies provides appropriate evaluation, care and delivery into the Center’s team of pediatric specialists, including pediatric cardiovascular surgeons, if needed. Ernesto T. Alboliras, MD, FACC, FAAP, directs the Fetal Cardiology Program. He is also director of Pediatric and Fetal Non-invasive Imaging and Telemedicine, and the Pediatric and Fetal Echocardiography Laboratory of the HLI.

“Fetal heart rhythm problems such as supraventricular tachycardia respond well to in utero therapy,” says Dr. Alboliras. “At St. Joseph’s, we work as a team to monitor and treat potentially life-threatening fetal arrhythmias.”

Fetal Cardiology Program services include:

• Direct referrals accepted from obstetricians, family practitioners, perinatologists or other specialists taking care of the unborn child.
• Consultation for pregnancies with fetus at-risk for cardiac defects including abnormal maternal serum screening; abnormal obstetric ultrasound; late or early maternal age; maternal intake of potentially teratogenic medications or drugs; lupus, diabetes, family history of cardiac disorder or genetic disease; abnormalities of other fetal organ systems.
• Fetal echocardiography. This test involves the use of an ultrasound machine specially equipped for use in cardiac imaging.
• Diagnosis and management of fetal arrhythmias.
• Consultation with other Scott and Laura Eller Congenital Heart Center and/or the Fetal Care Center staff for services including cardiothoracic surgery, maternal-fetal medicine, neonatology, genetics and social services.

Dr. Alboliras has 20 years experience in pediatric cardiology and was one of the pioneers in the transmission of pediatric echocardiograms via telemedicine lines. Before joining the HLI at St. Joseph’s, Dr. Alboliras was associate professor at the University of Chicago Pritzker School of Medicine and director of fetal cardiology at the University of Chicago Hospitals. He is board certified in pediatrics and pediatric cardiology.

For information or consultation, please contact Dr. Alboliras at 602-406-4000.