Engineering and medicine: *Partnering for success*

Lab's 'mission control' looks like the real thing

Some of the physicians who work there call the echocardiography laboratory at Texas Children's Hospital "mission control" because of its appearance and operations style. The new laboratory will certainly look even more like the Mission Control Center.

Texas Children's Hospital, a non-profit facility, has for some time operated this laboratory, providing diagnosis and surgical support to pediatric heart patients. This lab is a high volume, multi-physician and multi-patient support facility. Working with a number of architects, the hospital's management team is designing an enlarged, upgraded laboratory to be located in a building now under construction.

This opportunity prompted the management of TCH to contact JSC for collaborative support of facility redesign and revision of operations techniques. JSC's Mission Operations Directorate took up the challenge as a unique opportunity to share its experience and know-how in the operations arena with the local community. Many of the technologies JSC is sharing with TCH were featured in exhibits at Inspection 98.

A team of JSC operations technologists visited TCH to gain an understanding of the current operations paradigm and facilities. The team then talked at length with the physicians in the lab and members of the technical staff about their requirements and how they envision their future workplace.

TCH's echocardiography physicians and technical staff then visited JSC's facilities. Their tour consisted of briefings by JSC telemedicine experts and a visit to the MCC. The TCH staff was presented with informational briefings on the MCC's operations techniques and data architectures.

The tour culminated with a visit to JSC's Emergency Operations Center. The JSC EOC, which uses many of the same technologies and data architectures installed in the MCC, was an excellent match to the style and size of the envisioned laboratory. The hospital staff also expressed interest in the EOC as the basis for an emergency response operations center for the hospital. Follow-up discussions are anticipated.

The TCH staff members and representatives from the MOD then discussed the potential use of the represented JSC technologies and operations concepts.

The MOD operations technologists – Bruce Hilty/DD, James Ortiz/DD, and Tony Griffith/DD – then went to work reengineering the TCH operations technique, currently a very linear and manual operations process. The MOD team suggested a highly distributed and interchangeable operations concept centered on techniques established within the current MCC operation paradigm and encompassing networked data architectures, remote file servers, digital voice systems, remote data services, digital video servers, archiving and the use of commercial-off-the-shelf software and equipment.

MOD presented the TCH staff a proposed operations vision targeted toward a multiplexed and multitasked environment providing enhanced situational awareness, enhanced connectivity and computer-based physician and facility scheduling in a facility designed for operations. The envisioned facility architecture would also enable integrated patient and exam evaluation data and easy and seamless access to information locally and remotely. It will also allow for integrated training and operations, expandability, operating cost reduction, and better patient diagnosis and care. Integrated training and operations is an important aspect of the suggested operations concept as the TCH is a teaching hospital.

MOD's cross-cultural training expertise, developed from work on the International Space Station, is a valuable asset that TCH is planning to tap into in the future. MOD's comments and suggested operations concept were openly received by the TCH staff. Many of the suggestions were incorporated into the design of the new lab.

Any NASA-owned technology the hospital uses will be coordinated through JSC's Technology Transfer and Commercialization Office. ■

JSC Photo S98-17373 by Mark Sowa

JSC Director George Abbey and University of Texas Medical Branch President John D. Stobo shake hands after signing an agreement to develop specialized doctoral training in the space life sciences.

JSC and University of Texas Medical Branch to develop doctoral program

JSC Director George Abbey and University of Texas Medical Branch President John D. Stobo, M.D., have signed an agreement expressing their mutual intent to develop specialized doctoral training in the space life sciences.

Doctoral candidates will participate in class work, laboratory studies and other learning experiences at both institutions. NASA and UTMB will commit the necessary faculty and staff to develop the program, and both parties will seek internal and external sources to provide funding for operations and student stipends.

"This will be a very good partnership for both JSC and UTMB," said Abbey. "We will all benefit from it. There are a number of areas in medicine and the life sciences that we need to pursue and develop together."

The immediate objectives of the cooperative venture are to recruit and train one or more students each year in a mutually agreeable curriculum in the space life sciences; seek external support (including federal and state) for the development, operations and evolution of the program; develop a detailed program agreement by March 1999; and enter the first student in the program by next fall. ■

Cardiac device co-developed by NASA implanted in human

A tiny heart-assist pump developed in part by NASA received approval to begin clinical trials in Europe in October. Berlin heart surgeons implanted the device in a human for the first time in mid-November under the watchful eye of its principal developer, Dr. Michael DeBakey.

The pump, called the DeBakey VAD™ (ventricular assist device), is no bigger than two AA batteries, one-tenth the size of portable heart-assist devices now on the market.

MicroMed Technology, Inc., based in The Woodlands, Texas, the company which holds the license to develop and manufacture the device, received European approval to use it in humans in October. The purpose of these trials, conducted at multiple sites, is to document the performance of the miniaturized DeBakey VAD™ for bridge-to-transplant patients with end-stage heart failure.

Development of the DeBakey VAD™ began as a collaboration with NASA engineer David Saucier, who was a heart transplant patient. He and DeBakey had discussed the idea of developing a heart pump so simple that it could not fail and so tiny that it could fit into a child's chest. Eventually, work on the heart pump became an official program at NASA. Saucier has since died.

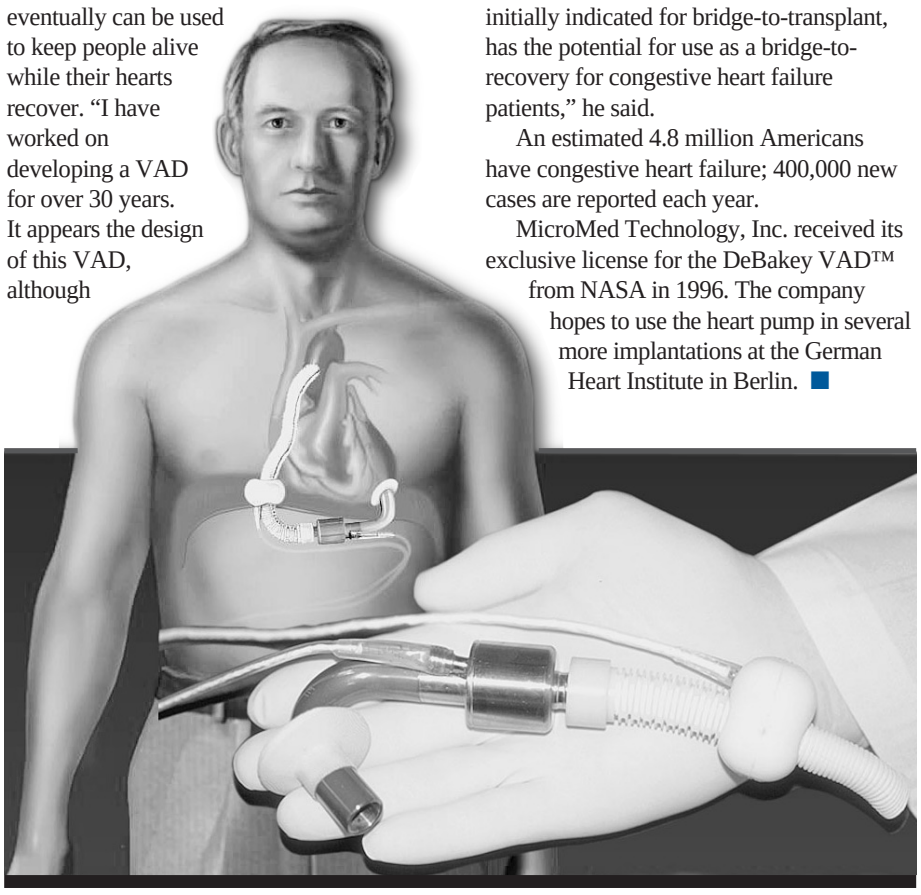
Co-developed by NASA with DeBakey and Dr. George Noon, the DeBakey VAD™ is an investigational heart-assist device designed to provide increased blood flow, up to 10 liters per minute, to patients suffering from congestive heart failure. The VAD is 30 mm × 76 mm and weighs 93 grams.

DeBakey, chancellor emeritus of the Baylor College of Medicine and director of the DeBakey Heart Center at Baylor and the Methodist Hospital, implanted the first successful VAD in 1966. Noon is a clinical professor of surgery at Baylor College of Medicine and the Methodist Hospital.

DeBakey, the primary investigator of the DeBakey VAD™, hopes the VAD eventually can be used to keep people alive while their hearts recover. "I have worked on developing a VAD for over 30 years. It appears the design of this VAD, although initially indicated for bridge-to-transplant, has the potential for use as a bridge-to-recovery for congestive heart failure patients," he said.

An estimated 4.8 million Americans have congestive heart failure; 400,000 new cases are reported each year.

MicroMed Technology, Inc. received its exclusive license for the DeBakey VAD™ from NASA in 1996. The company hopes to use the heart pump in several more implantations at the German Heart Institute in Berlin. ■



Photos courtesy MicroMed Technology, Inc.

The DeBakey ventricular assist device is no bigger than two AA batteries, one-tenth the size of portable heart-assist devices now on the market.