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NASA Joins DeBakey Developing New Heart — May Rival Cooley Heart —

HOUSTON—The National Aeronautics and Space Administration (NASA) has joined forces with the renowned cardiac surgical team of Dr. Michael DeBakey to develop a new miniaturized, axial rotary-flow, implantable heart-assist device.

According to Dr. George P. Noon, professor of surgery with the DeBakey Heart Center of Baylor College of Medicine and the Methodist Hospital here, the decision to team up with NASA engineers for this project was natural. "They put a man on the moon," he said in an interview with *The Newspaper of Cardiology*. "They like to do things that are hard."

This is not the first time that a heart surgery group has teamed up with a space agency to produce an artificial heart. Perhaps not coincidentally, the DeBakey/NASA alliance will compete with another Houston-based surgical team and space agency group. Dr. Denton Cooley and his associates at the Texas Heart Institute and the French space agency Aerospatiale already have a two-year head start on Dr. DeBakey's group in developing a rival device, a totally

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ARTIFICIAL HEART

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implantable pneumatic artificial heart (*The Newspaper of Cardiology* 1990;2[8]:1).

Although Dr. Cooley's group has already done preliminary placement tests in humans (see sidebar), the DeBakey/NASA group hopes to have the first prototype if its device ready for animal testing this spring or summer.

"Basically what we're doing is developing an axial flow pump that can maintain adequate circulation," said Dr. Noon. The pump will probably be attached to the left ventricle. According to Dr. Noon, the advantages of the NASA pump over devices that are currently on the market are its small size and implantability. He said some of the pumps now being used are too large for many potential recipients. "If someone weighs less than 70 kg, you can barely get the device in him. Our pump will be small enough to provide circulation for infants as well as adults."

According to Jim Akkerman, a 30-year NASA engineering veteran normally assigned to the space shuttle program but working with Dr. DeBakey's team part-

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time, the NASA pump will consist of a tubing about 2" long and 0.5" in diameter. Its motor drive unit will fit over the tubing and will be about 0.75" long and 0.5" round.

Its appearance will somewhat resemble that of the Jarvik 2000™ pump, the latest creation of Dr. Robert Jarvik (*The Newspaper of Cardiology* 1990;2[11]:1), inventor of the Jarvik 7 heart. Both pumps will use magnetic repulsion to power their axial rotary blades.

Unlike the Jarvik 2000, however, which will use a separate titanium-encased magnet assembly to propel its blades around a centralized bearing, the NASA pump will



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have several magnets inserted into the tips of each of its rotary blades. The magnets will be about .05" round, and .187" inch long. The magnets, in turn, will be driven by stationary windings energized by rechargeable batteries and a miniturized computer implanted under the patient's skin. The battery/computer package will be about the size of a microcassette recorder.

Mr. Akkerman explained that the NASA device will be able to pump about four liters of blood per minute at about 14,000 rpm. The blood flow will be regulated by the computer to match the patient's need.

Both Dr. Noon and Mr. Akkerman said the decision to develop a heart-assist device rather than a total artificial heart, such as the device being fabricated by Dr.

Cooley's team, was dictated by Dr. DeBakey. Said Mr. Akkerman, "Let me tell you what Dr. DeBakey said to us. He said very few people who need a heart transplant make it to the hospital, but those who need just a little help come in by the droves."

Added Dr. Noon, "At least 50,000 people each year require some kind of heart assist device. We have to develop a safe, reliable, and durable device. And if we do, the market is there."

Both men shrugged off the coincidence that their direct rivals in both space and medicine are also working on a new heart device. Aerospatiale, the French space agency working with Dr. Cooley's team to develop the totally implantable artificial heart, also developed the Ariane booster rocket and the Concorde supersonic transport jet. "It's interesting that the two surgical teams are working with the rival space agencies," admitted Mr. Akkerman. "But I guess it's not too surprising." ^{MC}

—Anita Cecchin

Developed from interviews with Dr. George P. Noon and Mr. Jim Akkerman.