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FOR IMMEDIATE RELEASE

## **Minimally Invasive Heart Surgery Research Wins N.I.H. Award Boston University, Children’s Hospital Boston, and Microfabrica to Develop Revolutionary Needle-Based Tools**

BOSTON (9-5-07) -- Efforts to make open-heart surgery a minimally invasive procedure have earned a five-year, \$5 million National Institutes of Health Bioengineering Research Partnership award. Professor Pierre Dupont of Boston University’s College of Engineering, cardiac surgeon Pedro del Nido, M.D., at Children’s Hospital Boston/Harvard Medical School, and microdevice manufacturer Microfabrica Inc. (Van Nuys, CA) will collaborate to develop instruments and procedures that promise to bring the precision of conventional open-heart surgery to minimally invasive instruments and tools, allowing complex surgical repairs to be made while the heart is still beating.

“To perform repairs inside the heart, there are two approaches – open heart surgery and catheter interventions,” Dupont said. “With catheters, you don’t have to place the patient on a heart-lung machine or cut the chest and heart open. But in comparison with open heart surgery, what you can actually do with a catheter is limited. We’re trying to incorporate the best of both approaches. We want to produce instruments that are as minimally invasive as catheters, but which provide the precision and control of open-heart surgery.”

Under the grant from the National Heart, Lung, and Blood Institute, the team is developing robotic instruments that could extend into the heart through needle-sized incisions in the chest and heart walls. Using a joystick controller and real-time medical imaging technology, a surgeon could navigate the robotic instrument through the chambers of the heart to the surgical site and deploy an array of tools from its tip to remove blockages, repair faulty valves and close leaks inside the beating heart. “The repair of complex heart defects through open heart surgery has become routine, in great part because of the availability of cardiopulmonary bypass,” said del Nido. “But we now know that putting patients on bypass carries some risks and can lead to problems, such as neuromotor defects in children and stroke in adults.” Dupont is developing the instruments and robotics technology needed to perform these tasks, while partnering with Microfabrica to develop a toolbox of millimeter-scale tools that can perform a variety of delicate repairs.

“Using our EFAB® manufacturing process, we can economically produce tiny, robust metal tools to remove and suture tissue. These tools can be quickly designed on a computer, then fabricated without the need for assembly, even when they include dozens of moving parts. And while the overall tool is measured in millimeters, it has features measured in microns,” noted Microfabrica chief technology officer Adam Cohen. According to Dupont, the

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biggest benefit may be the technology's potential to help all age groups: adults, children and even fetuses. "Working with our clinical partners at Children's Hospital Boston, we're developing different instruments for each of these groups," he said. "Fetal surgery is especially exciting since, in certain cases, repairing a heart defect before birth can greatly improve the chances for the heart to develop normally."

Founded in 1839, Boston University is an internationally recognized institution of higher education and research. With more than 30,000 students, it is the fourth largest independent university in the United States. It contains 17 colleges and schools along with a number of multi-disciplinary centers and institutes which are central to the university's research and teaching mission. For more information please visit [www.bu.edu](http://www.bu.edu).

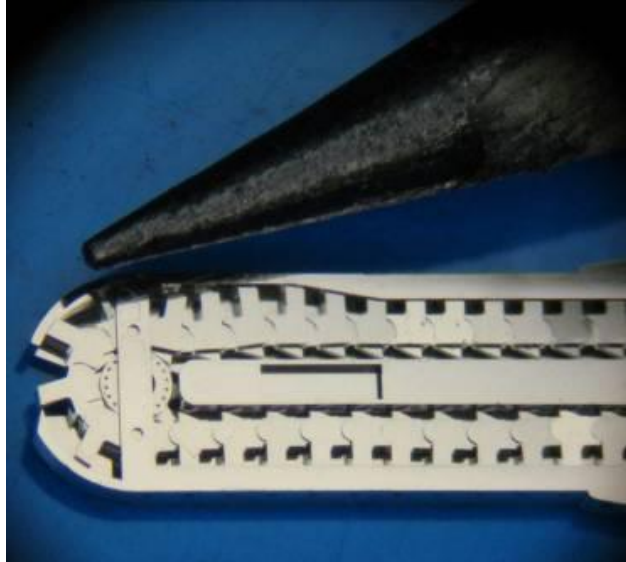
Children's Hospital Boston is home to the world's largest research enterprise based at a pediatric medical center, where its discoveries have benefited both children and adults since 1869. More than 500 scientists, including eight members of the National Academy of Sciences, 11 members of the Institute of Medicine and 10 members of the Howard Hughes Medical Institute comprise Children's research community. Founded as a 20-bed hospital for children, Children's Hospital Boston today is a 377-bed comprehensive center for pediatric and adolescent health care grounded in the values of excellence in patient care and sensitivity to the complex needs and diversity of children and families. Children's also is the primary pediatric teaching affiliate of Harvard Medical School. For more information about the hospital please visit [www.childrenshospital.org/newsroom](http://www.childrenshospital.org/newsroom).

Microfabrica Inc. is a leading manufacturer of micro and millimeter-scale mechanical devices for the medical, defense, and electronics industries. The company's unique EFAB® technology offers an unprecedented capability to cost-effectively and flexibly manufacture highly-miniaturized components and mechanisms in production volumes. EFAB is the only manufacturing technology to produce robust, fully-assembled devices that are millimeters to centimeters in size with micron-scale features. The technology works by depositing dozens of precisely-defined metal layers, achieving features and tolerances measured in microns. EFAB technology opens up a world of possibilities for sophisticated, miniaturized devices impossible or impractical to manufacture using other methods. Microfabrica is based in Van Nuys, California. For more information, please visit [www.microfabrica.com](http://www.microfabrica.com).

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## Photos

The following high-resolution photos are available by e-mailing [mseele@bu.edu](mailto:mseele@bu.edu):



Millimeter-scale metal chainsaw-like tissue removal instrument shown next to a sharpened pencil point. This device—having dozens of moving parts—was fabricated pre-assembled with micron-level precision using EFAB® technology.



Millimeter-scale forceps protruding from a robotic needle

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