A Better Way to Diagnose Pneumonia

Georgia Institute of Technology

Researchers from the Georgia Institute of Technology have created a new sampling device that could prevent thousands of people worldwide from dying of pneumonia each year.

Called PneumoniaCheck, the device created at Georgia Tech is a solution to the problem of diagnosing pneumonia, which is a major initiative of the U.S. Centers for Disease Control and Prevention (CDC).

Pneumonia, an inflammation of the lungs, kills about 2.4 million people each year. The problem is particularly devastating in Africa, Southeast Asia and the Eastern Mediterranean, where a child dies of pneumonia every 15 seconds.

Developed by mechanical engineering students, graduate business students and faculty at Georgia Tech, PneumoniaCheck will be commercially launched this month to healthcare professionals through the startup company, MD Innovate Inc.

“Georgia Tech created a simple and new device to detect the lung pathogens causing pneumonia, “ said David Ku, Georgia Tech Regents’ Professor of Mechanical Engineering, L.P. Huang Chair Professor for Engineering Entrepreneurship in the College of Management, and Professor of Surgery at Emory University. “It has the potential to save more lives than any other medical device.”

Last year, Ku was asked by the head of virology at the CDC to develop a quick and economical way to diagnose pneumonia, particularly in developing nations where it is a leading cause of death among children.

Ku challenged a group of mechanical engineering and bioengineering graduate students to develop an accurate device for diagnosing pneumonia. Current sampling methods using the mouth and nose are only 40 percent effective. The samples are typically contaminated by bacteria in the mouth, which leads to misdiagnosis and an incorrect prescription of antibiotics.

In developing nations, many children with respiratory infections fail to receive adequate care, and the overuse of antibiotics has led to an increase in drug-resistant bacteria. An accurate, easy-to-use and widely available new diagnostic test could improve identification of bacterial respiratory infection in children, reducing the inappropriate use of antibiotics and the long-term negative impacts of drug resistance, according to a recent article in *Nature* titled “Reducing the global burden of acute lower respiratory infections in children: The contributions of new diagnostics.”

As a Tech graduate student, Tamera Scholz and her peers developed the solution – PneumoniaCheck.

The device contains a plastic tube with a mouthpiece. A patient coughs into the device to fill up a balloon-like upper airway reservoir before the lung aerosols go into a filter. Using fluid mechanics, PneumoniaCheck separates the upper airway particles of the mouth from the lower airway particles coming from the lungs.

“It’s interesting because it’s so simple,” said Scholz (M.S. ’10 Mechanical Engineering), who is now an engineer for Newell Rubbermaid. “It’s not a fancy contraption. It’s a device that patients cough into and through fluid mechanics it separates upper and lower airway aerosols. Through each iteration, it got simpler. … I like that I will be able to see it make a difference in my lifetime.”

Once the device was developed, Taylor Bronikowski and a group of Georgia Tech M.B.A. students from the College of Management started developing a business plan for PneumoniaCheck that starts locally and grows globally. They used the device as a test case to develop a Triple Bottom Line company in India that could result in financial profits, environmental sustainability and social benefits, such as jobs and healthcare.

“Our goal is to provide better medicine at a cost savings to patients and hospitals,” Bronikowski said. “We wanted a worldwide solution, so patients in developing nations can afford it.”

Bronikowksi, Ku and Sarah Ku formed the startup company, MD Innovate Inc., in 2010 to manufacture the device in large quantities and organize distribution and commercialization. The device is now being used in pneumonia studies at Grady Memorial Hospital in downtown Atlanta and the Atlanta Veterans Administration Medical Center, Ku said.

The FDA has cleared PneumoniaCheck for sale in the U.S. The device is licensed but its patent is pending. The company will start selling PneumoniaCheck in the U.S. in January and it could hit other countries in two years, Ku said.

“It’s a great feeling, working on something that has the potential to save thousands of lives,” Bronikowski said.

On the horizon, Ku and future Georgia Tech graduate students will be developing a simple and effective method for diagnosing pneumonia in regions without healthcare facilities or basic infrastructure.

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