McGowan Institute for Regenerative Medicine
A program of the University of Pittsburgh and UPMC

Technology Developed by McGowan Faculty Permitted the First U.S. Implant of a Medical Device Before Lifesaving Double Lung Transplant

Based on technology developed by McGowan Institute of Regenerative Medicine faculty members William Federspiel, PhD, W.K. Whiteford professor of bioengineering, chemical engineering, and critical care medicine, and the late Brack Hattler, MD, ALung Technologies developed the Hemolung Respiratory Assist System (RAS) as a dialysis-like alternative or supplement to mechanical ventilation. Earlier this year, the Hemolung RAS was implanted into the first person in the U.S. at the University of Pittsburgh Medical Center (UPMC). The device was used as a bridge to transplantation upon receiving the U.S. Food and Drug Administration's approval to use the technology.

Suffering from cystic fibrosis and rejecting the transplanted lungs he had gotten just 2 years ago, Jon Sacker, 33, came to UPMC from his hometown in Moore, Oklahoma, as a last resort. But when his carbon dioxide levels spiked, making him too sick for another transplant, his family feared the worst.

"I thought I had brought my husband here to die," said Mr. Sacker's wife, Sallie.

Instead, UPMC clinicians turned to a Pittsburgh-made device called the Hemolung RAS that would filter out harmful carbon dioxide and provide healthy oxygen to his blood, giving Mr. Sacker a chance to gain enough strength to undergo a lifesaving transplant. In February, he became the first person in the U.S. to be implanted with the Hemolung RAS; in March, he underwent a double lung transplant and today is on the road to recovery.

"The entire series of events that led to this transplant and Jon's recovery have been amazing," said McGowan Institute for Regenerative Medicine faculty member Christian Bermudez, MD, chief of UPMC's Division of Cardiothoracic Transplantation. "Jon had previously been very active and fit, and we knew we had to do whatever it took to help him."

"Jon was in very critical condition when he came to Pittsburgh, and the Hemolung was a lifesaver for him while waiting for his second lung transplant. We are very proud of his good recovery," said Mr. Sacker's pulmonologist, Mario Crespo, MD, associate medical director of UPMC's Lung Transplant Program.

Many patients waiting for lungs or a heart use mechanical devices as a bridge to transplant. But doctors said Mr. Sacker was too sick for the traditional extracorporeal membrane oxygenation, or ECMO. However, UPMC doctors knew about the Hemolung RAS, which removes carbon dioxide and delivers oxygen directly to the blood, allowing a patient's lungs to rest and heal.

Several years before, Dr. Federspiel, director of the Medical Devices Laboratory at the McGowan Institute for Regenerative Medicine, along with a designer fabricator and a bioengineering doctoral student, developed what was known as the Paracorporeal Respiratory Assist Lung. The device underwent product development and was commercialized by ALung Technologies as the renamed Hemolung RAS. ALung was founded by Dr. Federspiel and UPMC's former chief of lung transplant, Dr. Hattler, MD.

"We had seen the Hemolung RAS used in other countries and wanted to do whatever we could to help this patient," said Peter M. DeComo, chairman and chief executive of ALung Technologies.

Drs. Bermudez and Crespo worked with Diana Zaldonis, MPH, BSN, in the Division of Cardiac Surgery, to notify Food and Drug Administration officials of the intent to use the Hemolung RAS, which isn't approved for use in the U.S., and to get emergency approval from the local hospital officials. Meanwhile, Mr. DeComo drove with another ALung official in the middle of the night to Toronto, where the closest Hemolung RAS was available.

"Jon's story is a tremendous example of the depth of the work we do here every day. Most hospitals across the country couldn't handle a situation as complex as Jon's, but we can because of our collective experience and an extensive team that includes transplant surgeons, pulmonologists, nurses, and so many more," said McGowan Institute for Regenerative Medicine affiliated faculty member James D. Luketich, MD, chairman of the Department of Cardiothoracic Surgery. "

Mr. Sacker will remain in Pittsburgh for several months during his recovery, with his wife splitting her time between here and their hometown in Oklahoma. He said he's looking forward to getting back home, where he had been a runner and public speaker spreading the word about the importance of organ donation after writing the book "Imperfect Perfection."

"Out of all of the transplant centers we could have come to, we came here to Pittsburgh," he said. "It's a miracle that's just not explainable. You just have to thank God."

Illustration: Jon Sacker, seen here on the Hemolung RAS, came to Pittsburgh from his home in Oklahoma after rejecting his transplanted lungs and in need of a second transplant. –UPMC.

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