

## **HE HOPES TO HELP MORE LUNG PATIENTS BREATHE EASIER**

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By Sarah Avery

Staff Writer

CHAPEL HILL - If Dr. Tom Egan is successful in his latest undertakings, the number of lung transplants in the United States will increase, and the results may improve.

Egan, a surgeon at the University of North Carolina at Chapel Hill, has long been a pioneer in organ transplantation. He performed the first successful lung transplant in North Carolina nearly 20 years ago.

Now he's working to expand the pool of eligible organs, using a technology that rescues lungs currently disqualified for consideration.

Last fall, Egan won a \$1.4 million grant from the National Institutes of Health to move his science forward, and the first stages of his work will likely begin next month.

"Tom had this idea probably 10 years ago, and the world is sort of catching up to Tom on this one," says Dr. Richard Boucher, who has collaborated and worked with Egan as director of UNC-CH's Cystic Fibrosis Pulmonary Research and Treatment Center.

Egan's idea was forged from need. More than 1,850 people are on the nation's waiting list for lung transplants, including 60 in North Carolina. But even with more people indicating they want to be organ donors, only about 1,400 lung transplants are performed a year in the United States.

The imbalance occurs because only a small fraction of lungs from willing donors can be used. For years, doctors believed that lungs, like other solid organs, perished quickly from oxygen starvation after a would-be donor's death. As a result, the only lungs used in transplants have come from donors who die on ventilators in hospitals, just as brain death is declared.

But Egan discovered that lungs have an advantage over other organs. Because lungs get oxygen directly from the air, not red blood cells, they actually have stores of oxygen in air sacs that can sustain their tissue for several hours.

### **FINDING A SOLUTION**

Armed with that knowledge, Egan launched a quest to widen the eligibility criteria for donated lungs, using organs from people who may have died in a car crash or at home from a heart attack.

"We got to a point in 2002 where we applied for a grant to evaluate the lungs from non-heart-beating donors," Egan says.

The effort involved a heart-lung bypass machine, like those used by cardiac surgeons to pump

blood and oxygen to patients during open heart surgery. Hooking up surgically extracted lungs to the bypass machine staved off the buildup of fluids and kept essential gases in balance.

Basically, the lungs could be put in a box and kept for hours before transplant.

But Egan and his team ran into hurdles from federal funding agencies when they proposed actually transplanting the revived organs. Instead, they won a grant to demonstrate the feasibility of using lungs turned down for transplant and published their findings in 2006.

Meanwhile, scientists in Sweden and Canada forged ahead, discovering that the lungs performed better if the bypass machine also flushed them with fluid specially formulated to preserve them.

Both groups have transplanted lungs once considered ineligible and have had success. The flushing process, called perfusion, could also result in better outcomes - a finding that was first made with kidneys that underwent a similar step.

## PROVING IT WORKS

For Egan, a native Canadian who trained at the Toronto hospital where the lung transplants have been done, the groups' milestones only make him more determined to move forward in the United States.

The NIH grant will fuel his efforts. Next month, he says, he hopes to begin testing rejected organs to establish the proper procedures necessary for transplant.

"Clearly we are going to need to change our way of thinking," Egan says of using once-rejected lungs for transplant.

He says there's much work to be done convincing other transplant surgeons that the lungs are viable; getting cooperation from organ procurement agencies that work with families; and teaching emergency responders not to rule out organ donation for victims who die at the scene.

Danielle Niedfeldt, chief operating officer of Carolina Donor Services, says her agency is eager to see Egan's work progress, and has agreed to work with families to approve donations for the research.

"It's all driven by the need," Niedfeldt says. "This may have the potential to increase the number of lungs taken to transplant."

## NEVER LETTING UP

Egan's colleagues say he's just the person to steer the nation's lung transplantation process in the new direction.

"This is the future of lung transplantation," says Scott Randell, a molecular physiologist at UNC-CH who has worked with Egan for years. "It's easy to just do the same old accepted practice, but

he's pushing forward and trying to make things better."

Described by his wife, Lynn, as persistent, Egan is meeting acceptance of his vision at a time when his surgical work has come to an end. Years of standing in the operating room performing lung transplants inflamed his back. Now 57, Egan walks with a cane. He quit performing surgery about three years ago.

Instead, he has delved into research, focusing on the immune response in lungs and other tissue that causes swelling during oxygen deprivation. He and others in his lab have figured out that mechanism and are working to shut it off so that tissue damage can be minimized.

He's founded a company, X-in8 Biologicals Corp., to develop new anti-inflammatory therapies for transplants, strokes and heart attacks.

"Here's a high-end surgeon, who's used to being at the peak of a clinical empire, and he has to change his life," Boucher says. "And you can either sort of hang it up and go to the Caribbean and think about things, or try to do things in a way you haven't been able to before, and is valuable. I have total admiration for Tom that he took the latter approach."

Lynn Egan says her husband, not one to sit on any beach, has also started a nonprofit group, Lung Banks of America, to promote the idea of using lungs from the expanded donor pool.

Despite shifting his career focus in recent years, she says, her husband has not slowed since moving to North Carolina to start the lung transplant program at UNC-CH in 1989. With their three sons now grown, Egan still keeps late hours.

"He's incredibly dedicated to providing the best health care, the best surgical care he could possibly manage," Lynn Egan says. "He would frequently compromise his own sleep and rest and time with his family to champion for patient care and devote time to research."

savery@newsobserver.com or 919-829-4882

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**Dr. Thomas Michael Egan**

**Title:** Professor of surgery, University of North Carolina at Chapel Hill

**Born:** July 15, 1952

**Education:** Medical degree from the University of Toronto, 1976; Master of Science Degree from the University of Toronto, 1984.

**Family:** Wife, Lynn; sons Mark, 24; Ryan, 22; and Colin, 20.

**Career note:** Trained under the Toronto transplant surgeon who performed the first successful single and double lung transplants; was the first surgeon to perform a lung transplant at UNC Hospitals, in 1990.

**Hobbies:** Reading - he can devour a novel in an overseas airplane flight; photography; maintaining tropical fish aquaria.

**Favorite book:** "Trinity" by Leon Uris.

**Favorite movie:** "2001: A Space Odyssey."