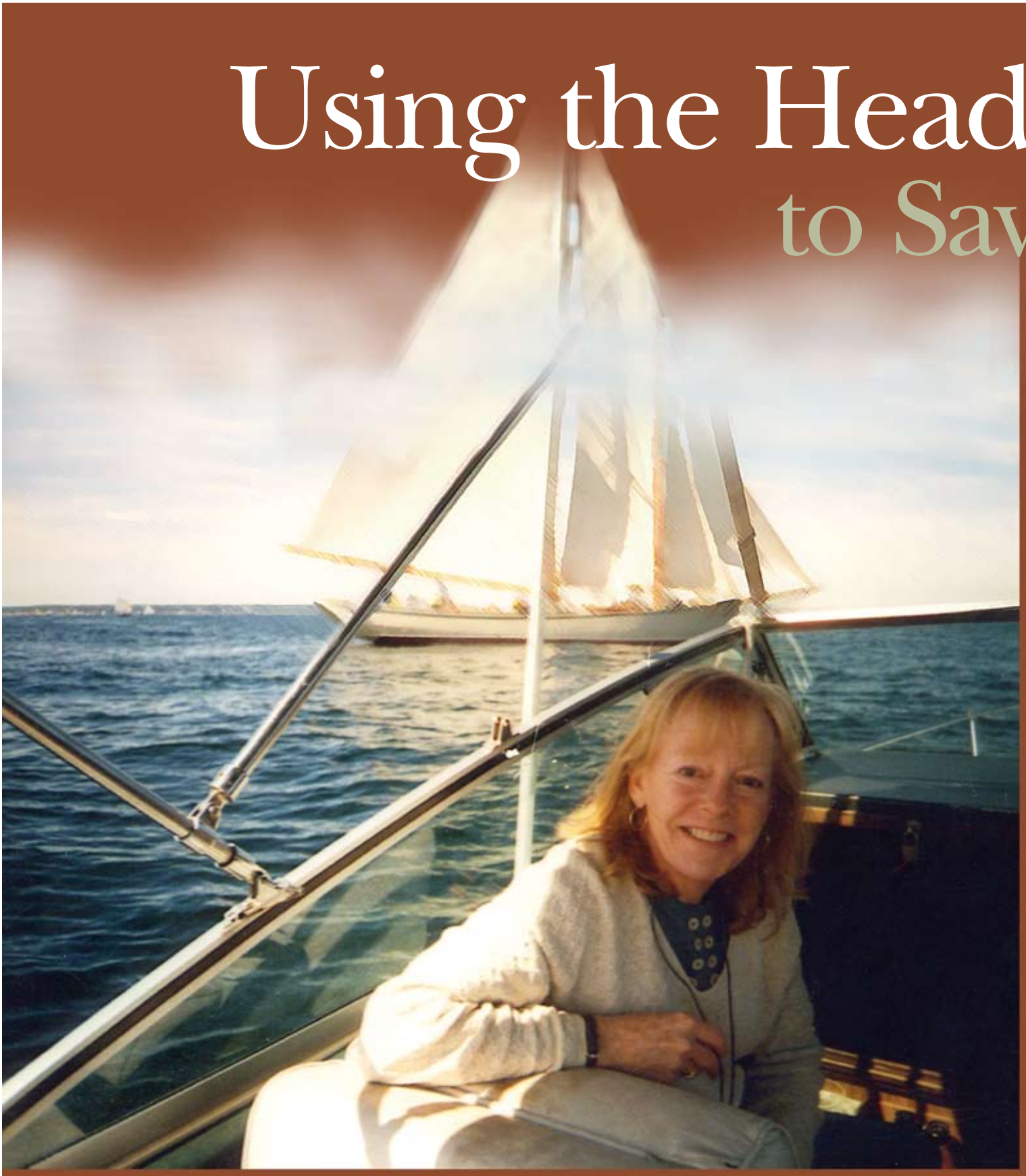
# Using the Head to Save



*Karen Smyth before her heart attack*

How teamwork and the innovative use of technology helped Karen Smyth recover from a massive heart attack

# the Heart

Like the baby whale in her children's book, *Crystal, The Story of A Real Baby Whale,* naturalist Karen Smyth is beginning a new life.

Smyth, now 60 years old, was at home in Gloucester, Mass., last August when she started to feel sick. "I remember feeling warm and anxious," Smyth says. "I thought, 'Maybe I'm having a heart attack…maybe not.'"

Smyth, who had no history of heart disease and had a perfect physical only four days before, recalls little else about that night.

"I guess it got bad because I called 911. I've never done that before," she says.

An ambulance took her to a local hospital, which later transferred her to Lahey.

## Not Your Average Heart Attack

According to the American Heart Association, an estimated one million people are diagnosed with heart attacks at hospitals each year. The majority of heart attacks are a result of coronary artery disease. The coronary arteries that bring blood to the heart can slowly become harder and thicker due to a buildup of plaque, a combination of fat and cholesterol. If this plaque cracks or breaks, a blood clot can form, significantly reducing or completely blocking blood flow to the heart. The heart muscle then starves for oxygen and nutrients. When this process causes damage or death to parts of the heart muscle, it is referred to as a heart attack.

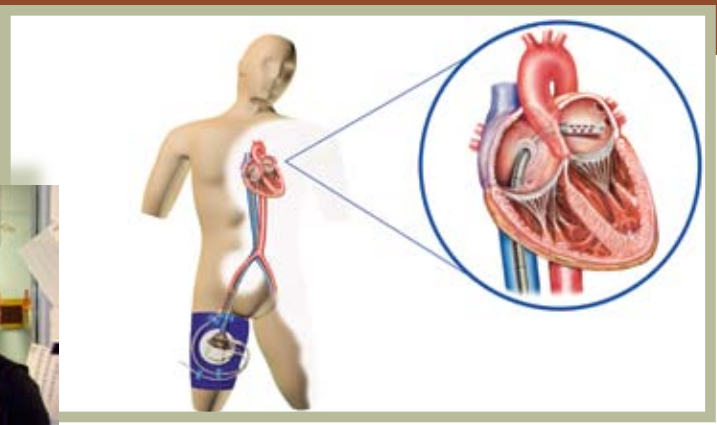
"Heart attacks come in all different sizes," explains David E. Gossman, MD, an interventional cardiologist at Lahey. "At one end of the continuum, a heart attack can be lethal, and at the other end, it may be so mild that an individual might not interpret it as a heart attack. The majority of heart attacks are somewhere in the middle."

Gossman was working in Lahey's Cardiac Interventional Center the weekend that Smyth arrived. "Karen's heart attack was a big one," he recalls. "Her blood pressure was dangerously low and she was having trouble breathing. These are signs of a large heart attack."

According to Gossman, Smyth's heart attack was not just large, it was also unusual. "People who have large heart attacks leading to a crisis situation like Karen's typically have damage to their left ventricle. In Karen's case, however, it was predominantly the right ventricle that was damaged. That's less common. And it was severe enough to send her into shock."

*(continued on next page)*

*Smyth returned to the Medical Intensive Care Unit last January for an emotional reunion with nurses and doctors who took part in her care. From left: Evin Parker-Hoare, RN; cardiac fellow Al Husami, MD; David Gossman, MD; Karen Smyth; and Lauren Savage, RN.*



*Normally the LVAD is used to take blood from the left atrium after it has been oxygenated in the lungs, and circulate it through an external pump before the blood is recirculated back into the body. In Smyth's case, doctors used the LVAD to reroute blood from her right atrium. Graphic courtesy of CardiacAssist, Inc.*

## An Innovative Treatment

The most common treatment to open an artery blockage in someone having a heart attack is a percutaneous intervention, or PCI. PCI refers to any cardiac therapy performed through a slender tube called a catheter, usually inserted through the femoral artery in the upper part of the leg or the radial artery in the wrist. A specialized dye is then injected into the heart's arteries to identify coronary artery blockages. Should these blockages require treatment, a number of techniques may be used, the most common being angioplasty, the inflation of a tiny balloon to open an artery, and insertion of a stent.

"In Karen's case, we did an emergency catheterization and inserted a stent to keep the artery open, but that wasn't enough," says Gossman. "A lot of damage had already been done to her heart. What we needed was something to allow her heart to rest for a period of time so it could recover, while still circulating blood. In order for Karen to make it, we had to think outside the box. And we had to do it quickly."

What Gossman turned to at this critical moment was something called a left ventricular assist device, or LVAD, which provides external circulatory support so the left side of the heart can rest. Lahey is one of only three hospitals in the Boston area using this technology.

Typically, an LVAD takes blood from the left atrium after it has been oxygenated in the lungs, draws it out, and circulates it through an external centrifugal pump before the blood is recirculated back into the body. "These newer cardiac assist devices are utilized without large surgical incisions," explains Gossman. "They can be applied very quickly when time is critical.

"The idea is to reroute the blood, to detour it, so the left side of the heart can rest," he adds. "In this case, however, we needed to allow the right side to rest, so we did the opposite. We routed blood from the right atrium out to the device, and then brought it back directly to the lungs, thereby resting the right side of the heart. In other words, we used the device as an RVAD instead of an LVAD."

This innovative thinking worked. After three or four days using the device, Smyth's heart recovered. "Gradually we turned down the device and shifted the work back to her heart," says Gossman. "The device did its job—it circulated the blood so her heart could rest."

Although Smyth is not the only patient to have had an LVAD used in this untraditional way, she is the first in New England to have this innovative procedure done successfully.

## A Heartwarming Recovery

After five weeks at Lahey, Smyth went to a rehabilitation facility and finally returned home in November of 2007. On her first follow-up visit to Lahey in January, the impact of what had happened hit everyone.

"She walked in and she was relatively weak," recalls Gossman. "But she walked in on her own. I took her to the MICU [Medical Intensive Care Unit] to see the nurses and doctors who had cared for her, and everyone was teary-eyed. If we hadn't used this device in the way we did, she clearly would have died. As a physician, it was very gratifying to see her complete recovery."

For Smyth, who still can't remember much about the whole experience, the occasion was powerful as well. "I saw faces that were warm, voices that were familiar. It meant a lot to everyone because you don't usually see people come back after this kind of heart attack. It was special for a lot of people at Lahey, and for me."

*To learn more about Lahey's Heart & Vascular Center, visit our Web site, www.Lahey.org/Heart.*

## Bridging Cardiology and Radiology to Save Lives

It's not every day you see cardiologists working closely with radiologists, but at Lahey, it's at least twice per week.

Lahey's Cardiovascular Imaging Center leverages today's most advanced cardiovascular imaging technologies while combining the expertise of radiologists and cardiologists to advance patient care. Specialists from these two disciplines meet regularly to view images and discuss cases, resulting in the best course of treatment for each patient.

Last July, Lahey Clinic became one of the first hospitals in the United States to install a Dual Source Siemens Definition scanner, the fastest and most progressive equipment commercially available for performing cardiac (coronary) CT angiography. CTA is a noninvasive procedure that uses CT technology to examine a patient's heart and determine if fatty deposits, called plaques, have built up in the walls of the coronary arteries. Plaque that is left untreated can lead to a narrowing of the coronary arteries (known as coronary artery disease or CAD), chest pain and, ultimately, a heart attack.

CTA is typically used in cases where there is low or intermediate suspicion of CAD. "If you already know that CAD exists, then a catheterization may be better because you can often fix the problem at the same time," explains radiologist Sebastian Flacke, MD, PhD, director of Lahey's new Cardiovascular Imaging Center. "But if you want to determine if CAD exists and avoid an interventional procedure, CTA is the better choice."

Flacke adds that one of the most important advantages this technology can offer to patients is to obtain high quality images at lower radiation dosage. "For most studies performed with the dual source scanner, we can actually cut the radiation dose in half compared to what we used to do, while still obtaining full cardiac detail."

Other benefits of the new scanner include the faster speed at which exams are performed and the elimination of medications to slow the heart down at the time of the scan. "Because of this scanner's enhanced time resolution, we can image any heart no matter how high the heart rate without the use of beta-blockers," says Flacke. The dual source scanner is also the current gold standard for imaging and diagnosing all diseases of the aorta.

The cardiac CTA service is only one pillar of the Cardiovascular Imaging Center. The other two include cardiac MRI and cardiac nuclear imaging/PET.

"As a group, we have all the tools and expertise to do high-end cardiac imaging," concludes Flacke. "And by combining these technologies with the expertise of both cardiologists and radiologists, we're gradually changing the way we manage chest patients."

*For more information, visit www.Lahey.org/Radiology.*