In March 2015, the director of clinical affairs for Advanced Circulatory Systems, Inc., got a letter from the Food and Drug Administration’s Office of Device Evaluation that included the phrase every medical device manufacturer hopes to hear: “We are pleased to inform you …”

The FDA was giving full approval for the Roseville, Minnesota, company’s ResQCPR system. Designed for use during cardiopulmonary resuscitation, the system consists of two parts. One is the suction-cup-like ResQPump that allows responders to both pull up on and push down on the chest while administering CPR. The other, the ResQPOD, impedes airflow during the decompression phase of CPR. Used together, the two components generate two to three times more blood flow to the brain and heart muscle than conventional CPR.

The letter was good news for the company, which in January was purchased by Massachusetts-based ZOLL Medical Corp. For its founder, Keith Lurie, MD, the FDA’s blessing was a very long time in coming. “For about 20 years, we’ve been trying to get approval for one part of this device combination,” says the professor of emergency and internal medicine at the University of Minnesota.

Actually, Lurie has been working to improve CPR even longer. He started his quest in the late 1980s, when he cared for a patient whose family members had used a toilet plunger to resuscitate him. He published a letter to the editor about it in JAMA in 1990 that bore the slightly humorous title “CPR: the P stands for plumber’s helper.”

Lurie, however, saw serious potential in the idea. If you could pull up on the chest with a suction device, you’d create negative pressure in the chest and draw air into the lungs and venous blood back to the heart, allowing it to refill more efficiently. He began experimenting. By 1992, he reported that “active compression-decompression,” as he called it, enabled better circulation than conventional CPR. Lurie was on to something.

By the mid ’90s, Lurie and Mike Sweeney, MD, an anesthesiologist at the University of Minnesota, were suggesting that impeding inspiration during CPR yielded further benefit. In 1997, Lurie started Advanced Circulatory Systems “against my better judgment, as I really did not want to become a businessman,” he told an interviewer in 2010. By 2000, the American Heart Association and the European Resuscitation Council had revised their CPR guidelines, recommending use of inspira-
One is gaining a better understanding of what happens when blood is reintroduced to the circulatory system during CPR. “It can cause injury unless you do it smartly,” he says, noting that the research on this being led by Demetris Yannopoulos, MD, at the university is still at the animal-testing stage.

The other is another tweak to CPR—elevating the head of the patient in cardiac arrest by 30 degrees. “If we elevate the head a little bit during CPR, there’s a tremendous increase in blood flow to the brain because we drain the venous blood out of the brain each time you decompress the chest,” he explains. “This lowers intracranial pressure immediately, thus reducing resistance to forward blood flow.” Lurie says researchers at the university hope to start a clinical trial within a year. But he acknowledges it could be many years before this enhancement to CPR is adopted.

Although getting FDA approval for the ResQ system was a lengthy process, Lurie is pleased with the progress. One sign is that in three Twin Cities hospitals new resuscitation devices and techniques are allowing teams to keep blood flowing in patients in cardiac arrest while their arteries are being fixed in the cath lab. “As a result of all this activity over the last 20 years in Minnesota, we have the highest survival rates of any state in the country for cardiac arrest. That’s pretty exciting progress from our perspective.” – CARMEN PEOTA