

A HEALING HEART

DR. SPEARS UTILIZES RESEARCH TO IMPROVE THE LIVES OF HEART ATTACK PATIENTS



Dr. James Spears

While Dr. James Spears was studying chemistry in college, he, like many doctors-to-be, enjoyed research. He wanted to pursue something that was helpful to people, but he knew there was always a chance that he could spend his whole life in research without ever uncovering anything entirely useful.

Spears turned to medical school for a career that would not only be helpful to people, but would also allow him to stay in research. “I chose to become a doctor, so I would increase my chances of doing something useful,” says Spears, who is a cardiologist at Oakwood Hospital and Medical Center in Dearborn and has been in practice for more than 40 years.

He spent three years in basic research after receiving his medical degree from the State University of New York Downstate Medical Center College of Medicine. Two of which he spent at the University of California at San Francisco Cardiovascular Research Institute, working with Dr. John Clements. “I was interested in problems with lack of oxygen,” he recalls. “And for me, it was frustrating as a young

physician in those days to be confronted with chronic lung patients and not really having anything to offer them.” Although the research was interesting, Spears says he really wanted to spend his time as a clinician being able to do something “fairly profound for patients that could alter their illness and make them better.”

In the early 1980s, after Spears received funding from the National Institutes of Health (NIH), he used some of the leftover money from different projects on something more radical that he knew couldn’t be funded at the time. “I wanted to develop a new carrier for oxygen that you can inject in the blood somehow and target hypoxic tissues (where there is a lack of oxygen in the blood flowing to the tissues),” he says.

Spears figured out a way that might just work, which involved phase transitioning from a liquid to a solid by freezing the substance. “When I put a lot of oxygen into water, I was stunned. The frozen material I had made is officially called oxygen hydrate. It’s an unusual form of ice,” Spears explains. “There are only two articles in the whole scientific literature describing it, but it’s basically a form of ice that carries 200 times its own volume in gas. It can be solid at room temperature if it’s kept under pressure.”

After years of hard work, Spears had found a carrier for oxygen. His next task, however, was getting it into blood. “I needed a liquid carrier,” he notes. In order to do that, in simple terms, Spears says he took ordinary ice, ground it up, put that in with the hydrate ice, ground them together and then put them in a really cold compressor, high-pressure delivery system. “I actually did it on some animals. I was able to inject it into the right atrium and oxygenate the animal to show you can do it,” he explains. “But it created a lot of micro bubbles.”

Spears had the breakthrough he had been waiting for – a new type of metastable liquid he named Aqueous Oxygen (AO). “I couldn’t believe what I was seeing. There were no bubbles. I was injecting this liquid with 2,000 pounds per square inch gas pressure, four cc’s of gas per gram, injecting it into a beaker of water, and there were no bubbles,” says Spears with perhaps the same amount of sincere amazement as if he were witnessing it for the first time again. “It wasn’t long thereafter that I figured the potential of this technique.”

In 1994, after receiving some seed money from investors in Ann Arbor, a private, venture-financed company called TherOx was formed in Irvine, Calif. The company still exists today and focuses on improving the standard of care for the treatment of heart attack patients. Spears was the inventor of AO and directed all of the bench and preclinical studies with his colleagues at Wayne State University. The clinical AO system delivers hyperbaric oxygen as a liquid and mixes rapidly with blood in a small circuit outside the body. He also recently invented an experimental AO catheter at Oakwood Hospital. The first randomized trial, published in *Circulation* 2009, demonstrated a significant reduction in the size of the heart attack in treated patients compared to conventional therapy.

“Every opportunity you can help somebody – whether that’s your family, your friends, or other people – never miss an opportunity to do some good for the world,” Spears says. 🙏 — Audrey LaForest

