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A Look Back With Gravenstein Award— Winner Barker, With an Eye Ahead For Whatever's Next



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Steven J. Barker, PhD, MD, left, receiving Gravenstein Award from STA president Brian Rothman, MD

For Steven J. Barker, PhD, MD, winning *two* lifetime achievement awards in the past six months doesn't mean it's time for resting on his laurels. Indeed, talking to Dr. Barker, one gets the impression that, at 71 years of age, he's just warming up.

Last October, Dr. Barker was in Japan for the international symposium on Innovations and Applications of Monitoring, Perfusion, Oxygenation, and Ventilation, a periodic gathering of like-minded professionals whose goal is to promote the development of health care monitoring technologies and improve their application in perfusion, oxygenation and ventilation. During the symposium's dinner meeting, Dr. Barker was surprised to hear himself called to the podium; minutes later, he was handed the group's Harvey W. Weiley Lifetime Achievement Award, an honor that caught him completely off guard.

Dr. Barker got a bit more lead time from the Society for Technology in Anesthesia (STA), which notified him in November that he would be honored with the organization's 2016 J.S. "Nik" Gravenstein Award, recognizing lifetime achievement at its annual meeting in January in Palm Beach, Fla. "When I got the email from STA saying I was going to win the award, I just about fell out of my chair," said Dr. Barker, professor emeritus of anesthesiology at the University of Arizona College of Medicine, Tucson, and chief science officer of Masimo Corporation, located in Irvine, Calif.

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Yet for STA immediate past-president Joseph Orr, PhD, it was an honor well earned: "We selected Dr. Barker as the recipient of the Gravenstein Award because of his years of innovation, instruction and service," said Dr. Orr. "Dr. Barker is a rare combination of training in the physical sciences and in medicine. Over the years, he has been able to

apply his training, research and talent to study and improve medical monitoring devices."

Proud Nerd

If anything, the award was even more meaningful for Dr. Barker because of his association with its namesake, and the society members who chose him. "I knew Nik Gravenstein," he told *Anesthesiology News*. "But more than that, these are my people. Like me, STA is a group of what I like to call—in a nice way—the nerds in medicine."

And while youth of today may see the word "nerd" as a put-down, there is no higher praise from Dr. Barker, who regularly cites Bill Gates, Steve Jobs and Albert Einstein as paragons of, well, nerdiness. "I like to say that nerds rule the world these days," he quipped.

If being a nerd means embracing life's intellectual pursuits, then one can't argue with Dr. Barker's track record. After a bachelor of science degree in physics from Harvey Mudd College, in Claremont, Calif., he went on to earn his doctorate in aeronautical engineering from the California Institute of Technology, in Pasadena, in 1972. However, a tenured teaching position at the University of California, Los Angeles (UCLA) was not enough to quell a desire that had been growing inside him for years. "While I was at UCLA, there were people getting involved in engineering with medicine ... bioengineering," he described. "At about that time, I heard about an accelerated MD program at the University of Miami for PhDs. I thought 'what the hell?' and did it."

By 1981, doctor of philosophy Steven Barker had become doctor of medicine Steven Barker. Yet, anesthesiology was not a sure thing, as he started his residency in surgery at UC San Diego (UCSD). "Around halfway in my first year, I realized that the people who were doing the thinking about engineering and physics and technology were on the other side of the drape," he said. After switching to anesthesiology, a career merging two passions was born.

Helped Found STA

In the three-plus decades since then, Dr. Barker has dedicated himself to the integration of technology in anesthesia, and education of those principles. In fact, it was during his UCSD residency that he and the late N. Ty Smith, MD, PhD (himself a Gravenstein Award winner, in 2002), began talking about the need for a society that promoted these values. In 1988, STA was born.

Other friendships have led to similarly fruitful ends. When fellow Gravenstein Award recipient (2012) Kevin Tremper, PhD, MD, recruited Dr. Barker to UC Irvine, the two former engineers immediately began to put their collective experience to work on applications of transcutaneous oxygen and pulse oximetry. "We were like blood brothers," Dr. Barker said. When Dr. Tremper resigned as chair of UC Irvine's Anesthesiology Department in 1990, it was Dr. Barker who took his place, a position he held until 1995, when he became chair of anesthesiology at the University of Arizona College of Medicine.

"And now, after 23 years as a department chair [he resigned the Arizona position in 2013], I'm doing what I first went into medicine to do, which is the marriage between my engineering and medical backgrounds," he explained.

And a productive union it's been. Over the years, Dr. Barker has been involved in the conception, development and refinement of numerous devices, although none with a greater influence than the pulse oximeter. While he is proud of his many associations with industry during his career, his relationship with Masimo has persisted since the company's earliest days. "In 1990, two young engineers [Joe Kiani and Mohammed Diab] with a startup company came to my office," he related. "They had a new idea for a pulse oximeter that would work during patient motion. When they explained their technology to me, I saw that they really did have something different." Soon after, Masimo was born.

Industry Partnerships

The way Dr. Barker sees it, relationships such as these—between industry and academia—should be celebrated, not squelched. Of course, he recognizes the challenges with respect to conflict of interest. “So if I’m going to give a lecture about oxygen transport, I obviously need to disclose my relationship with Masimo; I’m hyperreligious about that,” he explained. “But the pendulum has swung too far to the paranoia side, to the point where it’s maybe starting to interfere with the wonderful collaboration that has produced many great advances in medicine.”

Dr. Barker pointed out, “There is no National Institute of Anesthesiology. Only 17% of academic anesthesia departments in the U.S. have any NIH [National Institutes of Health] support, so we need industry’s financial support.” As an example, Dr. Barker pointed to the many “children” of this academia–industry marriage:

- sevoflurane, desflurane and propofol;
- fentanyl and its derivatives;
- high-potency narcotics;
- outpatient anesthesia;
- pulse oximetry and other oxygen monitors;
- capnography;
- processed EEG monitoring;
- transesophageal echocardiography;
- electronic medical records; and
- cardiac output devices.

As for slowing down, Dr. Barker shows no signs of it. In fact, he continues to work to

integrate advances in aeronautical engineering into medicine, the most recent of which are analog needle-type gauges in Masimo's new Root monitoring system. "The main display looks a lot like an aircraft instrument panel," he explained. "Modern aircraft can do anything they want with their display, and yet they choose to put old-fashioned gauges and dials there. Because when you look at an instrument panel, your brain registers the position of a needle almost instantly. It takes a lot more time for your brain to translate digital information into something meaningful."

Dr. Barker also has been a strong advocate of heads-up display units in the operating room (OR), akin to the devices that fighter pilots wear. "So even though the pilots are looking out of the cockpit, they're seeing some of the instruments in their helmets," he noted. "I think we need to have that in medicine, especially in the OR. So while you're looking at the patient, you can also be seeing information from your monitors."

Masimo's prototype of the heads-up display (<http://bit.ly/1NTmY1c>) debuted at the 2015 annual meeting of the American Society of Anesthesiologists. "This is an example of two things," he said. "It's the transfer of aviation technology into medicine, and the collaboration between industry and medicine," Dr. Barker said. He also has been a strong advocate of aviation-like checklists in anesthesiology.

Dr. Barker is too busy enjoying his many roles—engineer, anesthesiologist, teacher, innovator, nerd—to consider retirement, no matter how many lifetime achievement awards he garners. "I'm going to keep doing what I'm doing for as long as I can," he said.

—Michael Vlessides