What Happened to the Cancer-Detecting Bra?

By Liz Savage

This is part of an occasional series that recalls some of the stories reported 10 years ago in the News section of the Journal.

Ten years ago, researchers dreamed of a heat-sensing bra that could detect early signs of breast cancer in premenopausal women. A preliminary clinical trial on just such a bra was in the works, and the scientists were hopeful that it would someday offer an accurate breast cancer screening method that women could use at home.

The trial was never conducted, but the bra was not forgotten. Today, the inventor of the device, Hugh Simpson, M.D., a retired pathologist and currently a senior research fellow at Glasgow University in Scotland, is continuing the work he began decades ago. While this thermographic approach to breast cancer detection has lost favor with many breast cancer researchers, it has not been entirely abandoned. Technological advances in the last decade have allowed the use of more sophisticated methods of measuring breast temperature.

Some breast cancer experts warn, though, that these kind of heat-sensing devices have not been tested enough to recommend their use. “There is only preliminary data on small numbers of women, and the specificity question has not been addressed, meaning that most of the studies look at women who are known to have breast cancer, or 50% of the study population has breast cancer,” said Debbie Saslow, Ph.D., director of breast and gynecologic cancer at the American Cancer Society, in an e-mail.

The bra, which Simpson dubbed the Chronobra, measures the deep temperature of a woman’s breasts with a series of built-in heat sensors. Breast temperature changes over a woman’s menstrual cycle as her body prepares for pregnancy. “The breast really is a very dynamic thing. Taking a mammogram at a random point in the [menstrual] cycle is rather like snapping a photo of a roller coaster at a point in time—you might well miss something—whereas the bra measures all that,” Simpson said. He hypothesized that this pattern of temperature change is substantially different in women with breast cancer or those at high risk for breast cancer. His data comparing temperature patterns and breast cancer status suggested that, by wearing the bra for an hour every day for a month, a woman could learn whether she is at high risk of breast cancer.

At least, that was his hypothesis 10 years ago. While he still believes that the Chronobra can predict breast cancer risk, Simpson has changed the focus of his research. Several years ago, he approached the British National Health Service with his Chronobra research to see if they were interested in the device. “I was told the real thing would be if it could predict outcome [in women who already had cancer]. Outcome was the big issue in Britain because if you don’t know what the outcome is, then a huge number of women get treated unnecessarily, and the cost is enormous,” Simpson said. “So my whole initiative changed, you see, to predicting outcome.”

Simpson has collected data from 100 women—50 women with breast cancer or with a family history of breast cancer and 50 healthy women—and has followed up on them for 20 years, he said. Half the patients have died of metastatic breast cancer, and half are still alive, he said. He is nearly ready to hand over his data to statisticians to see how well the bra can predict outcome. “The data I have are very satisfactory, but I can’t get any more because the instruments are unserviceable,” he said. Without any bras to continue his research, Simpson hopes that his outcome data will be strong enough to persuade others to pursue this line of research. “I’m just trying to finish before I run out of steam.”

Simpson is not alone in his pursuit of a breast cancer—detecting bra. Elias Siores, Ph.D., director of the Centre for Materials Research and Innovation at the University of Bolton in England, and his colleagues developed a “smart bra” that detects changes in the breast tissue, such as inflammation or blood flow changes, that occur before a tumor is established. “We believe that we can pick up these changes at a very early stage,” Siores said. Like the Chronobra, Siores’ smart bra uses breast temperature variation in an attempt to detect early breast cancer, but the smart bra uses a system of microwave antennae to detect the changes. The technology is similar to that used to find submarines underwater—just a bit smaller. “The technology already exists, but taking this technology and putting it into a bra is a task and a half,” Siores said. Whether these heat-sensing devises will ever gain broad acceptance is unclear. At the least, it will take strong evidence to overcome the skeptics. “It all comes down to one thing: What are the statistical strengths of the signals?” Simpson said.