Spies in the sky

High-tech wizards spotting tumors missed by doctors

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The idea came to Susan Blumenthal in the spring of 1994. Blumenthal had lost her mother to breast cancer 20 years earlier, and she wondered why the military, with all its fancy technology, couldn’t help other similarly stricken women.

“Everyone had seen the images used to guide the smart bombs down chimneys in Iraq during the Gulf War,” says Blumenthal. “And most of us were mesmerized by the little rocks on the surface of Mars that could be seen through the Hubble telescope.”

To Blumenthal, then, it was a no-brainer. If the intelligence agencies had the capacity to detect small, hidden objects, then that capability could be used to see small breast cancers.

And why shouldn’t the defense and intelligence establishments help, Blumenthal asked herself. “Everyone was talking about a peace dividend after the Cold War,” she says. “That’s when she began pushing the application of all the intensity and money that was spent toward getting us ready to fight the Soviets that could be directed toward solving nonmilitary problems at home.”

“It was really a common-sense notion, and not exactly new,” says Blumenthal. But until she raised the question, the intelligence agencies had rarely wandered into the world of purely civilian problems. What Blumenthal had been doing for her, besides being a doctor, which meant she knew what she was talking about, was her role as the first federal official specifically tasked to oversee women’s health issues in the U.S. Department of Health and Human Services.

So when Blumenthal, who is now the assistant U.S. surgeon general, called the Central Intelligence Agency to pose her idea, the CIA director quickly took her call. And that began a process that continued to the day — the application of intelligence community expertise to the war on breast cancer.

This is the story of the efforts Blumenthal inspired and the battle of breast cancer detection, an ongoing battle against the second leading cause of death among U.S. women. Today’s new battle of breast cancer will be diagnosed every three minutes.

Within months of Blumenthal’s first call to the CIA, a task force of intelligence community imagery analysts and cancer doctors was officially charged with combining their thinking in order to catch breast cancers sooner than they did then (and still do now).

The government’s image analysis centers in numerous agencies under the general supervision of the director of central intelligence, are the people who view satellite photographs of otherwise ordinary-looking landscapes and determine that things such as enemy missiles lurking somewhere to launch missiles.

“Blumenthal is right,” says Darryl Garrett, the chief technologist at the National Imagery and Mapping Agency. “We do in selecting targets (which is all optics), and what radiologists do in trying to find cancers is essentially the same thing. We both want to find the hidden stuff that’s hard to find, the hidden enemies, or our bodies, mask from view.”

The urgency of Blumenthal’s challenge isn’t hard to understand. When identified early, breast cancer can be easily and inexpensively treated, and the survival rates are high. But many cancers are missed — or not caught early enough — and not simply because too many women still fail to get regular mammograms.

Cancers are missed for basically two reasons that involve the limitations of conventional mammograms and the limitations of those who interpret them.

First, roughly 40% of women have breasts with tissue so dense that it is exceedingly hard to see small cancers using the available technology. And unless a cancer is detected and treated before it grows to about one centimeter, the chances for successful treatment are cut sharply.

The other reason that mammograms are less useful than advisors thought involves those who read them. Simply put, there are too few experts dealing with too many mammograms to devote enough time to study them thoroughly. The statistics the way, but the consensus is troubling. Between 15% and 20% of cancers are missed (until they grow inappreciably large) because of what might be called “radiologist fatigue.”

On average, a radiologist has less than a minute to read a mammogram, compare it with a woman’s earlier X-rays and determine that something suspicious is going on. Many studies report what you would expect. A radiologist’s productivity: the ability to read a mammogram correctly falls off rapidly as the day goes on.

“Think of a 100 keys and you do the keys on your fingers,” says Harvard’s Dr. Daniel Kopans, chief of the radiology department. “You leave your keys in plain view and can’t find them until someone points them out to you, right in front of your face. That kind of is supposedly inapplicable fall-off happens all the time to radiologists...”

Within weeks, two radiologists using the same mammogram, a double-check that is unfortunately too expensive and time-consuming for most medical practices. With those realities, the possibility of a radiologist to improve the accuracy of mammograms, a search that is only now beginning to prove feasible in the real world — thanks mostly to an intelligence community effort costing several million dollars under the watchful eyes of the Bob Casey (D-N.J.), who has made sure the money and focus continue.

Most of the ongoing work has been done at the National Information and Display Laboratory at NIDR, a quasi-government agency that spends most of its time looking for military targets via satellite images.

Mammography faces two basic challenges. The first involves detecting the small clusters, called microcalcifica-
vs. breast cancer

The stumbling block, says Dr. Dan Shultz, the acting director of the FDA office that approves radiologic devices, "is the law. By statute, we insist that a product be proven both safe and effective before we will permit its being used in the U.S. "The European and Canadian philosophies are different," says Shultz, "outside the U.S., a product can be sold if it is deemed safe. Then, as it is used, its effectiveness is determined."

There's no doubt that America's more conservative approach has saved consumers from all kinds of previously acceptable medical devices. Because the application of digital solutions to medical problems has already been widely accepted in many other areas, why is mammography trailing?"

"I don't say that we're working on it," says Shultz, "but I don't say it's easy. Our philosophy is that we want to make sure people are safe." General Electric, the primary maker of the digital mammography system, has just begun shipping the devices to Europe and Canada.

"The beauty of digital," says G.E.'s Bruce Griffin, "is that it allows you to manipulate the image, whereas films were just pictures taken with a film camera. What you've shot is what you've shot with. With digital mammography, you can zoom in, you can look at different areas. If you don't like what you see, you can change it."

At Berlin's Charité Hospital, which began using the G.E. machines on Sept. 1, the chief radiologist is enthusiastic.

"In our clinical studies," says Bernd Hamann, "the digital image detector has shown that breast cancers are easier to detect and with a higher degree of confidence than was previously possible." What's more, says Dr. Karina Balkhavac, the head of breast imaging at Mont Sinai Hospital in Toronto (who got the digital detector a few years ago), "The CAD software that R2 has developed will work much better with a digital machine. It's a perfect marriage of technologies."

A perfect marriage of technology and detection is needed in the United States. To those such as the Army's Greg Magill, the fact that a U.S.-developed technology is being used in Europe first is incomprehensible. "This is something that can save lives right now," he says. "And we shouldn't have it."

Americans will. The question is when. Source: future is he's almost - and who decides, in the final analysis, what digital mammography begins its role?"