

Ovarian Cancer Early Detection Home Test

More than 30 years ago the first home pregnancy kits became available. In 1977 ten dollars got you a test tube containing red blood cells from sheep, a clear plastic test tube stand with a mirror on the bottom and a medicine dropper. Add some urine and results appeared in two hours. This revolutionized pre-natal care, giving women the opportunity to discontinue drugs, alcohol, smoking, or avoid X-rays.

Now there are home test kits for blood alcohol, glucose monitoring, drug screening, cholesterol, ovulation, HIV and even menopause. While accurate testing and monitoring for diabetics can lead to almost normal lifestyles, many of these home tests provide confirmations of suspected conditions.

But what if there was a home test kit for one of the most insidious, most silent killers of all: ovarian cancer? The deadliest of all gynecologic cancers, the mortality rate for ovarian cancer has not improved in 30 years. The symptoms are as vague as bloating, abdominal pain, unexplained weight gain or loss, menstrual changes or fatigue. These symptoms could describe a 50-year-old woman experiencing the first signs of menopause, hardly a reason to be concerned with cancer. However, that same woman has 1 chance in 71 of developing ovarian cancer, and 1 chance in 95 of dying from it.

But a simple, inexpensive and accurate home test for ovarian cancer? Prior to 1976, the concept of home pregnancy tests was unheard of. Now, for a whole new generation of child-bearing women, the possibility of living without home pregnancy tests is unthinkable. Could a simple test for cancer be at your local drugstore in a few years?

“Yes, we can do this. In three years our goal is to have a working prototype,” explains Rasim Guldiken. An assistant professor of Mechanical Engineering, Guldiken is the principal investigator along with Patricia Kruk, PhD, and Santo Nicosia, MD, both from the Department of Pathology and Cell Biology at USF. They have been awarded a \$400,000 grant from the Bankhead-Coley Cancer Research Program of the Florida Department of Health. Their project, “A Novel, Low Cost, Ultra-Sensitive Nanosensor for Early Detection of Ovarian Cancer” might well be the beginnings of a quantum leap in diagnostic medicine.

“I believe that nanotechnology will revolutionize medicine,” explains Prof. Guldiken. A passionate advocate for the early detection of ovarian cancer, he is quick to point out how other cancers, such as breast and skin cancer have excellent survival rates and generate a lot more media attention than ovarian cancer. “The survival rate for early detection of breast cancer is 89%, but for ovarian cancers, it is half that - only 46%. And of that, only about 20% of ovarian cancers are detected in the first stage, which is localized or confined to the primary site.”

Guldiken believes that interdisciplinary relationships will provide the foundations for future advances in medicine, “Especially if we combine the experience of engineers and medical doctors. That’s what’s got to happen,” he explains. “If the engineers do not talk to the medical doctors, and only talk to each other, it’s not going to help much. I think engineers

need to go out to medical doctors and see what's needed. Tell me what to look for so that I can guide my machines. This is needed.”

At the heart of the concept is an inexpensive ultrasonic MEMS (micro electro mechanical systems) nanosensor that can detect elevated levels of Bcl-2 protein in urine. The heart of the device is smaller than a human hair. The test kit will require a simple battery and is expected to cost a few dollars. The current ELISA blood test, which looks for a concentration of the protein CA-125, is a complicated, expensive and expert procedure that must be performed at a medical facility.

The project will be developed and prototyped at USF's Nanotechnology Research and Education Center. The center's clean rooms, packaging facilities and high-tech equipment will provide a state-of-the-art manufacturing environment.

“My ultimate goal is to send this device to developing countries,” Guldiken explains. In industrialized countries, the survival rates for ovarian cancer are dismal. “Think of what it means to be living in the mountains of Africa, what the incidence rate must be in the Third World.” His concern for humanity is truly genuine.

Guldiken believes that using nanotechnology to measure biomarkers will be commonplace. It will not be limited to ovarian cancer, but could encompass HIV, prostate cancer and a host of other silent killers. A person will perform their own simple tests and take the results to their health care provider, who can zero in on the treatment without having to go through the costly process of testing for dozens of potential diagnoses.

Why target ovarian cancer for this research? Dr. Guldiken believes that the disease has taken a back seat to breast cancer, which is relatively easy to detect in the primary state. Breast cancer is also more treatable and survivable than ovarian cancer. Everyone knows about the pink ribbons for breast cancer. What is the color for ovarian cancer ribbons? Teal blue.

Here are a few famous women who have died from ovarian cancer in the past 20 years: actresses Sandy Dennis (54), Dinah Shore (77) and Jessica Tandy (85), Ann Dunham (Barak Obama's mother, age 52), comedienne Madeline Kahn (57) and Gilda Radner (42), Coretta Scott King (78), and singer Laura Nyro (49). Perhaps in the next few years this hidden killer will be discovered in time with a simple test kit from your local drugstore, developed by engineers and scientists at the University of South Florida. By-Janet Dawald