

Protecting the hearts of patients with cancer

Ongoing research, new technology and the work of doctors like Dinesh Thavendiranathan at the Ted Rogers Centre for Heart Research, which is part of the PMCC, make it possible for women like Elenita Vargas to continue life-saving cancer treatments

By **Judy Gerstel**

ELENITA VARGAS IS A NURSE.

So she's very matter-of-fact when she talks about her medical history and what happened to her.

"I had a suspicious mass. A mammogram, ultrasound and biopsy showed that I had cancer. I wasn't expecting it. I saw the oncologist the next day. On the 13th day after diagnosis, I began chemo. I think they were worried that it was aggressive."

In April 2016, Mrs. Vargas underwent a bilateral mastectomy.

Her husband, Romeo Vargas, is also a nurse, working in the Cardiac Unit at the Peter Munk Cardiac Centre (PMCC).

Before they emigrated from the Philippines 18 years ago, Mr. Vargas worked in his home country as a physician.

Unlike many people without experience in health care, the couple understands the connection between oncology and cardiology.

And yet, when Mrs. Vargas began having breathing difficulties, heart palpitations and a spiking heart rate while she was being treated for Stage 2B invasive breast cancer, she recalls, "I was thinking that it was only from the chemo that I was getting tired."

It's what many cancer patients think, and for good reason.

"One of the biggest challenges in cardio-oncology," says PMCC Cardiologist Dr. Paaladinesh (Dinesh) Thavendiranathan, "is that the symptoms of cancer treatment overlap with the symptoms of the cardiac effect of cancer treatment."

Cardio-oncology is a fairly new field of collaborative medicine. The name was coined about 20 years ago. It's also referred to as



onco-cardiology.

Which medical specialty name comes first depends on the preference of the practitioner.

"Many of us trained for a long time to be called cardiologists," Dr. Thavendiranathan says wryly.

The collaborative field evolved because advances in medical science have made it possible for cancer patients, especially breast cancer patients, to live longer.

And one of the important chemotherapy drugs for treating breast cancer, as well as several blood cancers, is anthracycline which can lead to congestive heart failure in 2 to 3 per cent of survivors.

But surviving cancer can bring its own problems.

"Patients are living long enough to have complications of treatment," says Dr. Thavendiranathan, who is the

Director of the Ted Rogers Program in Cardiotoxicity Prevention, Ted Rogers Centre for

Heart Research (TRCHR).

Mrs. Vargas is his patient. "He's very easy to talk to," she says. "He will explain everything; he's very conscientious."

Cancer drugs, Dr. Thavendiranathan explains, "are not always 100 per cent specific to cancer. They're in the body and can affect any part of the body. There are so many new cancer drugs, and some of these new agents can be toxic to the heart."

"We don't want the cancer patient of today to be the heart failure patient of tomorrow."

Dr. Thavendiranathan is the lead investigator for a study at the TRCHR about preventing heart dysfunction in breast cancer patients.

Especially vulnerable are older patients (those over the age of 65). In addition, like Mrs. Vargas, about 15 to 20 per cent of women express high levels of a protein called HER2 on their cancer cells. Treatment used in these patients

includes a drug called herceptin that can also contribute to heart dysfunction.

"In the case of breast cancer and herceptin," says Dr. Thavendiranathan, "the incidence of heart dysfunction goes from 2 per cent to 6 per cent." Therefore careful monitoring of heart function during cancer treatment is particularly important in these patients.

The study Dr. Thavendiranathan is leading is called the EMBRACE-MRI trial, a creative acronym for Evaluation of Myocardial Changes During Breast Adenocarcinoma Therapy to Detect Cardiotoxicity Earlier with MRI.

The goal, says Dr. Thavendiranathan, is "to identify the earliest point where change to the heart from cancer treatment occurs, so we can intervene early. That may include modification of the cancer treatment or intervention with drugs that may

stop further injury."

Mrs. Vargas was invited to be part of the study.

"She's a sweetheart and incredibly, eternally optimistic," says PMCC Nurse Practitioner Linda Belford, who is part of the EMBRACE-MRI team following Mrs. Vargas. "I think her husband does all the worrying."

Participants who have volunteered for EMBRACE-MRI are seen every three months for routine clinical echocardiograms and blood work and a research heart MRI.

Mrs. Vargas was already being followed in the study when she started experiencing heart problems.

"I was kind of worried because her heart rate was really going up," recalls her husband. "It would go as fast as 130 [beats per minute] sitting down and that's not normal."

Dr. Thavendiranathan and his team responded quickly.

"That's why we're here," says Ms. Belford. "Our responsibility to patients is to provide timely access. These are the kinds of things that make a difference."

Dr. Thavendiranathan explains: "When she came back for the first follow-up, we saw the first small change in heart function. We were worried enough that we brought her back one month later. She was complaining of severe shortness of breath and a fast heart rate – what would be classified as cardiac toxicity. We made changes to her treatment and added heart protective medications."

"If we hadn't intervened, her cancer treatment may have been stopped."

Mrs. Vargas recalls one incident in particular, while she was receiving her chemotherapy treatments at St. Michael's Hospital in Toronto.

"One time I was in the chair," she says, "and we weren't sure whether I should be receiving the chemo or not. I called Dr. Dinesh,

01 Elenita Vargas continues to be part of an important EMBRACE-MRI clinical research study at PMCC.

02 Dr. Dinesh Thavendiranathan and Nurse Practitioner Linda Belford are key players in the EMBRACE-MRI team following Mrs. Vargas' progress.



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PMCC cardiologist

and he answered the phone himself. He said I should go ahead with the treatment.

"I am always reluctant to phone him unless it's an emergency because he is so busy, but I am confident that he will always answer the phone."

While it's too late for Mrs. Vargas, another clinical trial at the TRCHR, part of an international study, is looking at whether using drugs such as beta blockers and ACE inhibitors when subtle changes to heart function are seen by echocardiography could protect the heart from cancer treatment-related heart function. "Research is ongoing as to whether or not pretreatment with beta blockers and ACE-I will mitigate cardiotoxicity," says Ms. Belford. "These cancer patients are dehydrated and experiencing fatigue. Beta blockers or other preventive drugs might make them feel worse with an unclear benefit," she says.

"We're trying to get closer to get risk prediction models to treat those who will benefit the most, and that's also why we're looking at genomes as part of the EMBRACE-MRI study."

In the meantime, the knowledge, research and technology at the TRCHR have made it possible for women like Elenita Vargas to continue their life-saving cancer treatments, while preventing debilitating damage to their hearts. ▽



PET/MRI TRACKS INFLAMMATION AND CELL MIGRATION, GIVING RESEARCHERS NEW INSIGHTS INTO THE WORKING HEART

Cardiologists, radiologists and basic scientists at the Ted Rogers Centre for Heart Research (TRCHR), part of the Peter Munk Cardiac Centre (PMCC), are understandably excited about a sophisticated, game-changing technological marvel that arrived in their midst over the summer.

Significant advances in cardiac MRI can identify swelling and inflammation," says PMCC cardiologist Dr. Dinesh Thavendiranathan. The new PET/MRI cyclotron machine offers even more insight into the working heart.

"We can identify changes regarding inflammation or cell migration by PET and correlate it with functional data from an MRI," explains PMCC and Joint Department of Medical Imaging Radiologist Dr. Bernd Wintersperger.

"Now we can measure flow direction and velocity in the vessels— how hard blood is pounding into the wall – and simultaneously get information about the wall tissue."

The new machine also provides measures of arterial stiffness and vascular function – how hard the pulse hits all the peripheral vessels. "Many people think that changes in the cardiovascular system play an important role in dementia and those changes in the brain as well," says Dr.

Wintersperger.

Located in a room next to the PET/MRI machine is the UHN cyclotron facility. The cyclotron is used to produce radioisotopes for PET imaging. The proximity of the PET/MRI to the cyclotron enables imaging using short-lived radioisotopes (some of which have a half life of only a few minutes), which otherwise would not be possible. This offers a unique advantage to both patients and their clinicians and expands the research opportunities.

While the PET/MRI offers valuable insights into many aspects of heart dysfunction, its role in identifying predictors of damage from cancer treatment will be paramount.

That's because the TRCHR is at the forefront of cardiac research and cardio-oncology research not just in Canada, but also in the world.

"We have the largest heart failure program in the country," says PMCC Cardiologist Dr. Diego Delgado, "and we are across the street from one of the largest oncology and hematology institutions in the world [the Princess Margaret Cancer Centre]."

As part of the University Health Network, and next door to the MaRS Innovation research centre, he notes, "we have access to clinical trials and new drugs. We are leaders in this area." ▽