# THE CANCER CONUNDRUM

As cancer therapies have improved, more patients like Shamoon Amir Nasir are developing cardiovascular disease. The team at the Ted Rogers Centre for Heart Research at the Peter Munk Cardiac Centre are taking on the case.

BY TAMAR SATOV

**AFTER SHAMOON AMIR NASIR** was diagnosed with skin cancer in the summer of 2019, the then 78-year-old and her family had every reason to be optimistic. Within two weeks, she underwent surgery at her local hospital, where clinicians successfully removed a melanoma tumour on her leg and one of her lymph nodes. When she began chemotherapy about a month later, she responded well to the treatment. It looked like she would make a full recovery.

But then she developed some alarming new symptoms: she was dizzy, short of breath and couldn't climb the stairs in her Milton, Ont., home. She was readmitted to the hospital in November 2019 and had tests that revealed her heart was severely damaged – a side effect of the chemotherapy. Over the next two weeks, her condition took a turn for the worse. "They had to shock her heart twice," recalls her son, Bashar. "All of our family came from the U.S. to say goodbye."

Nasir's physicians knew who to refer her to: Dr. Dinesh Thavendiranathan, a cardiologist and Director of the Ted Rogers Cardiotoxicity Prevention Program, and Canada's foremost expert in the burgeoning field of cardio-oncology. At the Ted Rogers Centre for Heart Research at the Peter Munk Cardiac Centre, he specializes in treating patients just like Nasir who have developed heart disease as a result of their cancer treatments.

An increasing number of people who receive chemotherapy end up with cardiovascular disease, with the Peter Munk Cardiac Centre's Cardio-oncology Clinic seeing a 500 per cent increase in referrals since 2014. That's because some new kinds of chemotherapy, while extremely effective at combatting various forms of cancer and increasing survival rates, also have the unintended consequence of damaging the heart. In fact, the most common cause of death in older cancer survivors is now heart disease.

## CARING FOR COMPLEX CASES

Nasir's situation was particularly challenging – "her case is as complex as it gets in cardio-oncology," Dr. Thavendiranathan notes – in part because of the way new chemotherapy drugs, which are referred to as immune checkpoint inhibitors, work. These drugs activate the body's own immune system to fight off the cancer. The problem is that once you kick-start the immune system, it can be difficult to control. Sometimes, in addition to the cancer cells, it will attack healthy parts of the body, including vital organs such as the heart.

That's what happened to Nasir. Her immune system started battling her heart, which led to myocarditis (inflammation of the heart), life-threatening abnormal heart rhythms and, ultimately, heart failure. "Patients like Shamoon come in worried and upset, thinking how unlucky they are to have cancer and now cardiovascular disease," says Dr. Thavendiranathan. "We let them know we can help their heart function recover."

How can you put the brakes on an immune system in overdrive? By using immunosuppressive therapies – steroid drugs, such as prednisone – similar to the drugs transplant patients receive to prevent their immune systems from attacking a new organ. But with the immune system's defences suppressed, the patient is at risk of developing other illnesses – and a recurrence of their cancer. It's a catch-22 that requires a careful treatment protocol, with dosages often being adjusted daily in response to blood biomarkers such as troponin, which measures damage to the heart.

This dilemma may be one of the most complicated issues in cardiology right now. "Can a patient go back to the same immune checkpoint inhibitor to fight the cancer? How do we continue to monitor their cardiovascular risk? Unless a doctor is engaged in this 24-7 and looking at literature and clinical data from around the world to come up with a treatment plan, these are decisions that are very difficult to make," says Dr. Thavendiranathan.

Bashar has no doubt Dr. Thavendiranathan was the right practitioner to make those calls for his mother. "My mom was almost dead," he says. "He saved her life."

AT RISK

**30%**

Breast cancer patients with one or two risk factors who experience a cardiac event.

SOURCE: THE SCIENTIST

CANCER CARE

**500%**

Increase in referrals to the Peter Munk Cardiac Centre's Cardio-oncology Clinic since 2014.

SOURCE: PETER MUNK CARDIAC CENTRE

**"The heart research we're conducting at the Ted Rogers Centre for Heart Research will change how we treat cancer patients."**

**– DR. DINESH THAVENDIRANATHAN**

**Dr. Dinesh Thavendiranathan** is Canada's leading expert in cardio-oncology. Nasir's case, he says, was one of the most complex he's ever seen.

### A LIFE-SAVING PROGRAM

Solving these heart-related conundrums is a team of three cardiologists, five fellows and four research co-ordinators, all of whom are involved with the Ted Rogers Cardiotoxicity Prevention Program at the Peter Munk Cardiac Centre. Dr. Thavendiranathan established the program in 2013 after seeing that patients with cancer-related cardiovascular disease were not receiving care tailored to their specific circumstances. "Until then, people were seen by a broad spectrum of cardiologists who may not have had the expertise in cardio-oncology, and many patients were not seen as rapidly as needed," he explains.

While the program now provides prompt life-saving clinical care for cancer patients who develop symptoms from heart disease, the Ted Rogers Centre for Heart Research researchers are also working on groundbreaking studies that include new ways to assess a cancer patient's cardiovascular risk prior to beginning chemotherapy and novel methods of heart disease detection. They want to get to a place where cancer-related heart problems are eliminated altogether.

One completed study, for example, has led to a first-of-its-kind system of assessing heart disease risk in breast cancer patients, which was previously a complete unknown. As a result of this research, oncologists can now screen patients and give them what's called a "B-risk score" that indicates their likelihood of developing cardiovascular disease within five or 10 years post-cancer treatment. This allows physicians and their patients to consider a more personalized risk of cardiotoxicity, so they can make better decisions about how and when to administer cancer treatment.

The team conducted a major study to see whether cardiac MRIs in breast cancer patients can identify early heart injury during the initial stages of chemotherapy, which could ultimately decrease the number of these patients who develop heart failure. This research is already being heralded as one of the most important studies in cardio-oncology. "It will change how we treat breast cancer patients," says Dr. Thavendiranathan.

All of these efforts have not gone unnoticed. Earlier this year, Dr. Thavendiranathan received a prestigious Tier 2 Canada Research Chair – a title bestowed by the Government of Canada upon exceptional researchers who are acknowledged by their peers as having the potential to lead in their field – in recognition of his work in cardio-oncology. Still, with so many patients now seeking specialized cardio-oncology treatment, Dr. Thavendiranathan says more funding is needed to continue the program's research, which is already profoundly improving outcomes for patients like Nasir.

In February 2020, after about three months at the Peter Munk Cardiac Centre, Nasir was released to Toronto Rehabilitation Institute, also part of University Health Network, where Dr. Thavendiranathan tapered her off the immunosuppressive therapy and continued to monitor her progress. She went home in March, where she no longer had trouble walking up the stairs. By the end of September, she had stopped all drug therapy and was completely cancer-free. "I feel very lucky," says Nasir, who credits Dr. Thavendiranathan for her recovery. ■