



Dr. Kieran Murphy received the Leaders in Innovation Award from the Society of Interventional Radiology.

# A radiologist stirs up a vitamin cocktail to protect against radiation exposure

A chat with his mother-in-law and a walk with his dog gave this neuroradiologist the idea to use anti-oxidants to help lessen the dangerous after-effects from life-saving radiation

By **Mary Gooderham**

**SURGERY PERFORMED UNDER X-RAY GUIDANCE HAS TRANSFORMED MODERN MEDICINE**, allowing for minimally-invasive operations (from neurosurgery to gastroenterology procedures), reduced pain and shorter recovery periods for patients. It also means lower costs to the health-care system. But X-rays also subject patients, and especially doctors, nurses and technologists, to ionizing radiation, causing molecular changes in the body's DNA that have been linked to elevated risks for cataracts and cancerous tumours.

"It's scary; we are exposed to vast amounts of radiation over a career," says Dr. Kieran Murphy, an interventional neuroradiologist at Toronto Western Hospital who uses imaging-guided technology to fix fractures, perform biopsies and kill tumours in the spine, for example.

Medical professionals such as Dr. Murphy can take precautions, including wearing lead shields and lead-lined glasses, and they sport badges that monitor their radiation

dosage. But it's impossible to avoid some exposure, he says. "It's a risk we bear because of our vocational commitment to patient care."

Disturbed by reports of injuries among his colleagues, Dr. Murphy found the answer to the problem in a chat he had with his mother-in-law seven years ago, as she prepared for breast cancer treatment. She showed him a list of things she'd been instructed not to take before radiation therapy because they could reduce its effectiveness.

"They were all anti-oxidants," recalls Dr. Murphy, who, after viewing the list, then went on a walk with his dog Cora and

met a fellow dog-owner who made anti-oxidants. They fell into conversation and were soon working together, making anti-oxidants that could be taken in advance of radiation exposure, in order to lessen DNA damage.

The result was an anti-oxidant cocktail developed in collaboration with researchers at Dalhousie University that includes quercetin, extracted from apple skins. The cocktail, which Dr. Murphy calls Coramed in honour of his dog's role in the discovery, is currently in clinical trials. After extensive research, the first clinical study was carried out using 10 patients undergoing diagnostic radiation and was funded by donors who supported the Peter Munk Cardiac Centre (PMCC) Innovation Committee.

"Without that, we wouldn't be at this stage; it was a very, very important step for us," says Dr. Murphy, noting that the trial showed the premedication treatment to be beneficial in reducing DNA breaks in the blood of patients exposed to diagnostic radiation.

The research is being closely watched by clinicians such as Dr. Lindsay Machan, an interventional radiologist at Vancouver Hospital who has experienced occupational radiation-induced cataracts and lost the sight in one eye as a result of cataract surgery. He says that the anti-oxidant premedication is an "exciting advance" in the effort to reduce the impact of radiation in imaging-guided surgery. "The data are impressive and encouraging."

Dr. Machan says that minimally-invasive procedures are "exploding" in fields such as cardiology, orthopaedics, vascular surgery and pain medicine. "The numbers are

just increasing every year." Patients face little risk from their temporary radiation exposure and "enormous benefits," indeed a growing number of procedures can only be done by imaging-guided techniques, including delivering chemotherapy agents to parts of the liver.

Meanwhile, medical professionals performing procedures such as fluoroscopy and CT scans are exposed to continual low doses of radiation, yet don't see the danger, he comments. "No one has invented the perfect protection as yet – that's for sure."

The International Commission on Radiological Protection has suggested new exposure limits that are one-seventh of the previous average annual level. But Dr. Machan notes there is "tremendous individual variation in how people respond to radiation, and the idea of a threshold is somewhat arbitrary." His goals are to reduce the amount of radiation given off by imaging devices, improve radiation shielding and introduce innovative protective measures, such as Dr. Murphy's premedication treatment.

"It's one more step," he says. "There's no doubt in my mind that it will become a product."

The next study of Coramed will involve testing it on interventional radiologists, cardiologists and other medical professionals who work in a field of radiation, says Dr. Murphy. He expects one of the largest markets for the product to be airline crews, who are exposed to high levels of solar radiation from flying at high altitudes, especially on polar routes.

His research has been recognized by the Society of Interventional Radiology, which gave him its Leaders in Innovation Award in 2015. Murphy has also filed 64 patents on new medical devices and started six companies. He's grateful to be able to devote two days each week to research, and to be part of a "vibrant, intellectually active and questioning" community at the PMCC.

"We're not just here to do a job, but to change how the job is done," says Dr. Murphy, who hopes the premedication anti-oxidant will be on the market within about a year. ▽

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Dr. Kieran Murphy,  
Interventional Neuroradiologist, Toronto Western Hospital