Radioisotopes in our backyard

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Editor's note: In this week's submission from our 2005 Community Editorial Board, Frank van Hoof says we have a Canadian success story right here...

In a Texas hospital, a man lays on a platform, while a large machine circles his body. Nearby, a technician watches a three-dimensional image of his kidney emerge on a computer screen. An hour later, the doctor diagnoses the cause of his kidney malfunction and recommends treatment.

At the same time, a young girl in Ottawa is given an injection, and after a short wait, lays under a similar 'camera' while images of her beating heart are recreated on a computer. The doctor is able to pinpoint a leaking valve and plot a course of action to repair the problem.

In London, England, a woman breathes in a fine mist, while technicians take a diagnostic image of her lungs.

A middle-aged man in Los Angeles enters a clinic for his prostate cancer treatment. In a non-surgical procedure, several seeds of radioactive iodine are injected into the tumour. As he leaves for home a few hours later, the seeds are already treating the cancer.

A young woman in Vermont is given an injection to cure her hyperactive thyroid.

Meanwhile, at a cancer clinic in Osaka, Japan, a woman receives radiation treatment for a tumour found on her breast.

Is this a futuristic dream, or reality? What do these scenarios have in common? First, they are all part of a very real branch of health care called nuclear medicine, which involve the application of radioisotopes - radioactive cousins of elements like iodine, cobalt, xenon and molybdenum. Secondly, the isotopes were likely produced in the Valley, at Chalk River Laboratories.

For many Valley residents, the activities up at "The Plant" are a mystery. Most people realize that it has something to do with the CANDU reactor system that generates much of our power in Ontario. Not many realize that AECL is in the business of saving lives, producing more than half of the world's medical isotopes.

Nuclear medicine has two main uses: diagnostic imaging, to 'look' inside the human body without surgery, and various forms of therapy, mostly to destroy cancer.

Diagnostic imaging involves attaching a radioisotope to a carrier that seeks out a part of the body that the doctor wants to 'see.' A small amount of this mixture is injected into the patient, who waits until it reaches the target location. Then, the patient lies down while a special camera and computer use the weak gamma rays emitted by the isotope to create an image. The camera can take still images or create movies of functioning organs such as a beating heart. All of this is painless to the patient and is performed without scalpels. The patient usually goes home a few hours later. The isotope depletes quickly and is excreted from the body.

The isotopes used in nuclear medicine have short half-lives (the time it takes the isotope to be reduced to half its strength), ranging from a few hours to a few days. Because of this, a 'just in time' delivery schedule is required.

Currently, isotopes like "Moly-99" are produced in the NRU reactor at Chalk River, then removed and shipped to a hot cell for processing. The material is quickly delivered to MDS Nordion in Ottawa, where further processing occurs. Within hours, the product, now divided into many packages, is flown to pharmaceutical companies around the world. After further processing and packaging, the final product is delivered to hundreds of hospitals, where it must be used in less than three days. The whole process is like shipping an iceberg to the middle of the Sahara desert!

Approximately 34,000 diagnostic procedures are carried out every day, using isotopes produced at Chalk River.

Other isotopes like cobalt-60 have another purpose: killing cancer. Chalk River was responsible for inventing the use of cobalt-60 for therapeutic treatments in the early 1950s. Cobalt has been the isotope of choice for cancer therapy for decades and is used in machines manufactured by MDS Nordion. Cobalt treatment has been credited with saving or prolonging the lives of literally millions of people. Chalk River produces about 80 per cent of the world's cobalt, which is used for a further 33,000 treatments per day.

In total, isotopes made at Chalk River directly affect the lives of 67,000 people each day around the world. There's a good chance you know someone whose health has benefited from the technology. Nuclear medicine is a great Canadian success story, and it's one that started - and continues today - right here in your backyard!

The opinions expressed in this column are those of the writer, and do not represent the opinions of The Daily Observer or its senior editorial staff.