Battista: Cobalt-60 celebrates 60 years

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On Oct. 27, 1951, the world's first cancer treatment with Cobalt-60 radiation took place at the South Street site of the London Health Sciences Centre (LHSC) – then Victoria Hospital. This marked an important milestone for both the fight against cancer and Canada's emergence as a leader in medical physics and radiation oncology.

Recently, LHSC acknowledged the 60th anniversary of Cobalt-60 and this tremendous medical breakthrough. Staff of the London Regional Cancer Program proudly wore 'cobalt blue' items to mark the event.

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Revolutionizing cancer treatment throughout the world and serving as an excellent example of highly effective patient-oriented translational research, the Cobalt-60 radiation technology, nicknamed the Eldorado 'Cobalt Bomb', was developed by physicist and engineers at Atomic Energy of Canada Limited and the Eldorado Mining Company. London's radioactive source was pre-calibrated by staff of the National Research Council and first installed at Victoria Hospital on Oct. 16, 1951.

Just a little over a week later, its widely publicized first medical use took place under the clinical direction of Dr. Ivan Smith, a Department of Therapeutic Radiology professor at The University of Western Ontario and Cancer Clinic director at Victoria Hospital.

Another Cobalt-60 source had arrived earlier at the Saskatoon Cancer Clinic.

Pioneering physics development had taken place there under the leadership of Dr. Harold Johns, duly credited as the 'inventor' of Cobalt machines. However, the first treatment of patients was delayed past the London date by a few weeks, much to the ongoing chagrin of the Saskatoon team.

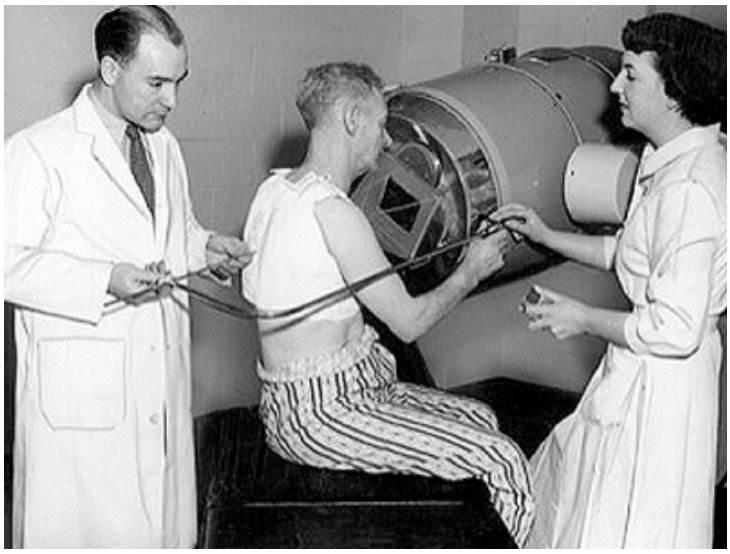
The development of Cobalt-60 radiation therapy opened a treatment window into the human body and, for the very first time in history, we were able to treat deep-seated tumours without harming the skin. This was the first major advancement in the radiation treatment of all cancers, aside from skin cancer, since Roentgen's discovery of X-rays in 1895.

Natural Radium-226 had been proposed to solve this issue but its mining was painstakingly inefficient and too costly; the level of radioactivity that could be extracted limited the 'dose rate' achievable from a radium treatment machine – radiation treatment times would be intolerable for patients. As an alternative, Cobalt-60 could be produced artificially by

bombarding natural Cobalt-59 with a high-flux of neutrons in Chalk River's new NRX reactor – a unique enabling technology available only in Canada at the time.

The compact Cobalt source was highly radioactive and could be placed in a machine designed to irradiate tumours with external beams of radiation in reasonable time (minutes). This offered a new exciting treatment option: 'healing rays' over invasive surgery.

This was an exciting time.



A patient prepares to receive Cobalt-60 radiation for a tumour.

The ambassador to Canada from Argentina was in London at an inaugural event and was hoping to place an order for a Cobalt machine to save Evita Peron's life. She was the spouse of the President of Argentina (Juan Peron) and had developed cancer. Rumours and news reports in the *Montreal Gazette* insisted she was treated in London as an 'incognito' patient.

At its peak, Dr. J.C.F. MacDonald, a medical physicist appointed to the physics department at Western, and oncologist Dr. F. Batley fielded numerous telephone calls from around the world all day.

This tantalizing story on Evita has been investigated, but no evidence is found in medical records, correspondence to Smith and interviews with staff of the cancer clinic present at the time.

If she was actually treated, it would be one of the most guarded secrets and cover-ups of the century.

Cancer treatment technologies have steadily progressed since the introduction of the megavoltage period in 1951. Today, linear accelerators produce more penetrating X-ray beams and have built-in 3D CT imaging capabilities to 'focus' the radiation onto well-specified targets. The new breed of machines provides a more localized treatment at the tumour site with fewer side-effects.

Despite these advances in technology, however, the Cobalt-60 unit remains the world's main radiotherapy machine because the developed countries only cover 30 per cent of the world's cancer caseload.

Due to its cost effectiveness, reliability, tolerance to electrical power fluctuations and ease of use, Cobalt is prevalent in developing countries. Cobalt-60 technology is therefore still currently used to treat roughly 70 per cent of the world's cancer cases treated by radiation. London's last Cobalt treatment was delivered in June 2001.

To date, approximately 35 million cancer patients worldwide have benefitted from this groundbreaking technology first applied at LHSC, 60 years ago.

London and Canada as a whole must take pride in the continuum of bench-to-industry-to-bedside research that has saved tens of millions of lives around the world. In this era of targeted cancer therapy, the 'little Cobalt engine that could' merits some perhaps forgotten attention.

It serves as an outstanding illustration of patient-oriented research being touted today by national research granting agencies and institutes.

Jerry Battista is Chair of Medical Biophysics, The University of Western Ontario; Physics Research and Education director, London Regional Cancer Program, London Health Sciences Centre; and a Lawson Health Research Institute scientist.