

Cyberknife Offers Novel Non-Invasive & Non-Surgical Cancer Treatment Option to Canadians

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News Reporter – HSI 2010-2011

November 2010 marked the one year anniversary of a new robotic radiosurgery treatment option for cancer patients at the Juravinski Cancer Centre JCC in Hamilton, Ontario. Cyberknife is a non-invasive & non-surgical tool used for the removal of a variety of tumours and represents one technology in a growing field of engineering advancements with medical applications introduced in the past decade.



Tom Chow, physicist at the Juravinski cancer explains that the Cyberknife is “an accelerator on an industrial robot [with the ability to] treat a small target with a very high dose [of radiation], and spare neighbouring organs”. The Cyberknife produces multiple X-ray beams of high dose radiation that are directed by an image-guided software. The software targets the beams to the tumour in real time, and is designed to compensate for normal body movements such as breathing. Cyberknife has been approved for use on tumours anywhere in the

body, and has already been applied to prostate, liver, pancreas, spine, brain, head and neck cancers, to name a few.

This real time imaging improves accuracy and patient comfort, allowing technicians to deliver radiation in high doses to only diseased areas and not the surrounding tissues. This also allows for increased patient comfort as other radiation systems can require patients to be secured in order to ensure accurate treatment. Due to its high level of precision, patients can receive higher radiation doses in fewer treatments with the Cyberknife.

Terrence Sullivan, President and CEO of Cancer Care Ontario, stated that “this new technology allows a level of precision that is not currently available for some cancer patients, especially for those who have tumours that are considered inoperable or surgically complex.”

Support for the device was garnered from a variety of sources in the Hamilton Community. The Juravinski Cancer Centre Foundation provided \$1 million to enable the acquisition of Cyberknife, and Hamilton businessman Mischa Weisz has donated \$500,000. Weisz, prior to passing away from cancer in 2009, made the donation in support of the battles against cancer for patients and families.

The robotic treatment device in Hamilton is the first of its kind in Ontario, and second in Canada only to the Centre Hospitalier de l'Université de Montréal (CHUM) with a Cyberknife in operation since September 2009.

The JCC and its radiation program lead by Dr. Tim Whelan were selected to receive the Cyberknife by an expert panel formed by Cancer Care Ontario. Michael Sherrar, Vice President, Planning and Regional Programs, Cancer Care Ontario, noted that “Of all the regions in Canada, the JCC in Hamilton is consistently at the top for improving the cancer system”. Ottawa is the next Canadian site in line to receive a Cyberknife.

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When asked to comment on where Canada stood amongst other nations for innovative cancer treatment technologies such as this one, Chow stated that “Canada has a pretty comprehensive national and provincial system that has worked very well. We have good cancer data and statistics. Because our system is completely publicly funded, the governing bodies actively evaluate new technologies like the CyberKnife, and fund their implementation at selected sites to evaluate their efficacy and cost effectiveness.” He then added that, “[Canadians] are pretty good at determining what technologies, and where these technologies should be used in cancer treatment.”

In regards to the future of the Cyberknife and other similar biomedical technologies for cancer treatment, Chow commented that “the device is still in its infancy, much like robotic surgery, and needs updated software and control systems. The hardware is capable of much more, but the software is not there”.

The Cyberknife was developed at Stanford University by Dr. John Adler, and approved by the US FDA in 2001. Today there are over 150 Cyberknife systems in treatment facilities around the world. With the field of biomedical engineering on the rise, it is likely we will be seeing an increase in the number of radiosurgery cancer treatment options in the near future.

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News Reporter Profile

Megan Dodd is a PhD student in Biomedical Engineering at McMaster University, where her research focuses on a gene therapy for Hemophilia B. In addition to Health Science Inquiry she also works as a coordinator for the Let's Talk Science Outreach Program and instructor for the Learning Enrichment Advancement Program.