

Ideas on the Edge



Doing More with the Magic

CAN WE MAKE ONE OF THE OLDEST TREATMENTS FOR CANCER EVEN MORE EFFECTIVE? DAVID JAFFRAY AT THE UNIVERSITY HEALTH NETWORK SAYS YES — A LOT MORE.

“We’re using something that has no taste and no smell, and something that doesn’t touch the patient physically, to treat an illness inside the patient.”

Dr. David Jaffray, a researcher with the University Health Network—isn’t describing some dodgy New Age therapy. He’s talking about the almost magical

power of a tool physicians have been using for more than a hundred years: radiation.

Despite its effectiveness, however, radiation therapy has always had a major downside: the destruction of healthy tissue around a tumor. But over the last decade, advances in medical imaging, computers and robotics have been leading to radical improvements in the ability to target only cancer cells. “We’re able to hit much smaller targets, and avoid healthy tissue altogether,” explains Dr. Jaffray.

He and his colleagues are helping to explore the frontiers of increasingly precise radiation therapy at STTARR—Spatio-Temporal Targeting and Amplification of Radiation Response—a facility within Toronto’s Princess Margaret Hospital funded in part by an investment from the Ontario Innovation Trust. “It’s unique in the world,” says Dr. Jaffray. “This facility brings together radiation treatment, every type of imaging technology you can imagine, cell studies, computers, robotics—all to move us forward in understanding how radiation and biology interact.”

RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- more effective radiation therapies
- less cost to the Ontario healthcare system

Understanding the precise interactions between the two—especially at the cellular level—wasn’t critically important as long as radiation therapy was a relatively blunt instrument. But just as a



sculptor needs an increasingly detailed understanding of her material the more finely she works it, so it is with those who wield radiation ever more precisely in the art of healing. In fact, the capacity for more focused treatment is pushing researchers like Dr. Jaffray to ask entirely new questions. If we don't have to worry about healthy tissue, just how high can dosages go? How frequently can they be administered? And what exactly happens in a cancer cell with this more intense therapy? There are questions

Project: Spatio-Temporal Targeting and Amplification of Radiation Response (STTARR) Innovation Centre
Institution: University Health Network
Research Sector: Engineering/Health Sector
Principal Investigator: David Jaffray
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CFI Investment: \$3,893,177
Ontario Research Fund Investment: \$1,210,389
Total research investment from all sources: \$9,824,217



DAVID JAFFRAY

too about patients who react differently to the same treatment. How can our burgeoning knowledge of genetics help us understand the reasons? And how can that understanding be used to craft radiation therapies that are not only highly targeted, but highly personalized?

The quest for answers demands an interdisciplinary approach; Dr. Jaffray, a physicist, is working closely with colleagues Dr. Michael Milosevic, an engineer turned physician, and Dr. Robert Bristow, a physician and biologist. What they discover may lead to significantly more effective—and perhaps less expensive—radiation therapy.

“A prostate patient today may need over 40 treatments,” Dr. Jaffray explains. “But we might be able to reduce that to 20. And that means we could treat more patients on the same number of machines.”



University Health Network, Toronto

Clearly, there are still some rabbits to be pulled out of the magic hat of radiation. “I think in the next ten years we’ll squeeze every last ounce of performance out of these therapies,” predicts Dr. Jaffray, “resulting in as much as a 15 percent increase in controlling cancer without increasing toxicity. Everyone wants a blockbuster treatment, but I’d be happy with 15 percent—that’s a lot of people.”



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.