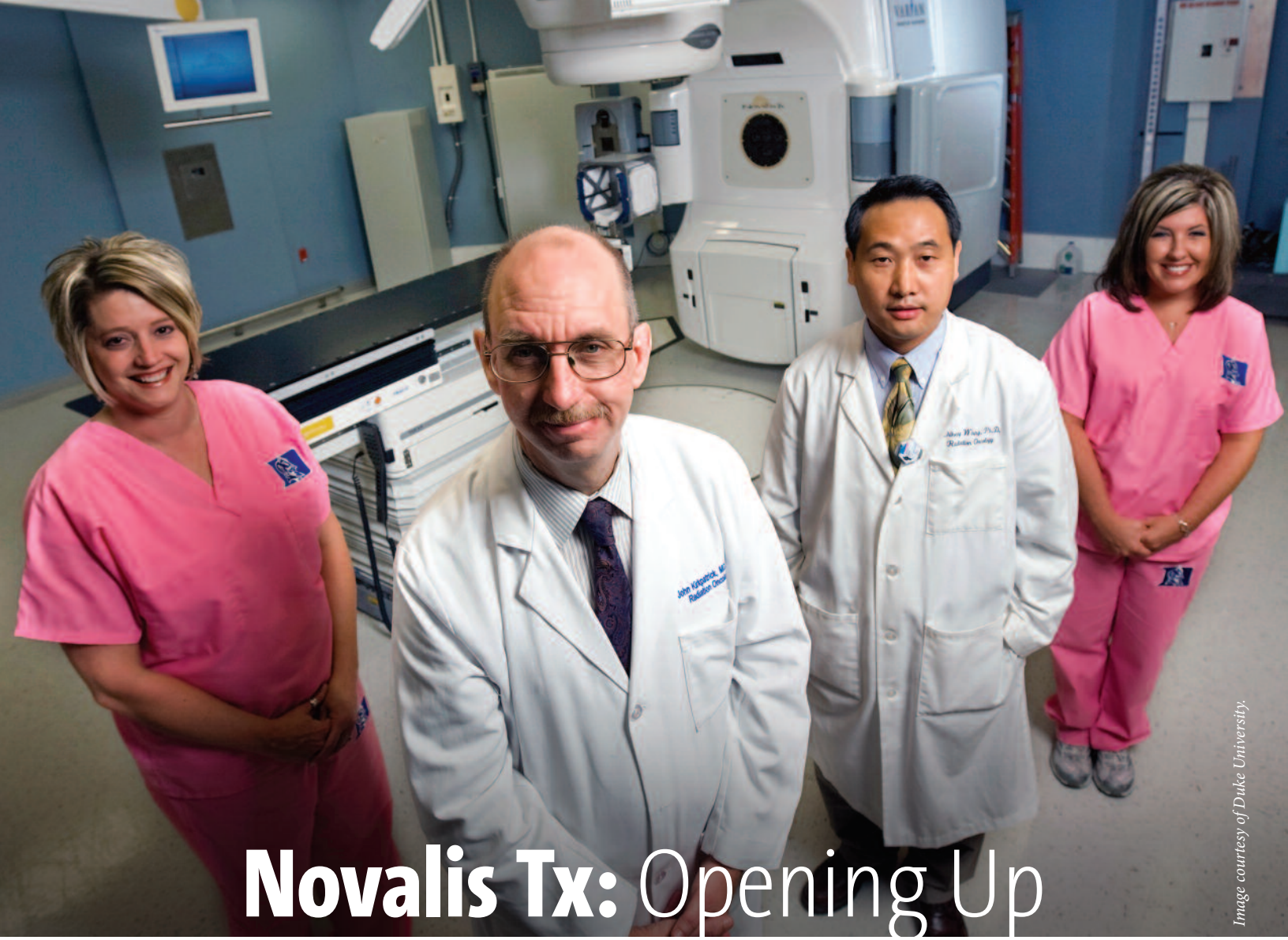

Image courtesy of Duke University.

Novalis Tx: Opening Up New Avenues of Radiosurgery

By Barbara Boughton

When Michael Selch, MD, and his fellow clinicians at the University of California, Los Angeles (UCLA), decided to upgrade their stereotactic radiosurgery system, the Novalis Tx™ platform was the obvious choice. A Novalis site since 1997, UCLA was the world's first center to deploy a Novalis system for shaped-beam surgery, and clinicians had been intimately involved with the development of this technology since that time. Adoption of the new Novalis Tx, with its combination of world-class imaging, treatment planning, and treatment delivery technologies from Varian Medical Systems and BrainLAB, was a natural next step.

"The Novalis Tx has a lot of advantages, but what attracted our attention was the multileaf collimator upgrade," says Selch, professor of radiation oncology at UCLA and a specialist in central nervous system (CNS) radiation oncology. "It allows us to shape the dose and target tumors very precisely to protect normal tissues. Because of its adaptive gating, we can be more efficient, accurate, and rapid in targeting stereotactic body radiation therapy (SBRT) to tissues such as the lung and liver, where movement with respiration is a problem.* We fully expect that the Novalis Tx will open up new avenues of radiosurgery for us, allowing us to perform radiosurgery on even difficult-to-plan tumors with unusual shapes."

ABOVE | Duke University radiation therapist Jennifer Lee; John Kirkpatrick, MD, PhD, clinical director, radiation oncology; physicist Zhiheng Wang, PhD; and radiation therapist Robyn Walker.

Fast, accurate, ultraprecise SRS

From academic research centers to small community hospitals, radiation oncologists and neurosurgeons around the globe are acquiring the Novalis Tx to carry out ultraprecise image-guided stereotactic radiosurgery (SRS) procedures—including frameless radiosurgery—quickly and accurately.* With a dose delivery rate of 1,000 MU per minute and a range of energies from 6 MV to 20 MV, the Novalis Tx can deliver high doses rapidly.

The Novalis Tx platform offers comprehensive treatment planning, image-guidance, verification, and information management technologies, making it possible to deliver a wide range of treatment options for a large number of indications, including malignant and benign lesions, brain metastases, arteriovenous malformations, and functional lesions. In addition to SRS and SBRT, the Novalis Tx can be used to deliver conformal and intensity-modulated radiotherapy (IMRT), electron treatments, and RapidArc™ volumetric modulated arc therapy.

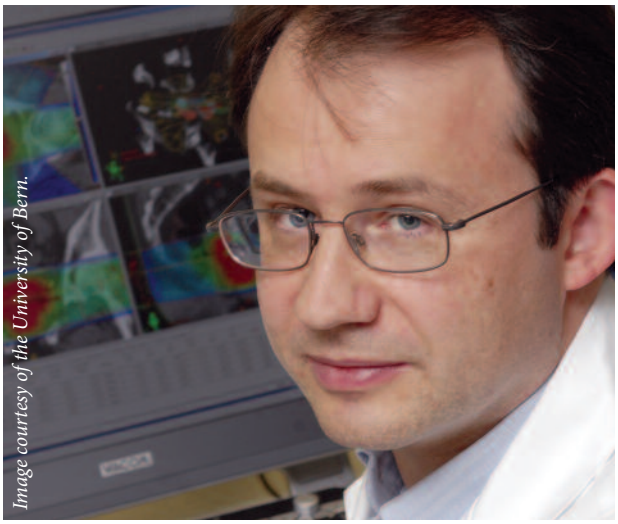

Image courtesy of the University of Bern.

"Robotic radiosurgery really enlarges the armamentarium for treating prostate cancer, enabling less invasive and more efficient treatment options."

Daniel Aebersold, MD, Inselspital, University of Bern

Worldwide adoption

At Tata Memorial Hospital in Mumbai, India, Shyam Kishore Shrivastava, MD, has been treating brain tumor patients using linac-based stereotactic radiotherapy with BrainLAB's M3 micromultileaf collimator since 2000. "We decided to procure the Novalis Tx because this equipment is a technological marvel combining technologies from the two leading manufacturers of radiotherapy equipment," says Shrivastava. "It will allow us the benefit of being able to provide simple and complex treatments with a single machine."

In Switzerland, radiation oncologists at Inselspital at the University of Bern plan to use the Novalis Tx to treat cranial, pulmonary, and spinal lesions as well as unresectable liver and prostate cancer, according to Daniel Aebersold, MD, director and chief physician of the radiation oncology clinic. Up until now, prostate cancer treatment at the University of Bern has involved seed brachytherapy, HDR brachytherapy, or IMRT with marker-based image guidance. "Robotic radiosurgery really enlarges the armamentarium for treating prostate cancer, enabling less invasive and more efficient treatment options," says Aebersold. "We'll also be treating pulmonary and liver lesions that couldn't be treated until now because of toxicity restraints with conventional radiotherapy."

Clinicians at Brigham and Women's Hospital/Dana-Farber Cancer Institute at Harvard Medical School in Boston, Massachusetts, another longtime Novalis user, anticipate using the Novalis Tx to treat larger cranial and spinal tumors more accurately, thanks to features like variable energy levels and real-time imaging and verification. "We estimate that we should be able to treat tumors that are twice as large as those we can currently treat," says Naren Ramakrishna, MD, PhD, chief physician of CNS radiation oncology. "The Novalis Tx is a very versatile machine that will facilitate image-guided treatment for a variety of body sites."

Treating the previously untreatable

According to John Sampson, MD, neurosurgeon and associate professor of surgery at Duke University in Durham, North Carolina, and codirector of Duke's Center for Stereotactic Radiosurgery, the high conformality of treatments delivered with the Novalis Tx enables him to treat tumors and growths of the spine and brain that were previously untreatable. "We can treat patients with tumors around the trigeminal nerve as well as the brain stem, whereas previously we were only able to offer these patients standard radiation therapy that was primarily palliative," says Sampson. "The Novalis Tx provides the right dose in the right location, so you can focus right down to the tumor."

"Because of the localization accuracy and fine delivery using Novalis Tx, we can reduce the cord dose for spine radiosurgery and still not undertreat tumors," adds Fang-Fang Yin, PhD, medical physicist and codirector of Duke's Center for Stereotactic Radiosurgery. Yin also notes that, because of the variable dose rate possible with the Novalis Tx, much faster treatment times are achievable. Treatments that once took an hour or more can now take as little as 30 minutes.

With the Novalis Tx, clinicians can offer patients more comfortable frameless radiosurgery of the brain as well. "Some patients can't tolerate a frame because of the pain," says Sampson. "The ability to do frameless radiosurgery really makes treatments much easier for patients."

According to John Kirkpatrick, MD, PhD, assistant professor of radiation oncology and codirector of Duke's Center for Stereotactic Radiosurgery, the software and real-time imaging make the Novalis Tx an exceptionally versatile, efficient, and effective device for planning and verifying radiosurgery treatments.

Combining the best technologies

Benjamin Movsas, MD, chairman of the department of radiation oncology at Henry Ford Health System in Detroit, Michigan, likes that the Novalis Tx is versatile enough to switch between stereotactic and more traditional radiotherapy treatments if necessary. "With the Novalis Tx, you can deliver stereotactic radiosurgery that is second to none, but if necessary, switch to traditional radiotherapy and deliver a very precise IMRT treatment," he says.

Henry Ford clinicians have been using Novalis technology for some time, and have treated thousands of patients with focused SRS. "We have published on outcomes as well as on SRS planning and accuracy," Movsas says. "When you start treating in areas that are very close to sensitive and critical structures, you want to do it with technology like Novalis Tx, which combines the best of BrainLAB's know-how and SRS software experience with the best of technology from Varian."

In fact, Movsas adds, with its cone-beam CT, room-based imaging, and adjustable 6D robotic couch, the Novalis Tx affords him and his colleagues a very high degree of accuracy. "You don't need all these components for every indication," says Movsas, "but for something as delicate as radiosurgery near the spinal cord, you do. The spinal cord is not forgiving, so there's no room for error."

Image courtesy of the Henry Ford Health System.

"With Novalis Tx, you can deliver stereotactic radiosurgery that is second to none, but if necessary, switch to traditional radiotherapy, and deliver a very precise IMRT treatment."

Benjamin Movsas, MD, Henry Ford Health System

Movsas also appreciates the iPlan® software for the way it facilitates collaboration between radiation oncologists and other clinicians such as neurosurgeons. "If I'm planning a treatment today," says Movsas, "I can have colleagues take a look at the treatment plan from their offices, and we can communicate well before we treat the patient. You need that communication, so having this kind of network is very useful."

Another plus to the Novalis Tx is the ARIA™ oncology information system, which, in addition to affording added levels of safety during treatments, should save both time and money, according to Indrin Chetty, PhD, director of radiation physics at Henry Ford. ARIA allows the radiation oncologist, physicist, or surgeon to link to other key resources such as treatment planning, pathology, and pharmacy, and can handle any current imaging modality, including PET, CT, and MRI. "There are only so many hours in a day," notes Chetty. "As a radiation oncologist, you need a system that can set up patients for treatment as well as facilitate communication among all members of the team. This function of the ARIA software is really important for patients, because you have the key information at your fingertips at all times."

Multimodality care

"The Novalis Tx puts the power of clinical excellence in our hands," says Gordon Ray, MD, chairman of the department of radiation oncology at the Palo Alto Medical Foundation in Palo Alto, California. "It will serve as the centerpiece of the radiation oncology suite at our Hiller Radiosurgical Center, where patients will have access to treatment with leading-edge technology in radiation oncology and neurosurgery. The precision of the Novalis Tx platform will allow us to treat very challenging cases."

"We looked with due diligence at a lot of systems, but we felt the Novalis Tx was the best machine to deliver multimodality care to patients in a cost-effective way," Ray adds. "With the Novalis Tx, we'll be able to perform radiosurgery that is so conformal, it ensconces the tumor within a Saran Wrap of radiation. We'll also be able to treat very small lesions in the spine as well as targets that move with respiration. Although we could do this type of work with other technologies, there are few that could do it as well."

Barbara Boughton is a freelance writer and editor who specializes in health and medicine.

** The American Association of Neurological Surgeons (AANS) and the American Society for Therapeutic Radiology and Oncology (ASTRO) have agreed on the following definitions:*

Stereotactic radiosurgery *(SRS) is a distinct discipline that utilizes externally generated ionizing radiation in certain cases to inactivate or eradicate (a) defined target(s) in the head and spine without the need to make an incision… SRS is typically performed in a single session, using a rigidly attached stereotactic guiding device, other immobilization technology, and/or a stereotactic guidance system, but can be performed in a limited number of sessions, up to a maximum of five.*

The term stereotactic body radiation therapy *(SBRT) applies to stereotactic radiation treatments given elsewhere in the body (other than the brain or spine) delivered in one to five fractions, or stereotactic cranial treatments delivered in two to five fractions.*

These definitions were adopted for this article.