

# RapidArc. Revolutionary Success.



RapidArc™ radiotherapy technology  
successfully treats cancer patients around  
the world.

# RapidArc. One revolution is all it takes.

**Say hello to the 2-minute treatment.**

RapidArc™ radiotherapy technology is a major advance from Varian Medical Systems that improves dose conformity while significantly shortening treatment times. RapidArc technology delivers treatments two to eight times faster than Varian's current dynamic treatments and increases precision—a winning combination that enables physicians to improve the standard of care and treat more patients.

This revolutionary approach is faster, more precise, and as simple to plan as conventional treatments. Read stories from clinical experts as they talk about their experience in using Varian RapidArc radiotherapy technology.

Isn't it time you joined the revolution too?

[www.varian.com/rapidarc](http://www.varian.com/rapidarc)

Our story begins at Verity Radiation Therapy in Plano, Texas, where the clinical staff has found that with Varian RapidArc™ radiotherapy technology they can design plans that minimize the radiation delivered to healthy tissue and critical structures while aggressively treating diseased tissue.

In one case, the treatment called for 6000 cGy delivered to a tumor in the patient's right lung. Because RapidArc delivers a volumetric modulated arc therapy by rotating the treatment machine around the patient, the Verity clinical staff was able to develop a plan that reduced the dose to the spinal cord by 30 percent, reduced the lung dose by almost 50 percent, and reduced the overall dose delivered to the heart, compared to conventional Intensity Modulated Radiation Therapy (IMRT) treatments.<sup>1</sup> "RapidArc gives us significant control over treatment dosage," says Randi Aaronson, Ph.D., medical physicist for Verity. "With RapidArc, we can increase the target dose while reducing dosage to healthy tissue."

The Verity team has also documented that the dosage reduction isn't limited to the tissue immediately surrounding the therapy target. In one case, Verity therapists were able to reduce the total number of monitor units for a given treatment from over 1,100 down to 400 reducing the out-of-field dose being delivered to the patient volume. "The RapidArc system reduces the total number of monitor units that we need in nearly every case," says Dr. Aaronson.

Varian RapidArc technology has also significantly reduced treatment times at Verity. On average, treatment deliveries that required over 5 minutes can now be completed in 90 seconds. The shorter times provide an opportunity to increase patient comfort. "Five minutes doesn't sound like a long time, but for a patient with severe bone pain, it's an eternity," says Dr. Aaronson. "Because RapidArc delivers treatments so quickly, we have been able to create significantly better plans for several patients who could not have withstood 10 or 15 minutes on the couch due to pain or difficulty breathing."

Despite the remarkable effects that Varian RapidArc technology has had on the medical center's cancer treatment program, the Verity staff reports that the deployment and training had very little impact on their

daily operations. The deployment began on a Friday afternoon, and the equipment was ready for testing and dry runs by the following Monday. "I have to hand it to Varian," says Dr. Aaronson. "Bringing up a new system isn't easy, but the RapidArc installation team was fast, thorough, and effective."

Dr. Aaronson also notes that the on-site and Web-based training was on target. "The dosimetry training that Varian provided via Microsoft® Live Meeting was especially helpful," says Dr. Aaronson. "Varian gave us the variables that we needed to know about right away, and the time spent going through treatment plans was invaluable."

Meanwhile, halfway around the world at the Vrije Universiteit Medical Center (VUMC), Dr. Ben Slotman, chairman of the VUMC Department of Radiation Oncology and the radiation oncology team have adopted RapidArc radiotherapy technology as the next generation of radiotherapy.

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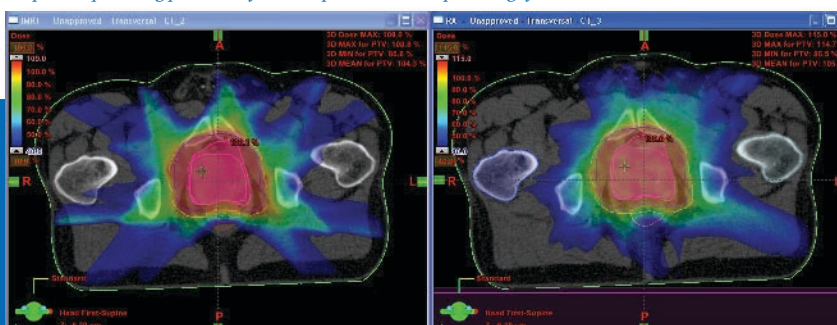
– Randi Aaronson, Ph.D.

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Located in Amsterdam, the VUMC is using Varian's RapidArc radiotherapy technology to advance the frontiers of cancer treatment. The VUMC Department of Radiation Oncology—which specializes in the early clinical application of new technologies—was one of the first clinics in Europe to offer 4D CT-guided radiotherapy. The clinic was also one of the first to do respiratory-gated radiotherapy, which they now perform on a routine basis.

VUMC is now one of the first clinics in the world to adopt RapidArc technology, and the radiation oncology staff there is finding that the speed and precision of Varian RapidArc technology enable them to provide breakthroughs in patient care. "RapidArc technology

#### RapidArc planning powered by the Eclipse™ treatment planning system



IMRT

RapidArc

(Left)  
The clinician's plan goals were achieved with RapidArc radiotherapy technology. IMRT-like PTV coverage and OAR sparing were preserved while reducing MU by 30% and treatment time by 70%.

– Image courtesy of Verity Radiation Therapy

# Global Success !!

is the future of IMRT,” says Dr. Slotman. “Treatment planning and delivery are both much quicker with Varian RapidArc technology, and we can deliver treatments that are equivalent to our current IMRT capabilities.”

Faster treatments with RapidArc radiotherapy technology at VUMC start in the planning stages, where Dr. Slotman’s team has found that they can develop detailed, precise treatment plans in roughly half the time it takes to develop a standard IMRT treatment plan. “With RapidArc technology, we can develop treatment plans in less than half the time that it previously took a radiation technologist or physicist,” says Dr. Slotman.

Once the patient is on the table, VUMC specialists are able to deliver a typical treatment of 2 Gy per field in 2 minutes, compared with the 6-12 minutes necessary for a standard IMRT treatment. For Dr. Slotman, this is a critical breakthrough, as it not only provides an opportunity to increase patient comfort, but can also increase the accuracy of the treatment by minimizing the opportunity for patient movement. “For high-precision radiotherapy, you have to be sure that the tumor is where you expect it to be,” says Dr. Slotman. “With the speed of RapidArc treatment delivery, the chances that movement takes place during the treatment are considerably smaller, which we feel will lead to more consistently accurate treatments.”

In keeping with the VUMC mission of research and development, Dr. Slotman is also using RapidArc technology to advance the state of the art in cancer treatment, developing an entirely new treatment procedure for patients with multiple metastatic brain tumors. Currently, these cases are treated with a sequential plan of whole brain

radiation, followed by stereotactic booster doses targeted at the locations where the cancer has metastasized. “With RapidArc, we can deliver whole brain radiation and booster doses simultaneously, which is not possible with standard IMRT equipment,” says Dr. Slotman.

Ultimately, Dr. Slotman is most enthusiastic about the ability that RapidArc gives him and others to expand the availability of high-precision IMRT to many more patients. “At VUMC, we see as many as 2,500 new patients every year,” says Dr. Slotman. “The greatest benefit of RapidArc is that we will be able to treat more patients more effectively every single day.”

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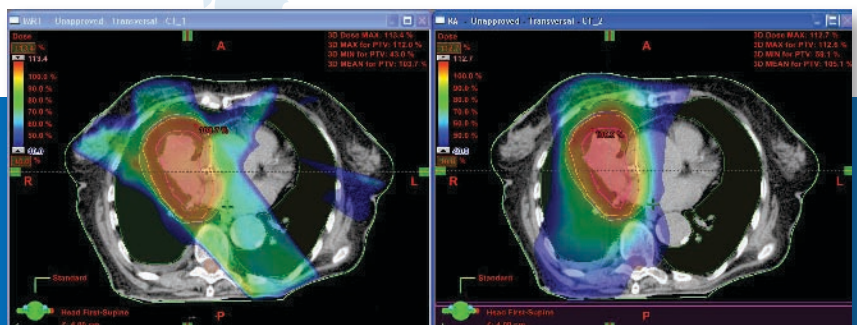
— Ben Slotman, M.D., Ph.D.

Treating more patients more effectively is also a top priority at the University of Alabama at Birmingham (UAB) Comprehensive Cancer Center, the first RapidArc radiotherapy technology site in the United States. Here, therapists are using RapidArc technology to deliver treatments in less than two minutes that formerly took ten minutes or more.

During the early evaluation of Varian RapidArc radiotherapy technology at the UAB Comprehensive Cancer

*(Right)  
RapidArc radiotherapy technology reduces the spinal cord dose by 30% and the mean dose to the left lung by half while keeping the same PTV coverage*

— Image courtesy of Verity Radiation Therapy



IMRT

RapidArc

At medical facilities around the world, RapidArc radiotherapy technology is helping clinicians treat patients faster and more precisely. The results speak for themselves as more and more clinics document faster treatment times, increased patient comfort, and lower doses delivered to healthy tissue and critical structures.

Center, it quickly became clear that RapidArc would become the next successful “first” in the school’s long history of leading-edge cancer treatment. UAB was the first radiotherapy site in Alabama, the first in the state to perform IMRT, and is now the first medical center in the United States to begin treating cancer patients with RapidArc technology.

With Varian RapidArc radiotherapy technology, the UAB clinical staff is able to deliver IMRT-quality treatments in less than two minutes that previously took an average of ten minutes with conventional IMRT. “Half of the RapidArc treatments have been delivered in less than 90 seconds,” says Richard Popple, Ph.D., assistant professor and RapidArc team leader at UAB. “The most time that we have needed for a RapidArc treatment is 110 seconds from beam on to beam off.”

The reduced treatment times have a number of significant ramifications, starting with an increase in patient comfort that Dr. Popple believes may directly affect the quality of treatment. “It can be very uncomfortable for some patients to lie flat and remain still,” says Dr. Popple. “With RapidArc, we can minimize their discomfort and minimize the chances that they will inadvertently shift position due to pain.”

Completing a treatment in less than two minutes also reduces the chances of other involuntary anatomical movement during longer treatments. “With a prostate tumor, for example, gradual filling of the bladder or the sudden movement of bowel gas can displace the target by a few millimeters,” says Ivan Brezovich, Ph.D., chief of medical physics. Given the time and effort that goes

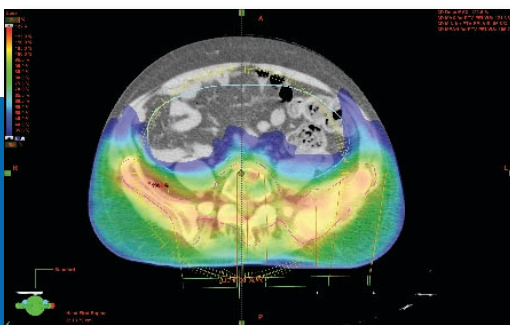
into getting a patient properly positioned for an accurate treatment, we’re excited about a treatment approach that has a better chance of preserving that accuracy.”

“RapidArc helps make us a more efficient, more effective medical team, and that translates to better care for our patients”

– Richard Popple, Ph.D.

Operationally, the UAB staff feels that Varian RapidArc radiotherapy technology dramatically increases their overall efficiency. RapidArc makes it possible to program a Varian linear accelerator to deliver a complete volumetric modulated arc therapy with a single rotation of the treatment machine around the patient. “Radiation therapists are asking me to move their patients to the RapidArc machine because it simplifies the treatment process,” says Dr. Popple.

Dr. Popple and the rest of the UAB team are excited about the clinical possibilities that may open up with RapidArc. In addition to improving the treatment that they can provide for patients, the speed of the RapidArc treatments effectively gives the medical center more time every day. “If we are able to treat all IMRT patients with RapidArc, reducing the average treatment time by eight minutes adds up to four hours a day,” says Dr. Popple. “RapidArc technology helps make us a more efficient, more effective medical team, and that translates to better care for our patients.”



(Left)  
RapidArc radiotherapy technology treats the pelvis while minimizing dose to bowel. This treatment required 90 seconds.

– Image courtesy of University of Alabama at Birmingham

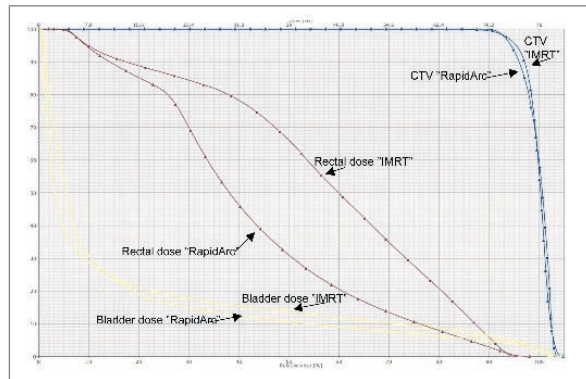
Better cancer treatments for more patients is a theme that resonates at every Varian RapidArc radiotherapy technology site, and Rigshospitalet in Copenhagen is no exception. Dr. Svend Aage Engelholm, head of the Department of Oncology at Rigshospitalet Finsen Centre, University Hospital, Copenhagen, is using RapidArc to bring advanced cancer treatment to more cancer patients than ever before.

Faster delivery of radiation therapy means many things to many people. For patients, it means less time holding still on the treatment couch. For Dr. Engelholm, the shorter treatment times will considerably increase the number of patients that can take advantage of the most advanced cancer treatment currently available.

Using RapidArc technology, Dr. Engelholm and the staff at Rigshospitalet are seeing noticeably reduced treatment times over standard IMRT techniques. "Including patient setup and positioning, a 5-field IMRT treatment for prostate cancer typically takes 14 minutes," says Dr. Engelholm. "With RapidArc, we can reduce that time to 10 minutes, because the actual dose delivery only takes 69 seconds."

Treating patients more quickly is important because it helps the clinical staff have time to make patients more comfortable. "Nobody wants to spend a long time in the treatment room, so the faster that we can make it happen, the better," says Dr. Engelholm. He also believes that the faster treatments reduce the potential for involuntary movement while the treatments are being delivered, increasing the chances that the dose will be delivered on target. Therapists at the Finsen Centre also report that the speed and simplicity of the RapidArc treatments enhance their ability to work effectively. "The therapists are asking us to move patients to RapidArc technology system," says Dr. Engelholm. "The setup is simple for the therapists and less demanding on the patients, which improves the treatment experience."

In addition to faster treatments, Dr. Engelholm has also been able to reduce the amount of radiation delivered to surrounding healthy tissue. To date, the clinic has focused on treating prostate cancers with RapidArc, and the team has been able to reduce the dose to the rectum by an average of 15-20 percent depending on the case. "We can see that the RapidArc treatments are reducing the dose



Comparison of RapidArc and IMRT DVH for a typical prostate case from Rigshospitalet showing significantly reduced rectal dose for equivalent target coverage.

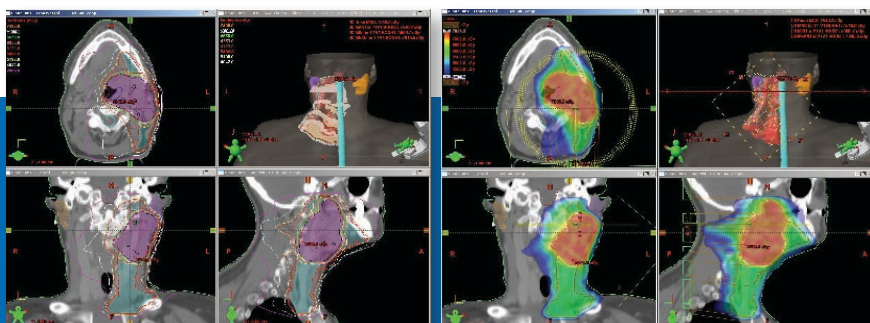
delivered to nearby healthy tissue, and we are hopeful that the reduction will translate to fewer side effects," says Dr. Engelholm, adding that he believes that the Finsen Centre is just at the beginning of what will be possible with RapidArc. Dr. Engelholm is particularly looking forward to expanding treatment to head/neck and intracranial cases, anticipating that the ability of RapidArc to avoid critical structures will increase the control that therapists have over the dose delivered to patients.

Finsen Centre has a long history of bringing advanced cancer treatments to ever-larger numbers of patients. It was the first facility to deliver IMRT treatments in Scandinavia, and one of the largest radiotherapy facilities in Europe. Dr. Engelholm believes that RapidArc technology will help the clinic continue to fulfill that mission.

RapidArc radiotherapy technology is making it possible for clinics around the world to deliver fast and precise advanced image-guided intensity modulated radiotherapy treatments in 2 minutes or less. This new treatment approach is gaining traction fast as more and more centers around the world join the RapidArc revolution.

<sup>1</sup> Results based on Varian Medical Systems' survey of four clinical sites. Data on file VMS, Palo Alto, 2008.

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(Right) RapidArc radiotherapy technology plan in the head and neck region

— Image courtesy of Vrije Universiteit Medical Center



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## RapidArc marketing is powerful.

The materials in the RapidArc Hospital Marketing Kit are specifically designed to help build awareness of your facility and promote RapidArc to patients, physicians, and your community.

The RapidArc marketing program includes sample materials and an image library to support a full range of communications, including:

- Public relations
- Advertising
- Direct marketing
- Open houses
- Presentations
- Website promotions

one revolution is all it takes



## Say hello to 2-minute treatments

RapidArc™ radiotherapy technology is a new, integrated way to deliver complex cancer treatments in less than 2 minutes. That's 2 to 8 times faster than our fastest treatment. In a single rotation, RapidArc modulates aperture shape, dose rate, and gantry speed at every angle. So you increase the probability of tumor control without complications. This revolutionary approach is faster, more precise, and as simple to plan as conventional treatments.



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