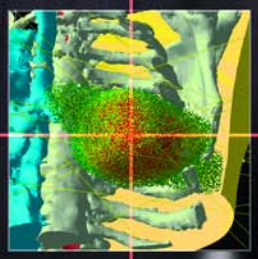
# VARIAN 04

VARIAN MEDICAL SYSTEMS **2004** ANNUAL REPORT

# TARGETING CANCER

## TECHNOLOGY GIVES FIGHTERS A NEW EDGE



### IMAGE-GUIDED RADIOTHERAPY
## TARGETING THE TUMOR

### STEREOTACTIC RADIOTHERAPY
## THE NEXT STEP IN PRECISION

### FLAT-PANEL DETECTORS
## REVOLUTIONIZING X-RAY IMAGING

VARIAN
medical systems

Varian Medical Systems, Inc., of Palo Alto, California, is the world's leading supplier of equipment and software for treating cancer. The company is also a premier supplier of components including X-ray tubes and flat-panel detectors for medical, scientific, and industrial imaging. Varian Medical Systems employs approximately 3,280 people who are located at manufacturing sites in North America and Europe and in its 55 sales and support offices around the world. Additional information is available on the company's Web site at www.varian.com.

**ON THE COVER**

With treatments like real-time image-guided radiotherapy and stereotactic radiosurgery, clinics are using new technology from Varian Medical Systems to give patients a fighting edge. In addition to helping doctors treat patients, Varian solutions are working for many people, from customs agents screening cargo containers to aerospace engineers inspecting rocket parts.

| (Dollars in millions) | FISCAL YEARS 2004 | 2003 | 2002 |
|---|---|---|---|
| Revenues | **$ 1,236** | $ 1,042 | $ 873 |
| Gross margin | **$ 517** | $ 422 | $ 339 |
| Operating earnings | **$ 256** | $ 198 | $ 145 |
| Operating earnings as percentage of revenues | **20.7%** | 19.0% | 16.6% |
| Net earnings | **$ 167** | $ 131 | $ 94 |
| Net earnings per diluted share[1] | **$ 1.18** | $ 0.92 | $ 0.67 |
| Net orders | **$ 1,398** | $ 1,152 | $ 974 |
| Backlog | **$ 970** | $ 808 | $ 698 |

[1] FY03 and FY02 have been restated for the two-for-one stock split (effected in the form of a 100% stock dividend) paid on July 30, 2004.

# VARIAN 04

www.varian.com/investor

Except for historical information, this summary annual report contains "forward-looking" statements within the meaning of the Private Securities Litigation Reform Act of 1995. Statements concerning industry outlook, including market acceptance of or transition to new products or technology such as intensity-modulated radiation therapy (IMRT), image-guided radiation therapy (IGRT), software, and advanced X-ray products; growth drivers; our orders, sales, backlog, or earnings growth; future financial results and any statements using the terms "set the stage," "can," "expect," "think," "should," "believe," "continue," "will," "could," "may," "would," "eliminate," "promises," "enable," "make," "might," "potential," "becoming," "transforming," "growing," "gaining," "momentum," "continued," "designed," "hope," or similar statements are forward-looking statements that involve risks and uncertainties that could cause our actual results to differ materially from those anticipated. Such risks and uncertainties include, without limitation, demand for our products; our ability to develop and commercialize new products; the impact of competitive products and pricing; the effect of economic conditions and currency exchange rates; our ability to meet demand for manufacturing capacity; the effect of environmental claims and expenses; our ability to protect our intellectual property; the impact of managed care initiatives or other healthcare reforms on capital expenditures and/or third-party reimbursement levels; our ability to meet U.S. FDA and other regulatory requirements or product clearances; our dependency on a small number of customers for a significant amount of our sales; our reliance on a limited group of suppliers, and in some cases sole source suppliers, for some product components; the potential loss of key distributors; the possibility that material product liability claims could harm future sales or require us to pay uninsured claims; the risk of operations interruptions due to events beyond our control; and other risks detailed from time to time in our filings with the Securities and Exchange Commission. We assume no obligation to update or revise any forward-looking statements because of new information, future events, or otherwise.



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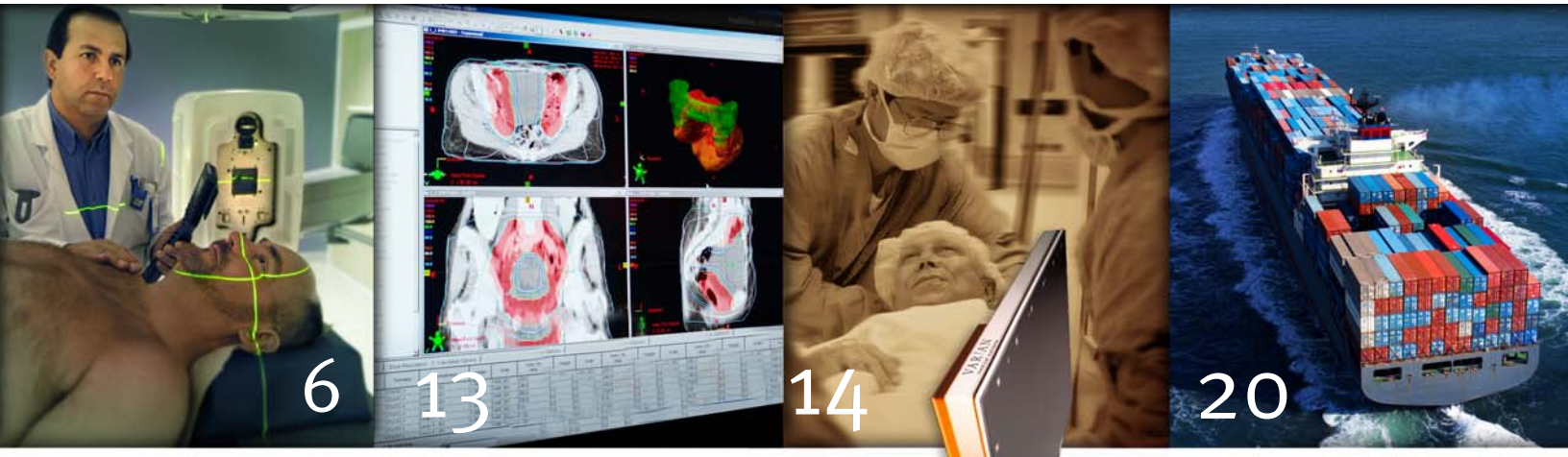



# Contents

**CLOCKWISE FROM FRONT:**

**Richard M. Levy**
Chairman, President and CEO

**Timothy E. Guertin**
Executive Vice President

**Wendy S. Reitherman**
Vice President, Human Resources

**John Anderson Thorson II**
Vice President, Business Development

**Joseph B. Phair**
Vice President, General Counsel

**George A. Zdasiuk**
Vice President, Chief Technology Officer

**Robert H. Kluge**
Vice President

**Elisha W. Finney**
Vice President, Chief Financial Officer

# To Our Stockholders, Customers, and Employees

***Fiscal year 2004 was a rewarding year*** *for Varian Medical Systems' stockholders, customers, and employees. We achieved impressive financial results, introduced six major new products, extended our technological and market leadership, significantly expanded three emerging business areas, completed three strategic acquisitions, entered two new markets, and enhanced our operational efficiency. These accomplishments set the stage for continued strong growth in fiscal year 2005.*

## PROFITABLE GROWTH

For 2004, in comparison with the previous year:

- Net orders rose 21 percent to $1.4 billion
- Year-end backlog rose 20 percent to $970 million
- Revenues increased 19 percent to $1.2 billion
- Operating earnings climbed 29 percent to $256 million
- Net earnings rose 28 percent to $167 million

After paying a two-for-one stock dividend during the year, our company recorded annual earnings of $1.18 per diluted share, up 28 percent from fiscal year 2003.

Annual net orders, revenues, and operating earnings rose in all three business segments. Net orders increased 20 percent in Oncology Systems, 30 percent in X-Ray Products, and 32 percent in the "Other" segment that includes the Ginzton Technology Center and BrachyTherapy products. Revenues rose 20 percent in Oncology Systems, 8 percent in X-Ray Products, and 20 percent in the "Other" segment.

Higher unit volumes and a sales mix change toward more profitable products drove the company's annual gross margin up by about 1.4 percent to a record 41.9 percent of revenue. We also reduced selling, general, and administrative expenses as a percentage of revenues by about one-half percent to 15.3 percent. Our operating earnings for fiscal year 2004 were a record 20.7 percent of revenues, up 29 percent from the previous year. In keeping with our commitment to technological leadership, we increased our research-and-development investment by about 20 percent.

For fiscal year 2004, Varian Medical Systems delivered a 27.9 percent return on equity—an increase of 2.4 percent over the prior year.

The company generated a record of $234 million in cash from operations. We ended the year with $393 million in cash and marketable securities after spending $202 million to repurchase approximately 5.6 million shares of the company's common stock and another $72 million on acquisitions.

For the year, Varian Medical Systems delivered a 27.9 percent return on equity—an increase of 2.4 percent from an already good 25.5 percent return on equity in fiscal year 2003.

## MARKET LEADERSHIP

In 2004, Varian Medical Systems introduced several significant new products for more precise radiotherapy treatments that will enable better outcomes in cancer treatment. These products also address the equally important need for greater cost-efficiency in modern healthcare.

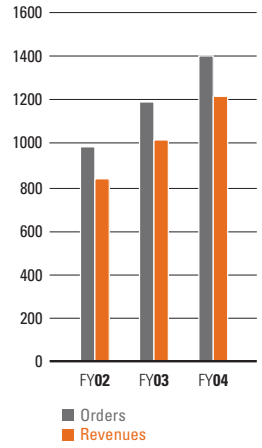
Varian developed the world's first clinically practical products for real-time, image-guided radiation therapy (IGRT), a new treatment process that addresses the problem of tumor motion. Our engineers made it possible for the equipment to track and target tumors more accurately than ever with a new On-Board Imager™ accessory that takes still, moving, or three-dimensional X rays of patients at the moment of treatment. Using these images, clinics are now able to treat patients with smaller radiation beams to concentrate higher doses in tumors while improving the protection of surrounding healthy tissue. To make our IGRT solution clinically practical, Varian has developed powerful software that integrates and automates the process so that treatments can be completed easily within a normal 15-minute session.

Annual net orders, revenues, and operating earnings rose in all three business segments.

**NET ORDERS AND REVENUES**

21 percent gain in annual net orders to $1.4 billion.

19 percent gain in annual revenues to $1.2 billion.




**41.9%** GROSS MARGIN **20.7%** OPERATING MARGIN **$1.18** EARNINGS PER SHARE

Customers welcomed our IGRT solution when it was introduced last March, and by the end of the fiscal year more than 80 clinics in North America and Europe had placed orders for the On-Board Imager product, one of the fastest new product introductions in our history. Meanwhile, clinics continued to adopt intensity-modulated radiation therapy (IMRT), a modern treatment process enabled by Varian developments over the last 15 years. Varian-equipped centers using this technique nearly doubled to more than 860 during the fiscal year.

Equally significant, in fiscal year 2004 we introduced the Trilogy™ accelerator, the most comprehensive, versatile, and cost-effective radiation treatment machine in the world—a device that can be shared by radiation oncologists and neurosurgeons to address multiple medical conditions. Trilogy is optimized for specialized radiosurgical procedures as well as all standard radiotherapies, including IGRT and IMRT. This product offers Varian a growth opportunity in the burgeoning field of radiosurgery, the substitution of focused radiation for traditional surgical techniques. Customer response again was gratifying. By the end of the fiscal year, 27 Trilogy accelerators had been ordered by centers around the world.

Fiscal year 2004 also saw the introduction of Varian's iX Series Clinac® accelerator, a modularized product designed to facilitate more rapid adoption of IMRT and IGRT. Other IGRT-related developments in the year included cone-beam CT 3D imaging on our Acuity™ simulator and the addition of Zmed's SonArray® 3D ultrasound imaging device.

Within the $100 million Oncology Systems software product line, we added an "electronic health record" feature to our VARiS Vision™ product to support paperless clinical processes. We acquired OpTx® assets and incorporated OpTx medical oncology practice management software into our product line for comprehensive cancer clinics. This acquisition also broadened Varian's market, giving us our first offering for stand-alone chemotherapy clinics.

Our engineers successfully developed two more precise dose calculating algorithms for our Eclipse™ treatment planning software. Varian's Eclipse product now supports stereotactic radiosurgery planning with Trilogy as well as IMRT and IGRT.

In summary, these product introductions extended Varian's technical and market leadership during fiscal 2004. Today, we offer a complete line of products that can be configured to support every type of radiation treatment within an integrated, automated, and cost-efficient system.

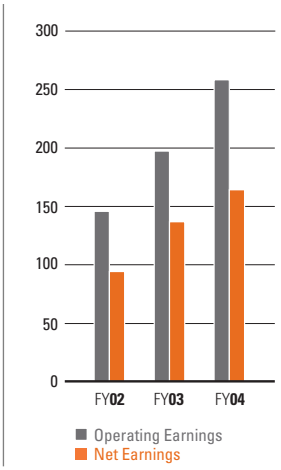
Progress in our X-Ray Products segment was similarly successful in 2004. A second major customer ordered a new version of the powerful anode-grounded CT scanning tube that is unique to Varian, and we successfully developed several other X-ray tubes that meet higher performance standards set by imaging equipment manufacturers.

## EMERGING BUSINESS AREAS AND ACQUISITIONS

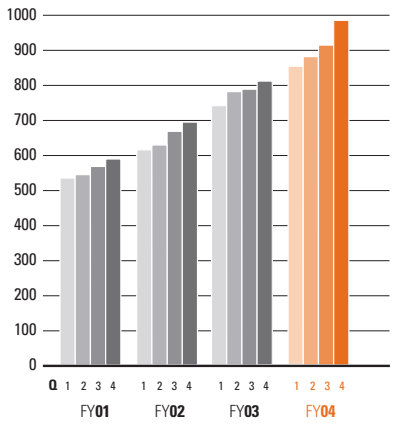
For several years, Varian has been investing in three emerging product lines complementary to our core business in radiation therapy and X-ray tubes. These are brachytherapy planning and delivery systems, flat-panel detectors for X-ray imaging, and Linatron® accelerators for nondestructive testing and cargo screening. In 2004, these products contributed significantly to our growth, with orders 51 percent higher and revenues 36 percent higher than in fiscal 2003. Each of these products contributed to our profits for the year. The three emerging businesses, together with our fiscal year 2004 acquisitions—Zmed, OpTx, and Mitsubishi Electric Corporation's radiotherapy equipment service business in Japan—generated orders in excess of $130 million during the year.

**EARNINGS**
29 percent gain in annual operating earnings to $256 million.

28 percent gain in annual net earnings to $167 million.




**BACKLOG**
20 percent gain in year-end backlog to $970 million.




**$234M** OPERATING CASH FLOW **$393M** CASH AND MARKETABLE SECURITIES **$614M** SHAREHOLDER EQUITY

Our execution is leading to growth in margins. In fiscal 2004, we extended our record of continuous improvement in operations.

## OPERATIONS

Our strategies are leading to growth in revenues. Our execution is leading to growth in margins. In fiscal 2004, we extended our record of continuous improvement in operations. In Oncology Systems, we stepped up production by more than 10 percent while improving operational efficiencies. We reduced production times for our accelerators and completed construction of two new test cells for expanded production in fiscal 2005 and beyond. We successfully reduced warranty costs and improved responsiveness to customer needs through expansion of our help desk and customer education programs. In our X-Ray Products segment, we enhanced efficiencies through expanded Six Sigma programs and increased inventory turns. Sales per employee rose in all of our business segments.

All of Varian Medical Systems' accomplishments in 2004 came through talented and committed employees who are inspired to help others. Above all, we owe our success to our people around the world.

## WHAT'S NEXT?

We have established ambitious goals for Varian Medical Systems in 2005. We expect to:

- Increase adoption of IMRT and IGRT throughout the world
- Expand acceptance of our new products for radiosurgery and medical oncology
- Aggressively pursue growth opportunities beyond our core businesses
- Continue to enhance operational performance and customer satisfaction

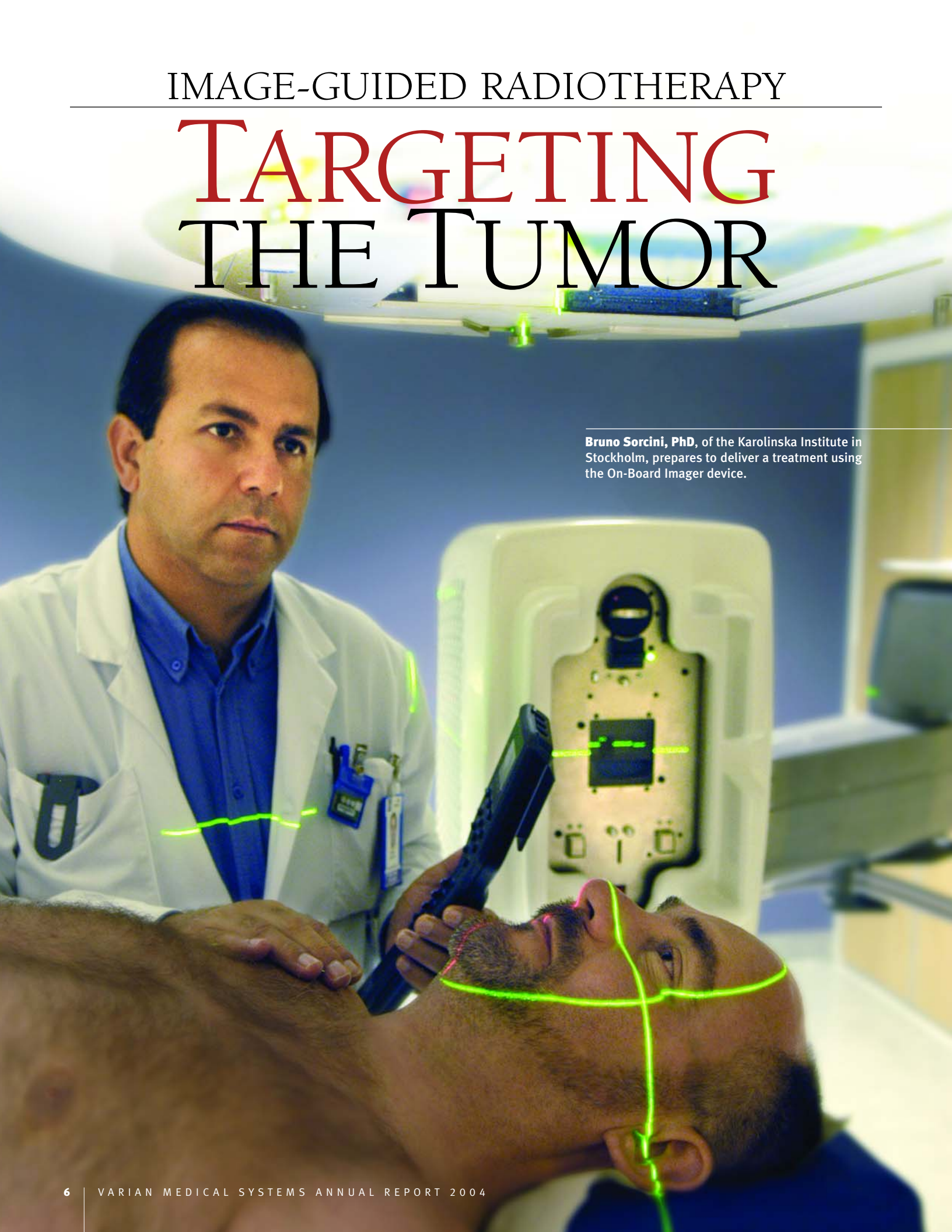
From the accomplishments of fiscal year 2004, it should be clear that Varian Medical Systems has the momentum for continued growth and can make a real difference in the quality and efficiency of modern healthcare. We look forward to another rewarding year for our stockholders, customers, and employees in fiscal 2005, and we thank all of you for your continued support.

Sincerely yours,

Richard M. Levy
Chairman, President and CEO
Varian Medical Systems

## IMAGE-GUIDED RADIOTHERAPY

# TARGETING THE TUMOR



**Bruno Sorcini, PhD**, of the Karolinska Institute in Stockholm, prepares to deliver a treatment using the On-Board Imager device.

# Dynamic Targeting™ IGRT using real-time imaging techniques helps doctors locate and target moving tumors with unprecedented accuracy.

***At the Karolinska Institute in Stockholm, Sweden,*** *Jan-Olov Carlsson lies on a treatment couch under a medical linear accelerator. He is ready to receive his daily dose of radiation for a prostate cancer diagnosed in early 2004. An X-ray system on robotic arms slides into place on either side of his body, then rotates around him, taking images to pinpoint the tumor's exact location. In a control room, clinicians monitor computers that match the images with Carlsson's treatment plan to see if the tumor has shifted. It has. Within seconds, the coordinates needed to put Carlsson's tumor into perfect alignment with the radiation beam are calculated. Then, with the push of a button, Carlsson's therapists adjust the couch and position him for treatment.*

Sixty-year-old Carlsson is one of more than a dozen patients this day at the Karolinska Institute, where Varian Medical Systems' On-Board Imager™ device is being used to deliver image-guided radiation therapy (IGRT). IGRT helps doctors locate and target tumors with unprecedented speed and precision.

"IGRT is a significant incremental improvement in accuracy and our ability to deliver more radiation safely," according to Munther Ajlouni, MD, an early adopter of IGRT and radiation oncology director at the Henry Ford Health System in Detroit, Michigan. Ajlouni and other doctors expect that IGRT will be an important weapon for combating many types of cancer.

"The On-Board Imager device verifies that you're hitting the target and avoiding surrounding critical structures," says Timothy Fox, PhD, director of medical physics at the Emory University School of Medicine's Department of Radiation Oncology in Atlanta, Georgia.

If accuracy increases as much as expected, radiotherapy guided by daily X-ray imaging could begin to be used to treat small metastatic tumors and lesions that currently require surgery or chemotherapy. "We think IGRT will allow us to tackle different stages and types of tumors that we haven't treated before," says Fox.

In 2004, Varian's On-Board Imager technology was not only installed at Karolinska, Henry Ford, and Emory, but also at the Hirslanden Klinik in Aarau, Switzerland; M.D. Anderson Cancer Center in Houston, Texas; Memorial Sloan-Kettering Cancer Center in New York; Piedmont Hospital in Atlanta, Georgia; Stanford University Medical Center in Palo Alto, California; and other major cancer treatment centers.

Doctors at these centers are using Varian's new technology to help treat prostate and brain tumors, and they are planning or beginning to use it with gynecological tumors as well as cancers of the pancreas and the head and neck. All these applications share the same goal: Deliver enough radiation to the tumor to eliminate it, while minimizing the amount of healthy tissue exposed to the beam.

## WHY ON-BOARD IMAGING?

Standard radiation therapy is limited in many cases by normal shifts within human anatomy. Tissues and organs can settle around the bones differently each time a patient climbs onto the treatment table. Patients may gain or lose weight over the course of 25 to 35 daily treatments, causing repositioning of organs. Tumors can move several centimeters as patients breathe during treatments.

Oncologists have had to compensate for tumor movements by making the radiation beam larger, exposing a significant volume of healthy tissue around the tumor. Unfortunately, to avoid causing complications in the surrounding healthy tissue, the radiation doses have had to be limited—sometimes to a point below the optimal amount needed to kill the tumor.

Using current procedures, clinicians typically verify tumor locations on a weekly basis, often using the high-energy treatment beam to generate an image that can be used to make any needed adjustments in patient positioning and treatment plans. Many physicians believe that daily imaging and adjustments would make treatments more precise, especially if these can be done using low-energy diagnostic X rays rather than the high-energy treatment beam. With the treatment beam, says Emory's Fox, "you don't get a high-quality diagnostic image."

Varian's On-Board Imager device solves these problems by using low-energy X rays (about one-sixtieth the energy of the treatment beam) to yield much higher quality images, rapidly and automatically. Clinicians at Emory have now used the device to refine patients' positions for more than 400 radiotherapy treatment sessions for prostate, brain, and central nervous system cancers.

## A VERSATILE DEVICE

The On-Board Imager device produces radiographic, fluoroscopic, and cone-beam CT images, providing still shots, X-ray movies of moving tumors, or 3D images that can provide excellent contrast between tumors and the surrounding normal soft tissue. Physicians can choose the optimal imaging technique for each patient's disease characteristics.

So far, the On-Board Imager device has been used primarily to track shifts in tumor locations immediately *before* treatment sessions. In the near future, however, doctors expect to be able to track and adjust for tumor movement *during* treatment sessions, using fluoroscopic imaging in combination with Varian's Real-Time Position Management (RPM™) respiratory gating system. The gating system tracks tumor movement caused by respiration and enables physicians to activate beams at optimal moments in their patients' normal breathing patterns. Because breathing can move tumors as much as two to four centimeters, tracking this motion using fluoroscopic imaging and gating could significantly reduce the margin of healthy tissue exposed to the beam. This could be particularly important in lung or breast cancer treatments (see article on page 9).

The On-Board Imager device is designed to be integrated and synchronized with other Varian hardware and software, including treatment planning and information management systems, all working through a single database to communicate in real time with one another and with treatment devices. Such linking helps automate and expedite imaging and treatment, making IGRT processes fast and practical.

Ingemar Naslund, MD, head of the radiotherapy unit at Karolinska, says his institution will be increasing its use of On-Board Imager devices. "Images are high quality and can be integrated automatically and easily into the treatment process to make the On-Board Imager practical for use in busy radiotherapy units," he says. Naslund is particularly enthusiastic about using fluoroscopic imaging to visualize gold markers implanted in tumors that are subject to respiratory motion.

Doctors and clinicians using the On-Board Imager device say that the amount of additional time required to take daily X-ray images and make positioning changes is not significant: three to five minutes or less in a typical treatment session.

The increased precision afforded by an On-Board Imager device raises the possibility of treating tumors with higher daily doses over shorter periods of time using Varian's new Trilogy™ linear accelerator (see article on page 10). "IGRT will be especially important for ensuring a precision treatment, particularly when we are escalating the dose," says Fang-Fang Yin, PhD, director of medical physics at Duke University Medical Center in Durham, North Carolina. During 2004, Yin was instrumental in implementing IGRT at the Henry Ford Health System.

After receiving the fifth of 25 planned radiation treatments, prostate cancer patient Jan-Olov Carlsson says his experience at Karolinska has been problem free. "To be able to adjust position before beaming the radiation is just great," says Carlsson. "My hope is that it results in fewer side effects. I am happy to get treated with the latest technology, especially when it means that the radiation should hit me exactly where it is supposed to." ●

## HOW AN ON-BOARD IMAGER WORKS


**Varian's On-Board Imager device** for the linear accelerator uses robotic arms that operate along three axes of motion to position an X-ray tube and flat-panel image detector on opposite sides of a patient. The imaging components are positioned with submillimeter accuracy for the best possible imaging angle.

**The tube generates low-dose X rays** needed for high-quality images. The flat-panel detector captures the X rays and electronically converts them into high-quality, real-time images that are instantly displayed on a monitor. Images from two or more angles are required to precisely locate a tumor position.

**Varian software compares real-time images** from the On-Board Imager with reference images to determine whether the patient must be moved to align the tumor with the treatment beam. Patients are automatically repositioned at the push of a button on the control console. The entire process takes three to five minutes.

**The On-Board Imager** can produce radiographic (still), fluoroscopic (moving), or cone-beam CT (3D) images to give clinicians optimal views of the tumor.

Breast cancer survivor **Karen Metz** with her doctor, **Francine Halberg, MD**, at the Marin Cancer Institute.

# RESPIRATORY GATING: TREATING A MOVING TARGET

***Lung cancer remains the number one cancer killer,*** *and its five-year survival rate of less than 15 percent has hardly budged over the last 30 years, according to the U.S. National Cancer Institute. But new Varian technology, "respiratory gating," offers patients and doctors the hope of more aggressive and successful treatments.*

Respiratory gating makes it possible to track the position of tumors that move as much as 4 centimeters (more than 1.5 inches) as the patient breathes. Varian's RPM™ gating system—now in place at more than 300 cancer centers around the world—uses an infrared camera and a special marker placed on the patient's diaphragm. Breathing can be monitored while taking CT scans for treatment planning as well as during treatment sessions, allowing doctors to pick the best moment in a patient's breathing cycle to turn on the beam. As a result, the margin of treatment around the tumor can be significantly reduced and the total dose can be increased without fear of harming the surrounding normal tissue.

"Traditionally we used margins of anywhere from 3 to 5 centimeters around a tumor to ensure that we were getting adequate coverage," says Anthony Berson, MD, chair of the Radiation Oncology Department at St. Vincent's Comprehensive Cancer Center in New York. With respiratory gating, the margin has been reduced to 1 to 2 centimeters. "That's a huge improvement."

At the same time, the total dose can be increased. "Our initial goal is to increase the dose 10 to 20 percent," says Berson. "It's too early to see what the long-term results are, but we expect that as we increase the dose, we should be controlling tumors at a higher rate."

At the Marin Cancer Institute in Greenbrae, California, Francine Halberg, MD, has been using respiratory gating to treat left-sided breast cancer, where the ability to precisely target a tumor helps avoid irradiating heart tissue and prevent related side effects. Respiratory gating protocols for lung cancer "usually seek to deliver treatment at the point of the patient's maximum exhalation," says Halberg. "That's a very stable point, and very consistent relative to other parts of the breathing cycle. However, for treating breast cancer, we're looking for the farthest inhalation because that's when the breast moves furthest from the heart."

Halberg has treated more than two dozen breast cancer patients with respiratory gating after their tumors were removed by lumpectomy. "We have a very, very low risk of recurrence after radiation therapy to the breast," she says.

At St. Vincent's, more than 300 patients have been treated with respiratory gating over the last three years. In addition to lung cancer, Berson and his team have used respiratory gating to treat upper abdominal cancers, including pancreatic, stomach, and liver tumors, which also move as patients breathe. In those cases, Berson says, the large radiation fields required by traditional techniques, combined with chemotherapy, result in high complication rates. "In that situation," he says, "anything you can do to reduce the size of the field will reduce unwanted complications."

The significant improvements respiratory gating makes possible can be achieved easily, without disrupting a clinic's practices. "We are a very busy community hospital, and our throughput is very high," says Berson. "We see a lot of patients in a day. This is just a normal part of our day." ●

## STEREOTACTIC RADIOTHERAPY

# THE NEXT STEP IN PRECISION

Cancer survivor **Linda Holland** with her treatment team at Emory University (left to right): radiation therapist **Tony Webb**; chief medical physicist **Timothy Fox, PhD**; and **Ian Crocker, MD**.

# New stereotactic treatment technologies represent significant progress toward turning cancer into a manageable condition.

***Cutting-edge radiation oncology departments** are pioneering ultraprecise stereotactic radiation treatment and bringing new hope of eradicating previously unreachable tumors. How? With a new breed of medical linear accelerator, specialized accessories, and techniques adapted from brain radiosurgery. This new dimension in radiation oncology makes it possible to think seriously about transforming cancer from a fatal disease into a manageable condition.*

In October 2004, a 56-year-old woman became the first person treated with image-guided radiosurgery using Varian's new Trilogy™ machine, an ultraprecise, high-powered linear accelerator with an On-Board Imager™ accessory. A 10-year survivor of lung cancer, the woman underwent radiosurgery for two small metastases in the brain. The single procedure delivered a cancer-killing radiation beam so powerful and tightly focused that it was called *radiosurgery* instead of radiation therapy. The patient was back at work within two days.

Had she been treated a month earlier, this patient would have received low-dose radiation to her entire brain, with less probability of eradicating the cancer. "Given her favorable long-term outlook, we were committed to delivering a focal high-dose radiation treatment to eliminate the risk of brain injury from radiation treatment to the whole brain," explains Ian Crocker, MD, professor of radiation oncology at the Emory University School of Medicine in Atlanta, Georgia.

## Varian's Trilogy machine is the first medical linear accelerator optimized for stereotactic treatments.

The case at Emory is just one of many examples of stereotactic treatments that take advantage of recent advances in imaging, precision beam delivery, treatment planning, and automated patient-positioning technologies.

In standard forms of external beam radiation therapy, the patient receives the radiation dose in small daily increments over a period of weeks. By contrast, stereotactic radiation treatment delivers very high radiation doses in a short course of only a few days—or even a single session. Recent studies have suggested this strategy can be more effective at killing or controlling certain types of cancer.

Delivering higher radiation doses safely, however, requires a higher standard of precision in targeting the beam to the tumor shape and exact location. Varian's Trilogy machine is the first medical linear accelerator optimized for stereotactic treatments. It has a more tightly focused beam and can deliver doses more than 60 percent faster than conventional accelerators to reduce the effects of tumor motion, shorten treatment times, and enhance patient comfort. It can be equipped with a highly maneuverable On-Board Imager accessory with radiographic, fluoroscopic, and cone-beam CT scanning capability for image-guided patient positioning.

The precision of stereotactic radiotherapy promises exciting new options for patients, enabling radiation treatment at earlier stages when cancer is most curable, making many inoperable tumors treatable, and providing a noninvasive alternative to surgery.

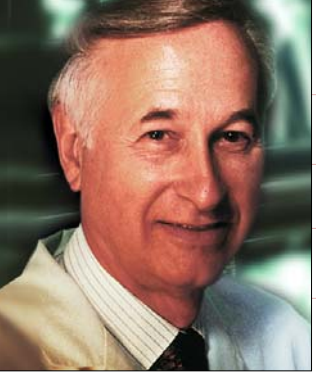
Radiotherapy Control Console

### ADVANCED TREATMENT FOR MORE PATIENTS

*A young mother is one of 90,000 people worldwide who develop spinal tumors each year. In her case, the location of the tumor near the spinal cord makes surgery and standard external beam radiation treatment too dangerous.*

The University of Texas M.D. Anderson Cancer Center in Houston is one of the few treatment centers where doctors offer stereotactic spine radiotherapy using a modified linear accelerator. A CT scanner in the treatment room is used to scan the patients and ensure they are positioned precisely for treatment. "Almost every type of cancer can spread to the spine, so there is a great clinical need for the procedure," explains Eric Chang, MD, director of the Stereotactic Spine Radiotherapy Program. "However, it isn't widely available because it is so complicated to perform."

Varian's Trilogy accelerator, which combines treatment delivery and imaging in a single system, represents a significant step toward making this kind of treatment easier to deliver. "With the CT imaging that is available on Trilogy, we hope to cut treatment time from the two hours it takes today to 30 minutes," says Chang. "This advance may make stereotactic spinal radiotherapy available in more centers."



"Using the Trilogy system, we have the potential to substantially improve cancer treatment outcomes."

*Lawrence Davis, MD, Emory University*

## INOPERABLE LUNG CANCER IN THE CROSSHAIRS

*Surgery can be an effective treatment for early-stage non–small cell lung cancer, which strikes more than a million people worldwide each year. But surgery is out of the question for a dearly loved grandfather because he also has advanced emphysema.*

Stereotactic radiotherapy can be an alternative for cancer patients like this man, who have other ailments that preclude surgery. The standard radiation treatment for inoperable lung tumors takes 30 daily sessions. Researchers at the Indiana University School of Medicine theorized that a higher dose delivered over just three sessions might be more effective and less dangerous for frail patients.

According to Robert D. Timmerman, MD, formerly of Indiana University and now at University of Texas Southwestern in Dallas, the Indiana clinical team was able to safely escalate the dose to levels they thought would improve on tumor control rates. Without the benefit of a Trilogy machine or an On-Board Imager device, they managed by immobilizing patients in a stereotactic body frame and using a conventional linear accelerator. A machine like Trilogy, with its On-Board Imager device, would have been extremely helpful, Timmerman says.

"An On-Board Imager accessory allows you to see, on the fly, what you're aiming at," he says. "We try hard to be accurate, but there is always uncertainty that the target is where you think it is. On-board imaging adds to your confidence that you are aiming correctly, so you can limit the safety margins. It might allow treatment of a smaller volume."

Early evidence from Indiana points toward good local tumor control with few side effects. Now a group study based on this work is taking place in the United States at dozens of hospitals and clinics. Timmerman, principal investigator for the study, expects stereotactic radiotherapy techniques to advance quickly with the number of multi-institutional studies under way, including one in Germany on liver metastases and another in Japan on lung tumors.

The Kyoto University Graduate School of Medicine is one of 16 leading institutes in Japan participating in a three-year study involving 165 lung cancer patients. "If this study demonstrates that stereotactic radiation treatment can be a standard of care for inoperable non–small cell lung cancer, it will be good news," says Yasushi Nagata, MD, PhD, Department of Therapeutic Radiology and Oncology. Because it is noninvasive, stereotactic radiation treatment could eventually become a preferred option for patients with operable tumors as well.

## ZEROING IN ON MULTIPLE METASTASES

*A woman with non–small cell lung cancer has several metastases in her liver. Three cycles of chemotherapy, the standard treatment, have had little effect.*

Patients like this woman are not normally treated with radiation once their cancer spreads, but investigators at the University of Chicago in Illinois are trying something new. They are backing up chemotherapy with pinpoint stereotactic radiotherapy to small metastatic tumors in up to five sites anywhere in the body.

"By treating each small metastatic tumor with a very high dose over a few sessions, we hope to shrink or completely eradicate the tumors," says Mary Martel, PhD, associate professor of radiation oncology.

With Trilogy, doctors may for the first time have a practical means of routinely treating tiny metastatic lesions where cancer has spread. Using new imaging processes such as PET/CT scans in post-treatment checkups, clinics may be able to detect these lesions and then eradicate them with image-guided stereotactic treatments. Thus, cancer could be turned into a chronic disease managed through a series of checkups and treatments when metastatic lesions reappear.

Varian introduced Trilogy at the beginning of 2004 and, by the end of September, had 27 orders for the new machine and several installations—a relatively fast adoption rate for a new technology in radiation oncology. The first Trilogy unit was installed at Emory University. "Using the Trilogy system, we have the potential to substantially improve cancer treatment outcomes," says Lawrence Davis, MD, chairman of the Department of Radiation Oncology at Emory.

Visionaries see tremendous potential in the combination of new imaging capabilities and more precise tools for radiosurgery. "Imaging technologies are being developed that will eventually give us the same information for diagnosis and treatment that we get from surgical biopsy today," predicts Emory's Ian Crocker. "If we could make a diagnosis of lung cancer, for example, based on imaging information alone, we are certainly developing the tools to remove the tumors radiosurgically."

In the meantime, the promise of stereotactic therapy is beginning to pick up speed. ●

# INTENSITY-MODULATED RADIOTHERAPY

# AN UPDATE

Medical physicist **John C. Roeske, PhD**, (left) and **Arno Mundt, MD**, review an IMRT treatment plan at the University of Chicago.

***Clinical use of IMRT—an advanced form of radiotherapy—has surged in the last year.*** *With IMRT, doctors are now treating cancers of the head and neck, prostate, lung, breast, gastrointestinal organs, cervix, and uterus as well as pediatric tumors, sarcoma, spinal metastases, and lymphoma.*

Arno Mundt, MD, radiation oncologist at the University of Chicago and medical director for radiation oncology at the University of Illinois at Chicago, and his colleague, medical physicist John C. Roeske, PhD, have compiled a comprehensive textbook on IMRT, collecting 30 chapters from 183 contributors at 43 treatment centers in nine countries. Chapters cover the use of IMRT to treat almost every type of solid tumor.

Their book illustrates how far IMRT has come since its introduction in the mid-1990s. "IMRT is coming into its own," says Mundt. "People are using it in more sophisticated ways, radiation oncology residents are being trained, and there's an explosion of literature showing the benefits of IMRT and how it can be applied."

Mundt conducted his first IMRT usage study in 2002, surveying 450 radiation oncologists in the United States. Published in the journal *Cancer*, the study showed that 32 percent of respondents were using IMRT. Most had adopted IMRT during the prior two years and were using it only to treat head-and-neck tumors and prostate cancer.

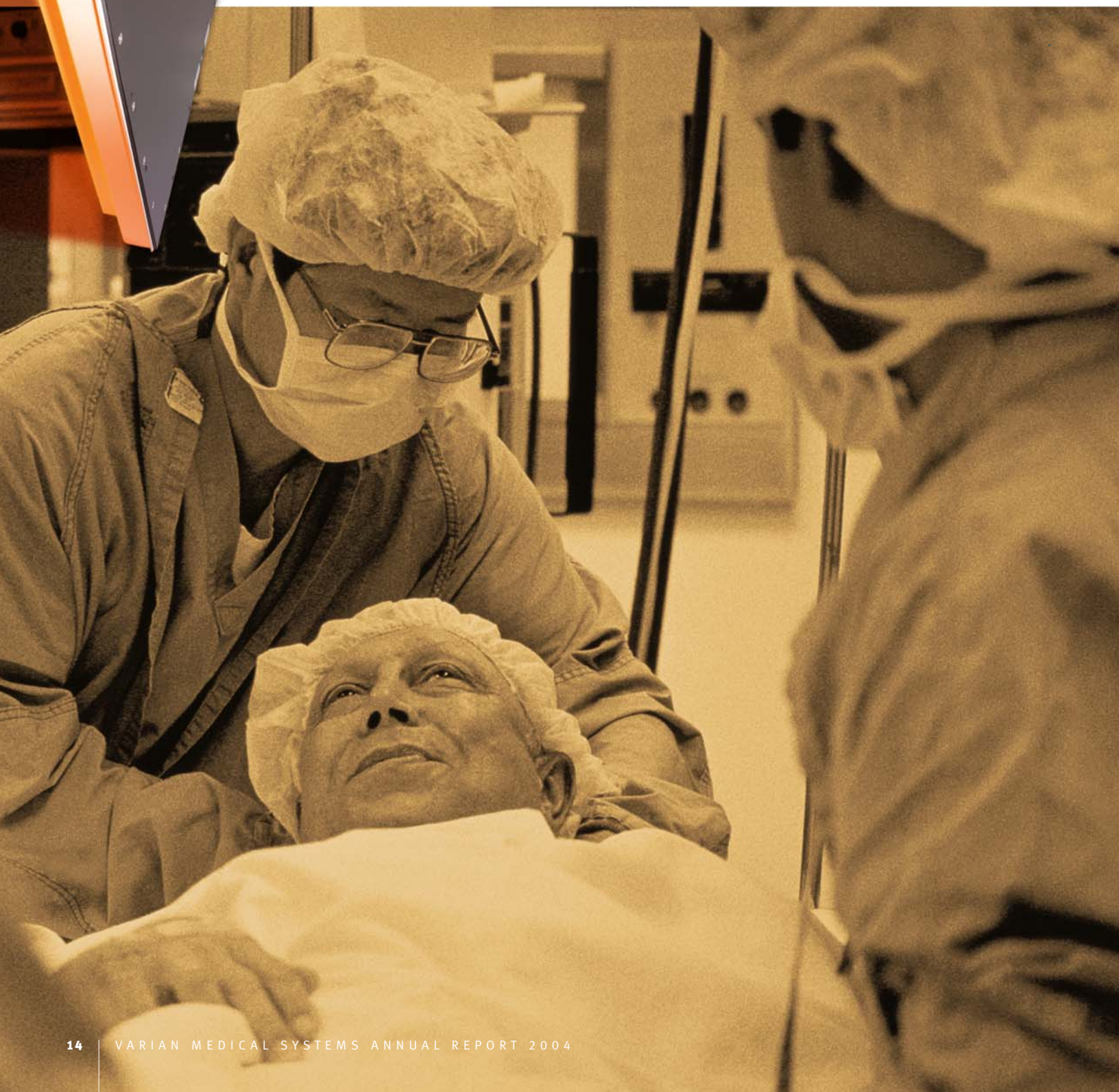
In 2004, Mundt's team did a follow-up study. This time, 73 percent of the respondents were using IMRT. Of those who were not, 90 percent planned to adopt it within three years. "There was a huge conversion of nonusers into users," says Mundt. "We also surveyed the chief residents at 77 accredited training programs and found that about 85 percent of the nation's residents are being trained to use IMRT. That really sets the stage for the future."

Varian figures echo the survey results. At the end of fiscal year 2003, the number of radiation oncology centers treating patients with Varian's SmartBeam™ IMRT had more than doubled to 472. By September 2004, that number had risen to 866. About half of the roughly 2,600 Varian-equipped sites around the world have the technology needed to deliver IMRT. And nearly 95 percent of the new linear accelerators ordered in 2004 included IMRT capabilities.

At the Princess Royal Hospital in Hull, England, IMRT has become one of the standard treatments for head-and-neck cancers. Chief physicist Andy Beavis, PhD, has also been running a dose escalation trial using IMRT for pancreatic cancers. "It has proven especially beneficial in palliative and other cases where there's no other way to get the necessary dose level to control the tumor," says Beavis. "IMRT is here to stay." ●

## FLAT-PANEL DETECTORS

# REVOLUTIONIZING X-RAY IMAGING



# Digital X-ray imaging leverages flat-panel receptor technology to transform industries where success hinges on seeing hidden structures quickly, clearly, and cost-effectively.

***The patient has suffered a severe stroke.*** *Around him, a team of doctors needs to come up with a treatment plan. Fast. But exactly where is the blood flow problem, and how bad is it? Fortunately this is Osaka City University Hospital, and the interventional room where this drama is playing out happens to be state-of-the-art. Almost anywhere else, the medical team would be shuttling the patient back and forth between imaging systems, even between rooms. Here, an advanced digital angiographic system from Hitachi Medical Corporation with flat-panel imaging technology from Varian Medical Systems quickly generates 3D vascular images that can answer the team's questions—in time to help save the patient's life.*

An emerging technology that is rapidly taking hold across a spectrum of applications, Varian's flat-panel detectors (FPDs) are beginning to transform whole industries.

In healthcare, FPD-based systems offer such significant benefits that hospitals without them suffer a competitive disadvantage. In dentistry and veterinary medicine, specialists and service labs using FPD-based digital radiography can offer faster turnaround and better consults to doctors. In other industries, FPDs save so much time in nondestructive testing and inspection that some work would simply never get done without them.

## NEW IMAGING OVERTAKES OLD

In the early 1990s Varian partnered with Xerox's Palo Alto Research Center to develop some of the first flat-panel X-ray imaging systems. Based on amorphous silicon technology, these FPDs resemble the LCD screens on computers and flat-screen televisions, but they act as receptors, not emitters. They work by converting X rays striking their surface into electronic data that computers can interpret and instantly display as high-quality digital images.

Varian's PaxScan® FPDs are known for being able to do both fast fluoroscopy (real-time moving images, for positioning and verification) and superior radiography (single-shot, higher resolution images, for diagnosis). In fact, Varian has a technological lead in FPD fluoroscopy, thanks to sophisticated electronics that can process data and display images at rates of up to 60 frames per second—fast enough to let doctors track a moving tumor, observe blood flowing through a kidney, or carefully guide a catheter into a premature infant or a beating heart.

Today Varian is a volume manufacturer of FPDs. Many are incorporated into the advanced cancer treatment systems offered by Varian's own Oncology Systems business, including the On-Board Imager™ and PortalVision™ devices for tracking and targeting tumors accurately, and the Acuity™ imaging system for verifying and simulating radiotherapy treatments. Shipments to external customers also ramped up significantly in 2004, as imaging equipment manufacturers and integrators capitalized on the versatility and performance advantages of flat-panel imaging.

An image generated at Osaka City University Hospital in Japan to assess damage to a patient's pancreatic artery prior to an operation.

One of the major advantages of FPDs is their compact size. Devices competing with FPDs, such as image-intensifier tubes (known as "IIs"), are typically much heavier, larger, and more awkward to work around and use. Compared to image intensifiers, FPDs have a longer service life and are able to instantly create distortion-free images that are rectangular, like traditional X-ray films, and highly detailed, even over large regions of interest. In addition, FPDs can significantly reduce the radiation dose to the patient.

## DOCTORS CHAMPION MEDICAL APPLICATIONS

Hitachi Medical Corporation, one of Varian's oldest and largest customers in Japan, was one of the first companies in the world to market real-time angiography and gastrointestinal imaging systems using PaxScan FPDs. Last year Hitachi Medical sold more such systems than any other company in Japan. "Almost 80 percent of these replaced older image-intensifier units on C-arm assemblies," says Shigeyuki Ikeda, senior engineer at the Hitachi Research and Development Center. "We think that within a few years all image intensifiers will be replaced by FPDs."

Japanese radiologists using Hitachi Medical systems list several reasons why flat-panel detectors have generated so much enthusiasm. "Patients feel more comfortable with a smaller unit during examinations," explains Gen Iinuma, MD, PhD, a pioneer in digital radiography now at Japan's National Cancer Center in Tokyo. "Also, FPDs make it easier to get close to the patient, which is important."

"Current FPDs provide good image quality with high resolution in a wide latitude," Iinuma adds. "We really like them, not only for these reasons, but also for their square shape, similar to X-ray films."

"Flat-panel detectors make it easier to get close to the patient, which is important. They provide good image quality with high resolution."

*Gen Iinuma, MD, PhD, National Cancer Center, Tokyo*

The new Varian PaxScan 4030CB flat-panel display is now being designed into some of Hitachi Medical's most advanced diagnostic equipment with advanced cone-beam CT technology. So named because of the cone-like volume of data that can be captured in a single 360-degree rotation around a patient, yielding a three-dimensional image of anatomy, the new systems offer advantages that image-intensifier technologies cannot match.

"CT scans give us three-dimensional views, but in angiography, body parts can get in the way, making it difficult to study the images," says Saori Tanaka, MD, of Osaka City University Hospital. "It takes a lot of effort to eliminate such things as bones from an image, but it is relatively easy to do with an FPD."

## OTHER APPLICATIONS PROLIFERATE

Besides human medicine, other fields, including dentistry, nondestructive testing, and veterinary medicine, are seizing on the advantages offered by flat-panel digital radiography systems, such as being able to dispense with the time-consuming chemistry, cost, storage, and nuisance of film.

*Dental applications.* As appearance-conscious baby boomers swell the ranks of senior citizens, dentures are becoming a thing of the past and dental implants are becoming the biggest growth area in dentistry. Imaging Sciences International, Inc., leads this new market with its i-CAT cone-beam CT system for dental scanning and planning of oral surgical procedures. The company reports that, compared to its image intensifier–based competitors, the PaxScan-equipped i-CAT systems are smaller and thus better designed for space-constrained dental offices. Unlike image intensifiers, they don't degrade over time, increasing the dose to patients; they're considerably better at resolving small contrast areas; and their resolution doesn't worsen near image edges.

"The question in dentistry today isn't *do* you go digital but *how* do you go digital," says Edward Marandola, Imaging Sciences vice president and general manager. "That's where a flat panel is the answer, and that's where Varian stands out with the best technology, a great R&D group, and the ability to maneuver and change quickly."

*Industrial applications.* Hytec, Inc., Varian's largest U.S. industrial distributor of PaxScan products, has different uses for each PaxScan model. "Besides being lightweight and fast, they all have good resolution and durability and long life expectancy," says David Phillips, general manager of the Hytec Sensors and Imaging Group.

Hytec sells most of its systems to the U.S. government for nondestructive testing and inspection. Applications include inspecting missile components and solid-fuel rocket motors, and performing failure analysis of space shuttle components for NASA. "This inspection work still often uses X-ray film," Phillips says, "but the government is buying our digital systems because they save time and are much less labor intensive."

Other applications for Hytec systems include forensic inspection of suspicious objects, concrete and asphalt materials research at Washington State University, and dental appliance manufacturing for Align Technology. For Align Technology, Hytec developed a special FPD-based CT imaging system that simplifies manufacturing of the company's popular Invisalign® clear plastic retainers for braceless orthodonture.

"We think that within a few years all image intensifiers will be replaced by flat-panel detectors."

*Shigeyuki Ikeda, Hitachi Medical Corporation*

*Veterinary applications.* Digital radiography and picture archival and communications systems (PACS) like those offered by Sound Technologies are transforming the way veterinary offices work. Film-based clinics have to struggle with storing and sharing animal X rays, a big problem, since only 400 or so board-certified radiologists support 54,000 U.S. general-practice veterinarians.

Veterinarians clear the bottleneck with Sound Technologies' turnkey digital radiography solutions. These include PaxScan-equipped TruDR™ radiographic systems for diagnostic imaging, VetPACS™ software for sending images via the Internet, and archiving services. Study images are accessible 24 hours a day, 7 days a week to a select group of board-certified specialists who respond within hours. In 2004, Sound Technologies will do 3,000 to 4,000 studies; in 2005, the company conservatively expects 24,000. Says Kevin Wilson, chairman and CEO, "With their solid technology, R&D, integration, and support, Varian allows us to create great products and bring them to market much faster and more cost-effectively." ●

# SIX SIGMA: QUALITY INITIATIVES IN X-RAY PRODUCT MANUFACTURING

**Mark Jonaitis** (left) and **Scott Coles** are leading Six Sigma programs that are strengthening X-Ray Products manufacturing operations at Varian Medical Systems.

*Mark Jonaitis and Scott Coles are evangelists—not for any particular religious perspective, but rather for "Six Sigma," a rigorous approach to using statistical analysis for improving manufacturing processes. Jonaitis, Coles, and other Six Sigma team members have been working to bring this methodology to all corners of Varian Medical Systems' Salt Lake City, Utah, X-Ray Products design and manufacturing facility.*

"Six Sigma seeks to minimize process variations in order to eliminate manufacturing defects," explains Jonaitis. "With Six Sigma standards, you want to see fewer than four defects per million. Most factories run somewhere around two or three sigma, which equates to anywhere from 65,000 to 300,000 defects per million. Moving toward Six Sigma pays for itself by saving labor, time, and money, and avoiding customer dissatisfaction."

## HISTORY OF SIX SIGMA

The main idea of Six Sigma is that sustainable process improvements can be achieved by taking a statistical approach to identifying and solving problems. The Six Sigma method was developed by Motorola engineers in the mid-1980s based on statistical concepts from Carl Frederick Gauss (1777–1855) and on work during the 1920s by Walter Shewhart, a Bell Telephone Laboratories engineer who created statistical tools for controlling industrial processes. Six Sigma spread from Motorola to AlliedSignal (later Honeywell) and, in 1995, to General Electric. Since its inception, hundreds of companies around the world have adopted Six Sigma quality programs.

## SIX SIGMA AT VARIAN X-RAY PRODUCTS

"The steps for solving a problem using Six Sigma methods are: Define the problem, take measurements, analyze the data, design process improvements, and put controls in place so the process improvements are sustained," explains Coles. "It means asking people not to rely on their 'gut feelings,' but to make observations, collect data, and base decisions on carefully documented statistical analysis."

For example: "Gut feelings" turned out to be wrong when a group of engineers was trying to account for some electrical instability showing up in a line of industrial X-ray tubes. Nearly everyone assumed it was caused by a problem with the insulating material. "A Six Sigma study showed us we were wrong," says Coles. Through factor identification, data collection, and experimentation—important components of a Six Sigma process—a team discovered the real causes of the problem and devised process improvements that virtually eliminated tube scrap or rework costs. A similar project fixed a brazing process that was resulting in misalignments of metal components about 40 percent of the time. The fix raised the yield to 98 percent.

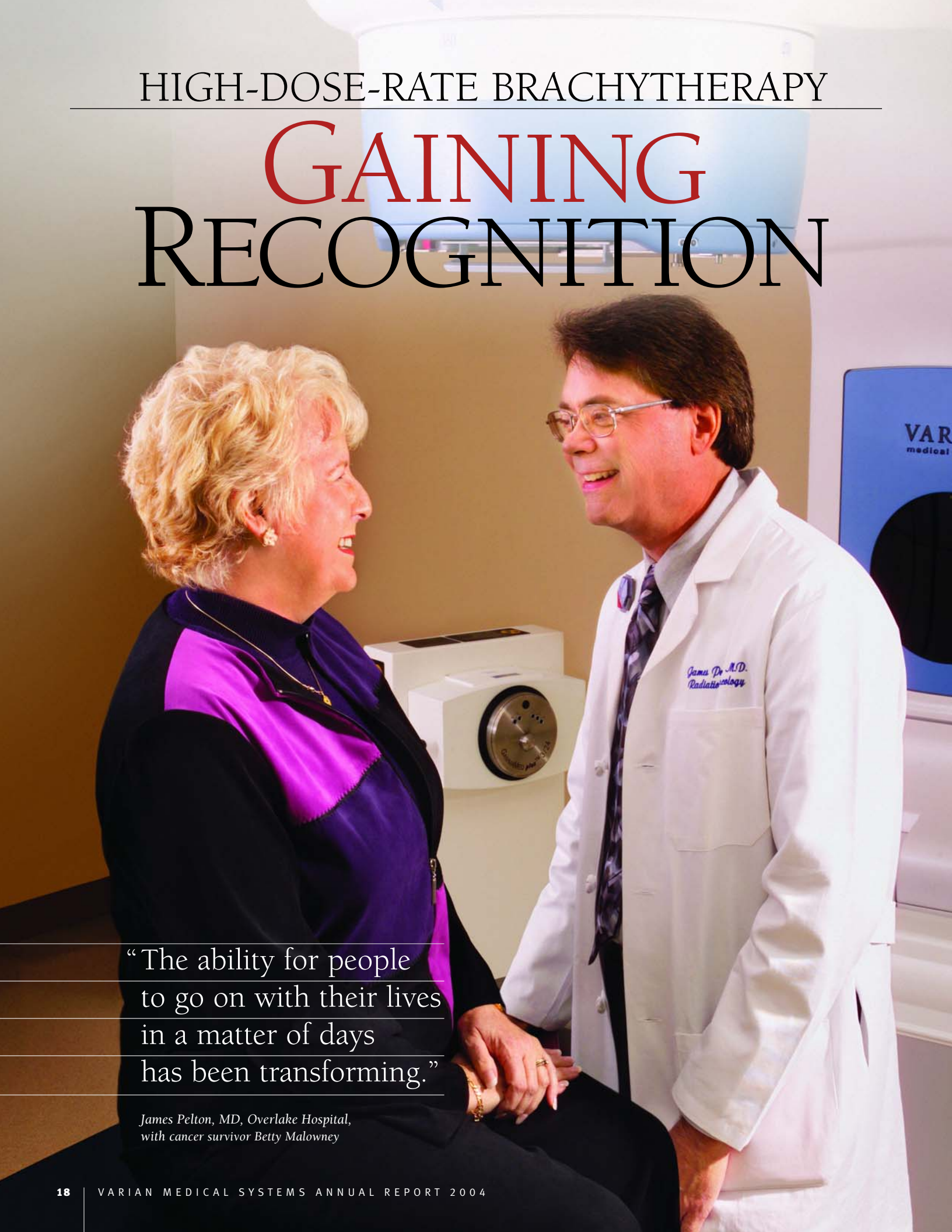
## BLACK, GREEN, AND YELLOW BELTS

At Varian, a group of Six Sigma "master black belts" is qualified to train and certify other "black belts." These project leaders are particularly adept at using statistical analysis to improve manufacturing. They, in turn, have trained 16 "green belts" in how to use Six Sigma to solve specific problems. Finally, as projects result in process improvements, another group—the "yellow belts"—takes over. "Yellow belts 'own' the improved processes, and control them into the future," says Jonaitis. "After the problem solvers walk away, the yellow belts are the ones who maintain the gain" in terms of improved yields, decreased failure rates, or a reduction in the number of units that do not meet quality standards.

"Varian has a reputation for making high-quality, long-lasting X-ray tubes," says Bob Kluge, president of the X-Ray Products business. "Six Sigma helps us maintain the highest quality in everything we do." ●

## HIGH-DOSE-RATE BRACHYTHERAPY

# GAINING RECOGNITION



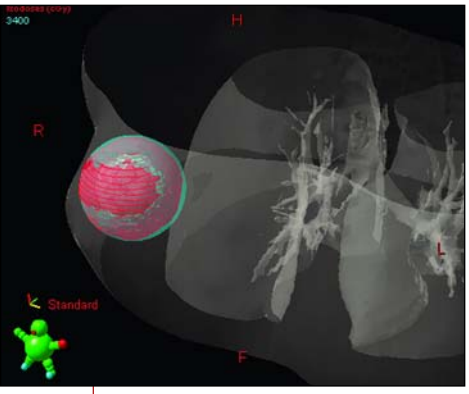

"The ability for people to go on with their lives in a matter of days has been transforming."

*James Pelton, MD, Overlake Hospital, with cancer survivor Betty Malowney*

*When Betty Malowney was diagnosed with breast cancer eight years ago, she underwent a modified radical mastectomy that required six weeks of recovery from surgery. Last year, a new cancer appeared in her other breast. But this time, says Betty, the difference in her treatment was like "night and day."*

Betty had a far less invasive treatment at Overlake Hospital in Bellevue, Washington, that involved a lumpectomy and five days of outpatient radiation therapy with high-dose-rate (HDR) brachytherapy. The treatment was made possible by a GammaMed® afterloader from Varian Medical Systems and a MammoSite™ device from Proxima Therapeutics. Just one week after treatment, the 57-year-old high school teacher was swimming and boating with friends.

"The ability for people to go on with their lives in a matter of days has been transforming," says James Pelton, MD, medical director at Overlake Radiation Oncology.




A 3D image from Varian's BrachyVision™ treatment planning software shows the dose distribution for a breast cancer case.

## BRINGING THE TREATMENT CLOSER TO THE TUMOR

HDR brachytherapy is a form of radiation therapy that is growing in use around the world, primarily for treating breast, prostate, and gynecological cancers. For many cancers, brachytherapy is a viable alternative to surgery, often with fewer side effects and faster recovery times. In addition, clinicians have found that new, more precise targeting methods enable them to use brachytherapy to treat areas that would have been considered too risky a few years ago, such as within the lung or the head and neck.

The process consists of inserting a radioactive source mounted on the end of a wire into the tumor through a catheter, using a computer-driven device called an "afterloader." Placement is guided with the help of X-ray images and treatment planning software. The radioactive source is generally left in place for several minutes and then removed.

"HDR brachytherapy systems use very small catheters, meaning they can be placed virtually anywhere in the body," says Peter Hoskin, MD, consultant clinical oncologist and professor, Mount Vernon Hospital in Northwood, England. "It allows us to give a very high dose of radiation to the target, while the surrounding area receives a very low dose."

"We have a fully integrated suite of brachytherapy products in one treatment room," says Rose Guerrero, oncology service line director at Overlake Hospital. Clinicians use Varian's Acuity™ imaging system to see the patient's anatomy and guide the placement of catheters and radiation sources.

## GUIDING TREATMENTS WITH CONE-BEAM CT

At the Texas Cancer Clinic, Bradley R. Prestidge, MD, medical director, is pioneering the use of Acuity-generated cone-beam CT images, which show anatomy in three dimensions, to guide his HDR brachytherapy procedures. He can place catheters, acquire images for treatment planning, and deliver a treatment in as little as 30 minutes, without leaving the operating room.

"We've used cone-beam CT so far for breast cancer, gynecological cancer, and prostate cancer," says Prestidge. "It's very convenient—a matter of imaging for a minute and waiting 30 seconds for the software to reconstruct the three-dimensional image that we use to guide the treatment. That's a 90-second process, so it doesn't add significantly to time spent in the operating room." At most treatment centers, patients must be sent out of the room for CT imaging after completion of the procedure, too late for any necessary adjustments.

With imaging capabilities and Varian's BrachyVision™ software in the operating room, doctors can see the effect of each placement on dose distribution and adjust placements as they work to make the treatment more precise.

## FOCUSING ON QUALITY OF LIFE

After being diagnosed with prostate cancer, Werner Thiele's big concern was maintaining his quality of life. Repeatedly he was told his only option was surgery that would likely leave him impotent and/or incontinent. A successful risk manager and security consultant, Werner explored his options. He found what he was looking for at University Hospital Schleswig-Holstein in Kiel, Germany. Now, four years after brachytherapy, Werner says he lives a normal, active life.

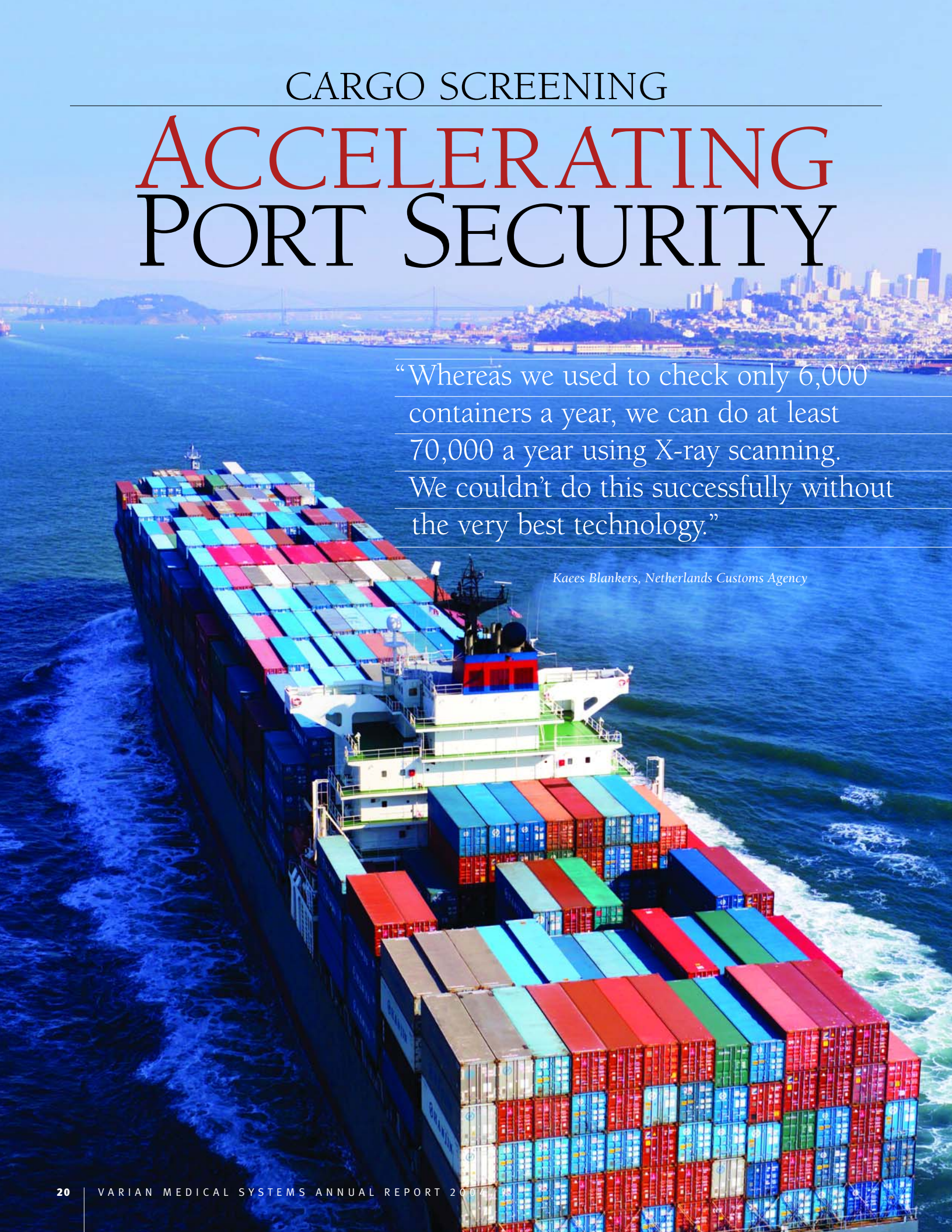
Doctors at the University Hospital Schleswig-Holstein have performed about 1,800 brachytherapy treatments using Varian devices. They specialize in an approach called intensity-modulated brachytherapy (IMBT).

According to György Kovács, MD, PhD, professor and vice chairman of the Clinic for Radiotherapy and head of the Interdisciplinary Brachytherapy Centre at University Hospital Schleswig-Holstein, IMBT places sources at different spots within a catheter to achieve more precise dose distribution. This carefully planned approach enabled him to save the eye of a young woman with a sinus tumor. "The standard surgical therapy would have involved removal of the eye," he says. "Today, eight years later, this woman has no tumor and no disturbance in her vision."

Brachytherapy solutions from Varian Medical Systems are used in 1,825 treatment centers worldwide. Used alone or with external beam therapy, brachytherapy is offering new hope for patients and gaining recognition as a viable and highly targeted approach to treating many types of cancer. ●

CARGO SCREENING

# ACCELERATING PORT SECURITY



"Whereas we used to check only 6,000 containers a year, we can do at least 70,000 a year using X-ray scanning. We couldn't do this successfully without the very best technology."

*Kaees Blankers, Netherlands Customs Agency*

*Millions of cargo containers are sailed annually into port cities, keeping commerce alive. Until recently, few of us gave any thought to what might be lurking inside one of them. Now we see these containers as possible transport vessels for terrorism. Fortunately, there's an effective way to check container contents and screen for weapons or contraband quickly and safely. It's a technology that is already at work in ports on every continent.*

Africa is one of those continents. Imagine a senior customs official at a busy port on Africa's west coast. He opts to check a suspicious container entering from overseas. The container is loaded onto a truck and driven through a mobile scanner that utilizes high-energy X rays to inspect the contents. The container is packed with goods that have not been declared to the authorities. It could just as easily have carried illegal substances, or even weapons of mass destruction.

For customs regulators, this is all in a day's work—work that has been made more efficient using cargo screening systems that incorporate high-energy Linatron® linear accelerators from Varian Medical Systems. These machines shoot a powerful beam through a container at a detector array, which turns the X rays into detailed images that can be viewed on a computer monitor. Such high-energy scanning systems are becoming more common at ports and airports around the world.

Susan Massihzadeh, vice president of programs with Massachusetts-based L-3 Security Detection Systems, says cargo screening is really taking off. "We see it as our largest growth area," she says.

## SAVING TIME, REDUCING RISK

In the Netherlands, "We now use X-ray technology to do a first analysis based on images," says Kaees Blankers, senior policy adviser with the Netherlands Customs Agency. "Previously, it was always done manually. In Rotterdam, we have to deal with 5.5 million containers a year. To take physical control of a container takes at least five hours. A scan will give you an image of the container's contents within four minutes. Whereas we used to check only 6,000 containers a year, we can do at least 70,000 a year using X-ray scanning. We couldn't do this successfully without the very best technology."

To date, Varian has supplied more than 100 accelerators to cargo screening system manufacturers, including L-3, ARACOR, Rapiscan, Smiths-Heimann, and BIR. These companies provide either fixed facilities or mobile units. Altogether, customs officials at more than 50 ports around the world are using Linatron-based systems to screen containers.

In Africa, Smiths-Heimann's customer Cotecna has implemented both fixed and mobile scanners in busy ports like Tema (Ghana), Dar es Salaam (Tanzania), Dakar (Senegal), and Lome (Togo). In Ghana, up to 1,500 containers are now routinely scanned each month.

Technicians review a high-energy X-ray image showing the contents of a cargo container on a truck.

"Before Ghana Customs had this, goods were being physically examined in the port, a process taking days to complete," says local scanner manager Ernest Woka. "Now it takes just minutes to do the scanning, and the whole clearance process can be completed in an hour or two."

According to Mike Peter Bakufan, senior customs official at Tema, the new scanner is an extremely effective way of counteracting smuggling, increasing revenue, and saving both labor and time. "With the scanner, a global view of the container's contents is ascertained in seconds," he says.

## MEETING A GROWING NEED FOR CARGO SCREENING

For L-3, where the largest growth area is the Middle East, Susan Massihzadeh says the company's cargo screening systems must meet strict requirements for reliability, image quality, and service. "Reliable performance is critical because these devices are often deployed in very remote sites and you don't want to keep having to send service people out to resolve problems," she says, adding that Varian's performance in these areas is "absolutely world class."

Bob Armistead, president of ARACOR, says high-energy accelerators are core to the company's security systems business. ARACOR has installed its Eagle mobile cargo inspection system at ports in Miami, Florida; Savannah, Georgia; and El Paso, Texas, and has systems in transit to Baltimore, Maryland, and Kingston, Jamaica. "We consider the Linatron-M accelerator to be a fundamental building block in our security solution," he says.

Kevin Igielski, general manager of Chicago-based BIR's Security Systems Division, says Japan is the key area for his company, with nine Linatron-based scanners installed in Tokyo, Osaka, Kobe, Ngoya, and Yokohama. BIR is expecting to install up to three systems a year in the region for the next three to six years.

"The Japanese have been very aggressive in spending money on technology to build the infrastructure to comply with regulations and make their borders safe," says Igielski. ●

# **ONCOLOGY SYSTEMS** 2004 HIGHLIGHTS

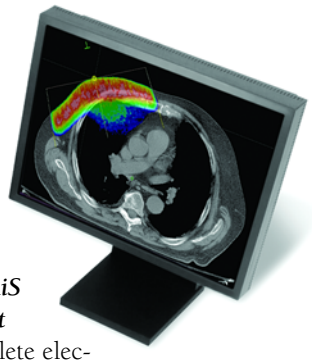
*Varian Oncology Systems is the leading supplier of radiotherapy systems for treating cancer. Its products include linear accelerators, simulators, and the broadest range of accessories and interconnected software tools for planning, verifying, and delivering the most sophisticated radiation and radiosurgical treatments available to patients. During fiscal year 2004, the business unit also supplied linear accelerators and components for nondestructive testing, industrial inspection, and cargo screening.*

***Record orders, revenues, and profits***. Annual net orders increased 20 percent to $1.2 billion, while revenues increased by 20 percent to $1 billion.

***The world's first clinically practical, automated On-Board Imager™ device and supporting software for medical linear accelerators.*** This accessory enables clinicians to track and adjust for normal tumor movements using smaller, more accurately targeted beams. The On-Board Imager accessory's capabilities were expanded during the year to encompass radiographic, fluoroscopic, and cone-beam CT imaging modes. Customers placed more than 80 orders for the new imaging device.

***Introduction of the Trilogy™ linear accelerator, a multipurpose platform for conventional and advanced radiotherapy and for radiosurgery.*** The introduction marked Varian's entry into radiosurgery. Customers placed 27 orders for Trilogy units in the product's first nine months on the market.

***The iX Series of Clinac® accelerators.*** This product provides a more compact control system, built-in imaging electronics, and a modular design, allowing easy upgrades for implementing modern treatment processes.



***Two new dose-calculation algorithms enhancing treatment planning software.*** The electron Monte Carlo algorithm calculates doses for treating superficial tumors with electrons. The AAA algorithm generates plans for treating tumors in heterogeneous tissues of differing densities.

***New clinical management tools for VARiS Vision™ radiation oncology management software.*** This product provides a complete electronic health record that can facilitate the adoption of a paperless and filmless environment at treatment centers.

***New cone-beam CT 3D imaging capabilities on the Acuity™ planning, simulation, and verification device.***

***The acquisition of OpTx® assets.*** The OpTx medical oncology management software complements the VARiS Vision information system to create a full-featured information system for comprehensive cancer clinics.

***The acquisition of Zmed®.*** Zmed products add ultrasonic positioning capabilities for IGRT and planning technologies for radiosurgery.

***The acquisition of Mitsubishi Electric Corporation's linear accelerator sales and service business in Japan.*** Varian is now servicing an additional 400 linear accelerators in Japan and other parts of Asia.

## ONCOLOGY SYSTEMS

| (Dollars in millions) | **04** | 03 | 02 |
|---|---|---|---|
| Net orders | **$1,170** | $977 | $825 |
| Revenues | **$1,031** | $856 | $725 |
| Operating earnings | **$250** | $200 | $159 |
| Operating earnings as a percentage of revenues | **24.2%** | 23.4% | 22.0% |
| Backlog | **$911** | $771 | $650 |
| Capital expenditures | **$16** | $8 | $14 |
| Depreciation and amortization | **$13** | $8 | $8 |

## ONCOLOGY SYSTEMS PRODUCTS AND SERVICES

*Oncology systems*

Clinac® and Trilogy™ medical linear accelerators

On-Board Imager™ accessories

Millennium™ multileaf collimators (MLCs)

Exact™ treatment couches

Acuity™ treatment planning, simulation, and verification imagers

Eclipse™/Helios™, FastPlan™, ImMerge®, and GrassFire™ treatment planning software

PortalVision™ digital imaging devices

VARiS Vision™ radiation oncology clinical data and image management software

RPM™ respiratory gating systems

Z-Scape™ image management and viewing software

Linac Scalpel™ stereotactic radiosurgery planning and positioning accessories

SonArray® ultrasound patient positioning platforms

Customer service, educational programs, and product support

*Industrial inspection and security systems*

Linatron® linear accelerators

## FACILITIES

Ashland, Massachusetts

Baden, Switzerland

Buc, France

Crawley, England

Helsinki, Finland

Las Vegas, Nevada

Milpitas, California

Palo Alto, California (headquarters)

Tokyo, Japan

Winnipeg, Canada

Zug, Switzerland

# **BRACHYTHERAPY** 2004 HIGHLIGHTS

*Varian's BrachyTherapy operation supplies products for treating cancer from the inside out by placing small radiation sources within tumors or into the area where a tumor has been surgically removed.*

***Record orders, revenues, and profits.*** Annual net orders increased 31 percent to $43 million, while revenues increased by 21 percent to $37 million.

***Two new applicators for specialized delivery of high-dose-rate brachytherapy.*** These enhance treatment of uterine and cervical cancer, and early-stage breast cancer.

***The MammoSource™ afterloader.*** A single-channel device for accelerated partial-breast brachytherapy was introduced.

***Three image-guided brachytherapy suites using Varian's Acuity™ simulator.*** Shared use of planning and verification devices such as Acuity enhance cooperation among medical specialties.

## BRACHYTHERAPY PRODUCTS AND SERVICES

VariSource™, GammaMedPlus™, and MammoSource™ high-dose-rate brachytherapy delivery systems

VariSeed™ brachytherapy treatment planning software for prostate seed implants

BrachyVision™ treatment planning software for high- and low-dose-rate brachytherapy

## FACILITIES

Charlottesville, Virginia

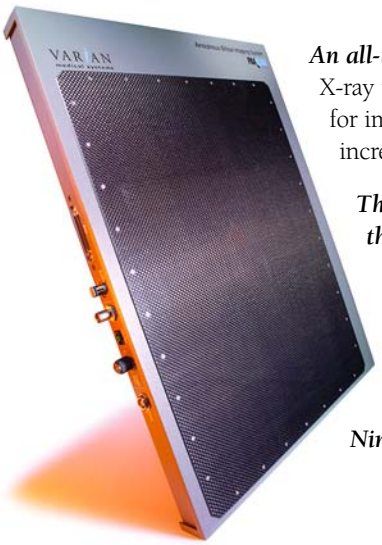
Crawley, England

Haan, Germany

Mountain View, California (headquarters)

# **X-RAY PRODUCTS** 2004 HIGHLIGHTS

*Varian X-Ray Products is the world's premier independent supplier of X-ray tubes and flat-panel detectors, providing imaging equipment for medical diagnostics, industrial inspection, and security.*

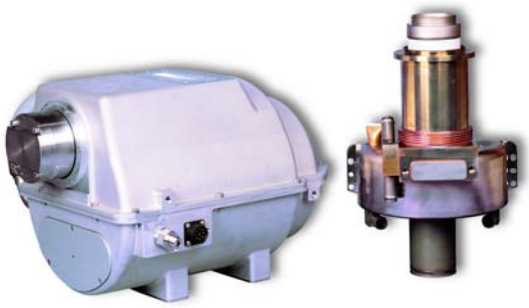



***An all-time revenue high of $165 million.*** Revenues for X-ray tubes increased 4 percent to $150 million. Revenues for imaging products (flat-panel X-ray image detectors) increased from $8.6 million to $15.2 million.

***The first-ever full-year profit of $1 million for the flat-panel image detector product line.***

***Inclusion of Varian's flat-panel X-ray image detector in several OEM products.*** A major equipment manufacturer began shipping cardiac imaging panels incorporating this technology.

***Nine new X-ray tubes.***



## X-RAY PRODUCTS

| (Dollars in millions) | **04** | 03 | 02 |
|---|---|---|---|
| Net orders | **$184** | $142 | $123 |
| Revenues | **$165** | $153 | $122 |
| Operating earnings | **$31** | $29 | $12 |
| Operating earnings as a percentage of revenues | **18.8%** | 18.7% | 10.2% |
| Backlog | **$44** | $25 | $36 |
| Capital expenditures | **$3** | $3 | $4 |
| Depreciation and amortization | **$7** | $7 | $7 |

## X-RAY PRODUCTS AND SERVICES

X-ray tubes for:

- *CT scanners*
- *Radiographic and fluoroscopic imaging*
- *Mammography*
- *Angiographic imaging*
- *Scientific instrumentation*
- *Airport baggage screening systems and nondestructive testing*

PaxScan® flat-panel image detectors for:

- *Industrial inspection*
- *Medical diagnostic subsystems*

## FACILITIES

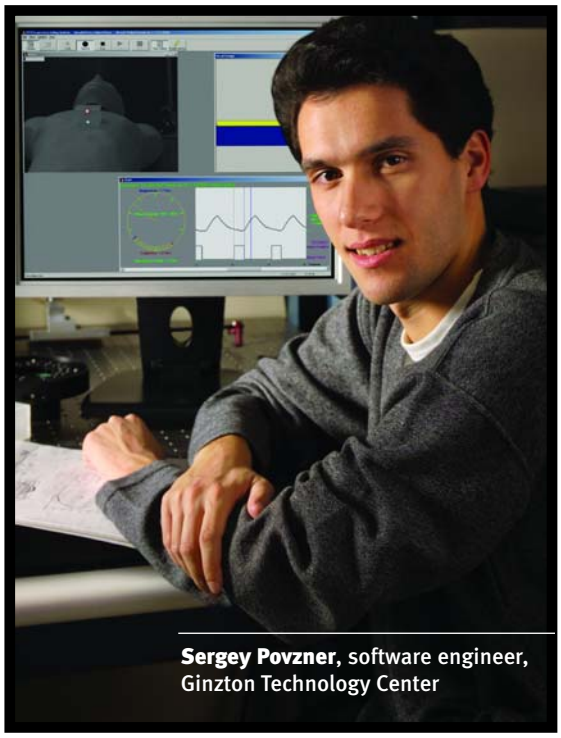
Charleston, South Carolina

Salt Lake City, Utah (headquarters)

Willich, Germany

# PUSHING THE TECHNOLOGICAL ENVELOPE

***Digital X-ray imagers. Prostate targeting using implanted, radiopaque marker seeds. Volumetric cone-beam CT (3D) and respiration-synchronized (4D) imaging and treatment. These are some of the challenging problems that scientists at Varian's Ginzton Technology Center (GTC) have tackled recently. The results of their work turn up in new product offerings from Varian Medical Systems.***



**Sergey Povzner,** software engineer, Ginzton Technology Center

Varian's GTC research and development organization serves as the company's incubator for new or so-called "disruptive" technologies that can create significantly enhanced capabilities for Varian's customers.

"We work to create growth opportunities for Varian Medical Systems by developing technologies that eclipse current capabilities in radiation therapy and X-ray imaging or that lead to entirely new businesses," says George Zdasiuk, PhD, vice president and chief technology officer at Varian and director of the GTC. "A disruptive technology is a new, more cost-effective way of accomplishing something."

> "We create growth opportunities by developing technologies that eclipse current capabilities."
>
> *George Zdasiuk, PhD, Ginzton Technology Center*

## TURNING RESEARCH INTO REALITY

Headquartered in Mountain View, California, with a staff of about 45, the GTC has existed since the 1960s when it was known as Varian's Central Research Department. The organization's mission is to explore new scientific frontiers and push the technological envelope in search of answers to the question: *What's next?*

"One of our main jobs is to take as much risk as possible out of a new technology," Zdasiuk says. "We work with Varian's marketing and engineering teams and their customers to investigate a promising idea and assess whether it one day will result in a meaningful product or service."

Probably the best example of a seedling technology that GTC researchers helped nurture into a commercial product is the flat-panel X-ray image detector. "We partnered with Xerox PARC researchers in the early 1990s to develop the early prototypes," Zdasiuk says. "Working with Varian's engineering department, we were able to incorporate this technology into the world's first FDA-cleared amorphous-silicon-based portal imaging product." Today, Varian's flat-panel imagers have been incorporated into a wide spectrum of products (see story on page 14).

GTC scientists have also been instrumental in the development of cone-beam computed tomography (CT), which can create three-dimensional images of tumors and surrounding healthy anatomy. Cone-beam CT technology has now been incorporated into Varian's Acuity™ simulator and also the On-Board Imager™ accessory to the Clinac® and Trilogy™ accelerators, ushering in a new age of image-guided radiation therapy (see story on page 6).

## WORKING ON WHAT'S NEXT

GTC researchers helped develop the RPM™ respiratory gating system (see story on page 9). As part of the next step in Varian's initiative for image-guided radiation therapy, GTC researchers are now working to develop a new generation of motion-tracking tools using X rays to monitor tumor movements in real time.

The GTC is also engaged in a research effort encompassing the use of radiation-activated chemical agents that can enhance radiotherapy outcomes as well as the use of radiation to enhance therapies involving genes or cancer-killing chemical agents.

"Right now, we're focused on tracking soft tissue and dealing with anatomical distortion. And we hope to improve targeting further using biochemical markers and functional images that show where the cancer really is located," Zdasiuk says. "An important role for GTC is to develop the technology that will analyze images and extract information that oncologists can act upon." ●

# Consolidated Statement of Earnings

| (In thousands, except per-share amounts) | FISCAL YEARS | | |
|---|---|---|---|
| | **2004** | 2003 | 2002 |
| Revenues | | | |
| Product | **$1,058,702** | $907,668 | $756,657 |
| Service contracts and other | **176,821** | 133,889 | 116,435 |
| Total revenues | **1,235,523** | 1,041,557 | 873,092 |
| Cost of revenues | | | |
| Product | **605,473** | 530,457 | 451,271 |
| Service contracts and other | **112,565** | 89,194 | 82,506 |
| Total cost of revenues | **718,038** | 619,651 | 533,777 |
| Gross margin | **517,485** | 421,906 | 339,315 |
| Operating expenses | | | |
| Research and development | **72,106** | 59,176 | 48,442 |
| Selling, general and administrative | **189,378** | 164,380 | 146,088 |
| Reorganization income | **–** | – | (192) |
| Total operating expenses | **261,484** | 223,556 | 194,338 |
| Operating earnings | **256,001** | 198,350 | 144,977 |
| Interest income | **5,970** | 7,401 | 5,768 |
| Interest expense | **(4,668)** | (4,383) | (4,486) |
| Earnings from operations before taxes | **257,303** | 201,368 | 146,259 |
| Taxes on earnings | **90,060** | 70,480 | 52,650 |
| Net earnings | **$167,243** | $130,888 | $93,609 |
| Net earnings per share: Basic [1] | **$1.23** | $0.96 | $0.69 |
| Net earnings per share: Diluted [1] | **$1.18** | $0.92 | $0.67 |
| Shares used in the calculation of net earnings per share [1] | | | |
| Weighted average shares outstanding: Basic | **136,036** | 136,113 | 135,327 |
| Weighted average shares outstanding: Diluted | **142,215** | 142,153 | 140,477 |

*(1) The results for fiscal years 2003 and 2002 have been restated for the two-for-one stock split (effected in the form of a 100% stock dividend) paid on July 30, 2004.*

# Consolidated Balance Sheets

(In thousands, except par values)

| | FISCAL YEAR END | |
|---|---|---|
| | **2004** | 2003 [2] |
| **Assets** | | |
| Current assets | | |
| Cash and cash equivalents | **$239,470** | $210,448 |
| Short-term marketable securities | **112,478** | 112,128 |
| Accounts receivable, net | **288,663** | 252,265 |
| Inventories | **127,701** | 116,815 |
| Prepaid expenses and other | **29,454** | 26,143 |
| Deferred tax assets | **87,370** | 87,725 |
| **Total current assets** | **885,136** | 805,524 |
| Property, plant and equipment, net | **85,377** | 81,172 |
| Long-term marketable securities | **40,970** | 84,820 |
| Goodwill | **112,653** | 59,979 |
| Other assets | **46,056** | 21,992 |
| **Total assets** | **$1,170,192** | $1,053,487 |
| **Liabilities and stockholders' equity** | | |
| Current liabilities | | |
| Accounts payable | **$59,639** | $53,231 |
| Accrued expenses | **255,519** | 234,344 |
| Current maturities of long-term debt | **5,250** | – |
| Product warranty | **40,654** | 36,040 |
| Advance payments from customers | **100,277** | 85,801 |
| **Total current liabilities** | **461,339** | 409,416 |
| Long-term accrued expenses and other | **41,889** | 21,895 |
| Long-term debt | **53,250** | 58,500 |
| **Total liabilities** | **556,478** | 489,811 |
| Commitments and contingencies | | |
| Stockholders' equity | | |
| Preferred stock of $1 par value: 1,000 shares authorized; none issued and outstanding | – | – |
| Common stock of $1 par value: 189,000 shares authorized; 134,045 and 135,942 shares issued and outstanding at October 1, 2004, and at September 26, 2003, respectively [1] | **134,045** | 135,942 |
| Capital in excess of par value [1] | **133,985** | 91,568 |
| Deferred stock compensation | **(1,110)** | (2,281) |
| Retained earnings | **346,794** | 341,863 |
| Accumulated other comprehensive loss | – | (3,416) |
| **Total stockholders' equity** | **613,714** | 563,676 |
| **Total liabilities and stockholders' equity** | **$1,170,192** | $1,053,487 |

*(1) The consolidated balance sheets as of October 1, 2004, and September 26, 2003, reflect the two-for-one stock split (effected in the form of a 100 percent stock dividend) paid on July 30, 2004.*

*(2) Certain reclassifications have been made to the prior-period consolidated financial statements to conform to the current-period presentation. These reclassifications have no impact on previously reported net earnings.*

# Consolidated Statement of Cash Flows

| (In thousands) | FISCAL YEARS | | |
|---|---|---|---|
| | **2004** | 2003 | 2002 |
| **Cash flows from operating activities** | | | |
| Net earnings | **$167,243** | $130,888 | $93,609 |
| Adjustments to reconcile net earnings to net cash provided by operating activities | | | |
| Tax benefits from employee stock option exercises | **33,916** | 28,142 | 17,403 |
| Depreciation | **20,751** | 19,482 | 19,090 |
| Provision for doubtful accounts receivable | **805** | 2,160 | 1,539 |
| Loss on disposal of property, plant and equipment | **179** | 44 | 237 |
| Amortization of intangibles | **4,372** | 832 | 759 |
| Amortization of premium/discount on marketable securities, net | **795** | 1,359 | 546 |
| Amortization of deferred stock compensation | **1,171** | 1,055 | 1,057 |
| Deferred taxes | **8,519** | (9,071) | (15,681) |
| Net change in fair value of derivatives and underlying commitments | **1,907** | (10,172) | 138 |
| Noncash stock-based compensation | **–** | 119 | – |
| Other | **496** | (235) | (460) |
| Changes in assets and liabilities | | | |
| Accounts receivable | **(25,267)** | (110) | (2,179) |
| Inventories | **(8,705)** | 7,141 | (10,172) |
| Prepaid expenses and other current assets | **(6,530)** | 2,042 | (4,592) |
| Accounts payable | **4,122** | (857) | (257) |
| Accrued expenses | **15,666** | 31,483 | 35,845 |
| Product warranty | **4,256** | 4,912 | 7,154 |
| Advance payments from customers | **12,964** | 2,657 | 13,997 |
| Long-term accrued expenses and other liabilities | **(2,750)** | (2,072) | (1,996) |
| **Net cash provided by operating activities** | **233,910** | 209,799 | 156,037 |
| **Cash flows from investing activities** | | | |
| Purchases of marketable securities | **(77,960)** | (110,708) | (139,110) |
| Proceeds from maturities of marketable securities | **120,665** | 50,965 | – |
| Purchases of property, plant and equipment | **(24,218)** | (18,888) | (25,907) |
| Proceeds from disposal of property, plant and equipment | **311** | 189 | 437 |
| Purchase of businesses, net of cash acquired | **(71,770)** | (135) | (14,086) |
| Increase in cash surrender value of life insurance | **(6,002)** | (5,166) | (2,799) |
| Other, net | **(976)** | (378) | (385) |
| **Net cash used in investing activities** | **(59,950)** | (84,121) | (181,850) |
| **Cash flows from financing activities** | | | |
| Repurchase of common stock | **(201,807)** | (105,099) | (55,092) |
| Proceeds from issuance of common stock to employees | **46,099** | 36,654 | 23,960 |
| Proceeds from sale of mandatorily redeemable financial instrument | **13,457** | – | – |
| Net repayments on short-term obligations | **–** | (58) | (116) |
| **Net cash used in financing activities** | **(142,251)** | (68,503) | (31,248) |
| Effects of exchange rate changes on cash and cash equivalents | **(2,687)** | (7,012) | (1,615) |
| Net increase (decrease) in cash and cash equivalents | **29,022** | 50,163 | (58,676) |
| Cash and cash equivalents at beginning of fiscal year | **210,448** | 160,285 | 218,961 |
| **Cash and cash equivalents at end of fiscal year** | **$239,470** | $210,448 | $160,285 |

# Management and Directors

## MANAGEMENT

**Richard M. Levy, PhD** [1] [2]
Chairman of the Board,
President and CEO

**Elisha W. Finney** [1] [2]
Vice President, Finance
Chief Financial Officer

**Timothy E. Guertin** [1] [2]
Executive Vice President
President, Oncology Systems

**Robert H. Kluge** [1] [2]
Vice President,
President, X-Ray Products

**Franco N. Palomba** [2]
Vice President,
Corporate Treasurer

**Joseph B. Phair** [1] [2]
Vice President, Administration
General Counsel and Secretary

**Crisanto C. Raimundo** [1] [2]
Vice President,
Corporate Controller

**Wendy S. Reitherman**
Vice President,
Human Resources

**John Anderson Thorson II**
Vice President,
Business Development

**George A. Zdasiuk, PhD** [2]
Vice President,
Ginzton Technology Center
and Chief Technology Officer

*(1) Executive Officers*
*(2) Corporate Officers*

## BOARD OF DIRECTORS

**Susan L. Bostrom**
Senior Vice President,
Internet Business Solutions Group
and Worldwide Government Affairs,
Cisco Systems, Inc.

**John Seely Brown, PhD**
Former Chief Scientist,
Xerox Corporation
Director Emeritus,
Xerox PARC

**R. Andrew Eckert**
Chief Executive Officer,
SumTotal Systems, Inc.

**Samuel Hellman, MD**
A.N. Pritzker Distinguished
Service Professor,
Department of Radiation
and Cellular Oncology,
University of Chicago

**Richard M. Levy, PhD**
Chairman of the Board,
President and CEO,
Varian Medical Systems, Inc.

**Allen S. Lichter, MD**
Dean and Professor of
Radiation Oncology,
University of Michigan
Medical School

**David W. Martin, Jr., MD**
Lead Director,
Varian Medical Systems, Inc.

**Ruediger Naumann-Etienne, PhD**
Owner and Managing Director,
Intertec Group

## STOCKHOLDER INFORMATION

### WORLD HEADQUARTERS

Varian Medical Systems, Inc.
3100 Hansen Way
Palo Alto, CA 94304-1038
650.493.4000

### STOCKHOLDER RELATIONS

Copies of Varian Medical Systems' Annual Report on Form 10-K filed with the Securities and Exchange Commission and other current financial information are available without charge by contacting:
Investor Relations
Varian Medical Systems, Inc.
3100 Hansen Way, M/S E-210
Palo Alto, CA 94304-1038

To obtain information over the Internet, visit www.varian.com/investor.

### LISTINGS

Varian Medical Systems' common stock is listed on the New York and Pacific Stock Exchanges. The symbol is VAR.

### TRANSFER AGENT AND REGISTRAR

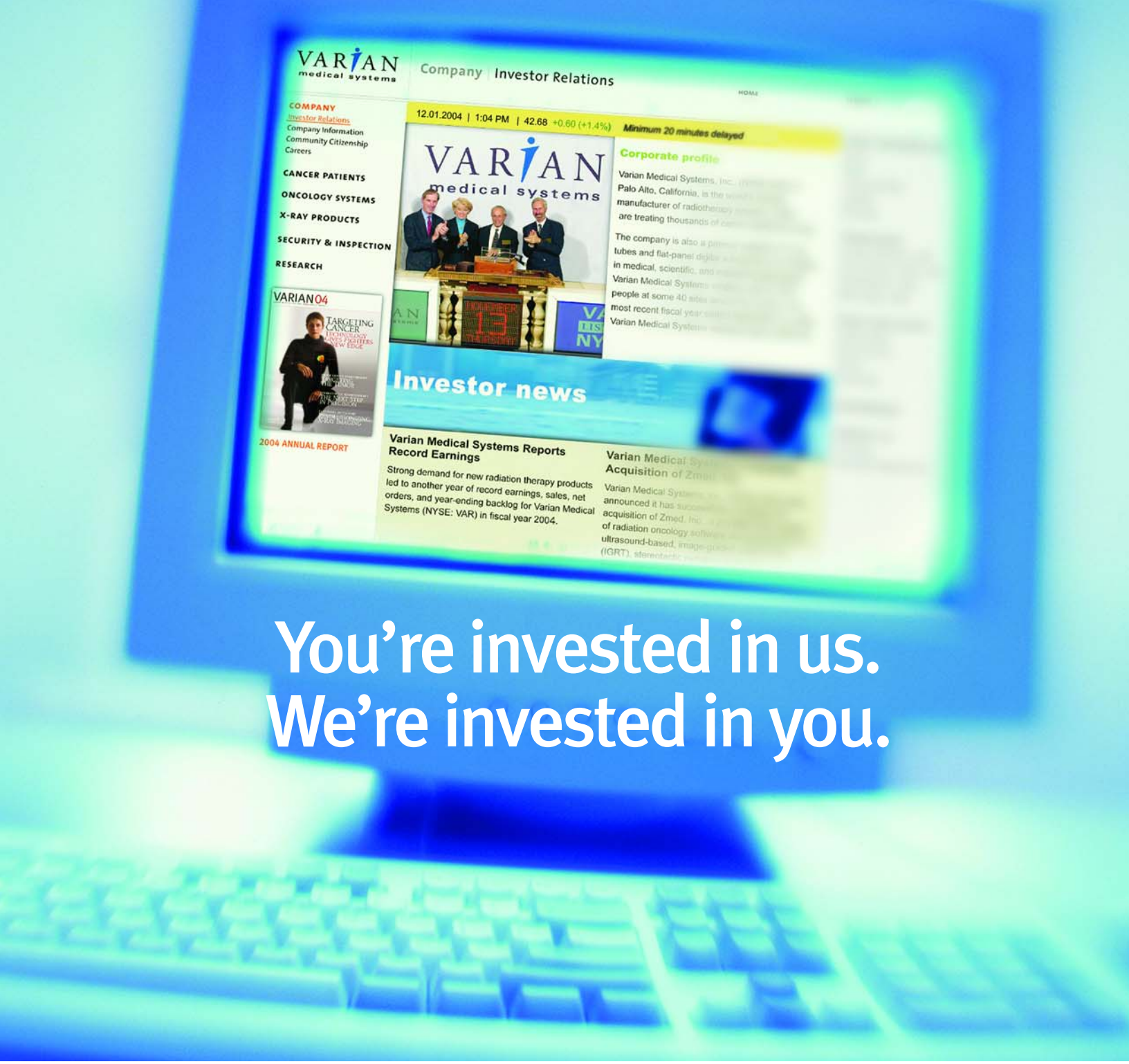
EquiServe Trust Company, N.A.
PO Box 43069
Providence, RI 02940-3069
1.800.756.8200
Hearing impaired: 1.800.952.9245
www.equiserve.com

### STOCKHOLDERS' MEETING

The annual meeting of stockholders will be held at 1:00 p.m. PT on February 17, 2005, at the Sheraton Palo Alto, 625 El Camino Real, Palo Alto, California.

### STOCKHOLDERS OF RECORD

There were 3,969 stockholders of record of the company's common stock on October 1, 2004.




# You're invested in us. We're invested in you.

Whether you're managing a client's portfolio or your own, Varian Medical Systems is committed to keeping you informed. Visit www.varian.com/investor for the latest shareholder news, stock prices, and more.

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medical systems