Vol. 18 | No. 1 | March 2014

# wavelength

*Pioneering Significant Innovations in Clinical Solutions for Treating Cancer and Brain Disorders*

## In this issue







ELEKTA

Pioneer and partner in cancer care.

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wavelength

Vol. 18 | No. 1 | March 2014

Published by Elekta | www.elekta.com


## *Dear friends,*

The new year always brings exciting new opportunities to refine the techniques and technology to treat cancer and other serious diseases. Things are always changing, and in a positive way! In 2014, as in previous years, however, the only thing that doesn't change – and the guiding force behind all of your efforts and ours – is our focus on the welfare of patients. The imperative must always be to provide the best patient care with the best possible outcomes.

In this issue of *Wavelength,* we present more evidence from your peers in the clinical world concerning the sophistication of the Versa HD system. Dr. Vivian Cosgrove at Leeds shows how Versa HD can cut treatment time and days of treatment. A sidebar to that article tells the story of a woman who experienced just how rapid and precise radiosurgery can be with Versa HD.

Additionally, in the fall *Wavelength* survey, you asked us to share new frontiers with you. Magnetoencephalography (MEG) is among those technologies that always seems to be pushing the boundaries of neuroscientific discovery, as the researchers at MIT will show you.

As reported in late 2013, I will step down as CEO but will continue with Elekta as a working member of the Board of Directors. It has been an honor to lead a business that is so intimately focused on the lives and well-being of individuals facing cancer and neurological disorders.

Now, it is with great pleasure to once again inform you of the appointment of Niklas Savander as Elekta's next President and Chief Executive Officer, effective May 1, 2014. Together, we will encounter many exciting challenges and opportunities in the next few years, and I am enormously confident that under Niklas's leadership we will meet them boldly in service to you and your patients.

In the meantime, please enjoy this issue of *Wavelength,* which once again highlights how our solutions can help you make a difference in the lives of your patients. Let's chart the future of cancer care together!

Good reading!

Tomas Puusepp
President and CEO of Elekta




All letters, comments or suggestions for future articles, requests for reprints and permissions are welcome.

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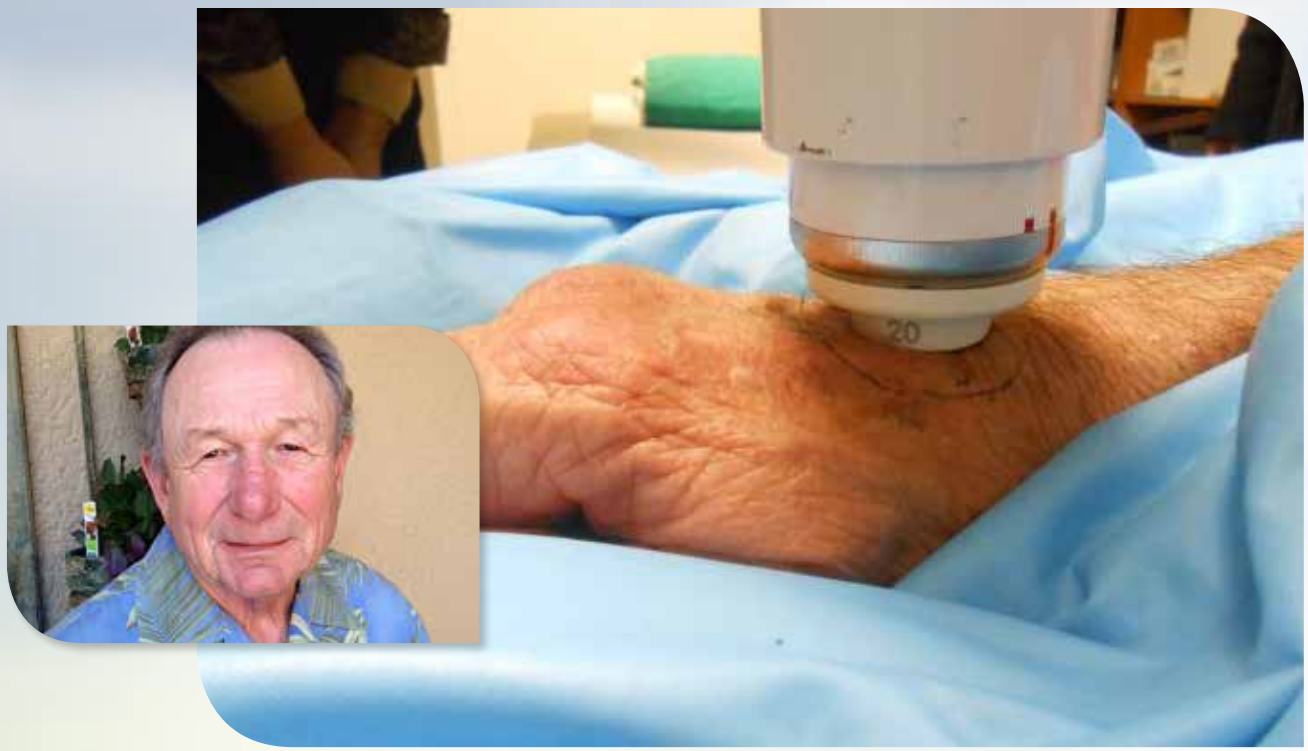

*Thomas Roberts, first patient in US to receive Esteya treatments by Rakesh Patel, MD, Medical Director at The Targeted Radiation Institutes, Los Gatos, CA*

# First US patients receive Esteya® electronic brachytherapy

**On January 14, 67-year-old retired telecommunications company executive Thomas Roberts** received his last Esteya® electronic brachytherapy session to treat a squamous cell carcinoma on his right hand.

Mr. Roberts was the first patient in the United States to receive Esteya treatment, which was delivered at a Los Gatos, California clinic by Rakesh Patel, MD, Medical Director at The Targeted Radiation Institutes (Bay Area, Calif.). Since Mr. Roberts began treatment in late December, Dr. Patel has added nine additional patients to the Esteya schedule.

Esteya electronic brachytherapy is a form of high dose rate (HDR) brachytherapy that brings an electronic brachytherapy source in close proximity to the cancerous site. Its direct delivery enables Esteya to focus more therapeutic radiation on the disease target and to minimize radiation to surrounding tissues and organs. The therapy typically is delivered over six to eight treatments, twice per week.

Dr. Patel presented Mr. Roberts with a variety of options to treat his hand lesion, chief among these were Mohs surgery and Esteya electronic brachytherapy.

"The hand is traditionally a very difficult place to treat because of healing potential issues," he says. "In Mr. Roberts's case, I want to stress that cosmetic issues were not the main concern – it was about form and function. The skin on the hand is very thin and there are nerves and tendons that we want to avoid the risk of damage that surgery potentially incurs. I recommended – and Mr. Roberts agreed – that electronic brachytherapy was a good option. It's pain-free, non-invasive and takes just a few minutes per fraction."

Mr. Roberts was treated from late December 2013 to January 14, 2014.

"Each Esteya treatment was very quick and efficient and I had no pain whatsoever," he recalls. "I wouldn't hesitate to have this procedure again."

A few weeks after his final Esteya session, Mr. Roberts is surprised and pleased with the results.

"The healing process began very quickly," he says. "I'm looking at it now and the site where the lesion was looks completely flat and the skin is starting to come back to its normal color. It's moving along extremely well. As a retired person, it hasn't interfered with my golf or tennis game at all."

*"It's pain-free, non-invasive and takes just a few minutes per fraction."*

## Simple and refined

Dr. Patel, past president of the American Brachytherapy Society, adds that in comparison to

*Post-treatment*

other HDR brachytherapy systems, Esteya offers a combination of simplicity and refinement.

"Esteya has significant advantages over current brachytherapy technology," he observes. "The quality assurance process is robust and efficient, requiring only a once-daily, two-minute QA. In other systems, QA must be done not only for every source in every machine, but also for every single patient every time they come in, which decreases clinic efficiency."

He adds that the durability of the Esteya source throughout the day and throughout the patient's treatment course is a significant advantage in the Esteya system. The Esteya source is expected to last for 4,000 fractions (i.e., 12,000 minutes) which is 15 times greater than existing technology.

"We're not used to disposable sources in radiation oncology," Dr. Patel notes. "In that respect, Esteya is more akin to existing high dose rate technology in, for instance, Elekta's microSelectron® system. Esteya has reintroduced the concept of durable radiation output for electronic brachytherapy, and that removes some of the variability day to day and patient to patient."

More importantly, from a patient welfare perspective, electronic brachytherapy as a modality can control the dose and minimize the exposure to underlying critical structures relative to electron beam radiation and superficial radiotherapy, he adds. A typical course of electronic brachytherapy includes six to eight short visits often twice a week, compared to up to six weeks for other radiation modalities.

"Superficial radiotherapy employs a similar energy range as electronic brachy, but the source to skin distance in superficial, orthovoltage or electron beam radiotherapy is greater, which translates into higher doses at depth," Dr. Patel observes. "The way this technology is configured – if you're trying to treat a small, superficial skin lesion, like a skin cancer, particularly in a cosmetically sensitive area such as the face – you will potentially get unnecessary collateral radiation exposure to deeper structures. This is not the case in highly tailored electronic brachytherapy.

"Electronic brachytherapy systems," he continues, "present a tremendous opportunity to extend the reach of brachytherapy for patients with skin cancer beyond cancer centers and radiation facilities."


**FOR MORE INFORMATION**

visit **www.esteya.com**

*Case study details and patient photos for this patient provided by Dr. Rakesh Patel.*



# Technology in VersaHD™ boosts VMAT efficiency

*Vivian Cosgrove, PhD, Head of Radiotherapy Physics*
*Leeds Cancer Centre, St James's University Hospital, Leeds, UK*

**Leeds Cancer Centre is among Europe's largest cancer treatment centers,** serving a catchment population in Yorkshire of 2.8 million. Radiotherapy facilities include three CT-simulators with 4D CT capability, 10 Elekta linear accelerators, a dedicated brachytherapy suite with theatres for high dose rate (HDR) treatment and $I^{125}$ seed implants, and an Xstrahl orthovoltage (kV) unit. Today, the centre delivers over 7,500 new radiotherapy treatment courses annually.

A research suite also was established in the center, comprising two Elekta Synergy® linear accelerators. This facility provides a platform for developing and evaluating novel radiotherapy equipment and delivery techniques. One of these linear accelerators is used primarily for radiation physics research and equipment development in partnership with Elekta. The second accelerator is used for translating these developments into clinical research programs and ultimately into routine clinical practice. This was instrumental in establishing a Stereotactic Body Radiation Therapy (SBRT) program in Leeds for the treatment of inoperable non-small cell lung cancer[1]. Leeds now has the largest clinical service for this treatment in the UK, with over 600 patients treated to date. The linear accelerator technology that has facilitated this new program – Agility™ MLC and flattening filter-free (FFF or High Dose Rate mode) – is part of Elekta's new Versa HD system.

## Volumetric Modulated Arc Therapy (VMAT)

An early focus of the research program was the development of VMAT, the fast, arc-based method for delivering IMRT. It was recognized in 2010 that the UK's adoption of IMRT was lagging behind much of Europe, leading to several initiatives to increase the UK availability of the technique, so that at least 24 percent of all radical treatments were delivered using IMRT[2]. In Leeds, calculations based on initial experience using step-and-shoot IMRT indicated that delivering 24 percent IMRT would strain the service due to the increased time required to deliver an IMRT fraction compared to standard CRT (Table 1). However, the evaluations on the research accelerators demonstrated that VMAT would reduce the time taken to deliver a treatment course, which is consistent with early adopters' experience[3].

| Technique | No. Treatment fractions | Set-up time (min) | Imaging (min) | Treatment delivery (min) | Room exit (min) | Total time per patient (min) | Linac time for 320 patients (hours) | Time demands relative to standard CRT (Hrs) |
|---|---|---|---|---|---|---|---|---|
| 3D CRT | 37 | 4 | 4 | 4 | 1 | 369 | 1968 | - |
| IMRT | 37 | 4 | 4 | 8 | 1 | 517 | 2757 | +789 |
| VMAT | 37 | 4 | 4 | 3 | 1 | 332 | 1771 | -197 |

***Table 1: Time taken to deliver radical radiotherapy for prostate carcinoma. Therefore, to increase patient access to IMRT in the Leeds Cancer Centre, and achieve better equipment utilization, a program to upgrade linacs in the center to deliver VMAT was implemented. This was completed in 2013, helped in part by the national Radiotherapy Innovations Fund[4].***

## Agility™ multi-leaf collimator

Another project carried out in Leeds in partnership with Elekta was the evaluation and clinical implementation of the first Agility MLC[5-6]. The unique features of Agility have improved IMRT delivery. These features include field shaping over a maximum field size of 40 cm x 40 cm with 160 leaves that can individually move by up to 6.5 cm per second. The final production head was installed in January 2012 and received CE marking in April 2012, when first clinical treatments started in Leeds.

A chief objective was to use Agility to deliver SBRT for inoperable non-small cell lung cancer (NSCLC) using VMAT. SBRT enables high-doses of radiation to be precisely targeted to the tumor with a sharp dose fall-off beyond the volume, thereby reducing the dose to normal, healthy tissue. Radiotherapy can then be delivered in high-dose hypofractionated sessions. In terms of local control and survival, considerable non-randomized evidence supports SBRT as superior to conventional radiotherapy for medically inoperable NSCLC[7]. This is achieved with fewer visits to the hospital (3-8) compared to a conventionally-fractionated approach (up to 30).

Initial work using Agility and VMAT demonstrated that lung SBRT could be delivered much faster than standard SBRT with fixed conformal beams (Table 2). Standard SBRT might require seven fixed beams and eight to nine minutes of beam-on time, whereas SBRT with Agility VMAT typically required around three minutes of beam delivery time. The reduced delivery time was found to be more tolerable for patients, while minimizing the risks of patient movement during treatment. Therefore the technique was seen to improve the overall patient experience and reduce clinical risks.

| | 3D CRT (MLCi, XiO Planned) | Agility VMAT Monaco v3.2 Planned | Agility VMAT with High dose rate (FFF) Monaco v3.3 Planned |
|---|---|---|---|
| Average measured beam-on times per 11 Gy fraction (seconds) ± 1SD | 516 ± 109 | 183 ± 20 | 106 ± 9 |

***Table 2: Comparison of beam-on times using different SBRT delivery techniques. A five patient average; initially planned and treated with 3D CRT using an MLCi2, 6 MV on an Elekta Synergy accelerator. Plans were to treat inoperable lung cancer with SBRT, 55 Gy in five fractions. All patients were re-planned with Agility VMAT and then Agility VMAT with high dose rate, flattening filter-free or FFF. VMAT plans were delivered on the same Synergy accelerator using 6 MV and 6 MV FFF. Dosimetrically, all plans met the dose-volume targets and constraints defined by the UK SBRT consortium[8].***

## Flattening filter-free High Dose Rate mode delivery

Another joint Leeds-Elekta project was the development of FFF delivery for clinical use. By removing the flattening filter from the linear accelerator, dose rates of up to two to three times greater than those of standard, flattened beams can be achieved[9]. Advanced treatment planning technology can then be used to modulate the non-flat, high dose rate treatment beams so that highly conformal, VMAT dose distributions can be achieved but with a reduced delivery time.

*Members of the Leeds Cancer Centre SBRT team received an award from the Quality in Care (QiC) Programme in 2013. Leeds members pictured are: Dr. Kevin Franks (second from left), followed by Dr. Vivian Cosgrove, radiographers Helen Summers and Alan Needham, physicist John Lilley and dosimetrist Stuart Wilson.*

Again, SBRT VMAT treatments were prioritized for the high dose rate, FFF treatment deliveries. The high doses per fraction (up to 16 Gy) were considered ideally suited to benefit from the higher dose rates now attainable. Initial experience demonstrated a reduction in treatment beam-on times down to less than two minutes for an 11 Gy irradiation (Table 2). Leeds began high dose rate, VMAT SBRT clinical treatments in February 2013. One of the first patient treatments was featured in an Al Jazeera documentary program[10].

## Versa HD in action

In March 2013, Elekta unveiled Versa HD, a system that unites Agility, High Dose Rate mode (FFF) and improved image guidance capabilities in a single platform. Soon after the unveiling, negotiations commenced between Leeds Teaching Hospitals NHS Trust, Elekta and Medipass Healthcare Ltd., the Managed Equipment Service provider to Leeds Trust. This provided an opportunity to advance the schedule of the PFI equipment replacement program, leading to the installation of two Versa HD systems in Leeds. The first entered clinical service in July 2013, and the second in November 2013.

Already, the first Versa HD has had a significant impact on clinical workflow. Up to 60 patients per day are scheduled for treatment on the new machine. Treatment slots are booked at 10 minute intervals, so that as many as six patients can be treated per hour. Initially, patients undergoing radical prostate radiotherapy have been prioritized for treatment, all with High Dose Rate mode VMAT. In addition, the process to move all lung SBRT treatments to High Dose Rate mode VMAT has begun. Patients have their SBRT treatment scheduled to a 20-minute time slot on the Versa HD.

## Conclusion

In September 2013, over 25 percent of all radical treatments were delivered in the Leeds Cancer Centre using IMRT and VMAT. This equates to around 90 new patients starting advanced radiotherapy treatment every month. In addition, 20-25 new patients also start an SBRT course each month. This volume growth has been greatly enhanced by opportunities to develop the techniques, delivery equipment and workflow on the research accelerators, side-by-side with the clinical service.

The ambition for the Leeds Cancer Centre has been to make advanced radiotherapy available for more of our patients. The release of Versa HD and the early adoption of the new accelerators at Leeds have supported further improvements in the technical delivery of radiotherapy while also increasing productivity and efficiency. This will help to both increase patient access to radiotherapy and to improve clinical outcomes following treatment.

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# Versa HD is critical tool in patient's miraculous recovery

*Sally Owens on vacation*

**Elekta's Versa HD partnered with aggressive chemotherapy** and Sally Owens's own indestructible positive attitude and faith to beat back her cancer. In May 2013, the 71-year-old Dayton (Ohio, USA) resident and retired registered nurse was diagnosed with stage four colon cancer that had metastasized to her liver. When a chest X-ray also revealed lung cancer, Sally nearly gave up.

"To be told you have two primary cancers is devastating," she recalls. "I was to the point of giving away possessions."

Doctors told Sally that surgery for the lung tumors wasn't an option due to their location. Kettering Medical Center Chairman of Radiation Oncology, Douglas Einstein, MD, PhD, however, reassured her that stereotactic radiosurgery offered her a fighting chance.

"Chemotherapy was having a positive effect on Sally's colon cancer, but we needed a different strategy to address her lung tumors, as surgery would be too risky," Dr. Einstein says. "Versa HD would give us the ability to administer the radiation very accurately and rapidly to these tumors."

Sally became the first in the United States to receive radiosurgery on Kettering's Versa HD system.

She received five treatments to one tumor and three treatments to the second tumor – each under just 4.5 minutes of total beam-on time – between September 4 and September 23, 2013.

"My last PET scan around the middle of October 2013 indicated that the lung tumors were 80 percent gone," she says.

In addition to the benefits of revolutionary technology like Versa HD and advanced chemotherapy techniques, Sally attributes her recovery to the power of prayer and a positive attitude.

"It's so important to be positive and grateful every day," she says. "I'm a living example of that!" ●

*"My last PET scan around the middle of October 2013 indicated that the lung tumors were 80 percent gone."*

# Conversion creates seamless radiotherapy workflow

*Bothwell Regional Health Center, Sedalia, Missouri*

*Sandra M. Hewlett, MS, RN, AOCN, FACHE, BRHC's Director, Oncology Service Line*

**With its Siemens PRIMUS system having operated past its lifecycle,** Sedalia, Missouri's Bothwell Regional Health Center (BRHC), in 2010, began the process of re-equipping the radiation oncology department. Vendor evaluations narrowed the field to Elekta and Varian, but in the end it was Elekta's open systems philosophy that gave the company the edge. BRHC's selection of Elekta as its provider proved a wise choice, yielding spectacular clinical, workflow, care quality and financial benefits.

## Time for a change

Although patient satisfaction surveys consistently gave BRHC's radiation therapy service high marks, change was inevitable as the center's Siemens PRIMUS eclipsed its service life.

"Before the Elekta conversion, we were limited to 3D conformal radiation therapy and compensator-based IMRT," according to BRHC's Director, Oncology Service Line, Sandra M. Hewlett, MS, RN, AOCN, FACHE. "We needed to expand our radiation therapy capabilities and bring needed and different treatment modalities to our community."

In addition to a new linac, a rejuvenated department would optimally include CT simulation, cancer registry, electronic medical records (EMR), treatment planning, patient support, immobilization, motion management, and quality assurance (see list page 13). In such a multi-system workflow, integrating the components to operate together would be crucial.

"I wanted to create a comprehensive workflow that was seamless, interoperable, and integrated," Hewlett says. "Elekta enabled us to incorporate virtually any product and have it operate smoothly through direct integration or minimal interfaces.

"I wanted to avoid a 'piecemeal' approach to

building a complete radiation therapy solution," she continues. "Conversely, we also wanted to avoid the risk of choosing a vendor that would compel us to acquire only their solutions to avoid compatibility issues."

On April 29, 2010, BRHC officials signed the purchase order with Elekta, initiating the radiation oncology department overhaul. This project proceeded concurrently with a $25 million renovation and construction of the Susan O'Brien Fischer Cancer Center and the new, contiguous Canon Cancer and Cardiovascular Center.

## Elekta's Consulting Services assists in rapid implementation

In October 2010, BRHC began modifying the linac vault to accommodate installation of an Elekta Synergy® linear accelerator. Delivery of the system occurred in mid-December and installation was complete in January 2011. From mid-January to February 2011, Elekta and BRHC staff performed commissioning, acceptance testing and beam modeling.

In the meantime, Dr. Decker and BRHC staff treated their radiation therapy patients at a hospital located approximately 30 miles away.

To help them manage the new workflow, Hewlett and BRHC staff called on Elekta's Consulting Services team during the pre-go-live stage.

"They evaluated our existing radiation oncology clinical, operational, administrative and financial procedures, and then process mapped every department area," Hewlett says. "That helped me build our assessments and many aspects of customizing our new MOSAIQ® oncology information system (OIS), while the rest of the radiation team was at the temporary location."

On February 15, 2011, BRHC went live with its comprehensive Elekta solution, its dual centerpieces Elekta Synergy and MOSAIQ, the latter enabling BRHC to manage a paperless department on the first day.

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*"Elekta enabled us to incorporate virtually any product and have it operate smoothly through direct integration or minimal interfaces."*

*Dr. William Decker, radiation oncologist at BRHC*

*"This project was more than replacing a linac – it was also about how the technology would work together now and in the future. Keeping people on treatment and ensuring fully functional intra- and interdepartmental work flow processes are mission-critical."*

## Everyone benefits – patients, physicians, hospital

Since go-live, BRHC has seen major improvements in clinical capabilities and workflow, in addition to realizing financial rewards.

Once limited to traditional techniques, BRHC now offers VMAT, stereotactic radiotherapy and radiosurgery (SBRT, SRS), IMRT, respiratory gating, and electron treatments. The greater precision that Elekta Synergy® affords also has reduced treatment-related toxicity in patients.

"In the last 19 months, I have not had to report any Grade III or IV toxicities, which we occasionally incurred and reported before the Elekta conversion," she says.

Treatments are also quicker. Patient set-up, CBCT and beam delivery now take just 12 minutes, a reduction of about seven minutes. Faster treatments also have improved BRHC's process efficiencies and bottom line. BRHC was averaging 2-4 percent in overtime costs each fiscal year. In the first year with Elekta (2011), overtime dropped from the previous year's 2.1 percent to 0.5 percent. In 2012, overtime decreased to 0.3 percent and from June 1, 2013 to November 2013, it was 0.1 percent. .

The added speed and capabilities of Elekta Synergy have created openings in the treatment schedule, increasing revenues and improving access to treatment, she adds. BRHC's patient volume has increased over 10 percent year-on-year, with concomitant increases in revenues.

## Harmony through integration

The most dramatic result has been a much improved technological interconnectedness within the department.

"Other radiotherapy sites have heard about our seamless operation and have requested visits to observe our system," Hewlett says. "This project was more than replacing a linac – it was also about how the technology would work together now and in the future. Keeping people on treatment and ensuring fully functional intra- and interdepartmental work flow processes are mission-critical."

At BRHC, establishing and maintaining effective work flow processes starts the moment the patient enters the cancer center. Barcode technology in MOSAIQ® facilitates patient check-in and tracking, increasing safety and improving the patient's experience. New patients receive a card with a unique barcode label. Instead of standing in line to check in, patients check themselves into the queue with their card. The radiation nurse is prompted upon patient arrival, and can see the patient's face on her desktop screen.

"Even if it's a new consult, the nurse can recognize the patient's face in reception and greet her personally," she explains. "It's a personal experience that Elekta technology enables us to offer patients."

The most significant workflow change at BRHC was the paperless environment that MOSAIQ created, Hewlett emphasizes.

"We're not hand-carrying or searching for charts," she says. "The medical record is available for all authorized users to see in real time. MOSAIQ has decreased most of the time-consuming face-to-face communication that was required in the paper-based system."

Either through interface or direct integration, BRHC worked to make most key applications

instantly accessible through MOSAIQ, including billing, ADT, charge entry, check-in, e-Prescribe and computerized physician order entry.

"My physician is meeting the required HITECH Act meaningful use criteria," she says. "Currently, we're implementing the final interface: labs. The interface will facilitate dual functions: allowing MOSAIQ orders to flow into the hospital's MEDITECH EMR and enabling MEDITECH-based lab results to auto-import into MOSAIQ."

Another workflow enhancement is the department's Philips Brilliance Oncology Big Bore CT. Patients at the hospital no longer need to be transported to the radiology department for their CT scans.

## High tech, high touch satisfaction

Since go-live, BRHC is achieving almost perfect scores in patient surveys.

"We now consistently score 99 percent. for 'likelihood to recommend'," she notes. "Patients perceive that the radiation oncology department can compete with anything in Missouri. That is a testament to the complementary blend of my staff's high touch and Elekta's high tech solutions."

Hewlett also is "likely to recommend" when it comes to advising other radiation oncology programs.

"I would tell them that BRHC defined and met its goals to create a radiation oncology workflow that is interoperable, integrated, seamless and paperless. This approach ensured high safety, clinical performance and care quality – in addition to a greater range of treatment techniques," she says. "If a radiation oncology program desires these qualities, Elekta is the clear choice."

*The Susan O'Brien Fischer Cancer Center oncology team*

### ABOUT SUSAN O'BRIEN FISCHER CANCER CENTER, AFFILIATE OF BOTHWELL REGIONAL HEALTH CENTER (BRHC)

**Location**

- Sedalia, Missouri, USA

**Staff**

- 1 radiation oncologist; 6 PRN radiation oncologists
- 3 radiation therapists
- 1 dosimetrist
- 1 physicist
- 2 nurses
- 1 secretary-biller
- Oncology service line director

**Elekta Solutions**

- Elekta Synergy®
- MOSAIQ®
- METRIQ® cancer registry
- 2 HexaPOD™ evo RT System
- Monaco® treatment planning system
- XiO® treatment planning system
- Focal™, Focal 4D® TPS
- Atlas-Based Auto-segmentation™
- Respiratory Gating
- BodyFIX®
- Bar code

# Elekta around the world

ALGIERS, ALGERIA

### Elekta collaborates with Algeria to bring new hope to cancer patients

Algeria's Ministry of Health, Population and Hospital Reform launched a plan in 2013 to equip or build 13 new cancer centers over the next five years. In January, the Ministry announced that this plan includes the purchase of hardware and software solutions from Elekta, including training. "The MoHPHR has reported the number of new cancer cases at 44,000 annually, making cancer the second leading cause of death in Algeria," says Ian Alexander, Executive Vice President Region Europe and AFLAME. "We are proud that Elekta has been chosen to help close the gap between treatment needs and treatment capacity."

ATLANTA, GEORGIA, USA

### Elekta raises $67,000 to support pediatric brain tumor disease

Elekta activities at the 55th ASTRO annual meeting raised a total of $67,000 for the Brain Tumor Foundation for Children, the first nonprofit organization in the United States to focus on pediatric brain tumor disease. "Organizations such as the Brain Tumor Foundation for Children are part of an absolutely vital support network for families who are touched by this disease," says Jay Hoey, Executive Vice President, Elekta. "We are proud to use the occasion of our annual charitable event to ensure BTFC and its sister institutions carry on their important activities."

BANGALORE, INDIA

### First Elekta Synergy with Agility MLC sited in India

On December 18, 2013, the first patient in India was treated at HCG MSR Centre of Oncology in Bangalore with Elekta's Agility™ multileaf collimator. "This is truly a fantastic achievement when one considers that HCG itself was founded in 1990 with five oncologists opening a private cancer hospital to ensure people in Bangalore have top-flight cancer treatment at the Bangalore Cancer Hospital," says Dr. G. Kilara, Director of HCG MSR Centre of Oncology. "We are very happy to be the first site in India to have the Agility MLC on our Synergy, and we see this as a long-term partnership with Elekta to improve cancer treatments to people in Bangalore."

BEIJING, CHINA

### State-of-the-art Elekta education and training center opens in Beijing

In November, Chinese government officials, key Elekta radiotherapy customers and members of Elekta's senior management inaugurated Elekta's Learning and Innovation Center (LINC) in Beijing. The three-story, 1,800 sq m (19,375 sq ft) facility is equipped with Elekta systems and classrooms to educate professionals as well as employees on the use of radiotherapy solutions and workflows. "Elekta is committed to customer education and training, a priority of all of our users worldwide," says Gilbert Wai, Executive Vice President, Elekta Asia Pacific. "A center such as the Beijing LINC is urgently needed in Asia-Pacific as the region rapidly grows its radiation therapy capacity."

CRAWLEY, ENGLAND, UK

### Elekta wins "Made in the South East" award

In October, Elekta won the Technology Award at the inaugural Made in the South East Awards 2013, sponsored by Insider Media and held in Guildford. "We're a global company, but we're very proud of our home here in the South East," says Bill Yaeger, Executive Vice President, Elekta Oncology. "We were delighted to stand shoulder to shoulder with other manufacturing businesses and celebrate the region's outstanding contribution to the UK economy and honored to receive an award that offers further recognition of all our efforts here in Crawley."

GELSENKIRCHEN, GERMANY

### Versa HD system boosts speed and precision at German clinic

On October 28, clinicians at Evangelische Kliniken Gelsenkirchen launched a new era of radiation therapy speed and accuracy with their first Versa HD™ case. "This was a seven-field, 56-segment IMRT treatment, and what we found was that – in comparison with our other system – Versa HD afforded better dose conformance to the target and enhanced avoidance of critical structures, such as the small bowel, kidneys, rectum and bladder," says Razvan Galalae, MD, PhD, Chief Physician at Evangelische Kliniken. "We think Versa HD is a really wonderful linac, and we're happy we made this decision over the other systems we evaluated."

MELBOURNE, AUSTRALIA

### More than 200 users gather for Australasian User Meeting

In August 2013, more than 200 customers, prospective customers and Elekta staff gathered at the Sofitel on Collins in Melbourne for Elekta's Australasian User Meeting. "Compared to the 2012 meeting, the number of attendees increased by 30 percent," says Andrew Wilson Managing Director, Elekta Pty, Ltd. "And, for the first time, we held a Monaco® User Forum, which almost 50 percent of people present at the user meeting attended. We are looking forward to this year's meeting in Queenstown, New Zealand."

MOSCOW, RUSSIA

### Eastern European User Meeting convenes in Moscow

The 2nd Eastern Europe Elekta User Meeting was held October 2013 in Moscow. Doubling the number of attendees since the last meeting held in 2011, more than 200 customers from centers in Russia, Ukraine, Belarus, Kazakhstan, Bulgaria and other countries of the region participated in the gathering, which featured presentations and interactive discussions on a wide variety of technological and cancer management topics. In addition to user presentations, Elekta representatives gave presentations on treatment techniques, such as VMAT and SRS, used with Elekta linear accelerators. "Elekta is committed to ensuring our Eastern European customers are trained in the proper use of their equipment and that they receive ongoing clinical support," says Irina Sandin, Elekta Business Director for Eastern Europe.

NEW YORK, NEW YORK USA

### New York hospital first in the U.S. to install Esteya

In December, the first Esteya® electronic brachytherapy system in the United States was installed at Memorial Sloan-Kettering Cancer Center. "With support from Elekta, Memorial Sloan-Kettering will lead a multicenter clinical study with the goal to further improve skin cancer treatment," says John Lapré, Executive Vice President, Elekta Brachytherapy. "With its leading role at the forefront of brachytherapy research, the hospital will help further improve the quality of patient care and add to the evidence base that caregivers need for their clinical decisions."

SÃO PAULO, BRAZIL

### Hospital do Coração to site São Paulo's first Gamma Knife

In January, HCor inaugurated a new building as part of their ongoing expansion plan. Designed to house the new, oncology and neuroscience centers, the building will serve as home for Elekta's latest generation Leksell Gamma Knife® Perfexion™ radiosurgery system, the first in São Paulo. Neurosurgeons leading the project are Dr. Antonio De Salles and Dr. Alessandra Gorgulho, both of whom bring vast experience in intracranial radiosurgery, spine radiosurgery and open surgery in the magnetic resonance environment. "HCor Neuro is the first in Brazil to integrate these technologies and recruit the medical expertise required to successfully implement stereotactic radiosurgery," says Dr. De Salles. "In addition, at HCor Neuro/Onco, radiosurgery is extended to the spine and other body sites with Elekta Axesse™ technology," adds Dr. Gorgulho. "This system contributes to our full range of radiosurgery capabilities."

STOCKHOLM, SWEDEN

### Elekta wins Swedish Export Award

On Wednesday, December 4, Tomas Puusepp, Elekta's President and CEO, accepted the 2013 Swedish Export Credit Corporation's (SEK) Export Award, on behalf of the company. In addition to being on hand to receive the award, Puusepp also was among the invited speakers at the event. "This distinction from SEK means a lot," says Puusepp. "It's also an acknowledgement of the job we're doing and the pride we feel at Elekta, and this award will inspire us to be even better."

VEJLE, DENMARK

### Radiotherapy symposium at Vejle Hospital addresses challenges

In November, an interdisciplinary symposium titled "Advanced Radiotherapy of Anal and Rectal Cancer" was held at Vejle Hospital. The scope of the program, which was attended by more than 70 healthcare professionals, was to share knowledge about the radiotherapy-related challenges these two patient groups face. Martin Berg, MSc, Head of Medical Physics at Vejle Hospital, and his colleagues, organized the symposium, the second such meeting in two years. The first symposium focused on radiotherapy for breast cancer. "The symposia were very highly appreciated by the attendees and a great success for the clinic and Elekta."

VIENNA, AUSTRIA

### Elekt-aRT Band delights customers around the globe

In 2011, the love of music brought together about a dozen men and women, Elekta employees and customers to form the ever-popular Elekt-aRT band. Bringing smiles to the faces of those attending conventions, Elekta user meetings and internal trainings, the band has played together across the globe, in locations such as: Warnemünde, Germany; Barcelona, Spain; and Rhodes, Greece. "We just love to play," says Roberto Pellegrini, Director Clinical Solutions for Elekta and a saxophone player. "Life is full of music and there are some really talented musicians in the group coming from inside Elekta and different clinical centers." If you enjoy dancing, R&B, Blues Brothers style and rock and jazz, be sure to check out the Elekt-aRT band as they headline the Elekta User Meeting at ESTRO in Vienna. More information and photos can be found here: https://www.facebook.com/elekt.art?ref=ts&fref=ts and here: https://www.facebook.com/pages/Elekt-aRT-Band/401504256546736?fref=ts. Enjoy!

# MEG sharpens focus on human vision

While magnetoencephalography (MEG) progresses clinically in such areas as localization of epilepsy and pre-surgical functional mapping before a tumor resection, basic MEG research is underway in such areas such as the diagnosis of traumatic brain injury and to explore how the brain interacts with the senses to impart meaning about the world.

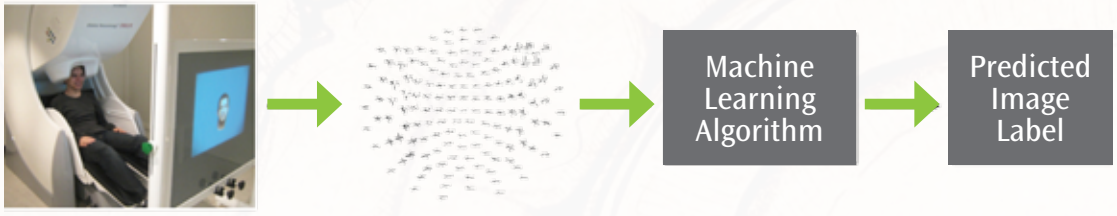


*Figure 1. MEG decoding work flow: A subject views images during a MEG scan and their MEG signals are recorded. Their MEG activity is then fed into a machine learning algorithm to get a predicted label for what image the subject was looking at. The accuracy of this prediction tells researchers what visual information is present in the MEG signals.*

**Investigators at the Massachusetts Institute of Technology's (MIT) MEG lab** are unraveling the elemental mechanics of the human visual system, the "what" and "when" of vision once visual information passes from the retina to the brain. Human vision, MIT researchers are finding, is a highly complex process involving low- and high-level neural computations, yet it's also incredibly fast – much faster than a typical 300 ms eye-blink – and one that requires no conscious effort.

"We produced a first-of-its-kind movie that illustrates how information travels in the human visual cortex in a resolution of milliseconds and millimeters," says Dimitrios Pantazis, PhD, Director of the MEG Lab at MIT's McGovern Institute for Brain Research. "Such fidelity opens up tremendous possibilities. For example, even the most advanced machine vision algorithms are hopeless compared to the human visual system. The human brain can teach us how to radically redesign machine vision by replicating human brain function. Additionally, our efforts to understand brain disorders – with our current emphasis on autism spectrum disorders (ASD) – can characterize the nature of hypersensitivities to stimuli, and lead to improved interventions at younger ages."

With their Elekta Neuromag® TRIUX™ MEG system, MIT researchers are exploring various aspects of the human visual system. MEG can detect the very weak magnetic fields arising from electrical activity in the brain, enabling investigators to monitor the timing of brain activity with millisecond precision. Imaging modalities such as fMRI complement MEG by adding spatial data.

*Dimitrios Pantazis, PhD, Director of the MEG Lab at MIT's McGovern Institute for Brain Research*

## Invariant object recognition

For many computer algorithms for vision, when does a cup cease to be a cup? Answer: when the perspective is shifted to above the cup, radically transforming its appearance. Object transformations frustrate computer algorithms, while human vision solves these "puzzles" effortlessly and unconsciously.

MIT Prof. Tomaso Poggio and doctoral student Leyla Isik are using MEG to study this phenomenon,

known as invariant object recognition. Invariance is a measure of how well the human visual system or computer algorithm recognizes objects despite transformations in their appearance (e.g., size, viewing angle).

To test invariant object recognition in human subjects, Isik presents different objects (e.g., faces, inanimate objects, letters, scenes) while the subject receives a MEG scan. Vision happens automatically, so subjects view the objects without being asked to perform a task. To analyze the MEG data, Isik uses a machine learning algorithm that associates a pattern of MEG activity with the image the subject was shown.

"We found we could very accurately determine which image a subject was viewing just based on the MEG data," she observes. "In addition, because MEG provides very high temporal resolution, I can see how the neural signals evolve in response to the images." (Figure 1)

## Object recognition in space and time

Investigators Aude Oliva, PhD, Radek Cichy, PhD and Dr. Pantazis, are using MEG and fMRI to study how the visual processing of objects in the human brain evolves in time and space within the first few hundred milliseconds of neural processing.

"We still lack fundamental knowledge on the 'where' and 'when' of these processes," Dr. Cichy says. "We're looking for analogies for how this processing works from a mechanistic viewpoint."

Subjects are presented with 92 different object images at 1.5- to 2-second intervals while receiving MEG and fMRI scans. The images represent six categories: human and non-human faces and bodies, and natural and artificial objects.

A machine learning algorithm is employed to determine when individual objects are decoded (i.e., "recognized") based on MEG signals in the brain's ventral visual pathway. The timing of assignment of objects to their membership in a category (e.g., human v. non-human) also is examined. To obtain spatial information, the MEG results are compared to fMRI responses to the objects.

"Individual images are decoded as early as 60 ms in the primary visual area, whereas the object's membership in a category is decoded later – ranging from 120 to 170 ms – with further processing in the inferior temporal cortex," explains Dr. Cichy. "These studies provide an integrated space- and time-resolved view of human object categorization during the first stages of vision. Importantly, this research provides a quantitative link between human visual dynamics and results from studies of the visual system of primate models." (Figure 2)

## Neural basis of attention

Attention to certain visual characteristics of an object is actually guided by widely distributed neural networks in the brain. These networks receive information from early visual areas and relay signals back to improve the integration of this visual information into a concept of the object or its characteristics. Research by Prof. Robert Desimone and Daniel Baldauf, PhD, is helping identify the higher order brain networks responsible for attention and the mechanisms by which they coordinate the refinement of object recognition.

*"We produced a first-of-its-kind movie that illustrates how information travels in the human visual cortex in a resolution of milliseconds and millimeters."*

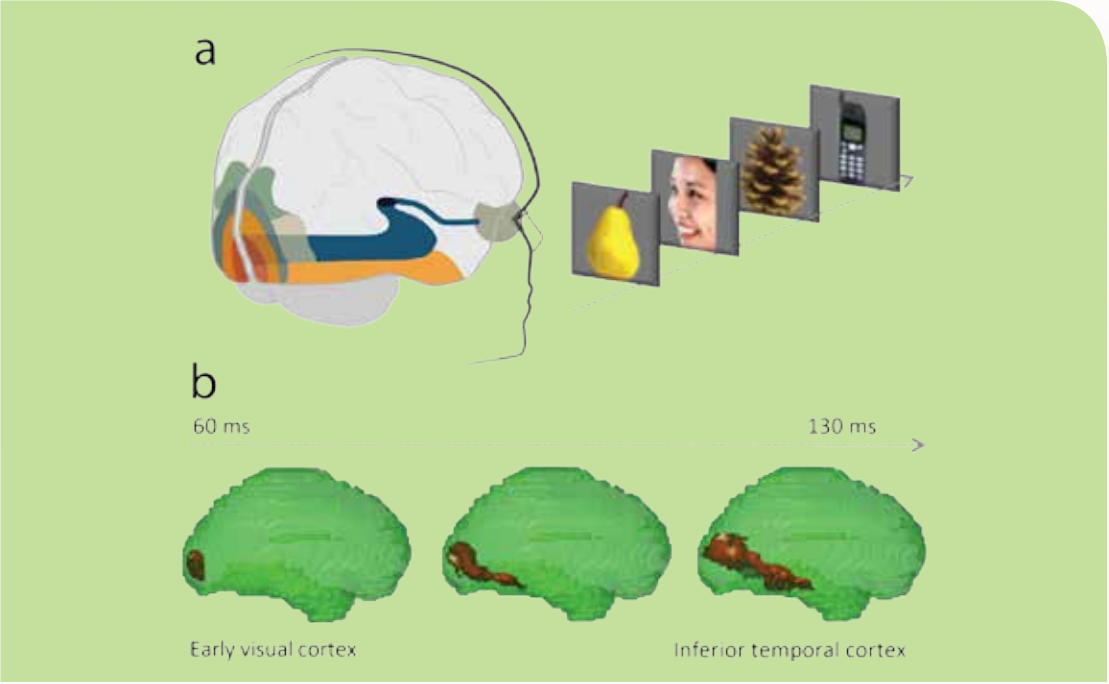


*Figure 2. a) Observers saw 92 different images of everyday objects while their brain activity was measured with MEG and fMRI. b) Combining MEG and fMRI data with representational similarity analysis, MIT researchers showed which part of the brain is active shortly after an image appeared. At about 60ms, only the early visual cortex in the back of the brain was active, a brain region known for early visual analysis. Subsequently, activity spread to brain regions involved in later visual processing, until the inferior temporal cortex was activated, a brain region that represents complex shapes and categories of objects.*

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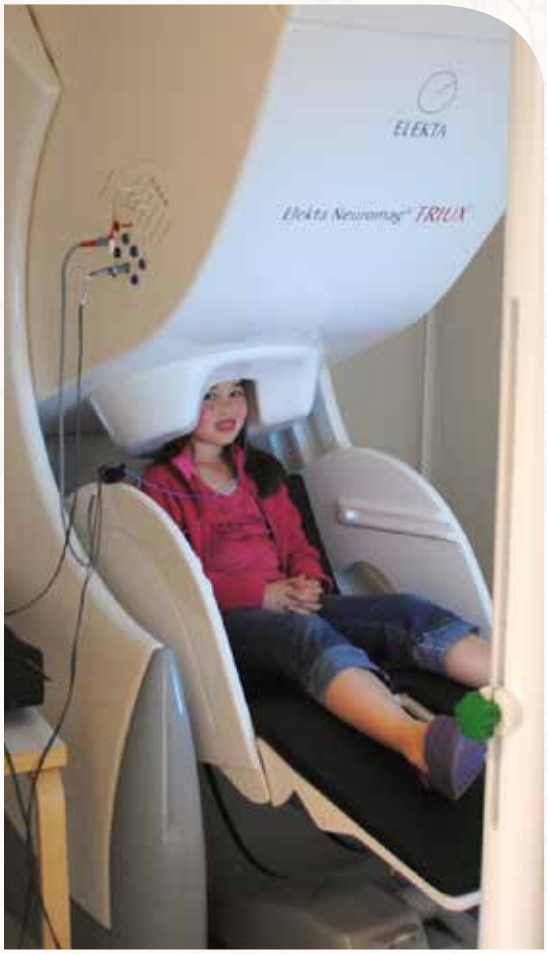
*"MEG's ability to measure the brain's response to repeated stimuli is helping researchers understand Autism Spectrum Disorders (ASD)."*




*MEG technology is very quiet and comfortable, offering an ideal environment to study the visual system of children participating in visual experiments at MIT'*

An example of how this bottom-up and top-down communication system works might be a scenario in which one is looking for a friend at the airport who is wearing a red sweater.

"Knowing your friend is wearing red allows you to selectively concentrate on that color," Dr. Baldauf explains. "A brain network called the inferior frontal junction [IFJ] would encode the target color red and then selectively engage the areas in the visual cortex that process red. Accordingly, this boosts that visual information over, for instance, green or blue items."

The use of MEG, fMRI and diffusion tensor imaging (DTI) have helped Dr. Baldauf better understand this process. Experimental subjects are presented with short movies containing images of either houses or faces and – importantly – shown in a specific rhythm to enable frequency tagging and reveal if certain brain areas are coupled.

"If we present something in a 2 Hz rhythm on the screen, we will find some neural networks that also oscillate at 2 Hz," he says. "We found evidence that the IFJ guides the attentional process. If you attend to a face stimulus, the IFJ becomes functionally coupled with the fusiform face area, and if you attend to a house stimulus, the IFJ connects stronger to an inferior temporal area, the parahippocampal place area, which is more attuned to houses."

## Visual habituation in autism

MEG's ability to measure the brain's response to repeated stimuli is helping researchers understand Autism Spectrum Disorders (ASD). Profs. Pawan Sinha and Margaret Kjelgaard, and MEG Lab Director Dr. Pantazis, recently completed a study exploring ASD subjects' and control subjects' habituation to auditory stimuli. This study showed that ASD subjects demonstrate increasing MEG signal strengthening to periodic auditory stimuli, consistent with a lack of habituation that contrasts with the diminishing MEG signals in the brains of normal control subjects.

"The hypothesis is that kids with ASD cannot properly habituate to stimuli – everything seems new to them and so they tend to avoid stimuli and withdraw into their own world," researchers Kleovoulos Tsourides and Tapan Gandhi conducting the study, explain. "We're now moving from testing auditory stimuli to testing visual stimuli to corroborate this sensory hypersensitivity."

In the visual modality, several experiments are underway. So far, the results have correlated well for the control subjects. "We don't have results yet for the ASD subjects, but we predict similar behavior as observed with the auditory stimuli," Dr. Pantazis says. "This would confirm our hypothesis that autistic individuals lack habituation across domains. Such findings could lead to habituation as a biomarker for diagnosing ASD very early in child development."

## On the horizon

Dr. Pantazis believes there is a great deal yet to learn in their explorations of the human visual system with MEG.

"We have only scratched the surface," he says. "I am thrilled with the progress we have made during the three years of our MEG Lab operation. These projects are unique, yet at the same time they complement each other toward a comprehensive understanding of vision. I promise more will come in the near future."

NEW!

# White paper on HIPO in Oncentra® brachy

HIPO (Hybrid Inverse Planning Optimization) is an optimization tool for brachytherapy treatment planning. As part of Oncentra Brachy, HIPO supports quick and accurate optimization of treatment plans within predefined dose constraints.

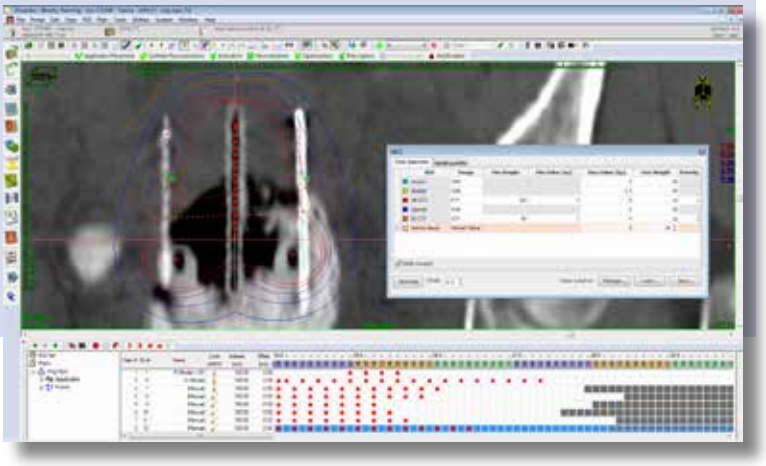
Oncentra Brachy and HIPO will help you create optimal treatment plans that fulfill your constraints both for target conformity and homogeneity, and sparing of organs-at-risk.

HIPO advantages include:

- Automated tool that guides you through the optimization process
- Make complex dose optimization accessible at significantly reduced time investment
- Full control over high and low dwell time peaks, to avoid hot and cold spots
- Option to lock your standard loading or the "good part" of a plan and optimize only the remainder using Catheter Locking

A HIPO white paper is available to you, explaining the algorithm, its operation and outcomes, as well as the unique capability of Catheter Locking.

**Access the HIPO white paper by sending an email to info@nucletron.com and enter "HIPO White Paper" in the subject field.**

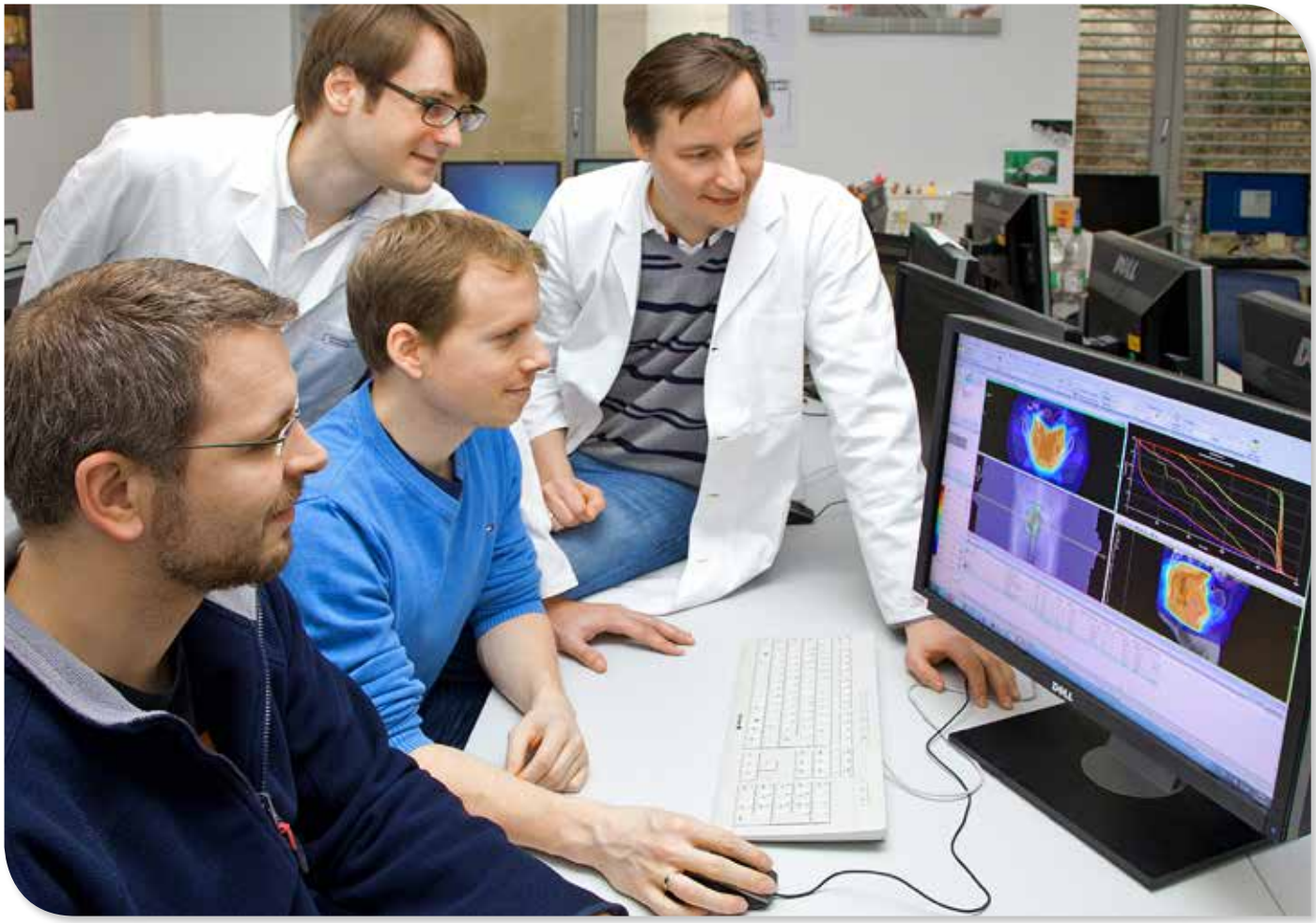


# *Tell us why we should feature your clinic in the September 2014* Wavelength

*Wavelength* is a great place to show your fellow cancer care professionals what you did to make your clinic stand out, and to give them some inspiration about what they can do to make their clinic a special place for patients – the people who are the focus of everything we do. Tell us what makes your center unique. Write a brief description of what you did to improve your facilities or services. **Photographs (high-resolution jpegs) are welcomed and encouraged. Include your name, clinic or hospital name and email address and email to: media@elekta.com.**

**Here are some examples to get you thinking:**

- Unique patient or survivorship story
- Recent renovations or use of technology such as solar-powered linacs
- Artwork, décor or architecture
- Patient parties, cancer survivor or celebrity-hosted events
- Support groups or classes such as art, music or yoga therapies, etc.



*The Mannheim physics team: (l-r) Dr. Florian Stieler, Dr. Jens Fleckenstein, Dr. Frank Schneider and Dr. Lennart Jahnke*



# First Monaco® 5 users assess benefits

Clinicians at a few of the first centers worldwide who recently began using Monaco® 5 provided their opinions about the latest version of this advanced treatment planning system. Monaco 5, introduced last fall, consolidates the best of Elekta's treatment planning solutions into a single system and features a new system architecture and graphical user interface.

**Question & answer participants:**

**University Medical Center Mannheim (Mannheim, Germany)**
Lennart Jahnke, PhD, physicist
Frank Schneider, PhD, physicist
Jens Fleckenstein, PhD, physicist

**Tulsa Cancer Institute (Tulsa [Oklahoma] USA)**
Matthew West, PhD, chief medical physicist

**Amrita Institute of Medical Sciences (Cochin [Kerala] India)**
Raghavendra Holla, MSc, DRP, assistant professor

*Matthew West, PhD, chief medical physicist, Tulsa Cancer Institute, Tulsa, OK*

*Raghavendra Holla, MSc, DRP, assistant professor, Amrita Institute of Medical Sciences, Cochin, India*

### What are your impressions about the Monaco 5 graphical user interface?

**Dr. Jahnke:** It is a tremendous change. The ribbon-based format of the user interface is significantly cleaner than previous versions. You don't hide behind small icons anymore and it seems less crowded, without as many toolbars lying around on the screen. Everything is now in a single window on the lower side of the screen, the beams, the prescription and the IMRT constraints.

**Dr. West:** Overall, it's much easier to use than that of the previous version – it's more streamlined, better organized and more intuitive. The dosimetrists seem to like it better as well.

**Mr. Holla:** The new user interface improves workflow substantially. The look and feel of it are dramatically different. It is organized in a very systematic manner. It is aimed at an easy flow of the planning process from simulation to treatment plan export. When I go for a new beam, I know that the beam modifiers, the treatment aid, beam weight and dose prescription all come in one window.

### Monaco 5 now supports all of the most clinically useful delivery techniques in a single system. How important is this to you?

**Dr. West:** Having everything in one "box" has been a huge psychological boost among the dosimetrists here. It has really increased their comfort level working with Monaco.

**Mr. Holla:** This is very important to me, because with our previous version – Monaco 3.3 – I had two databases. With 3D, I used to do it in XiO®, then for VMAT, I export that into Monaco. That was a difficult thing to handle. With all the delivery techniques in a single system, it is easy for us to migrate the entire database into Monaco and make sure that only Monaco takes the complete database. In addition, we didn't have electron Monte Carlo treatments in XiO. To have Monte Carlo electron treatments available in Monaco 5 is a big change for us, because we use quite a lot of electrons, especially for most of the breast cancers and even head-and-neck. It's very important for us to have an accurate dose calculation for electrons.

### What are your thoughts about how the new system architecture based on CPU and GPU-based technology is benefiting your center?

**Mr. Holla:** I have found that by employing the GPU for the collapsed cone algorithm, Monaco 5 boosts the speed and performance of 3D dose calculations over the previous version.

### What else about Monaco 5 impressed you?

**Dr. Schneider:** Frankly, it was a pleasant surprise that we could merely switch off Monaco 3 on one day and switch on Monaco 5 without any issues. The transition went very, very smoothly. We didn't have to redraw all of our templates like we had to do with the last version change. With Monaco 5, all of the existing templates worked.

**Dr. Fleckenstein:** Monaco 5 provides us with Segment Shape Optimization for the dynamic MLC, in addition to feet-first orientation of the CT scan, which enables us to set up CT scans for patients who have tumors in the lower abdomen or extremities. We also will be able to develop 3D plans, and there are some contouring features – such as a pearl tool that allows you to draw freehand contours – that are much better in Monaco 5.

**Mr. Holla:** The change in the beam model – which used a single machine with all the photon and electron models including VMAT models – really impressed me. It is easy to change the beam energy in the planning process.


*Jesse Kaestner, Chief Radiation Therapist and Department Manager, Epic Care*

*"Since Epic Care began using IQ Scripts in May 2013, our staff have experienced a much more fluid, orderly and streamlined radiotherapy operation."*

# Boosting workflow efficiency with MOSAIQ® IQ Scripts

## *Epic Care injects increased automation and process improvement into its radiotherapy service*

*Epic Care's three radiation therapy centers in the California communities of Antioch, Dublin and Pleasant Hill have used MOSAIQ® since 2008. However, the complexity of the radiotherapy workflow meant there were always areas to improve and standardize. With MOSAIQ® IQ Scripts, Epic Care has dramatically simplified its radiation therapy workflow, by enabling the department to consolidate and eliminate many Quality Check Lists (QCL's), more fully exploit Assessments and automate the creation and completion of documents via eScribe merge fields.*

**Before IQ Scripts, staff at each Epic Care center** coordinated the flow of radiation therapy activities through MOSAIQ, generating a quick order and QCL task sets for a particular patient's care. Once each workflow step was complete, the next QCL task set would be sent to another staff member to complete related to the patient's movement through the radiation therapy process. The somewhat disjointed nature of task sets and QCL's, however, resulted in a sometimes less-than-optimal workflow.

"The QCL's in a task set didn't have any particular order of when to complete them, and any given task set could contain as many as 10 QCL's," says Jesse Kaestner, Epic Care's Chief Radiation Therapist and Department Manager. "We simply had too many QCL's."

## Scripting an ideal solution

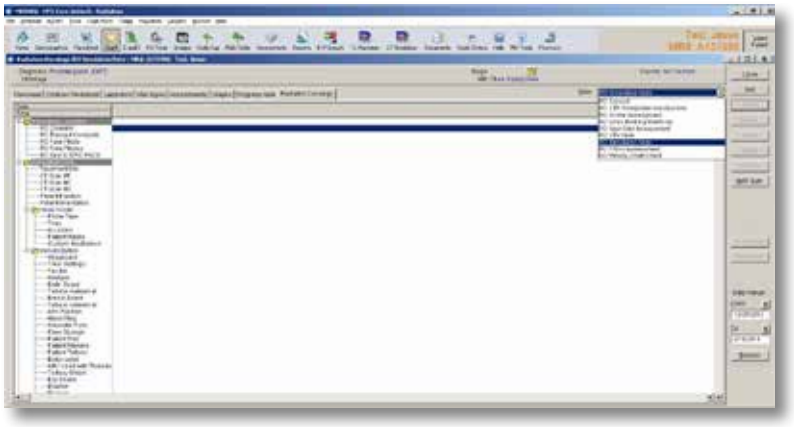
Epic Care needed a way to reduce the number of workflow steps (i.e., completion of QCL's) and speed up the workflow process in a coherent manner. MOSAIQ IQ Scripts presented the ideal solution, enabling Epic Care to automate and customize key aspects of the radiotherapy workflow to match its needs. IQ Scripts utilizes simple scripting via preferences that link together tasks in a chain. They automatically trigger the presentation of one or more new QCL's or an Assessment when a previous QCL or Assessment is completed.

In its implementation of IQ Scripts, Epic Care also exploited an improved Assessment design in MOSAIQ 2.5 to consolidate many discrete QCL's into the automatic presentation of items in checkbox Assessments. IQ Scripts automation also permitted data in Assessments to be captured and merged into eScribe documents, thereby eliminating the time-consuming manual completion of MS Word documents.

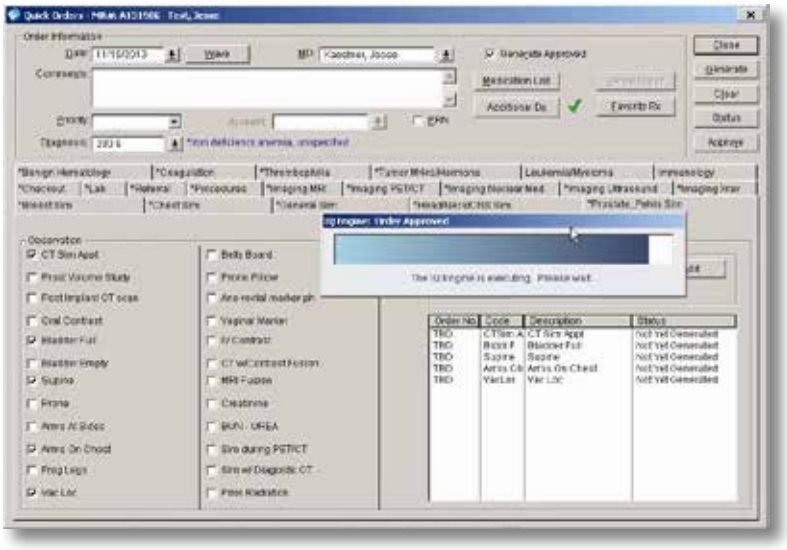
"With IQ Scripts, I was able to reduce the number of QCL task sets from 68 to 0, and eliminate approximately 35 QCLs, most of which were inactivated and converted into line item checkboxes within Assessments," Kaestner says.

**FOR ADDITIONAL EXAMPLES**

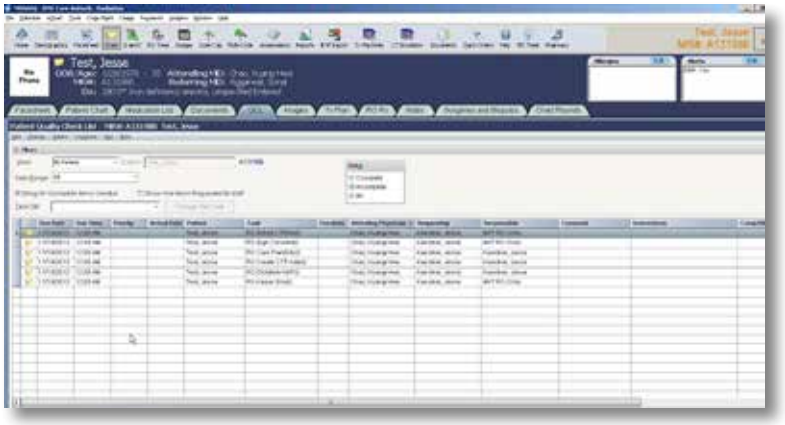
of IQ Script workflows at Epic Care, visit
**http://www.elekta.com/mosaiqscripts**



*Pre-IQ Scripts, Assessments for both Radiation Oncology and Medical Oncology departments were combined, creating a long list from which to select the desired Assessment. Kaestner developed a new tab on this screen (Radiation Oncology) and grouped RO-only Assessments, making RO Assessment selection from the dropdown menu a quick task.*



*The clinician checks boxes that specify parameters for the patient's CT Simulation. Note that checking the box "CT Sim Appt" serves as the trigger for an IQ Script to run after the physician clicks "Generate." The IQ Script (Engine) begins executing (note progress bar above) – automatically generating QCL's for the next step (Figure 3).*



*Automatically generated QCL's arrive in staff members' boxes ready for execution. Alerts can also be set up to remind users to complete the QCL.*

# What makes your center unique?


## New Zealand center debuts advanced Elekta technology for lung radiotherapy

**Auckland Radiation Oncology (ARO) is the first and only center** in New Zealand to employ Elekta's Agility™ beam-shaping technology and Symmetry™ software to deliver highly accurate stereotactic body radiation therapy (SBRT), giving patients hope for treatment of previously incurable tumors.

In November 2013, a male patient diagnosed with medically inoperable early stage non-small cell lung cancer, was ARO's first to benefit from SBRT. The treatment was delivered on the Elekta Synergy® linear accelerator equipped with Agility 160-leaf multi-leaf collimator (MLC).

"PET staging confirmed an active lung tumor and no nodal involvement. Based on the clinical evidence and the patient's condition, we determined that surgery and other alternatives were unsuitable for this patient, and that his best option for this potentially curable cancer was SBRT," explains Dr. Louis Lao, ARO Radiation Oncologist. "Patients tolerate SBRT well, and several studies show survival and local control advantages as well as a very acceptable side effect profile and treatment-related morbidity."

For highly accurate and reproducible positioning for the planning scans, the patient was immobilized with the BodyFIX® system, while the bellows respiratory monitoring system was used to correlate breathing motion to the tumor position. 4DCT scans acquired for the different breathing phases were used to determine the internal target volume and planning target volume (PTV) for precision treatment planning.

The treatment planning for delivering 60 Gy in eight fractions was aimed at closely conforming to the PTV while substantially minimizing dose to surrounding critical organs. Agility contributed to exceptionally low radiation leaf leakage, thereby reducing the integral dose, while the fast leaf speed and high precision leaf positioning provides better plan quality and delivery.

Daily imaging before treatment utilized the Symmetry 4D CBCT on the XVI system. This enables the monitoring of respiratory motion and correction of baseline shifts. Symmetry also provides better avoidance of moving critical structures at the time of treatment. For sub-millimeter positional accuracy, setup corrections were remotely applied using HexaPOD™ robotic patient positioning system, which offers six degrees of positioning freedom.

Setup correction was followed by 3D XVI verification scans before, halfway through and at the end of the treatment.

The patient remarks that his SBRT treatment has given him renewed hope in his fight against cancer, but above all he values the exceptional effort, kindness and care shown by ARO staff.

"My initial fears about the therapy melted away each day as soon as the staff engaged with me and made me feel valued and respected," he says. "Their concern for my well-being was very much appreciated and it made a huge difference throughout my treatment journey."

"We continually do our utmost to provide the best technology and care for our patients," adds Denise Redwood, Manager, Radiation Therapy Services at ARO. "The introduction of SBRT has helped us improve the accuracy and convenience of treatment, and provides better survival benefits that were previously unavailable for patients who are candidates for this treatment."

*"We continually do our utmost to provide the best technology and care for our patients."*

*At Elekta, we share a passion with our customers to advance the frontiers of cancer care and enjoy sharing news from clinics that are treating patients more effectively, precisely and efficiently with the help of Elekta technology. We asked readers of* Wavelength *to tell us what makes your center unique. Here are a few stories from across the globe.*


## Iraq's first new cancer clinic in more than a decade treats first patients

**With the assistance of foreign companies, Iraq is working to rebuild** and reinforce its healthcare delivery capabilities. On November 6, the Maysan Center for Tumor Treatment began treating patients with its complement of new Elekta radiation treatment systems and software. On November 26, Iraqi Ministry of Health officials inaugurated the new clinic, located in Mamouna, Maysan Province, about 400km (250 miles) southeast of Baghdad.

"Up to this point, Iraq had operated some very old Siemens linear accelerators in the center of Baghdad and a few cobalt teletherapy machines," says Dr. Emad Salman, director of El-Etimad, Elekta's Baghdad-based distributor partner. "Most patients were traveling outside of Iraq to Iran, Jordan and Turkey for treatment."

Maysan Center for Tumor Treatment is equipped with two Elekta Synergy® Platform systems, in addition to XiO® treatment planning system, MOSAIQ® Oncology Information System and patient fixation solutions.

"The Maysan center chose Elekta because of its sophisticated products, in addition to Elekta's willingness to support the clinic in a still-perilous region," Dr. Salman observes.

"We received assurances that when the center needs support, Elekta would provide it," says Dr. Salman, whose distributorship is coordinating medical and administrative staffing of the clinic for the first six months. "The company demonstrated this level of support initially by sending four Elekta engineers to work with three El-Etimad engineers to rapidly conduct the installation phases – it took just three weeks. They were able to complete commissioning in less than a month. I think this reflects Elekta's seriousness and commitment to finishing this project in a very short time, and to start treating the high number of Iraqis who need advanced care."

The Maysan clinic will treat 40 to 45 patients per day.

Iraq's radiotherapy capacity will grow further in 2014, as El-Etimad and Elekta recently signed a contract to install two new linear accelerators in the Baghdad Oncology Center, currently under construction.

"I hope other foreign companies learn from Elekta about what it takes to be a good partner to help this country," Dr. Salman says. "With such support, there will be many more success stories in Iraq." ●

*"I hope other foreign companies learn from Elekta about what it takes to be a good partner to help this country,"*



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# What makes your center unique?

*Arkadi Stolpner, MD, President of the Diagnostic and Treatment Center*

## Russia center treats record number of patients with Gamma Knife in 2013

*"I predict that with Perfexion, we will be able to treat 2,000 patients per year easily."*

**Although only 10 to 15 percent of patients in Russia** who would benefit from intracranial radiosurgery actually receive the therapy, that hasn't stopped the St. Petersburg Diagnostic and Treatment Center from beating its own "patients-treated" record every year since the center began using its Leksell Gamma Knife® 4C radiosurgery system. The St. Petersburg clinic and Moscow's N.N. Burdenko Neurosurgical Institute are the only centers operating a Gamma Knife system in this country of about 144 million inhabitants.

"An estimated 30,000 patients per year in Russia need some form of intracranial radiosurgery," says Arkadi Stolpner, MD, President of the Diagnostic and Treatment Center. "Between our center and the Burdenko Neurological Institute, we treat about 1,500 patients each per year using mainly Gamma Knife, but also linac-based modalities."

Gamma Knife radiosurgery has been available in Russia only since 2006, when the Burdenko Neurological Institute acquired its system. In December 2008, the Diagnostic and Treatment Center purchased its Leksell Gamma Knife 4C, treating about 300 patients in 2009. It built on this volume steadily, adding approximately 200 patients each year through 2012, during which about 900 patients received Gamma Knife radiosurgery.

The St. Petersburg clinic uses its Gamma Knife 4C to treat a wide array of benign and malignant, functional and vascular disorders, with meningiomas, metastases and vestibular schwannomas the top three indications.

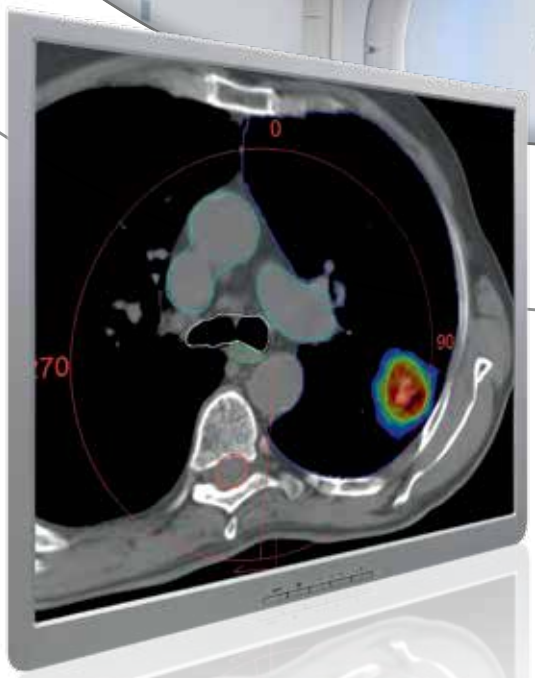
2014 presented the Diagnostic and Treatment Center with a decision to reload the cobalt-60 sources on its Gamma Knife 4C or to upgrade to Leksell Gamma Knife® Perfexion™.

"The Gamma Knife 4C has been an extremely reliable system over the last five years, but I have heard from many centers that use Perfexion that this model is also exceptionally reliable and promises major workflow advantages, so we decided to upgrade to Perfexion," he says.

The existing Gamma Knife 4C will either be refurbished and sited in a satellite clinic in Novosibirsk or decommissioned and replaced with a Perfexion system for that clinic. The St. Petersburg Perfexion is expected to begin clinical treatments in May 2014.

Depending on the level of government subsidies for patients to receive Gamma Knife radiosurgery, Dr. Stolpner is optimistic that 2014 will break another world record for patients treated.

"I predict that with Perfexion, we will be able to treat 2,000 patients per year easily," he says. ●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As compared to previous generation Elekta digital linear accelerators. Stieler F, Steil V, Wenz F, Lohr F, Department of Radiation Oncology, University Medical Center Mannheim, University of Heidelberg, Germany.
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