Advanced Visualization

A New Era in Medical Imaging Software
Discover a new era in diagnosing and sharing results at RSNA 2009.

Get the images you need, your way. Find your cases ready to diagnose on the spot. See your places networked to access and share information anywhere*. Have your needs anticipated with this, the leading edge of innovation. It’s a new era in imaging software, more deeply integrated with clinical imaging modalities than ever before. Start off an exciting experience in efficiency and ease of use: Images, my way – at RSNA 2009. www.siemens.com/RSNA +49 69 797 6420

Answers for life.

*Prerequisites include: Internet connection to clinical network, DICOM compliance, meeting of minimum hardware requirements, and adherence to local data security regulations
As a Siemens customer, you know that technology and innovation are truly part of our DNA. But even the most sophisticated innovations and high-end technologies will only help you in your daily business if they are focused on your needs and resources. To help you succeed as a healthcare provider in demographically as well as economically challenging times, we at Siemens Healthcare are working with three levers in mind: workflow efficiency, cost efficiency, and clinical utility.

The latest addition to syngo®, our unique software brand, fulfills all three requirements: The syngo.via solution supports workflow efficiency through more efficient reading of clinical images from routine and advanced applications. The thin-client solution addresses your needs for cost efficiency. And, its disease-specific workspace environment is focused on the clinical needs of radiologists, referrers, and, ultimately, patients. The development of syngo.via was triggered by the increasing importance of medical images in the clinical decision-making process to diagnose and justify the appropriate treatment protocol. New applications of imaging, technology breakthroughs in each modality, growing data volumes in the acquisition phase, less time to view and evaluate growing image datasets, and the need to easily and quickly share findings and results with referring physicians demand a new level of performance in imaging software.

syngo.via helps radiologists, IT administrators, and CFOs deal with these challenges. Efficiency, user-friendliness, and unlimited accessibility of results and findings generated by routine as well as advanced applications are some of the key features of our new imaging software. Read more about syngo.via in the cover story of this issue of Medical Solutions.

Sincerely,

Hermann Requardt,
Member of the Managing Board of Siemens AG and CEO of the Healthcare Sector
Cover Story

10 Getting the Full Benefit from Imaging
Radiologists Jacques Kirsch and Markus Lentschig, IT Administrator Andreas Engler, private practice CEO Stefan Braitinger, and Bernd Montag from Siemens sat down with Medical Solutions and shared their views on the needs and benefits of advanced imaging software.

syngo.via is Siemens’ new and highly innovative imaging software that helps save physicians time, hospital administrators money, and CIOs the burden of dealing with complicated IT systems.

To further increase workflow efficiency in MRI, Siemens is combining the Dot workflow engine and syngo.via.
The University Hospital in Essen will be one of the first centers to work with them.

Interventional procedures are steadily gaining importance when treating malignant tumors. Providing the physician with excellent image quality and a good overview leads to faster, more confident, and more successful treatment.

A busy community medical center in California put out a call for help in streamlining its operations, both administratively and clinically. Siemens listened, responded, and participated in defining the right solutions.

When China’s renowned Shandong Medical Imaging Research Institute decided to put the Guardian Program including TubeGuard to the test, the results were both positive and enlightening.

Siemens’ latest development in Adaptive Radiation Therapy allows clinicians to efficiently and precisely adjust treatment planning during a treatment fraction, fast and without repositioning the patient.

Hybrid rooms for treatment of cardiovascular disease offer an ideal setting for the use of modern techniques that put less strain on patients. Examples from Immenstadt and Leipzig show the benefits this approach can yield.

The environmentally friendly refurbished systems from Siemens Healthcare will now be combined with a plan aimed at breathing second life into the ecosystem by aiding in reforestation efforts.

Medical Solutions · December 2009 · www.siemens.com/healthcare-magazine
Siemens and COCIR: a Strong Commitment

Siemens Healthcare generates healthcare activities out of its own organization, out of well-established partnerships with leading clinical and research facilities, and together with medical associations. A very good example of the latter is the European Coordination Committee of the European Radiological, Electromedical and Healthcare IT Industry, COCIR. Just recently, COCIR celebrated its 50th anniversary. Leading-edge vendors of medical technology as well as European medical associations are among its members. It works closely with EU boards and committees and is therefore, located in Brussels, Belgium, right in the neighborhood of European Union (EU) policy makers, for example, Guenther Verheugen, the acting EU Commissioner for Enterprise and Industry. COCIR is highly involved in addressing industry requirements in European regulations so all European countries can quickly profit from the latest innovations of the healthcare industry. As president of COCIR, Heinrich von Wulfen, Regional CEO of the Siemens Healthcare Sales Regions Europe, Africa, Middle East & Customer Relationship Management, is actively involved in the organization’s programs and initiatives—along with other Siemens Healthcare colleagues.

COCIR’s anniversary was a retrospective look on establishing standards and guidelines for medical equipment on a European level, a development which is closely aligned to the growth of the EU itself. COCIR represents technical as well as healthcare-policy interests and understands the challenges of future requirements in healthcare. The association seeks answers on how healthcare systems can deal with the rising needs for higher quality services and simultaneous cost reduction. The latest achievement is COCIR’s renewed Code of Conduct. It provides guidelines for the healthcare industry about how to interact compliantly with healthcare professionals. In addition, the first industry standard on Good Refurbishment Practice was issued. It clearly demonstrates how COCIR companies are to handle refurbished medical systems to ensure their safety, quality, and continued performance. Furthermore, COCIR drives eHealth and the European Healthcare IT market’s acceleration. Understanding the importance of process optimization in healthcare in order to meet its future requirements, COCIR’s activities also concentrate on the sustainability of healthcare systems with a dedicated program that was introduced at this year’s European Health Forum in Bad Hofgastein, Austria. Siemens Healthcare appreciates the fruitful cooperation and strongly supports COCIR in driving continuous, positive developments in healthcare within the EU.

Highest Image Quality, Lowest Dose Contest

For years, physicians have been educated to follow the ALARA (as low as reasonably achievable) principle, that is, to use the minimum amount of dose required to obtain the necessary images. Siemens recognizes its responsibility in providing solutions that enable ALARA without compromising image quality. Now, for the first time, Siemens invites physicians to share their excellent images obtained at the lowest possible radiation dose by joining the Siemens International CT (computed tomography) Image Contest. The jury consists of luminary experts (Prof. Stephan Achenbach, MD; Prof. Dominik Fleischmann, MD; Prof. Yutaka Imai, MD; Prof. Zengyu Jin, MD; Prof. Borut Marincek, MD; Prof. Maximilian Reiser, MD; Prof. Uwe Joseph Schoepf, MD), who, combined, have significantly influenced the medical field with more than 3,000 peer-reviewed articles, 150 chapters/books, and more than 100 awards. Images can be submitted online by users of SOMATOM® Definition AS, SOMATOM Definition, or SOMATOM Definition Flash in six categories: cardiac, vascular, neuro, abdomen and pelvis, thorax, and Dual Energy. Image submission will end February 1, 2010.

www.siemens.com/image-contest
CAS Technique May Reduce Radiation Exposure for Patients and OR Staff

An initial study conducted at the University Hospital of Ulm in Germany suggests that computer-assisted surgical procedures may provide significant benefits for patients and OR staff. The study’s objective was to assess the effective dose as well as the organ dose of 2D and 3D C-arm imaging, comparing the conventional fluoroscopy-based approach to computer-assisted surgery (CAS) using a 3D mobile C-arm scan.

The study focused on dorsal spondylodesis and percutaneous transsacral screw stabilization. Siemens supported the hospital by providing dosimeters, an ARCADIS® Orbic 3D C-arm, and a male Rando-Alderson-phantom. The dose measurements were carried out with the help of this phantom, equipped with thermoluminescent dosimeters (TLDs). Representing the organs, the dosimeters were placed in 42 different positions. Three TLDs were positioned to obtain the results’ consistency for every measurement location.

On top of the phantom study, additional clinical cases were analyzed: In 20 prospective clinical cases of dorsal spondylodesis (with and without CAS support) and in 20 cases of percutaneous transsacral screw fixation (with CAS support), radiation exposure was documented and evaluated. In addition, two retrospective cases were evaluated and the current literature was reviewed.

The study’s results were not unexpected, but seem surprisingly conclusive: The utilization of 2D fluoroscopy during a standard spine surgery lead to an effective dose which was up to 12 times higher than the dose during a computer-assisted procedure using a mobile 3D C-arm. The effective dose of a conventional non-navigated sacroiliac joint operation was up to five times that of a navigated procedure.

The outcomes of the study regarding organ doses were similar. During non-navigated spine surgery, the lung was exposed to a radiation dose up to 32 times the dose of a navigated surgery.

The results suggest that a patient’s effective dose as well as the organ dose could be significantly reduced by using 3D C-arm imaging supported by CAS technology compared to a conventional 2D fluoroscopy-based approach. In conclusion, CAS may not only improve quality of care for the patient but also protect OR staff – a clear win-win situation.
Innovation and Creativity in Information Technology

Lifespan health system was one of this year’s recipients of the 2009 CIO 100 Awards, presented by the International Data Group’s (IDG) CIO magazine. For the past 22 years, CIO has honored organizations all over the globe with this award for presenting extraordinary achievements in information technology (IT). Lifespan, consisting of Rhode Island Hospital, Hasbro Children’s Hospital, The Miriam Hospital, Bradley Hospital, and Newport Hospital – all located in Rhode Island, USA – earned its award for an information solution it designed to support physicians’ decisions about future computed tomography (CT) scans. The solution, in which imaging and information technology work together, helps the clinician identify patients who have had a high exposure to ionized radiation. Using this information, he or she can then decide whether the patient should receive further CT scans.

Maryfran Johnson, Editor in Chief of CIO Magazine & Events, explains: “This year’s CIO 100 awards draws well-deserved attention to companies that are both innovating and creating business value with IT despite the economic downturn. These winners are an inspiration to businesses everywhere.” Lifespan and especially Carole Cotter, Chief Information Officer, take pride in what they have achieved: “I am proud of our information services team and their ability to work with other departments to innovate despite the constraints of the economic downturn. They remain focused on maximizing the technology we already have by using it in new ways that further the goals of the Lifespan hospitals.” The awards were presented in Colorado Springs, Colorado, in August 2009 during the CIO 100 Symposium.

Dedicated to Cardiovascular Exams

The premium performance ACUSON S2000™ cardiovascular (CV) ultrasound system offers exquisite image quality, full cardiovascular functionality, and the highest clinical performance in adult, pediatric, vascular, and OR environments. From image acquisition to application and review, the system offers individually customizable protocols for maximum user flexibility to further increase patient care while at the same time accelerating cardiovascular throughput. Unique knowledge-based workflow applications and automated measurements streamline clinical workflows to produce rapid, accurate, and reproducible results. The Cardiovascular Imaging and Quantification package provides the essential functionalities necessary for performing the standard cardiac exam, stress echo exam, and vascular exams: Cardiac Application Module, Stress Echo, Clarify™ Vascular Enhancement (VE) technology, TEQ™ ultrasound technology, and Advanced SieClear™ spatial compounding and Dynamic TCE™ Tissue Contrast Enhancement technology. The ACUSON S2000 CV system offers the following advanced clinical applications:

- syngo® Auto Left Heart (AutoLH) for the reliable and rapid automatic generation of left atrial and left ventricular volumes and ejection fractions for adult cardiac quantification;
- syngo Arterial Health Package (AHP) for semi-automated measurement of the Carotid Intima-Media Thickness (CIMT) with Vascular Age1 and Framingham Risk Factors to identify subclinical vascular disease and evaluate cardiovascular disease risk; and
- syngo Velocity Vector Imaging™ (VVI), a dynamic 2D method to visualize, measure, and display myocardial motion and mechanics, which allows easy gathering of information for a variety of applications, including rapid assessment of ventricular synergy in heart failure.

The ACUSON S2000 CV system's open architecture and transducer compatibility across multiple Siemens ultrasound platforms protect the customer’s investment and bring an entirely new price/performance level to premium cardiovascular imaging.

The focus on constant innovation is present throughout the entire Siemens computed tomography (CT) product portfolio and has now resulted in the release of the new SOMATOM® Emotion 6 and 16. The SOMATOM Emotion scanner remains the world’s most popular CT system1 with more than 6,700 Emotion systems installed globally since its release. The new SOMATOM Emotion builds on this platform and features an innovative new product design as well as new software features. The new software developments brought to the Emotion platform have a significant focus on the CT workflow. A key feature now available on the Emotion 6 and 16 is syngo® Expert-i, which enables access to the scan console from any remote computer attached to the hospital or practice network. This feature alone has the ability to significantly improve workflow in any practice with medical staff no longer required to physically attend the CT suite to assess images or decide on appropriate scan protocols.

The new SOMATOM Emotion system also builds on well-known total cost of ownership advantages of the Emotion CT family. With lower power requirements, reduced heat output, and significantly smaller installation space, the system is a cost-effective profit center for many customers worldwide.

SOMATOM Emotion Facelift

1 Based on system sales

Siemens offers a comprehensive portfolio of integrated tables – Artis family tables and the Trumpf TruSystem 7500 tables – for the hybrid operating room (OR). The Artis zee® family of tables comprises three different versions: standard table, table with tilt, and OR table with tilt and cradle. Carbon tabletops enable high-end and 3D imaging. Preferred for cardiac and vascular procedures, Artis zee tables provide excellent positioning, complete body coverage, and a floating tabletop.

Trumpf TruSystem 7500, equipped with a standard carbon plate and an optional universal breakable tabletop, is designed for orthopedic and neuro surgeons. High-quality imaging capabilities make the carbon tabletop suitable for interventional procedures as well as minimally invasive surgeries. The breakable tabletop, which consists of numerous segments that conform to the needs of surgeons, allows for the flexible positioning of patients.
Getting the Full Benefit from Imaging

syngo.via is a breathtaking new imaging software that helps save physicians time, hospital administrators money, and CIOs the burden of dealing with complicated IT systems.

By Irène Dietschi and Oliver Klaffke

Overview:

12 Roundtable Discussion: Reaping the Benefits of Advanced Visualization
20 syngo.via: Taking Image Processing to the Next Level
24 Magnetic Resonance Imaging: Faster and Easier than Ever Before
Radiologist Jacques Kirsch of the Hôpital Notre Dame in Tournai, Belgium; Markus Lentschig, a private radiologist from Bremen, Germany; Andreas Engler, IT-Administrator from the University Hospital in Erlangen, Germany; and Bernd Montag, CEO of Siemens Healthcare’s Imaging & IT Division, sat down with Medical Solutions and shared their views on the needs and benefits of advanced imaging software. One thing they all agree on: In the near future, syngo®.via will change the way images are handled.

Dr. Montag, what problems did Siemens want to address by developing syngo.via?
MONTAG: Today, radiologists don’t fully benefit from the progress made in imaging technology over the past ten years.

Very few other fields have seen such giant leaps of progress, and many of today’s standard imaging technologies were not available a couple of years ago. However, the way images are handled and managed has changed very little, and we have not yet arrived in the 21st century. Almost all scans are digital, but we continue to look at them in almost the same way as when they were hung on a light wall for examination. The present-day light wall is the PACS [picture archiving and communication system]. It shows very clearly the full progress that has been made in acquiring the images is not transferred to the daily work of the medical professionals who analyze them. I am very proud that we can easily produce four-dimensional cardio screens, but I am not happy that the standard outcome is still a two-dimensional, black-and-white image. We, at Siemens, would like to make all of the diagnostic benefits accessible to radiologists and, ultimately, to the patients. That’s why we developed syngo.via.

1 The information about this product is provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S. syngo.via can be used as a standalone device or together with a variety of syngo.via-based software options, which are medical devices in their own rights.
Are you taking the full advantage of medical imaging technology today, Dr. Lentschig?
LENTSCHIG: We can do so only if we are inclined to spend a great amount of time for every diagnosis. The time needed is increasing with the progress made in imaging technology. The reason behind it is the accelerating volume of data. Some ten or 15 years ago, an abdominal examination would yield results in four- or five-millimeter-thick layers. Today, we have arrived at two millimeters with more than ten times the number of images produced. We face the challenge of working with more than 2,000 images for a diagnosis today, compared to 150 a decade ago. Given the financial constraints of our present working conditions and the shortage of trained personnel – at least in Germany – it is fairly impossible to meticulously look through them all. In the end, one has to be very selective in order to get the work done. This will be even trickier in the future, as the capability of imaging technology increases.

What is urgently needed are innovations that will help us make diagnoses more easily, faster, and ultimately more efficiently. There is no way around increasing our productivity.

KIRSCH: I agree. We’ve seen the time needed to do a CT [computed tomography] scan decrease considerably over the past several years. It once took ten to 15 minutes to do a CT scan. Now, a cardiac CT only requires seconds to acquire, but we need 45 minutes to prepare the data and make the diagnosis. Of this time, more than half is spent doing uninteresting and boring work, for example, a run-off, where one is busy finding and marking blood vessels. Or when doing a heart examination, I have to remove the ribs from the image in order to see the structures I need, and then to mark the coronary arteries. These are very tedious tasks. Only when they are done can the diagnostic work start. Having an automated system that assists and takes over these jobs would be a great
Advanced Visualization
“What I like most is the approach of *syngo*.via based on workflows and indications.”

Jacques Kirsch, MD, Radiology Department, Clinique Notre Dame, Tournai, Belgium

“With *syngo*.via, I can conveniently do all the work from one computer and do not have to change places all the time.”

Markus Lentschig, MD, CEO, MRI and PET/CT Center Bremen-Middle, Radiology/Nuclear Medicine Group Practice, Bremen, Germany

“As it becomes easier to share images, I am convinced communication among medical professionals will increase and improve.”

Bernd Montag, PhD, CEO, Imaging & IT, Siemens Healthcare, Erlangen, Germany

“A client-server structure is easier to maintain and more cost-efficient to run than the workstation solution we have at the moment.”

Andreas Engler, IT Administrator, University Hospital Erlangen, Erlangen, Germany
help. I had the chance to test Siemens’ syngo.via, and I must say that it makes my work as a radiologist much easier and faster. A lot of this preparatory work is now done automatically.

Was making work more efficient the objective when Siemens decided to develop syngo.via?
MONTAG: Yes, we would indeed like to help our customers get their cases ready in less time, have the data available wherever they want to work, and benefit from innovations in the future. With syngo.via, we’ve built a system that can deal with the large amount of data that medical imaging technology is producing today. Our aim was to make it readily available and easy to handle. It is important for any diagnosis to have the best images at hand. It will also help other medical specialties, as syngo.via will make three-dimensional images easily accessible from virtually everywhere. This way, cases are better understood because they are well presented with exactly the images and all other information needed for a diagnosis.

Are the three-dimensional images a real benefit or simply a “nice-to-have” feature?
KIRSCH: They are a great plus. The possibility of switching with just one mouse-click from a two-dimensional PACS presentation to a three-dimensional one is very important. Surgeons will find this very useful when planning an operation because they have a spatial image of their patient that will give them more insight. Here is an example from my own experience: When I was at the golf driving range, my son hit me by accident with his golf club, and my cheekbone was broken. Normally, this would have meant a full operation and fixing the bone with screws. However, when the surgeon had a look at the 3D image, he thought he might be able to put the bone back in place with a hook. In the end, that’s what he succeeded in doing. Also, any physician will find it easier to talk to his patients and to show, for example, a tumor or a fracture in a three-dimensional image.

syngo.via is a client-server solution. Why did you move away from the workstation concept of the past?
MONTAG: Workstations were the best choice in the past because there was no other way to bring the huge amount of data to the radiologists’ workplace. In the meantime, this has changed. Transmission of huge volumes of data is possible today, so we can benefit from everything a client-server solution offers. We want radiologists, the hospital as a whole, and IT personnel to benefit from the innovations Siemens will be developing in the future. This is also one of the reasons we set up syngo.via as a client-server solution – it’s much easier to update the server with the latest version of the software. It also helps to keep costs at bay, because the cost of ownership is fairly predictable and makes it a safe investment.

LENTSCHIG: Productivity is really what matters in radiology today, and the client-server approach is a huge step toward increasing it. Today, we are limited in our work by the restrictions of software licenses. This often leads to unnerving situations, such as being forced to change workstations because of licensing reasons. If a certain software was installed on another workstation, you had to go to that very one to do a certain task. If you were lucky, this workstation wasn’t already occupied by a colleague. With syngo.via, I can conveniently do all the work from one computer and do not have to change places all the time.

KIRSCH: What I find very helpful with the client-server solution is that I can switch directly from PACS into syngo.via and have all kinds of images available. Before, I had to go to a different workstation – now a click is all that is needed. Overcoming the license issue is also a bonus to me. Our hospital has two branches at separate sites, but we don’t need to worry about distance in the future. Having a client-server solution also has positive clinical implications, since everyone can access the case from wherever he or she wishes. When a colleague is a specialist in cardio cases, for example, I can easily send him the 3D images for his advice.
He can turn them around, zoom in, and create exactly the views he wants. This really makes a difference. These are great advantages, because we can concentrate on diagnosis instead of losing time.

LENTSCHIG: Being networked is really one of the great advantages of syngo.via. It makes cases available to the specialist wherever he wants to work. Today, an orthopedist has to go to the radiology department to look at the images, and the radiologist has to spend some time preparing them and explaining them to him. Making 3D images easily available offers a lot of improvements. Imagine having a computer screen in the operating theater: A surgeon would be able to check the spatial situation in a patient’s knee or abdomen, for example, even while doing the operation.  

Is the client-server structure a benefit from an IT specialist’s point of view, Mr. Engler? 

ENGLER: It certainly is, and there are two sides to it. A client-server structure is easier to maintain and more cost-efficient to run than the workstation solution we have at the moment. Maintenance of several workstations requires a lot of time and is prone to errors. A centralized system is comparably easier to maintain. When I come to the office in the morning, a check-up of the system requires less time when it’s centralized. Another thing to consider is that individual workstations take up a lot of space, whereas a server is much smaller today than it used to be. The financial aspect is very important, too. A hospital no longer needs to invest in hardware, but can concentrate on software instead. A further plus is that it is a secure investment, since we will be able to take advantage of any innovation simply by installing the latest update.

Is syngo.via going to change the way radiologists work in the future? 

MONTAG: I think we will see new work methods developing in the medical community that will definitely change the way radiologists and specialists work with images. People will be working together more closely and more efficiently. We’ve seen a similar development in other walks of life in the past decade with the progress of telecommunication. The effect the cellular phone or the BlackBerry® had on our professional lives is absolutely profound and was actually not foreseeable. As it becomes easier to share images, I am convinced communication among medical professionals will increase and improve. Radiologists and specialists might more frequently ask qualified col-

Summary

syngo.via: Cases Ready, Places Networked, Needs Anticipated Radiologists get their cases ready in less time. syngo.via makes computed tomography, magnetic resonance, molecular and other clinical images readily available and automatically prepares them for analysis, thereby increasing productivity. Indication-specific layouts, case navigation, and intelligent tools assist radiologists in doing their diagnostic work more efficiently. Reporting can be improved with specific report layouts.

Places are networked and enhance efficiency. syngo.via is a client-server application. Images and data can be accessed from everywhere a radiologist or physician wishes. Information is easily shared and efficiency can be enhanced.

Needs are anticipated and investments safe. Siemens’ clients benefit from continued innovations, integrated services, and foreseeable total cost of ownership. With the secure remote infrastructure Siemens Remote Service (SRS) being a prerequisite, automated remote updates enable customers to easily stay up-to-date.

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Prerequisites include: Internet connection to clinical network, DICOM compliance, meeting of minimum hardware requirements, and adherence to local data security regulations.

Usage of syngo.via in operating room or for an emergency case requires customer to provide respective emergency measures in case of non-availability of system or network.
The Financial Impact

Investing in syngo.via is a strategic decision. Radiologist and healthcare entrepreneur Stefan Braitinger argues that modern IT systems are crucial for success.

“Information technology is the new growth driver in the health market, and that is why systems like Siemens’ syngo®.via¹ will play a vital role to boost profitability and prepare for the challenges of the future,” says Stefan Braitinger, MD, a Passau-based radiologist and owner of a network of radiology practices in Southern Germany. There are strong strategic reasons for investing in syngo.via: an immediate decrease in present costs, a decrease in future costs, plus long-term growth opportunities. And, its scalability is the absolute prerequisite that offers the best adaptation to future requirements of individual care providers as well as the overall healthcare market. Braitinger firmly believes that tomorrow’s hospitals will be closely networked, so they will need open IT systems that interact with those of their partners – and that leads to increased profitability. In the healthcare market, Web-based approaches used by modern IT systems offer new, unforeseen possibilities for every player. “The Internet has shown the enormous potential for collaboration and exchange of data,” he says.

Hospitals and private radiology practices will also see short-term bottom-line benefits from implementing syngo.via, which will please every CFO. Data integration, networked architecture, and client-server systems will help to save money, for example, by increasing cost transparency, enabling closer cooperation, or avoiding double examinations. High expenditures for workstations can be saved, as syngo.via is a client-server solution that stores data and software on a single server. Computers linked to it are installed in the hospital anyway, and when outdated, they cost less to replace than the sophisticated radiology workstations in use today. Siemens’ new imaging software has an impact on the cost structure of any radiology department. It can be easily administered, is scalable, has an open architecture, and can therefore be extended without any trouble. “In our radiology enterprise, systems like syngo.via already lowered expenditure for hardware, maintenance, and handling by 50 percent,” Braitinger says.

¹ The information about this product is provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.
leagues in a different building or city for their advice. Physicians who are not trained radiologists will be able to understand the images better and faster. The different applications we have been developing support them in their daily work. They are available for showing, for example, cancer, neuro, or cardio cases in indication-specific layouts that are designed to meet the special requirements of radiologists and specialists alike. They will also find it easier to explain a diagnosis to their patients, since they can show them the results on any computer in the hospital.

KIRSCH: What I like most is the approach of syngo.via based on workflows and indications. For almost every important indication, like cardio, oncology, or neuro, there are predefined workflows that help me go through a case. And, the system is still flexible enough to make allowances for sudden needs. If, for example, I see a node when analyzing the images and am currently not utilizing the specific oncology workflow, that isn’t a problem. I simply add a feature with just one mouse click. So I can adjust the workflow to my own demands and those of the case. Those small features of syngo.via will also make a great difference. I can operate the system just with the mouse and have the other hand free to hold the microphone to dictate my findings. With the system I use today, I have to constantly put the microphone down and pick it up again.

LENTSCHIG: The indication-specific workflows help to establish quality and best-practice standards, since they ensure that in every branch of a hospital or a radiologist’s practice, everybody sticks to the same procedures. Having these workflows is a great help, because they provide good guidance built on sound medical knowledge. The concept of syngo.via reflects the way we are doing our work. One example: On a light wall, we are used to looking back and forth between images with the same orientation. In the syngo.via layout, they are shown side-by-side, so you get the overall impression very fast. With syngo.via, I can just earmark my findings. When I see a tumor, I simply mark it and it is automatically measured and the volume is calculated. Today, I still need to measure the diameter on the screen and figure out the volume with the help of a pocket calculator. In the future, I won’t lose time on that. Plus, when I need to locate the tumor again, syngo.via will automatically show it on the images. We can actually increase the diagnostic quality while using less time.

MONTAG: This is exactly the point for the radiologist. syngo.via will help raise productivity by increasing the speed of image analysis.

What are the greatest benefits of syngo.via for patients?
LENTSCHIG: They will directly benefit in all cases where speed matters. A very good example is patients who have had a stroke – where "time is brain." It is crucial that the images are analyzed as quickly as possible in order to start the right treatment. syngo.via has a special application that speeds up this process. It automatically finds the brain region affected by the stroke and then marks and measures it. It does most of the analysis a radiologist is doing manually today.

syngo.via automatically finds older images of patients, and they are already available when the radiologist logs into the system. Is that a helpful feature?
KIRSCH: Indeed it is. We spend a lot of time looking for older images and even have to go to different workstations to find them. With syngo.via, the images are already there. When I want to refer to them, a click is enough to have them available. Most examinations are made to get an impression of the progress or regression of a disease. In most oncology exams, we are interested in the results of a treatment, so we need to follow an individual tumor over time. Today, we need to look through virtually thousands of images to find the tumor again and measure it. This is a very challenging task that demands a lot of resources. Trying to compare this tumor with findings in previous exams was extremely tedious. First, one had to locate the images and then the tumor. This has sometimes taken me up to an hour, but with syngo.via, the information is just there, and the measurements are made automatically.

ENGLER: With syngo.via, the access to the data is very easy, whereas when dealing with individual workstations, the images have to be loaded manually. When using a central server, you have more processing power at your disposal. This has an effect on the speed in which the tasks are done.

Why did it take so long for innovative software such as syngo.via to be developed?
MONTAG: We developed it as soon as the time was right and the technologies were available. Image processing is a very challenging task, and one must truly understand the medical routines. In oncology, for example, it is very difficult to program software so that it will automatically recognize the outlines of a tumor when it is highlighted on the computer screen. Any experienced radiologist can do this upon examining the images. To design software that will do the same is a great accomplishment.
Taking Image Processing to the Next Level

Siemens’ new and highly innovative imaging software, syngo.via, is designed to help physicians use computed tomography, molecular imaging, or magnetic resonance imaging applications more efficiently and get the most out of Siemens’ imaging technology.

syngo.via speeds up image processing, enhances diagnostic quality, and enables physicians to share 3D and 4D images with colleagues in a network. Plus, this new technology is a sound financial investment with a predictable lifetime cost. And, since the software is run on one server, maintained remotely, and updated with the latest version, syngo.via spares hospital CIOs from the problems that arise with decentralized systems.

In the past decade, technological progress in medical imaging technology has taken giant leaps. Even minor lesions can now be spotted, and 3D images of complex anatomical structures are readily available to specialists for easier diagno-

1 The information about this product is provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.
ing the case with all of its information electronically within a network. This is exactly what Siemens had in mind with syngo.via: a highly efficient tool helping physicians get their cases done in less time, enabling higher diagnostic quality, and leaving them more time to concentrate on what they do best: caring for the patient.

Up until now, imaging data has been stored in different systems, so the physician often has to switch from one computer workstation to another and back again. He or she finds 3D images on a different workstation than the two-dimensional picture archiving and communication system (PACS), and even refers to a third one to retrieve some older data. With syngo.via, all images are displayed on one workstation. In daily life, radiologists spend a lot of time organizing their cases, postprocessing the images, and sending reports to oncologists or cardiologists, for example. syngo.via takes over many of these tasks automatically.

**My Cases Ready**

When a doctor starts reviewing a patient case on the computer, all of the available patient information on the hospital server has already been assembled. Since syngo.via "knows" that the patient has lung cancer, for example, it will show all of the images and information in what Siemens calls an “indication-specific layout.” The radiologist may even decide that he or she would like to see a given indication in a specific layout that best suits his or her needs – and in the future, syngo.via uses this layout for this radiologist and this indication. syngo.via can even guide him or her through the case,
helping him or her stick to a defined protocol that can be part of a hospital’s quality management system and will help to enhance quality and productivity. At the same time, he or she still enjoys the freedom of being able to adapt this workflow in order to make a proper diagnosis. It is not only what the radiologists see, but also how they see it: Working in a PACS world, they have often relied only on two-dimensional images. A 3D representation was regarded as something for the true specialist, and was used only in certain cases. syngo.via shows a 3D image immediately, with just one stroke on the keyboard.

My Places Networked
The easy access of 3D images in syngo.via will persuade radiologists to use them more frequently for their diagnoses, helping to improve the quality of their work. The radiologist can even share these 3D images online with any colleague. This is a great advantage, since some referrers do not feel comfortable with two-dimensional images. The 3D representation is easier for them to understand. With syngo.via, the radiologist can simply send the images to a dedicated expert, who will find it in his or her inbox and can then support the diagnosis.

My Needs Anticipated
As a client-server solution, syngo.via is easier to maintain and update than the decentralized workstation solutions frequently found in radiology departments today. With new software versions, every workstation has to be updated separately. syngo.via runs on only one server, hence a new software version can be easily installed remotely. As software maintenance is highly important in order to protect the investment, Siemens continuously provides customers with managed remote updates as part of the service agreement. Remote updating also helps hospitals benefit from ongoing Siemens innovation in the field of image processing. syngo.via will help every hospital to keep costs at bay, as the total cost of ownership is foreseeable and additional investments in hardware, such as workstations, are no longer necessary. To use syngo.via, all that is needed is a PC – or even a laptop – with a high-speed data line to the server.

CT and MR Applications for syngo.via
In cardio and vascular CT examinations, the heart is automatically segmented,
the coronary arteries are segmented and labeled, and the rib cage as well as the blood pool are “removed.”

For MR cardiac examinations, the case is automatically prepared. Images of function and rest/stress perfusion are shown in a special automated layout, and the user is able to see image data in a way that most physicians are used to from echocardiography. When scrolling up and down in one data set, the available data in the other segments is displayed in the same anatomical position. This “linkage” of data is especially useful for getting a fast and easy overview in complex situations, where even minor abnormalities can be detected by comparing all available data of the same anatomy.

MR angio cases can also benefit from the automated case preparation. Until now, handling large, possibly even whole-body angiographic images could be quite cumbersome. Now, when acquiring angiography data that covers large parts of the body, different methods can be used. syngo.via automatically recognizes the acquisition method and uses a dedicated layout. This way, the handling of very large datasets is intuitive and easy.

In neuro CT cases, patients benefit from fast and accurate stroke examination, for example. Complex neurological disorders of the head and neck can also be studied efficiently with syngo.via on CT and MR data. For MR neuro cases, the syngo.MR Neuro Perfusion Engine automatically calculates perfusion maps. Furthermore, workflow for acute neuro cases is supported.

In oncology CT, syngo.via offers an automated calculation of tumor growth and total tumor burden, as well as other features like 3D Lesion Segmentation. In CT colonography, the small bowels are automatically tagged, and a “fly through” can be initiated.

MR oncology reading and follow-up are made easy through better schematic representation of all series and images. Even the most complex patient data is presented in a fast and structured way. In the ortho application of the syngo.MR General Engine, the radiologist can switch with just one click to 3D views of any sequence without changing the software or task card and combine 2D and 3D images in one layout. Applications for head-to-toe MRI scans, such as the spine (where the software assists in cervical, thoracic, lumbar, or whole-spine examinations) are supported.

syngo.via suggests a time-saving reading workflow according to modality and disease and provides the appropriate tools accordingly.

*This information about this product is preliminary. The product is under development and not commercially available in the U.S., and its future availability cannot be ensured.*
The Future of MRI: Faster and Easier than Ever Before

Productivity is the name of the game. When health budgets are under pressure while the demand for quality and output is rising, one way to cope is to increase workflow efficiency. To achieve that, Siemens is launching Dot and syngo via, two advanced and integrated solutions that will make working with MRI easier and faster.

Both solutions allow the user to automate routine tasks to their standards, which, until now, had to be done manually. These solutions make the most out of the latest advances in Tim® (Total imaging matrix) technology, which are now also ready for the market. Together with the Dot (Day optimizing throughput) engine, the throughput for magnetic resonance imaging (MRI) can be increased by up to 30 percent, Siemens specialists say. In addition, syngo®.via will help make it easier to process and document the data afterwards, making it more efficient and faster for radiologists, technologists, and their medical colleagues. This new imaging software will further enhance Dot’s increase in productivity.

Setting up an MRI system for an examination can be a tedious and complicated task. A great number of parameters need to be taken into account and medical professionals might spend up to a half-hour just to prepare an examination. “A lot of these activities can be done by intelligent software,” says Christoph Zindel, MD, Vice President of MR and Head of MRI Applications and Software Development at Siemens Healthcare. Thus, Dot is designed to take the complexity out of MRI scans and will have a profound effect on how MRI examinations will be done in the future. The seamless workflow it offers helps radiologists and technical personnel increase their productivity.

Zindel notes that there is no point in wasting the precious time of medical professionals when routine processes can be automated without compromising quality. This is exactly what Dot is designed to do. It will help to increase the efficiency of an MRI department by speeding up the examination process through Guidance, Personalization, and Automation.

Today, a patient enters the scanning room and the technologist places and positions him or her in the MRI system according to the needs and the nature of the examination. With Dot, that positioning will, to a large extent, be done automatically. If, for example, a liver scan is scheduled, the technologist positions the patient on the table and just pushes the Dot Control Center and the patient will be automatically positioned up to the abdomen in the isocenter of the magnet. For a cardiac examination, this will be up to the point where the thorax region is in focus. However, Siemens managed to make Dot even smarter when it comes to brain and knee examinations. For example, Dot features AutoAlign, which will even suggest the positioning of the slices that will offer most insight (based on the users standards of care). “The only thing the technologist still needs to do is to approve the systems’ suggestions,” Zindel says. Even more time is saved when Dot’s personalized workflows together with the customer’s sequences and protocols are used. Since every patient is different, a lot of time is spent adjusting the MRI setup to a patient’s special requirements. The setup needs to take into account the fact that a person might not be able to hold his or her breath for a few seconds, – something that is often requested of patients during an MR scan – or that a child simply won’t easily lie still during the examination.

“We designed a number of personalized workflows that are tailor-made for cases like these,” Zindel says. The radiographer simply chooses which Dot strategy fits the patient best. Dot still leaves ample room for individual preferences of the medical professionals in charge. The radiologist can define personalized protocols that reflect his or her special needs and preferences when doing certain examinations.

Dot also provides guidance for planning the examination. This will help dramatically reduce the time needed to prepare even complex scans, for example, in cardiac MRI. The user is guided from start to finish through every step of the examination and is offered “decision support.” The integrated guidance suggests what may be done next or which alternatives are available. However, it remains the radiologist’s job to make the final decision. Siemens put great emphasis on designing Dot’s user interface as attractive, appealing, and easy to use. During the

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1 The information about this product is being provided for planning purposes. The product requires 510(k) review and is not commercially available in the U.S.

2 The safety of imaging infants under two years of age has not been established.
Advanced Visualization

The development of the system, customers were an integral part and had a say on what the software should be doing and how it should work. What is always important when designing software is ease of use: It should be possible to learn to use it quickly and, even more important, intuitively.

Higher productivity comes not only from preparing the examinations more efficiently, but also from being able to analyze the images more quickly. Thus, syngo.via is designed to speed up image processing, preparing the cases, and making the results available in a network.

With the unique networked scanner, a radiologists or technologists can work simultaneously at the new Tim+Dot MRI scanners MAGNETOM® Skyra (3T) or MAGNETOM Aera (1.5T) and syngo.via on two screens with only one mouse and keyboard. With this, they can prepare and scan different patients easily without screen overlays and possible confusions, which results in a new level of efficiency at the scanner.

Thus, Dot and syngo.via work hand-in-hand to achieve a seamless workflow for the user from acquisition to diagnosis. They are the ideal combination to get the maximum output out of Siemens’ innovative imaging technology. Tim, Dot, and syngo.via will allow radiologists to concentrate on what they do best: diagnosing and helping patients.

“We would like to see performing MRI scans become easy and even fun,” Zindel says. The new Siemens solutions are a giant step toward this goal.

Christoph Zindel, MD, Vice President MR, Head, MRI Applications and Software Development, Siemens Healthcare, Erlangen, Germany

Irène Dietschi is an award-winning Swiss science writer and book author. She covers healthcare and medical issues for leading Swiss newspapers, including NZZ am Sonntag and Weltwoche.

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The Palpation Factor

An emerging technology, Acoustic Radiation Force Impulse imaging is expanding the use of ultrasound. At the Interdisciplinary Ultrasound Center of the University Hospital of Munich, Dirk-André Clevert, MD, explores the possibilities of tissue strain analytics and what it means for the detection, diagnosis, and treatment of liver disease.

By Andrea Röder

“An entirely new dimension of ultrasound information is provided with Acoustic Radiation Force Impulse [ARFI] imaging,” says Clevert as we walk the halls of the university hospital until we get to his office near the ultrasound labs. “In addition to seeing and hearing with B-Mode and Doppler imaging, tissue strain analytics applications give us the information we only used to get from physical palpation – the age-old proven medical technique, which, however, is difficult to apply except to superficial organs and structures such as the breast or the thyroid." Two innovative applications that provide numerical and visual information on tissue stiffness are about to change that: Virtual Touch™ Tissue Quantification and Virtual Touch Tissue Imaging.1 “This marks an important step in a development that will redefine how we use ultrasound in the diagnosis, treatment, and therapy of liver disease today.” Using sound waves, Virtual Touch Tissue Imaging and Virtual Touch Tissue Quantification are strain imaging applications that depict, evaluate, and measure the mechanical stiffness properties of tissue. An increase is often associated with pathology. An ultrasound push pulse is applied to a defined region of interest and the relative displacement of the tissue can be calculated. This displacement varies with the specific stiffness properties. “Stiff tissue will not be displaced as much as soft tissue, and what the system delivers is both visual and numerical information,” says Clevert as we sit down in front of the ultrasound system, where he explains the technique. “This allows us to gather valuable additional parameters of diagnostic information that we didn’t have before.” The applications provide stiffness measurements at a depth of up to six centimeters and stiffness tissue maps at up to ten centimeters below the skin.

He shows me a screen with ten different measurements he has taken of a patient’s liver. “I start by placing the region of interest about one to one-and-a-half inches below the liver capsule and then take ten separate measurements. The system calculates the average value out of those ten individual measurements,” Clevert explains. “This value shows the stiffness – or softness – of the tissue, revealing information that may not yet be visible in the conventional B-Mode image.”

Integrating the Workflow
Clevert outlines the typical examination workflow when using tissue strain ana-
Ultrasound

lytics. A thorough exam of the liver using B-Mode and Doppler imaging provides an overall status of the liver tissue as well as blood flow in the hepatic and portal veins and other vessels. "This will tell me if there are anomalies that are signs of liver disease: fibrotic and cirrhotic changes, fluid, open vessels, general flow," he says. That accomplished, the application of Virtual Touch Tissue Quantification will reveal a numerical value that allows a classification of tissue stiffness. "And if I see a lesion in the standard B-Mode, for example, a hemangioma, with Virtual Touch Tissue Imaging I can immediately determine whether it is stiff or soft." Unlike elastography, which provides the information on the basis of manual compression, Virtual Touch Tissue applications use intelligent algorithms that automatically calculate the values.

Dirk-André Clevert, MD, Section Head of the Interdisciplinary Ultrasound Center at the University Hospital of Munich, Germany, considers tissue strain analytics the most important development in ultrasound technology since the advent of Doppler imaging.
“In addition to visual and audio information, I can now ‘virtually touch’ the tissue, allowing me to determine its texture.”

Dirk-André Clevert, MD, Section Head, Interdisciplinary Ultrasound Center, University Hospital of Munich, Germany

At the same time, they address the challenges related to user-dependence and variability, as well as consistency and reproducibility. “That’s a great advantage and an absolute prerequisite for integrating strain imaging applications into the clinical routine.”

The Third Dimension of Information
According to Clevert, tissue strain analytics is the most important development in ultrasound technology since the advent of Doppler imaging. “In addition to visual and audio information, I can now ‘virtually touch’ the tissue, allowing me to determine its texture. In addition, Virtual Touch Tissue Quantification lets me obtain a numerical value to confirm and exactly determine what I see.” For Clevert, this is a decisive advantage over conventional elastography imaging, which provides visual information only. “It takes us beyond such statements as ‘a little red, a little blue,’ as provided by a conventional elastogram. It gives us a numerical value related to tissue stiffness, allowing us to assess the state and development of the disease.”

Virtual information provided by B-Mode and Doppler ultrasound imaging is an indispensable and valuable tool in liver diagnosis today; however, it has its limitations. Often, there are no visible anomalies, but the laboratory data continue to show that something is wrong. “Virtual Touch Tissue Quantification allows us to measure whether there are abnormalities in the liver parenchyma indicating an increased stiffness of the liver before it becomes visible in the B-Mode image,” says Clevert. Currently, he is participating in a study comparing the results of Virtual Touch to other established methods of defining liver stiffness. “With Virtual Touch Tissue software applications, we have a very reliable and fast tool to assess tissue stiffness, which gives us the additional advantage of being able to see what we are doing. By combining numerical values with the visual ultrasound information of the tissue and flow, we can make sure that we have really assessed it all.” In addition, Virtual Touch Tissue applications can be used for a wide variety of patients, including those with advanced ascites or distinct portal hypertension.

Therapy Control
Determining the stiffness of the liver will be increasingly requested by referring physicians. “Virtual Touch tissue analytics helps us detect anomalies in the liver at a very early stage, when we haven’t seen anything on standard ultrasound yet.
Ultrasound

Challenge:
- Clarify inconclusive laboratory findings
- Obtain information regarding the mechanical stiffness properties of tissue

Solution:
- Tissue strain analytics provides a new dimension of diagnostic information through qualitative or quantitative measurements of the mechanical stiffness of tissue

Result:
- Enables early detection of liver disease
- Greyscale image presents a map of regions and localized areas that shows relative stiffness in the tissue
- Virtual Touch applications together with conventional sonographic scans may enable physicians to avoid unnecessary biopsies
- Numeric value provides a good understanding of the general condition of the tissue
- Excellent means of therapy control

Summary

At a Glance

Tissue strain analytics comprises a suite of applications offering a new dimension of information: mechanical strain properties of tissue. These applications provide visual and numerical data not available using conventional sonographic imaging.

Three applications are currently available:
- eSie Touch™ elasticity imaging uses gentle compression to obtain a high-resolution elastogram.
- Virtual Touch™ Tissue Imaging allows clinicians to create a relative stiffness map (elastogram) for any region of interest.
- Virtual Touch Tissue Quantification is the first and only application to provide a numerical value of shear-wave speed related to tissue stiffness at a precise anatomical location.

It tells us whether the liver is fibrotic or cirrhotic.” At Clevert’s lab, the technology is also used to determine the success of Interferon therapy used to treat chronic and acute Hepatitis C. “The therapy with Interferon is expensive; however, not all patients respond and it can have adverse effects. Virtual Touch tissue analytics lets us monitor the success of the treatment and change gear if necessary.” Clevert thinks that tissue strain analytics will be implemented in the clinical routine in the near future. He says that an experienced user can make the measurements in less than three minutes. “Who wouldn’t want to make use of the additional information if it can be obtained so fast and in such an uncomplicated manner?” He and a team of researchers have recently published the results of a study investigating the use of ARFI and contrast-enhanced ultrasound to classify unclear renal tumors. “Both techniques are complimentary. We were able to characterize and visualize unclear renal masses.” As research for other applications continues, so does the integration of ARFI into higher and lower frequency range transducers. “This is a great application, and expanding its use will benefit all, patients and physicians alike.”

Further Information

www.siemens.com/strain
ADVIA WorkCell CDX automation solution integrates clinical chemistry, immunoassay, specimen processing management, centrifugation, and decapping.
Lab Mechanics

While research is increasingly showing the benefits of automating laboratory processes as labs continue to face rising demand for their services, experts agree that human touch is still essential. An automated, integrated system helps the clinical laboratory at White Plains Hospital achieve performance, business, and patient safety objectives.1

Less cost, increased productivity. Less error, more speed. Less hands-on drudgery, more time for complex tasks. Research is showing that automating laboratory processes can help labs meet the overwhelming demand to do more with less. Analytics were the first area to become predominantly automated, but robotics and digital processes have extended into the pre- and post-analytical stages, where their impact has been marked. Sarkozi et al. found that the introduction of a robotics system for peri-analytical automation in one laboratory brought a large improvement in productivity as well as a decrease in operational cost.2 In the study, the number of reported test results per employee per year within that laboratory increased from 10,600 to 104,558 while the cost per test decreased from US$0.79 to US$0.15.2 “It enabled us to significantly increase our workload together with a reduction of personnel. In addition, stats are handled easily and there are benefits such as safer working conditions and improved sample identification, which are difficult to quantify at this stage,”2 wrote the authors.

In a separate journal article, Da Rin wrote: “It has been estimated that more than 2,000 clinical laboratories worldwide use total or subtotal automation supporting pre-analytic activities, with a high rate of increase compared to 2007.”3 The clinical laboratory of White Plains Hospital Center, a not-for-profit healthcare organization serving Westchester County, New York, USA, is one of those laboratories. The facility has installed automated chemistry and immunoassay systems and added an automated workstation that integrates clinical chemistry, immunoassay, specimen processing management, centrifugation, and decapping. The main motivation for the acquisition was patient safety, but the benefits have impacted all aspects of the laboratory’s operation, from a 94-percent reduction in aliquoting to a 554-percent increase in annual billings.

Wanting It All

The decision to add or upgrade automation in the laboratory is often based on a risk-benefit analysis that takes into account current and future needs and objectives. Considerations include the laboratory’s patient population and testing menu, volume, space, staffing, business goals, and budget.

Some labs may just wish to automate their processes, allowing little room for growth, but primarily improving the quality of their service. Other labs may want to automate to increase their capa-

“We use the strength of our techs for validating test results, not delivering specimens.”

Marilyn Leonard,
Chemistry Supervisor,
White Plains Hospital Center,
White Plains, New York, USA

1 Individual results may vary.
When installing an automated workstation, Marilyn Leonard and Matt Palazola aimed to increase patient safety. The benefits, however, have impacted all aspects of the laboratory’s operation.

“The system helps us retain staff because it provides technicians with a good quality of life.”

Matt Palazola, MS, Administrative Director, Clinical Diagnostic Services, White Plains Hospital Center, White Plains, New York, USA

ities and permit an increase in revenues through outreach. White Plains wanted to do it all. The primary objective in its acquisition of the ADVIA WorkCell® CDX automation solution by Siemens Healthcare’s Diagnostics Division in Deerfield, Illinois, USA, was to reduce patient errors, largely through the elimination of aliquoting. In 2003, the hospital had issued a proclamation to meet The Joint Commission’s standards for performance improvement and error reduction declared the previous year. Reducing the manual handling of tubes and specimens in the laboratory would minimize the opportunities for error.

“We instituted a ‘We will not aliquot’ objective,” says Marilyn Leonard, the laboratory’s chemistry supervisor. Aliquots were not the only targeted objective, however. The laboratory also wanted the new instrument to help grow volume capacity, speed turnaround time, increase revenues, reduce blood draws, maximize space, and integrate with existing systems.

Choosing Wisely

Although it seems a tall order, many laboratories have a similar laundry list of needs. The best way to maximize their investment and subsequent performance is, therefore, to approach automation with their specific list in mind and a method to measure success. Included on that list should be the infrastructure requirements, both physical and digital. Every laboratory has a unique framework, which may include a laboratory information system (LIS), middleware, existing automated systems, space limitations, and staffing requirements. For instance, White Plains had a weight-bearing wall in the laboratory that constrained the available space. “We looked at systems that were monstrous and way too long to fit into our space,” says Leonard. The instrument they selected occupies 320 square feet, a good fit for the lab.

The solution would also fit in with the existing instrumentation (which includes other Siemens systems), information systems (also Siemens) and consumables (which included multiple tube sizes). “Some vendors said we’d have to draw two tubes or we could only use one tube size,” says Leonard.

Having It All

The selected instrument provides not only for multiple tube sizes, but also supports primary tube sampling: A single primary tube is intelligently routed to all required instruments, reducing aliquots. The efficiency permits a reduction in tube size and draw volume, an objective included on White Plains’ list. Aliquots were a major focus for the laboratory because technologists aliquoted
two-thirds of tubes at least once, and in many instances, up to seven times. Each time the technologist handles a tube presents an opportunity to introduce error. Hence, the patient safety measure to eliminate aliquots. The "no aliquot" policy has not yet been completely achieved, but the number of aliquots has been reduced by more than 94 percent. Technologists process approximately 800 fewer aliquot tubes a day and aliquot only samples that need to be frozen, about 50 parathyroid hormone (PTH) and Immunoglobulin E (IgE) samples daily. The laboratory has switched to 7.5 milliliter (ml) tubes, down from ten ml.

The associated decrease in consumption of tubes and labels has saved the facility money, and the reduction in manual handling has saved the technologists time. “We use the strength of our techs for validating test results, not delivering specimens,” says Leonard.

Productivity is, therefore, up. Before installing the integrated system, the laboratory processed 400 chemistry samples a day. Post-installation, that number rose to 1,200. And, the capacity has not yet been maximized; the system can handle 400 tubes an hour. “This has allowed us to shift from batch testing to routine testing 24/7,” says Leonard.

Routine results are now typically available within one hour, half the time taken previously; stats are delivered in slightly less time. “A methadone clinic sends us 300 samples at once, and each one has five screens. It used to take up to 17 hours to process these, whereas we can do them in an hour [with the new system],” says Matt Palazola, MS, Administrative Director of Clinical Diagnostic Services at White Plains.

The laboratory has also been able to expand its testing menu and outreach, bringing nearly two dozen tests in-house and allowing test volume to increase by 350 percent over the past six years.

Profitability has improved as well. Outreach now comprises 30 percent to 45 percent of White Plains’ testing volume and generates more than US$500,000 per month in revenue. Overall gross billings have increased 554 percent since 2006; the laboratory bills roughly US$4.6 million a month.

Naturally, management is happy with these results, as are the technologists, who feel neither overworked nor bored. “I can promise the techs that they will not be doing the same thing every day,” says Leonard.

The system has improved recruiting and retention efforts. Leonard notes that the prestige drew seven new hires and has contributed to a low turnover. “The system helps us retain staff because it provides technicians with a good quality of life,” says Palazola.

The phone is not constantly ringing – physician calls have been halved – the system and optional decapper have reduced the risk of repetitive strain injuries such as carpal tunnel syndrome, and job security has not changed. One full-time employee was lost to attrition and another redeployed to handle a newly adopted molecular assay, but there have been no reductions in force as a result of automating the laboratory.

The cost for these improvements has been minimal – comparatively – having risen 17 percent, a figure well below the increases in volume and revenue, both of which continue to rise. Minimal downtime has helped to maximize the investment. The system has gone down only once – during a blackout. Use of the associated networking solution ensures the system continues to function even if the LIS is down. “When our hospital information system is down, other departments wonder how they’re going to manage. When it comes to chemistry, we just print and fax the results, which really makes life easy,” says Leonard.

Reliability is a benefit that helps to ensure the laboratory continues to deliver results that are timely, clinically relevant, and profitable. “We could have never managed the growth in testing volume without automation,” says Leonard. With the right automation, White Plains’ chemistry laboratory has increased its turnaround, revenue, and patient safety while decreasing sample sizes, manual labor, and, ultimately, cost.

Summary

Challenge:
- Reduce patient errors, largely through the elimination of aliquoting
- Speed turnaround time
- Grow volume capacity
- Increase revenues
- Reduce blood draws
- Maximize space
- Integrate with existing systems

Solution:
- Install ADVIA WorkCell CDX automation solution

Result:
- Reduction of aliquots by more than 94 percent, saving time and money
- Processing of 1,200 chemistry samples a day, up from 400 pre-installation
- Routine results available within one hour, half the time taken previously
- Expanded test menu and outreach
- 350 percent increase in testing volume – 30 to 45 percent of White Plains’ testing volume, generating more than US$500,000 a month in revenue
- 554 percent increase in gross billings compared to only 17 percent rise in costs
- Improved recruiting and retention efforts, low staff turnover
- Reduced risk of repetitive strain injuries

Further Information
www.siemens.com/diagnostics-automation
On Pins and Needles

Ask any woman who’s had one. Breast biopsies are painful and stressful. Even with minimally invasive techniques, a physician has to guide a needle through the breast to a lump in order to obtain a sample of the tissue for examination. Then, there’s the tortuous wait for results. But a spate of advanced imaging modalities is helping to identify malignant tumors at earlier stages and avoid unnecessary breast biopsies.

By Diana Smith
In the United States, 1.4 million women undergo breast biopsies each year, according to the American Cancer Society. Worldwide, millions more endure the procedure and the subsequent agonizing wait to find out if a suspicious area is indeed cancer. And after all that, it is estimated that up to 80 percent of the lumps turn out to be benign.

Just ask Barbara Wray, a marketing account manager in Austin, Texas, USA. When Wray had a suspicious spot on her mammogram, she feared the worst: “I called my sister sobbing and just knew I had cancer.” Wray’s doctor ordered a vacuum-assisted biopsy, a procedure that uses a vacuum technique to assist in the collection of tissue via a hollow core needle. While the minimally invasive procedure was less draining than surgery, it still took a serious emotional and physical toll. “The sucking sound from the vacuum was unnerving, and recovery from the procedure definitely is painful,” says Wray. Luckily, after all the emotional and physical toll, Barbara Wray’s biopsy turned out to be negative.

Biopsy: How Much Is Enough?

A breast biopsy removes tissue or fluid for examination by a pathologist to determine if an abnormality is benign or malignant. Not so long ago, almost all breast biopsies were performed by “open” surgery, a procedure that is done in the operating room and requires sedation and stitches. Surgical biopsies remove a significant amount of tissue (from the size of a grape to a golf ball), cause excessive external scars, and even breast deformities. Plus, the surgeries are costly. Today, minimally invasive biopsies, including core needle and vacuum-assisted procedures, are performed under local anesthesia, are faster, and require less recovery time. They also leave smaller scars and are less expensive than surgical biopsies. Even so, most patients would prefer to opt out of the procedure if possible.

Imaging Innovations

Imaging techniques play an important role in helping doctors perform breast biopsies, and image guidance depends on how the abnormality is found, whether seen on a mammogram, with ultrasound, or with magnetic resonance imaging (MRI).

In the last decade, breast imaging has undergone a technological revolution. Reinvented familiar technologies as well

“For dedicated clarification, you need all three: high-quality mammography systems, ultrasound, and MRI.”

Evelyn Wenkel, MD, Department of Radiology, University Hospital Erlangen, Germany

Figure 1: Suspicious lesion in the left breast with partially unsharp margins in a T1 weighted image.

Figure 2: ADC value of $1.39 \times 10^{-3} \text{mm}^2/\text{s}$ indicating a benign lesion.
Breast Biopsies

as new, sophisticated imaging technologies are making it possible to identify cancer in earlier stages and reduce the number of unnecessary biopsies.

“For dedicated clarification, you need all three: high-quality mammography systems, ultrasound, and MRI,” explains Evelyn Wenkel, MD, Department of Radiology, University Hospital Erlangen, Germany. “Today, the equipment is faster and the resolution is better, so you can detect smaller cancer lesions.” Leading the way is Siemens’ wide range of breast solutions, from digital mammography and ultrasound to contrast-enhanced MRI, and emerging imaging tools, such as 3D tomosynthesis, which provide stellar image quality and other innovations to provide accurate and highly detailed clinical information.

Mammography: Still the Gold Standard

“Mammography is still the most important modality to use for early detection,” says Ilse Vejborg, MD, Chief Physician of Mammography at Rigshospitalet in Copenhagen, Denmark. “We know that it will reduce breast cancer mortality.” However, even though mammography is still the gold standard of breast cancer detection, it does present a few shortcomings. Normal breast tissue can hide a breast cancer so that it does not always show up on a mammogram. This is called a false negative. Mammography can also identify an abnormality that looks like a cancer, but turns out to be normal. This is called a false positive. These “false alarms” mean more tests and repeated trips to the doctor, which can be extremely upsetting and stressful. In recent years, significant improvements have been made regarding mammography technology and interpretation. Worldwide, more centers are relying on full-field digital mammography rather than film-based mammography. Unlike conventional mammography, digital images can be stored and retrieved electronically, which makes long-distance consultations easier. The images can be adjusted by a radiologist so that subtle differences between tissues may be noted, and improved accuracy may reduce the number of follow-up procedures. Mammography is particularly helpful in identifying microcalcifications – tiny deposits of calcium that cannot be felt but can be seen on a mammogram. A cluster of microcalcifications may indicate that cancer is present.

Studies suggest that breast tomosynthesis, which gives a 3D view of the inner structures of the breast, may significantly reduce the numbers of falsely diagnosed tumors. “It is very important to have optimum image quality in mammogra-
Breast Biopsies

“The wonderful detail now available is really helpful in confidently saying this is more than likely to be malignant, or on the other hand, saying the likelihood is greater for a benign mass.”

Ellen Mendelson, MD, Chief of Breast and Women’s Imaging, Lynn Sage Comprehensive Cancer Center, Northwestern Memorial Hospital, Chicago, Illinois, USA

Ultrasound: New Levels of Detail

Ultrasound is evolving to take on an increasing role in breast cancer detection, although it is not used for routine breast cancer screening because it does not consistently detect early signs of cancer such as microcalcifications. This imaging technique uses high-frequency sound waves that are bounced off tissues and internal organs, producing a picture or sonogram from the echoes. Breast ultrasound is used to distinguish between solid tumors and fluid-filled cysts. “Ultrasound is complementary to mammography,” says Dr. Vejborg. “Many times, we find tumors that we can’t see on mammography, but can see on ultrasound.”

Ultrasound has improved image quality in recent years. "Better image quality helps determine a diagnosis and may help avoid biopsies.”

Ellen Mendelson, MD, Chief of Breast and Women’s Imaging at the Lynn Sage Comprehensive Cancer Center, Northwestern Memorial Hospital, in Chicago, Illinois, USA, agrees. “When a screening or diagnostic mammogram doesn’t show any abnormalities in the breast, ultrasound can greatly improve the ability to"

A 17-year-old patient with large palpable mass, a fibroadenoma, and many other smaller, similar well-depicted masses. Top view is the wide B-mode acquisition, the coronal reconstruction with magnification glass over the mass in the lower left corner. In the right lower corner is a reconstruction orthogonal to the plane of the B-mode acquisition. The diagrams beneath show the location of the lesion as indicated by the cross hairs, which correlate the views. The patient requested a core biopsy, and it was done immediately after completion of the automated breast volume scanning study with guidance from the ACUSON S2000 system (handheld transducer) attached to the ABVS.

A 80-year-old man with a breast mass. B-mode acquisition image shows the irregularly shaped mass behind the left nipple with cross hairs placed over it, the cross hairs correlating with the mass on coronal and orthogonal reconstructions. The ABVS study shows the anatomy, mostly fat lobules, around the mass, with pectoral muscle in the deepest part of the image and the normal skin at the top. Core biopsy was performed using the handheld 18-L6 probe on the ACUSON S2000 system. The automated breast volume exam and a targeted handheld study prior to biopsy, including elastography, were assessed as BI-RADS category 5, highly suggestive of malignancy.
Innovations in Breast Health

Faster imaging, superior clinical detail, shorter exams – these are all part of the new generation of breast care. Diverse imaging solutions from Siemens combine laboratory diagnostics, advanced imaging, and information technologies to help physicians detect, diagnose, and treat breast cancer earlier, faster, and with greater precision. When the situation calls for excellent image quality and optimal access for biopsy, physicians and radiographers can rely on Siemens’ renowned technology to help improve diagnostic confidence and provide better patient care.

Digital Mammography

MAMMOMAT® Inspiration¹ is a highly flexible mammography platform for screening, diagnostics, and stereotactic biopsy. It increases diagnostic efficiency and confidence and makes possible a significant improvement in the early detection rate of breast cancer. It was designed with a constant focus on keeping workflow as easy and simple as possible. Its intelligent, ergonomic concept and intuitive operability make stereotactic biopsy a fast, straightforward, and user-friendly procedure. Biopsy images have the same image quality as regular mammography images, which boosts efficiency even further. MAMMOMAT Inspiration is the first mammography system to incorporate MoodLight, an LED glass panel that can be illuminated with freely selectable colors, producing a comfortable, relaxing effect. The upcoming technology breast tomosynthesis² will allow several views of the breast to be acquired from different angles. Slice images are reconstructed into a 3D volume set, providing increased visibility and higher diagnostic confidence by reducing tissue overlap – a factor that may help avoid an unnecessary biopsy.

Automated Breast Volume Scanning

The ACUSON S2000™ Automated Breast Volume Scanner (ABVS) is a highly advanced, multipurpose ultrasound system ideally suited to comfortably image patients with radiographically dense breast tissue or a history of breast disease. In less than 15 minutes, the automated system acquires full-field volumes of the breast, provides efficient and comprehensive analysis of the 3D data, and facilitates easy, semi-automated reporting. The ACUSON S2000 ABVS offers an innovative, mobile, in-suite design to accommodate virtually any environment – from dedicated breast centers to radiology departments, clinics, and private practices. Built on next-generation acoustic technologies, the ACUSON S2000 ABVS enables never-before-seen detail resolution and the ability to acquire the unique anatomical coronal plane not available using conventional ultrasound. In addition, the system supports advanced handheld, high-resolution ultrasound capabilities for biopsy guidance, color Doppler imaging, and the latest sophisticated breast applications, including eSie Touch™ elasticity imaging and fatty tissue imaging.

Magnetic Resonance Imaging

Introduced last year, MAGNETOM® Espree – Pink is Siemens’ latest innovation in breast magnetic resonance imaging (MRI). With its optimized applications, the system allows clinicians to see more, by improving accuracy and showing more details. The system can position the patient head- or feet-first and provides excellent access to perform biopsies. Additionally, both the 70-centimeter open bore scanner and the breast coil Sentinelle Vanguard offer an exceptional level of patient comfort, even for obese and claustrophobic patients. Sentinelle Vanguard is designed with variable coil geometry that not only allows accommodation of a wide range of patient sizes, but also increases signal-to-noise ratio, ultimately delivering excellent image quality.

The dedicated workplace includes syngo® BreVis for flexible reading and reporting and syngo BreVis Biopsy for fast and accurate MRI breast biopsy workflow with automatic calculation of target coordinates. The syngo BreVis Biopsy user interface offers a guide for MRI interventional planning and supports breast biopsies. The easy-to-handle workflow enables shorter examination times.

¹ Device not yet available in the U.S., PMA under review
detect cancers, particularly in women with dense breasts,” she says. “You can get additional data from the sonogram by looking at the marking and the shape – the morphological characteristics. The wonderful detail now available is really helpful in confidently saying this is more than likely to be malignant, or on the other hand, saying the likelihood is greater for a benign mass.” Ultrasound is changing due to the introduction of automated breast volume ultrasound and the addition of elastography imaging. Unlike conventional, handheld ultrasound, where the user moves a transducer over the breast to obtain partial views, clinicians can now use an automated, single-sweep volume acquisition technique to scan the whole breast three-dimensionally. “We’re also looking at other things that may increase specificity,” says Mendelson. “Elastography is used to assess the stiffness of a lesion or tumor. Malignancies, which are often firm, can be distinguished from softer benign masses. Elastography may help increase the specificity of breast ultrasound interpretations.” Ultrasound is often used as part of other diagnostic procedures, such as needle biopsy, when a lesion is seen on ultrasound. Mendelson says that performing needle biopsy with ultrasound guidance, “allows for real-time capability that you get with no other imaging modality. You can see and adjust and fine tune the needle approach and get good samples.”

MRI for High-risk Patients

MRI has become an integral part of breast screening, particularly for high-risk patients, according to Dr. Wenkel. These include women with a personal or family history of breast cancer, those who have undergone previous breast surgery, and those with certain inherited genetic factors. MRI is helpful in viewing breast abnormalities that can be felt but are not visible with mammography or ultrasound.

“The modality’s role is growing: In cases where breast MRI is the only modality to detect the tumor, we have to offer MRI-guided biopsies to the woman to get to the histological specimen,” says Wenkel. Dr. Mendelson adds, “Increasingly, MRI is being used in the evaluation of both breasts when a patient has a new diagnosis of suspected cancer. At Northwestern, we do about five or six studies a day, and we do about seven biopsies a week with MRI guidance in addition to all of our interventional procedures with stereotactic guidance and with ultrasound guidance. The MRI piece is becoming extremely important in the management of cancer patients.”

On the Horizon

An exciting development still to come, digital breast tomosynthesis, is a 3D imaging technology that will take two-dimensional images and reconstruct them to reveal depth. During this imaging procedure, a machine takes a series of X-rays as it rotates around the breast. Tomosynthesis allows the breast to be viewed in many thin slices, which can be combined into a three-dimensional picture. It may allow doctors to detect smaller lesions or ones that would otherwise be hidden with standard mammograms. The bottom line? Advanced imaging techniques play an important role in screening as well as diagnosis, and in the performance of minimally invasive breast biopsies. New and better imaging tools improve breast cancer diagnostic accuracy. For patients, the new techniques mean more comfort and reduced time, cost, and stress — and possibly, additional criteria for enabling the reduction of benign biopsies.

Diana Smith is a freelance journalist specializing in medical topics based in Liberty Hill, Texas, USA.

Summary

Challenge:
- Reduce the number of unnecessary surgical biopsies for patients with suspicious breast lesions or masses
- Decrease risk of complications for patients due to more tissue removal and necessity of anesthesia in surgical procedures
- High costs associated with OR-based surgery
- Difficulty in determining the difference between malignant and benign tumors without using surgical biopsy
- Reduce waiting time for patient results

Solution:
- A wide range of new imaging solutions from Siemens to accurately determine whether an abnormality is cancer, providing imperative information about disease presence and which treatment options may be most effective
- Innovations in mammography, ultrasound, and MRI for increased patient comfort
- New systems that allow significantly improved access and stellar image quality when needle biopsies are indicated
- Education for physicians, clinicians, and patients about the benefits of the new imaging modalities for detection of disease
- Improved management workflow, increasing efficiency and access to information

Result:
- Superior image quality
- Increased use of imaging or image-guided biopsies, a much less invasive procedure with fewer complications than surgical biopsies
- Optimized screening and diagnosis as standard protocol
- Less waiting time for test results
- Lower-cost diagnostic tools

Further Information

www.siemens.com/breastcare
Hybrid Imaging Gains Momentum

With more than 500 installations, Siemens SPECT·CT technology shows that hybrid imaging – providing increased diagnostic accuracy and clarity – is here to stay. Four professionals describe their experiences with the imaging modality.

By Amy K. Erickson
Imagine being able to peer inside the body with perfect 3D clarity to identify disease with remarkable accuracy. Symbia® TruePoint™ SPECT-CT (single photon emission computed tomography/computed tomography) from Siemens makes it possible for physicians to do just that. With a single scan, this hybrid technology fuses images captured on both a molecular and structural level, giving doctors a powerful tool for the diagnosis of disease and trauma.

Launched in 2005, Symbia is the first system to combine the functional sensitivity of SPECT with the detailed anatomical information provided by a diagnostic CT. The unit can perform three different scans (SPECT, diagnostic CT, and SPECT/CT) in a single, automated procedure. Combining these technologies brings together the benefits of both procedures to enhance therapy planning, speed exam time, and increase comfort and convenience for the patient.

“The SPECT·CT from Siemens is revolutionary,” says Jerry W. Froelich, MD, Director of Nuclear Medicine and Molecular Imaging at the University of Minnesota in the USA. “With a very high degree of accuracy, it gives a physician the ‘GPS coordinates’ of the problem. With this technology, we can get immediate answers to direct questions. Only SPECT/CT can offer this kind of accuracy.”

From cancer to heart disease, the incorporation of the two imaging scans offers several critical advantages over separate CT and SPECT studies. Because Symbia SPECT-CT can detect the early faint indicators of disease on a molecular level in addition to providing detailed structural information about a tumor, diagnosis can be earlier and more precise, which leads to more effective treatments. “The SPECT/CT shows precisely where the tumor is in the bone or soft tissue,” says Froelich. “Once treatment begins, we can follow the patient’s progress using this technology.”

The Symbia SPECT-CT Experience

In cardiac applications, SPECT/CT can present valuable information about cardiac function and overall health. "One of
the consistent problems in cardiac imaging is that you have patients with different body types who have different degrees of attenuation in the heart,” explains William F. Pavlosky, MD, Radiologist and Nuclear Physician with the Department of Diagnostic Imaging at St. Joseph’s Health Care in London, Ontario, Canada. “The SPECT combined with the CT technology gives physicians the confidence to determine whether they are looking at a real finding or an abnormality caused by motion or attenuation,” he says.

Pediatric Radiologist and Nuclear Medicine Physician Helen R. Nadel, MD, is the Head of the Division of Nuclear Medicine at British Columbia Children’s Hospital in Vancouver, Canada. She routinely uses the complementary images to diagnose health problems in babies and children who are nonverbal or are unable to communicate. “Using SPECT/CT,” Nadel says, “we are often able to find unanticipated fractures, infections, and tumor-like structures.” For example, she recently treated a child who appeared to be in pain. “When we did a bone scan using SPECT/CT, we were expecting to find a hip fracture, but instead we found an abnormality in the soft tissue around the hip,” explains Nadel. The treatment of this condition is very different from the treatment of a fracture. “Being able to see the anatomy of the abnormality is invaluable to accurate diagnosis and treatment,” she says.

**Saving Time, Increasing Diagnostic Precision**

One of the most noteworthy benefits of the Symbia SPECT-CT system is the improvement in diagnostic accuracy because of the vast amount of information gathered during a single scanning session. Additionally, by providing faster SPECT studies and CT studies in less than 30 seconds, the exams are easier on patients. Patients also appreciate the fact that SPECT/CT eliminates days or weeks of uncertainty while waiting for test results. “SPECT/CT can allow in many circumstances one sitting, one test, and an available answer at the end of the test. This reduces the time to diagnosis because there is no need for the patient...
to have further tests,” says Pavlosky. “In my experience, the higher quality of the CT allows you to see ancillary things like small tumors, fractures in the spine, and other disease processes. The image quality is phenomenal, and this is an extreme benefit to me from the standpoint of diagnosis. You serendipitously find things that you might not otherwise have found, and that leads to better patient care.” The integrated scans also reduce the number of hospital visits. When a child with cancer comes in for nuclear medicine, says Nadel, a CT scan can be performed at the same time, often sharing the same intravenous line. Nadel has been using the Symbia SPECT-CT system since April 2007. “It makes for one-stop shopping, whether we need to test for a single issue or multiple problems,” she says. “It takes virtually seconds to acquire the data, and Siemens SPECT-CT has the tools to enable the lowest possible dose that still allows us to get the best information.”

**Less Invasive Surgery**

Precise scans from the Symbia SPECT-CT also help physicians plan more effective treatment strategies and reduce surgical risk. “Our goal is to diagnose and treat patients with minimally invasive procedures in an outpatient setting,” says Homer A. Macapinlac, MD, Professor at the Department of Nuclear Medicine at the Division of Diagnostic Imaging of the University of Texas M. D. Anderson Cancer Center in the USA. “We are not only imaging for the sake of diagnosis, but the images also assist the surgeon in determining the cure.” Macapinlac has been a strong proponent of hybrid imaging for many years and was one of the first physicians to use the system. “With early adoption, there is always an uncertainty in embracing advanced technology,” says Macapinlac. “We quickly found that this modality allows us to identify the specific clinical need of each patient, which is a significant advantage for surgeons.” For example, notes Macapinlac, the SPECT/CT is often used to image parathyroid tumors. “The neck is a complicated anatomy, and these tumors can be the size of a pencil eraser. It’s best to know exactly where the tumor is,” he explains. “Armed with SPECT/CT imaging data, a surgeon can be guided to perform minimally invasive surgery to remove the tumor, using a small incision and local anesthetic. Wherever possible, we avoid unnecessarily invasive surgeries.”

**Summary**

**Challenge:**
- Necessity for patients to undergo multiple sessions with different scanning technologies in order to identify health problems
- Problem of metabolic processes making it difficult to corroborate data from separate modalities
- Ancillary tests often needed following a CT or SPECT scan to provide additional information
- Days or weeks of waiting for test results

**Solution:**
- Being able to perform three different scans (SPECT, diagnostic CT, and SPECT/CT) in a single, automated procedure with Symbia TruePoint SPECT-CT
- Comprehensive, accurate diagnostic information quickly captured, both on molecular and anatomical levels
- A system that measures attenuation correction with diagnostic multislice CT, providing the most accurate attenuation map possible

**Result:**
- Pinpointing the location, size, nature, and extent of the disease in the body
- Two scans performed during a single procedure, reducing exam times and increasing workflow
- Amount of information gathered in one scanning session considerably increased, leading to improved diagnostic accuracy as compared to conventional scans
- Improvement in the overall treatment and prognosis of the patient
- CT scan data acquired in less than 30 seconds, eliminating the inconvenience of waiting for test results
- Greatly improved image clarity for physicians, leading to better treatment and improved planning for necessary surgery

**Further Information**

www.siemens.com/SPECT-CT

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Precision Meets Efficiency in Radiation Oncology

The latest development in Adaptive Radiation Therapy, Siemens’ IM-RealART Solution, allows clinicians to efficiently and precisely adjust treatment planning during a treatment fraction, fast and without repositioning the patient.

By Sameh Fahmy, MS
The term Adaptive Radiation Therapy (ART) has been used for more than a decade to describe various methods that use imaging to increase the precision of radiation therapy, but its true potential is just now being realized in routine clinical use. X. Allen Li, PhD, Chief of Physics and Professor at the Medical College of Wisconsin and Froedtert Memorial Lutheran Hospital in Milwaukee, Wisconsin, USA, notes that, in the past, the term was often used to describe adjustments to treatment plans to account for systematic anatomic changes and/or to treatment table position in order to compensate for interfractional changes in tumor location. But conventional technologies cannot rapidly compensate for changes in tumor shape that can occur randomly during the course of treatment or the rotation that occurs in regions such as the head and neck and the prostate.

With Siemens’ new IM-RealART™ Solution, however, Li and his colleagues can adjust treatment plans to compensate for both systematic and random changes in tumor location, shape, and rotation while maintaining an efficient workflow. “By adopting the IM-RealART Solution from Siemens, we’re able to treat patients more efficiently and more precisely,” Li says. “That may offer them better care because of potentially increased local control and/or reduced toxicity.”

The IM-RealART Solution combines the CTVision™ System, Siemens’ unique computed tomography (CT) scanner on rails, with the Prowess Panther RealART Treatment Planning System. CTVision provides imaging with the highest resolution and quality directly in the treatment vault, making it the gold standard imaging solution. Optimized for Siemens’ linear accelerator ARTISTE™ Solution, the IM-RealART Solution allows clinicians to rapidly take an interfractional CT scan of a patient, to adapt to significant changes in tumor, and to create a new treatment plan in around seven minutes – without the need for patient repositioning.

**A Changing Target**

Li has been evaluating Siemens’ IM-RealART for the past two years through retrospective patient analysis and has quantified significant changes in tumor location, shape, and rotation. In prostate cancer, standard Image-Guided Radiation Therapy (IGRT) can adjust for changes in tumor location that occur as the prostate shifts in response to volume changes in the bladder or rectum. However, Li points out that changes in tumor shape and rotation can also be significant, and not compensating for those changes can result in unnecessary radiation exposure to healthy tissue and decreased dose to the tumor. "Without the adaptive approach, we would be treating patients with uncertainties that in some situations can be quite large," he says. Changes in tumor location, shape, and rotation are assessed by measuring the percent volume overlap between the planning CT image and the interfractional CT. An organ overlap of 100 percent indicates that no shape changes occurred, while lower levels indicate more severe changes. Li says that based on the preliminary data from his group, a percent tumor overlap of 85 percent or less in the prostate necessitates replanning. He has also found that severe variations in prostate shape and rotation occur in nearly one-third (31 percent) of treatment fractions. The IM-RealART Solution allows the radiation oncology team to adapt rapidly to such changes. As the patient is lying on the treatment table, the CT on rails acquires a new image in as little as one minute. Li points out that CTVision is a critical component of the IM-RealART approach.
Solution, since superb image quality and soft-tissue contrast that clearly define the target and nearby critical structures are prerequisites for precise dose delivery. Next, the new, interfractional CT scan is compared with the planning CT image or a former interfractional CT scan, and the percent tumor overlap is assessed. If the change to tumor shape and rotation is negligible, the treatment proceeds as planned. If the tumor has changed significantly, rapid replanning using the Prowess Panther RealART Planning System begins.

In a process that takes approximately seven minutes, the clinician delineates the new tumor and critical structure contours using a drawing tablet and pen. The software then morphs the aperture and optimizes the segment weights. With the click of the “export” button, the new multileaf collimator (MLC) apertures are transferred to the linear accelerator and treatment delivery can start.

“The key to this technology is its ability to generate the plan rapidly,” Li says. “Conventionally, we would need at least half an hour to generate a plan. Now, we can do it in a few minutes.”

**Workflow, Patient Benefits**

Li says that the IM-RealART Solution provides workflow benefits even in the two-thirds of patients in which there are no significant shape or rotation changes. He explains that tumor location changes were previously accounted for by moving the treatment table. He notes that in addition to requiring the technician to enter the treatment vault, repositioning the treatment table introduces the potential for human error. With the IM-RealART Solution, tumor location shifts can be accounted for through MLC changes, saving time and easing workflow. He points out that in roughly the same or slightly longer time required to deliver IGRT, which only compensates for location changes, he can now generate and deliver a new treatment plan that compensates for location, shape, and rotation. The IM-RealART Solution also improves the patient’s treatment experience by keeping the CT scanner and the linear accelerator in the same room and eliminating the patient’s need to relocate. Li says that when patients know they are being treated with a state-of-the-art system that reduces exposure to healthy tissue, they gain a sense of confidence in what is undoubtedly a challenging time for them.

At the Medical College of Wisconsin and Froedtert Hospital, the IM-RealART Solution is currently being used for prostate tumors, but Li and his colleagues are already planning to assess its potential in the treatment of breast tumors. He says that preliminary data suggest that shape changes in breast tumors can be dramatic, making this an ideal site for the RealART Solution. Head and neck tumors, in which rotational changes can also be significant, as well as abdominal tumors are other sites where the technology could be particularly well suited, he says.

**IM-Confident Plan for fast IMRT**

The ability to replan treatment of patients on the spot with the IM-RealART Solution can be combined with the IM-Confident™ Plan, Siemens’ solution for fast Intensity-Modulated Radiation Therapy (IMRT). IM-Confident combines intelligent planning software with Siemens’ fast and precise 160 MLC™ Multileaf Collimator, which has a small, five-millimeter leaf thickness to provide better conformity to the tumor shape and a high leaf speed of up to four centimeters per second. It is a standard component of the ARTISTE linear accelerator, but is also available as an upgrade on the ONCOR™ accelerator.

“Conventionally, it would take about 12 to 15 minutes to deliver IMRT,” Li says. “Now with the IM-Confident Plan, delivery time can be cut down to five minutes with the ARTISTE accelerator or the ONCOR 160 MLC accelerator.”

The rapid delivery of IMRT that IM-Confident enables has clear workflow benefits, Li says. It can allow the radiation oncology department to treat an additional two or three patients per day by shortening treatment scheduling blocks from 30 minutes per patient to 25 minutes per patient. Shorter treatment times also have the potential to reduce treatment uncertainties, Li points out, since the longer patients are on the treatment table, the more likely they are to fidget and move.
Dr. Li and his colleagues are now able to treat patients more efficiently and precisely with IM-RealART, including CTVision.

Part of Li’s excitement about Siemens’ IM-RealART and IM-Confident Solutions are the possibilities they create for dramatically improving the quality of care that patients receive. “This opens the door for several innovations,” Li says. “For example, because we are able to treat the patient more precisely with this technology, we should be able to reduce treatment margins. With reduced treatment margins, we can further increase the dose to the tumor to allow us to increase local control or reduce the dose to normal structures and reduce toxicity.”

Another exciting option that the increased precision of IM-RealART enables is hypofractionation, which is delivering a course of treatment in fewer fractions. Instead of a treatment course consisting of 44 fractions, for example, treatment has the potential to be safely delivered in as little as five or six fractions. Put another way, a course of treatment that would otherwise take two months has the potential to be completed in two weeks. The cost savings could be substantial, Li notes, and patients would experience significantly less disruption in their daily lives.

And while today’s ART is concerned primarily with anatomical changes, Li says that personalized radiation therapy based on biological data acquired through imaging is clearly on the horizon. “We are moving to an era where we can design and deliver more individualized treatment, tailored to not just the patient’s geometry and anatomy, but also biology,” he says, noting that functional and physiological magnetic resonance imaging (MRI) and positron emission tomography (PET) can be used to assess the sensitivity of tumors to radiation treatment. Li and his colleagues are currently planning two clinical trials that will assess the impact of ART on improving patient outcomes. The first is to explore the use of small margin to improve healthy tissue sparing, thus reducing treatment side effects. The second is a treatment fraction reduction trial in which Li and his colleagues plan to investigate reducing the number of treatment fractions to improve patient quality of life and reduce costs.

“We always want to provide the highest standard of care possible to our patients in terms of technology, treatment, and medicine,” says Li, “Together with Siemens we’re constantly working toward that goal.”

**Summary**

**Challenge:**
- Compensating for changes in tumor location, shape, and rotation that can occur between treatment fractions
- Easing workflow and improving patient experience
- Delivering fast IMRT with precision

**Solution:**
- Siemens’ IM-RealART Solution, optimized for the ARTISTE linear accelerator, combines CTVision with the Prowess Panther RealART Treatment Planning Software to make the delivery of ART precise and efficient
- The CTVision system places a CT scanner on rails in the same room as the linear accelerator with a gold-standard image quality, eliminating the need for the patient to relocate
- Siemens’ IM-Confident Plan combines intelligent treatment planning software with Siemens’ 160 MLC, standard on the ARTISTE accelerator and as an upgrade on the ONCOR solution

**Result:**
- Treatment plans can be adapted to interfractional changes in tumor shape, location, and rotation in around seven minutes, increasing the dose to the tumor and decreasing the dose to healthy tissue
- Workflow is streamlined and patient inconvenience is minimized
- IM-Confident delivers fast and precise IMRT possibly in five minutes or less in a clinical routine for all treatment sites

**Further Information**

www.siemens.com/radiation-oncology

*Sameh Fahmy, is an award-winning freelance medical and technology journalist based in Athens, Georgia, USA.*
The hybrid room in Leipzig promotes the development of minimally invasive procedures.
Hybrid Rooms – Worthwhile Investments

What was previously the exclusive area of large-scale university hospitals is now starting to become interesting for smaller hospitals as well. Hybrid rooms for treatment of cardiovascular disease offer an ideal setting for the use of modern techniques that put less strain on patients. Examples from the German cities of Immenstadt and Leipzig show the benefits this approach can yield.

By Ingrid Horn, PhD

Dr. Wulf Ito works comfortably and under optimum control – without having to move the patient.
Mountains, forests, and lakes – the Oberallgäu region in Southwest Germany is an excellent vacation destination – which is what led Peter Schmitt there. The Cologne resident intended to spend two weeks hiking this summer, but now he is lying in the nearby Immenstadt Hospital. He suffered a heart attack at his hotel. And yet, the 68-year-old was lucky things did not turn out worse, because the Immenstadt Hospital installed a cutting-edge cardiovascular center in the fall of 2008 with a hybrid room as its centerpiece. Equipped with high-performance technology from Siemens, the room functions as a catheter lab and operating room in one.

“Hybrid” Means “Interdisciplinary”

Whether it be vascular diagnostics or therapeutic measures such as insertion of stents, dilation of vessels in the legs, or endarterectomy of blockages – all of it is possible in just this one room. In extreme cases, four different medical experts attend the operation in Immenstadt: a cardiologist, an interventional angiologist, a vascular surgeon, and an anesthesiologist. All of them have free access to the patient and a free view to the monitors. Thanks to high-resolution imaging procedures, the monitors display the current vascular situation during the intervention, comparative images, and hemodynamics. “We decided in favor of the floor-mounted version of Artis zee®,” explains Wulf Ito, MD, one of the two head physicians at the center, “and we also chose an operating table with Trendelenburg and lateral tilt.” Artis zee is a C-arm that is equipped with corresponding fluoroscopy technology and has a 220-degree range of motion. Together with the variable positioning of the operating table, it allows the physician to work comfortably and without strain under optimum control before, during, and after the intervention – without moving the patient. At the same time, the hybrid room is equipped with everything a surgeon normally needs to operate. This eliminates time-consuming changes of location for the patient and the operating team.

Careful Analysis is Crucial

The Immenstadt Hospital took great care when preparing for the installation of its hybrid room. “We’re talking about a total investment of about a million euros for technology and modifications,” says Andreas Ruland, Managing Director of Oberallgäu Hospitals (Kliniken Oberallgäu), of which the Immenstadt Hospital also is a part of. “That being the case, we have to be sure that the measures we take will pay off in the long term.” The basis for the decision was an expert report on the hospital’s economic development prospects. According to the report, the local population was undersupplied with options for treating cardiovascular disease, which caused patients to shift to hospitals in the surrounding area. In addition, some of the many tourists visiting this popular vacation destination require emergency care. The demographic development of the population and the age structure of the tourists also serve as an indicator that the number of cardiovascular diseases will continue to grow in the future. Accordingly, the experts’ report sets expectations of about 1,200 patients to be treated annually, on both an out-

“Our investment will have paid for itself within three to five years.”

Andreas Ruland, Managing Director, Oberallgäu Hospitals, Immenstadt, Germany
The Oberallgäu Cardiovascular Center (Herz- und Gefäßzentrum Oberallgäu) is a facility at the Immenstadt Hospital. It offers round-the-clock care for all cardiovascular diseases. Detecting these diseases early and treating them in line with the latest in medical science are the stated quality aims of the center, which was founded in 2008. The center’s three departments, cardiology, angiology, and vascular surgery, offer a full spectrum of services. Alongside conventional procedures such as ultrasound diagnostics and electrocardiography, the center has the full range of tools and equipment of a cardiac catheter lab at its disposal. This is the key factor defining a hybrid room. Applications for catheter technology range from vascular imaging, biopsy of the heart muscle, and implantation of cardiac pacemakers and defibrillators, to dilation of blocked vessels and placement of stents. Vascular reconstruction surgery is one of the tasks of vascular surgery, which can also be used in combination with catheter technology.

The Immenstadt Hospital is part of Oberallgäu Hospitals, which also includes hospitals in the towns of Sonthofen and Oberstdorf. This hospital association receives 100 percent of its funding from the rural district of Oberallgäu and ensures that the population of the southern Oberallgäu region, with about 80,000 people in all, has access to medical care. To this end, it provides 270 beds and employs a staff of 500 employees and 50 physicians. Each year, the association treats about 18,000 patients, most of them at the Immenstadt Hospital.

To Ruland’s satisfaction, the initial expectations have been exceeded thus far. “Having treated 600 patients already in the first six months, we will reach 1200 patients in the first year of operation.” According to the report, the hospital was not supposed to reach that figure until the third year, because a two-year start-up period to grow the patient stream had been figured into the calculations. “If we include the other interventions, for example, those involving the leg and pelvic arteries as well as implantation of cardiac pacemakers, our investment will have paid for itself within three to five years,” the managing director says with confidence. The Immenstadt Hospital is evidently – thanks to the cutting-edge technology that Siemens has been offering for hybrid rooms for a decade now – on track to win back patients on a large scale. With the first hybrid catheter lab in Southwestern Germany, the Immenstadt Hospital offers gentle, university-level care close to patients’ homes – and that means more patients and, ultimately, more income.

## Attracting Top Talent

Modern technology alone is not enough to attract the qualified staff that enhance a hospital’s reputation, but it is an essential prerequisite. The existence of a hybrid catheter lab was also a major requirement for Ito in deciding to move to Immenstadt and, together with his colleague, Professor Jan Torzewski, MD, to take over as the head physicians of the new cardiovascular center. Both men are cardiologists and complement each other perfectly. Torzewski is additionally trained in intensive medicine and Ito in angiology. “In the medium term, we intend to use our hybrid room for heart valve replacement as well,” says Ito.

## Summary

### Challenge:
- Incidences of cardiovascular diseases are expected to continue to rise
- New treatment techniques require new rooms and cutting-edge technology

### Solution:
- Analyses of target vs. actual status are a prerequisite for sensible investment decisions
- Customized room and technology solutions from a single source
- C-arms of the Artis family, with integrated imaging system technology, can be used flexibly and optimize workflows

### Result:
- Hybrid rooms can be used across disciplines
- Cutting-edge technology helps attract highly qualified staff
- Gentle procedures reduce operating and recovery times
- Modern technology opens up new patient flows
- More patients mean more income
explaining future prospects. In this field, the center is currently working with the University Hospital of Ulm (Universitätsklinikum Ulm), where Torzewski was part of a team of physicians that uses a catheter to transport the new valve to the heart, passing through an incision in the iliac region and through the femoral artery. This method, which reduces strain on patients to a considerable degree, is characteristic of current developments in cardiac surgery, a field that will come to depend on hybrid rooms in the future.

Hybrid Rooms Promote Minimally Invasive Interventions

What is still a vision in Immenstadt is already routine at the Leipzig Heart Center (Herzzentrum Leipzig). At the center, Professor Thomas Walther, MD, works as the Assistant Medical Director of the Cardiac Surgery Clinic. He ranks among the pioneers of catheter-based heart valve implantation. The existence of a hybrid room was a crucial factor in the development of this minimally invasive procedure. "Minimally invasive" means that no heart-lung machine is required. A small incision is sufficient to gain access to the defective heart valve – either via the femoral artery or via the apex of the heart. Hospital management had established a hybrid room some years ago, choosing Siemens as its partner. The room is equipped with an AXIOM® Artis ceiling-mounted C-arm. The monitors can display not only conventional images, but also images produced using the syngo® DynaCT method developed by Siemens. This method yields computed tomography-like images that depict the vascular conditions of the heart in three dimensions and with outstanding precision. For Walther, this method was a precondition for being able to develop the procedure for heart valve implantation via the apex of the heart using catheter technology, a procedure he was the first to use. Walther can now look back on 250 successful interventions of this kind. "This progress became possible through direct cooperation with the cardiologist at the operating table," the heart surgeon says with certainty. And working directly with the cardiologist saves time, too. "What we used to need three hours for, now takes us just two hours to accomplish," Walther says, outlining the potential savings.

Hybrid Rooms Broaden the Patient Clientele

Another crucial factor in determining return on investment is the hybrid room’s level of capacity utilization. Shorter operating times per intervention mean that more patients per day can undergo operations. In Leipzig, about 50 percent of interventions involving the heart valves are now performed using minimally invasive techniques, and that figure is expected to grow. In patients with severe aortic stenosis, 19 percent of replacement valves are placed using a catheter. These figures make the Leipzig Heart Center a leader in Germany and internationally.

This gentler way to operate broadens the patient clientele in any case. In particular, older or frail patients with other diseases often benefit from the reduced operating times and lower physical strain. An 80-year-old diabetic patient with a
Leipzig

The Leipzig Heart Center is a wholly owned subsidiary of RHÖN-KLINIKUM AG, based in the town of Bad Neustadt, Germany. It is affiliated with the University of Leipzig as a specialized hospital and provides maximum care for cardiac patients. The center has 380 beds and ten full-day spaces. It offers high-performance medicine for all aspects concerning the heart in order to ensure that its patients enjoy optimum quality of life. This goal is also served by the center’s own research work, which develops new methods of treatment.

The Cardiac Surgery Clinic, based at the Leipzig Heart Center, enjoys an outstanding international reputation. It is among the centers pioneering the introduction of catheter-based techniques of heart valve implantation. The clinic focuses on mitral valve surgery, aortic valve implantation, coronary surgery, treatment of heart failure and arrhythmias, as well as treatment following organ transplantation. Each year, about 3,500 cardiac interventions are performed there. The majority of them are combination interventions involving both the blood vessels and the valves of the heart. Long accustomed to working with cutting-edge technology, the clinic has had a hybrid room for some time now and with it, has amassed a large body of experience in the use of minimally invasive methods.

Dedicated to Progress

Constant fluoroscopy requires three to four minutes for an aortic valve implantation. The team can follow the course of the guide wires, precisely place the implant, and monitor the success of the procedure. This is possible only because the system’s technology keeps the level of radiation exposure for the patient and operating team very low. Imaging methods such as syngo DynaCT contribute to this. Improving them is important when it comes to achieving technological progress. Professor Walther therefore intends to work together with Siemens on the further development of syngo DynaCT. A line concept that starts with a three-dimensional computed tomography (CT) image should help further increase the precision of the operating technology. For a university hospital like the cardiac surgery unit in Leipzig, being at the forefront of technology is mandatory. “That’s why we have already decided in favor of the next generation of the C-arm,” says Walther, meaning the latest addition to the Artis family – Artis zeego®. This C-arm moves via a multi-axis robotic arm. This means that the latest Siemens angiography system offers physicians practically unlimited freedom of motion. The system’s flat detector rotates around the patient at higher speed and with extreme precision, producing soft tissue tomosgrams of unprecedented precision. “Artis zeego will further improve the workflows in our team and will also make it easier to handle obese patients, for instance,” the experienced cardiac surgeon says with conviction. Identifying potential room for development, applying new techniques, and sharing experience with colleagues are all integral parts of Walther’s work ethic. The fact that this yields benefits for everyone involved – industry, hospitals, and the patient – goes without saying.

One of the pioneers of catheter-based heart valve implantation: Thomas Walther, MD

Further Information

www.siemens.com/surgery
Going Green from All Angles

Refurbishing preowned medical equipment with high quality standards is like giving these systems a second life. The environmentally friendly refurbished systems from Siemens Healthcare, manufactured under the Proven Excellence program, will now be combined with a plan aimed at breathing a second life into the ecosystem by aiding in reforestation efforts. Combating harmful carbon emissions from two angles makes this campaign a truly unique green solution in Siemens’ environmental protection portfolio.

By Abigail Weldon
In 2009, Siemens reported that 1,745 systems were refurbished in the 2007-08 fiscal year, which helped indirectly save nearly 20,000 tons of CO$_2$. This amount of savings is equal to the CO$_2$ storage of around 32 hectares of tropical rainforest or the electrical power consumption of approximately 5,700 households.
Refurbished systems from Siemens Healthcare are nothing new – literally and figuratively. The Proven Excellence (PE) program has been refurbishing pre-owned medical devices with the same quality standards as is required for new equipment for more than five years now. Healthcare providers have been able to acquire everything from ultrasound devices to computed tomography scanners to magnetic resonance imaging systems at high quality standards, while not breaking their budgets. However, the PE program is now getting a refurbishment of its own, which has even led to a name change: Proven Excellence – Sustainable Impact.

Even in times of economic instability and budget cuts, healthcare providers are also feeling the need to go green. Not only environmentally conscious consumers are recognizing the clear benefits of sustainability – for the ecosystem, but also for the bottom line. Siemens recognized the movement toward green long ago and has one of the largest environmental portfolios on the market. As Heinrich von Wulffen, Regional CEO Europe, Africa, Middle East & Customer Relationship Management at Siemens Healthcare reports, “Cost pressures in particular put enormous strain on hospitals. Siemens sees itself as a long-term partner that supports sustainability in healthcare for today and in the future.”

Now, the Siemens business unit Refurbished Systems is further committing itself to the trend with a new environmental initiative called Proven Excellence – Sustainable Impact. This program will not only provide healthcare facilities with sustainable systems, but also aid in more direct environmental protection with reforestation activities using external service providers. The new environmental protection campaign is quite simple: buy a refurbished system and Siemens’ service providers plant trees in dedicated reforestation areas.

The Need for Healthcare to Go Green

It is no secret that environmental protection has become a hot topic in politics, the media, and industry. Healthcare may not be the first industry that is thought of in the push to go green; however, the green trend’s presence appears to be increasing and it is clear why. Climate change can have an effect on human health and the healthcare sector can play a vital role in not only helping to adapt to the health consequences of these changes, but also in combating them. The environmental impact of healthcare may – at first glance – seem inconsequential, but in reality, hospitals are energy-intensive institutions that contribute to climate change whether it be through procurement policies, resource usage and disposal, or energy usage, as well as through various other measures. The Environmental Panel on Climate Change reported in 2007, for instance, that in Brazil, hospitals make up 10.6 percent of the country’s overall commercial energy consumption.¹ England’s National Health Service reports that healthcare’s footprint can be attributed to 18 million tons of carbon dioxide (CO2) emissions per year or 25 percent of total public sector emissions in the UK.² The World Health Organization (WHO) recognizes that healthcare co-benefits can be achieved by reducing the industry’s environmental impact, citing basic measures “from improving hospital design to reducing and sustainably managing waste, using safer chemicals, sustainably using resources such as water and energy, and purchasing environmentally-friendly products.”³ For the latter, Siemens Refurbished Systems comes into play.

Saving Tons of Carbon Dioxide

Refurbishing preowned medical devices has always been an environmentally friendly option, allowing for an average material reuse of 90 percent in refurbished systems. While the refurbishment process contributes to sustainability and to extending the respective product life cycle by preserving as well as recycling valuable resources, the new environmental protection campaign will help Siemens combat CO2 emissions from two angles: by reducing the emission of its own systems and by contributing to CO2 absorption with each planted tree. These co-benefits represent a unique option in the Siemens environmental portfolio; the medical establishment receives a recycled system with the Proven Excellence seal while directly contributing to environmental protection.

Siemens Healthcare is registered with the Eco-Management and Audit Scheme (EMAS), an instrument developed by the European Union (EU) to assist companies in evaluating, reporting, and improving their environmental performance in industry. Each year, three audits are performed at Siemens Healthcare locations in Germany and environmental indicators are reported. In 2009, Siemens reported that 1,745 systems were refurbished in the 2007-08 fiscal year, which helped indirectly save nearly 20,000 tons of CO2. In comparison to the manufacturing process of new systems, the refurbishment process contains fewer steps and the material provision phase of the product life cycle is cut out completely. The CO2 emissions savings of 20,000 tons include the refurbishment and disposal process as well as greener transportation efforts and manufacturing conditions. This amount of savings is equal to the CO2 storage of around 32 hectares of tropical rainforest or the electrical power con-

Summary

Challenge:
- Provide high-quality healthcare equipment with minimal environmental harm
- Developing sustainable solutions in the healthcare industry

Solution:
- Proven Excellence Refurbished Systems manufactured with reused material
- Proven Excellence – Sustainable Impact scheme for Siemens Refurbished Systems

Result:
- CO2 savings of 20,000 tons per year
- Double the environmental benefits with reforestation in rainforests
Proven Excellence by Siemens Refurbished Systems

All systems refurbished by Siemens have to receive the Proven Excellence quality seal before being put back into operation. The seal represents the fulfillment of strict specifications from relevant international norms and standards as well as security regulations set by global institutions and organizations.

One such organization is COCIR (European Coordination Committee of the European Radiological, Electromedical and Healthcare (IT Industry)), which seeks to promote the development of harmonized international standards and regulatory control with respect to the quality and effectiveness of medical devices. COCIR’s Green Paper on Good Refurbishment Practice, which sets forth guidelines for the refurbishment process, has been seen as the standard for Siemens Refurbished Systems for several years now. Siemens’ refurbishment process is comprised of five steps – the stringent selection of used equipment; disassembly and de-installation; Proven Excellence refurbishment; professional reinstallation of refurbished equipment; and warranty and professional services – all of which are in line with the specifications set forth by COCIR.

Siemens Goes Green

Proven Excellence – Sustainable Impact is part of a larger Siemens movement toward green solutions. Green+ Hospitals is a new approach that Siemens is taking in sustainable healthcare infrastructure. This approach tackles the challenge of unifying ecological and economical demands in the healthcare industry, without only focusing on the more obvious green aspects. The focus lies not only in green measures but also in quality and efficiency. Hospitals are set to benefit from this approach in all three areas.

The green effects are reduced energy costs, sustainable and careful use of resources, and pollution reduction. The efficiency effects are optimized workflows and efficient assignment of time and cost. And, the quality effects are patient identification and safety, convenient and healthy procedures, and health-supporting environmental conditions. Heinrich von Wulffen, Regional CEO Europe, Africa, Middle East & Customer Relationship Management at Siemens Healthcare, explains, “The Green+ Hospitals project was developed as part of Siemens’ commitment to long-term sustainability in healthcare. In addition to effective measures that increase performance quality and optimize organizational efficiency, we support hospitals in reducing their costs and in acquiring environmental certificates – a decisive competitive advantage.”

How the Program Works

The World Wildlife Fund (WWF), one of the largest environmental organizations worldwide, will be commissioned by Siemens to take on the reforestation efforts. Medical providers who purchase the refurbished equipment are also to receive promotional material for their facility from Siemens stating their commitment to the Proven Excellence – Sustainable Impact program. This way, their patients are also aware of the facility’s choice to go green.

Siemens will work with the WWF in Indonesia as part of their “NEWtrees” initiative. This replanting project operates in Sebangau National Forest in Central Kalimantan. Protection and growth efforts are monitored through “geotags,” which are placed on trees with the exact latitude and longitude coordinates. Medical facilities that opt for this program will receive the GPS (global positioning system) coordinates of the area that receives second life as a result of their purchase of a system that was given a second life as well. Proven Excellence – Sustainable Impact aims to reforest and sustainably protect 32 hectares of rainforest in order to double the reduction of CO2 emission. The second life benefits thanks to CO2 savings and absorption may very well be a revolutionary refurbishment for the Proven Excellence program. And this new program, introduced at the Radiological Society of North America’s (RSNA) 2009 Annual Meeting, marks a definite move towards more green options in the healthcare industry, which is on its way to catching up with the rest of industry’s green growth.

Abigail Weldon is a member of the Medical Solutions editorial team.

Further Information

www.siemens.com/hospitals
The Next Level of MRI

Automating processes, reducing complexity: Siemens answers challenges created by the demand to help physicians deliver ever-faster diagnosis and care with a new generation of magnetic resonance imaging (MRI) systems. The Institute for Diagnostic and Interventional Radiology at the University Hospital in Essen, Germany, will be one of the first centers to work with the new technology. Medical Solutions talked with the head of the institute, Professor Michael Forsting, MD, about the demands he has for modern MR diagnostics.

By Sonja Fischer
During the past several years, new applications and expansions such as whole-body functionality or parallel imaging enabled the integration of MRI into the daily diagnostic radiology routine. What next important step would you like to see in the development of this technology?

FORSTING: When we look at the image quality acquired with MRI today, it is obvious that the technology has already reached an unbelievably high performance level. For years now, our examinations have provided us with wonderful images. All in all, the technology has really come a long way. But MRI is also one of the most complex imaging modalities. Radiographers have to perform numerous configurations prior as well as during the examination to obtain these great images. Thus, depending on the type of examination performed, some of them are actually quite long. For me, the next step is to simplify the technology for the user and make the systems even faster. That’s what I expect from our new scanner as well.

Developments such as continuous table move or integrated body coils have already reduced examination expenditures.

FORSTING: That’s correct. The integrated coils, for example, are a huge step forward. It is no longer necessary to add or remove them constantly during the examination – activities that literally turned MRI into a construction site. But radiographers still require a relatively long training period until they are ready to fully operate an MRI system on their own.

Does this mean you consider shorter training periods for radiographers to be one of the keys to optimizing workflows in your hospital?

FORSTING: Yes – strictly speaking, one should ask the radiographers rather than the physicians: ‘What improvements
would you like to see? And today, they say: ‘System operation must be more intuitive – we can’t reinvent the settings every single time.’ I think this must be possible using intelligent software that also supports quick training for radiographers. And I have faith that Siemens manages to provide just that. Surely, in my opinion, Siemens systems have more power, more gradients, are quicker – after all, highly competent engineers are at work here. But when you look at the systems, you can also tell that early on in their development, the radiographer’s important job was also accounted for in the planning process. The engineers really ask for the expertise of those who will work with the system once it is in operation.

You head one of the largest radiology departments in Germany, train many medical specialists, have numerous MRI research projects, and the department supports three additional hospitals in the vicinity. This means that imaging as such has to meet completely different requirements with respect to complexity, workflow, and technology. How do you manage this?

FORSTING: To begin with, I believe that radiology has to be a large department in the future because the discipline has grown to a level where a single person is no longer able to display all of its contents. Today, you can’t be equally good in neuroradiology, mammography, pediatric radiology, and so on. Instead, you need specialists who see many patients each day. Conversely, you can also offer your expertise to smaller hospitals that are unable to establish comparable know-how. And in our case, we also have to deal with the educational aspects of the profession. The shortage of physicians in Germany has led to fewer and fewer unsolicited applications for jobs. However, our experience here is quite different. Many young physicians apply to our institute because with us, they have the opportunity to get to know everything pertaining to imaging – from simpler 1.5 Tesla systems used in clinical routine to highly complex examinations with our 7 Tesla system1, that we use, as one of the few facilities worldwide, for our patients as well. Plus, they see a large number of different disease patterns here.

Is patient throughput at the MRI system important to you?

FORSTING: Of course, but not so much in the area of reimbursement because we are a university hospital. Nevertheless, throughput is very important for us – because of the large number of patients required each day for the specialization of our doctors and because of increasing demand. The waiting lists for MRI are the longest here.

I believe that the modality of the future will be MRI for the most part – and not only because MRI does not expose patients to radiation. The number of applications fields is also growing steadily, and whole-body MRI is opening up new perspectives. In the long run, it is therefore imperative that we are able to examine even more patients with MRI.

What other criteria played a role in your decision to obtain your newest MRI system?

FORSTING: For us, it was very important that the system had a whole-body function and that it performed this examination quickly. We have a relatively high rate of referrals for this and several research projects that address cardiovascular diseases, where, in addition to the heart, all vessels have to be displayed as accurately as possible. For this purpose, you can only use a system that provides whole-body functionality and – ideally – easy and quick system operation.

Generally, cardiac examinations with MRI are on the rise – in our area of care, we perform a total of ten cardiac examinations per day, and this number will certainly increase.

Will the future of MRI also involve preventive care?

FORSTING: There are a number of diseases where preventive care makes absolute sense. A good example is colon cancer because this type of cancer develops very slowly. For this, MRI would be an excellent choice. So yes, if we want medical imaging for preventive care, it certainly should be MRI. I also think that in a few years, MR mammography will play an important role in preventive care. However, the speed and depth of penetration certainly depends on the financing available.

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Biography

Professor Michael Forsting, MD, is a radiologist and neuroradiologist. Since 1997, Forsting has headed the Neuroradiology Department. Since 2003, he has been responsible for the Institute of Diagnostic and Interventional Radiology and Neuroradiology at the University Hospital of Essen. In 2008, he was named Dean of the Medical Faculty.

Forsting is involved in empirical and clinical research dealing with stroke, MRI of brain tumors, and endovascular therapies for intracranial vessel malformations. He has received numerous awards for his work, including the Wilhelm Conrad Roentgen Award of the German Society of Radiology and the Science Prize from the European Society of Neuroradiology.

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1 The information about this product is preliminary. The product is under development and not commercially available in the U.S., and its future availability cannot be ensured. Only field strengths up to 3T are clinically used.
Redefining Productivity in MRI

The latest Siemens magnetic resonance imaging (MRI) systems, MAGNETOM® Aera1 (1.5 Tesla) and MAGNETOM Skyra1 (3 Tesla), are designed to make MR exams easier for the radiographer and more comfortable for the patient. Both systems are equipped with two newly developed, powerful, and intelligent technologies1 to enhance both productivity and image quality in the MRI suite:

- **Tim® (Total imaging matrix)** technology has already provided a large anatomical coverage without patient or coil repositioning in previous Siemens MRI systems. Now, the newly designed, ultra-high-density array enables higher spatial and temporal resolution and an imaging distance of up to 205 centimeters with no patient repositioning. Up to 204 coil elements deliver more signal than ever before. With up to 128 RF channels, the signal-to-noise ratio can be increased by 20 percent. The new Tim Dockable Table augments throughput as patients can be prepared outside the scanning room, and simplifies the setup of critically ill, physically challenged, and obese patients.

- **Dot™ (Day optimizing throughput) engine1**, the imaging world’s first MRI “throughput engine,” offers user guidance and automated workflows to reduce the complexity of MRI. Dot provides multiple scan strategies for different patient conditions. The user selects the appropriate strategy and the examination protocol is automatically adjusted.

Together Tim and Dot enable expert-level scans. Dot, for example, provides appropriate slice positioning automatically. Additionally, users are presented their predefined decision points at critical steps. Intelligent, automated workflows are customizable to the standards of the institution and enable to do more, with consistently high image quality.

In combination, these technologies enable practitioners to perform up to 30 percent more exams per day.3 Furthermore, both MAGNETOM Skyra and Aera come with a 70-centimeter Open Bore and a short magnet to make exams more patient-friendly, especially for claustrophobic and pediatric4 patients.

1 The information about the product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.

2 All current Tim systems can be upgraded to the next-generation Tim + Dot.

3 Results may vary. Data on file.

4 The safety of imaging infants under two years of age has not been established.
Advanced Imaging Provides New Possibilities for Minimally Invasive Tumor Treatment

Interventional procedures are steadily gaining importance for treating malignant tumors. Whenever it is possible to provide the physician with excellent image quality and a good overview during an intervention, patients can be treated faster and more successfully.

By Martina Lenzen-Schulte, MD
Anyone who is still talking about the three pillars of cancer therapy has missed the most recent developments. For some time now, tumors have not just been excised by surgeons, radiated by radiation therapists, or treated by oncologists with chemotherapy or cytotoxins. In addition to these three strategies, interventional methods are steadily gaining importance, basically becoming the fourth pillar of treatment. Since advanced imaging is an essential prerequisite for these procedures, interventional tumor therapy is performed in the angiography lab. The manifold procedures now available for cancer therapy are becoming indispensable for treatment of locally defined tumors.

**Onsite Tumor Control**

In doing so, different possibilities are applied: For example, vessels that solely supply the tumor are blocked via transarterial embolization. When chemotherapeutic substances are injected only in these vessels, toxic medications do not strain the entire organism, they only harm the tumor. In this case, one speaks of transarterial chemo-perfusion. Both methods can be combined into transarterial chemoembolization or TACE. Additional treatments involve destroying the tumor via laser, heat, (extreme) cold, or radiation. The objective is always to accurately position destructive reagents or energies in the tumor focus and to avoid collateral damage in adjacent tissue. The team of Thomas Vogl, MD, Head of the Department for Diagnostic and Interventional Radiology at the University Hospital of Frankfurt, Germany, masters ten interventional therapies, which offer an individually optimized solution to the patient. “Tumor foci in the lungs are a particular challenge,” explains Vogl. On one hand, the organ is very large, and on the other hand, extreme care has to be taken not to injure important vessels located immediately adjacent to the heart. “Even if it is not possible to operate, the patient still benefits. His quality of life is improved and/or his lifespan is extended when these foci are removed individually,” says the radiologist.

**Online, Whole-lung Display**

For the first time, the new C-arm system Artis zeego®, in combination with the Large Volume syngo® DynaCT software, offers the possibility to display the lung as a whole – that is, online during the operation. Previously, no system was able to deliver large-volume, soft-tissue images
Treatment of Local Tumor Foci is Increasing

Lung cancer, colon cancer, and breast cancer are the most frequent cancers in Western industrialized countries. For women, they constitute about 50 percent of all malignant tumors. For men, lung and colon cancer alone represent 70 percent of all cancer types. The frequency of these tumors is currently increasing in Europe as well as worldwide. In the long term, this will not change because the population's longevity in industrial nations is increasing steadily.

Lung Cancer
Lung cancer affects more than 1.3 million people worldwide. Despite a downward trend in the U.S., the yearly number of new patients is reaching 180,000. In Europe, the number is close to 400,000, in Japan, it is 85,000, and in Germany, the yearly number is approaching 45,000 new patients. Metastases are also quite commonly malignant lung foci. Only 20 to 30 percent of all patients can be operated at the time of diagnosis. For all others, local, interventional tumor therapies are increasingly used.

Colon Cancer
In Europe, colon cancer cases amount to 300,000 patients per year, in the U.S., 150,000, and more than 70,000 in Germany. Colon cancer preferentially metastasizes to the liver – at the time of diagnosis, 15 to 20 percent of the patients already have liver metastases. Together with liver-cell carcinoma, they represent the majority of all tumor foci in the liver. These are operable in only 10 to 25 percent of cases. For the large number of remaining foci, interventional tumor therapy is often the only chance of improving the quality of life, extending longevity or even curing the patient.

Breast Cancer
Breast cancer affects about one out of ten women in industrial nations. There are more than 50,000 new cases per year in Germany, 350,000 in Europe – more than a quarter of all cancers in women. – 200,000 in the U.S., despite a slightly downward trend due to a decrease in hormone therapy, and more than 1.2 million worldwide. Up to 13 percent of breast cancer patients develop liver metastases, which can be treated with interventional tumor therapy. The efficacy of interventional tumor therapy is improving steadily. First findings indicate that local treatment may lengthen the patient’s survival as compared to systemic chemotherapy, which makes this approach even more interesting.

It is plausible to predict that clinical results are improved with this method and that success stories of this kind support its application for a continuously growing number of patients who show malignant tumor foci in the lungs.

Standard Methods Fall Short
In the meantime, other international teams are also confirming the findings made in Frankfurt. Thus, interventional soft tissue imaging with syngo DynaCT provided additional information for approximately 60 to 90 percent of all patients treated with TACE because of liver cancer. As a result, the catheter could be adjusted to the individual treatment position in about 40 percent of all patients. Results of this kind are not surprising, considering that, for the first time, the entire liver can be displayed in the abdominal cavity via the Large Volume syngo DynaCT on the Artis zeego C-arm system. However, it is not just about the size of the display. “Seeing our treatment online allows us to simulate the therapy before-
hand. At the same time, it enables us to check the results. If the embolization is insufficient – the vessel supplying the tumor is not fully blocked – we can continue right away and close this artery completely.”

This is of great importance to a large number of patients. While lung cancers still account for five percent of the interventions in Frankfurt currently, therapy for focal hepatic tumors has reached one-fourth of the entire patient cohort. “Per year, we treat up to 400 patients with liver cell carcinoma, that is, tumors of liver-cell origin. However, most cancer foci in the liver are metastases of other tumors,” explains Vogl.

Cancer Foci in the Liver on the Rise

Trend: upward – because a large number of killers metastasize primarily in the liver. For example, more than half of all patients suffering from colon cancer show metastases in the liver as early as during the initial diagnosis or within the first year following diagnosis. By then, the primary colon cancer may have even been eradicated. Previously, locating a metastasis often suggested widespread disease. Today, however, we know that the tumor may have only metastasized in the liver.

Eliminating these foci oftentimes provides patients with years free of further discomfort and without any negative impact on quality of life. This can be particularly important to those patients in which tumors are increasing but the primary tumor no longer limits the therapeutic effort. This applies in particular to breast cancer patients, whose metastases are now, for the most part, treated with interventional therapy. It is also true for treatment of the pelvic region, where metastases or recurring tumors frequently appear. Their local therapy accounts for up to 15 percent of all cases in Frankfurt.

“We are not only able to offer a variety of interventional methods, we also see a growing number of indications as demonstrated by the example of the liver,” continues Vogl and outlines the steadily extended number of implementations. Prior to surgical intervention, for example, the radiologists reduce the liver foci to make them operable. Additionally, recurrences following initially successful treatments are handled interventionaly. As it were, one of the interventional methods will be applied at several instances along the pathway of tumor pathology.

Martina Lenzen-Schulte, MD, is a physician, author, and medical journalist. She is a frequent contributor to medical magazines and the scientific pages of German-speaking public media.

Summary

Challenge:
• Tumor pathologies are increasing around the world
• A large number of these tumors, but also metastases, and recurrences are non-operative. For this reason, effective, tissue-sparing methods for local tumor control are required

Solution:
• Interventional procedures that allow the foci to be destroyed locally by means of medication, radiation, heat, or cold
• High-resolution imaging that allows online simulation of the intervention, correction when necessary, and the checking of results

Result:
• Complete organ overview even with large organs (lungs, liver) via Large Volume syngo DynaCT, a unique feature of the Artis zeego C-arm system
• Correction of the original therapy for 30 to 40 percent of the patient cohort
• Additional information in 60 to 90 percent of the treatments
• Time-savings are as high as one-third of the time required for a single intervention

16 Daten&Zahlen zu Brustkrebs (Epidemiologie) – Breast Cancer Action Germany; www.bcaction.de/03info/fakten.htm.

Further Information
www.siemens.com/oncology
Johnson Lightfoote, MD, Director of Radiology, is impressed with the quality of integrated imaging, data retrieval, and report creation with syngo Suite.
Enterprise-wide Workflow Drives Productivity

When a busy community medical center in California put out a call for help in streamlining its operations – both administratively and clinically – Siemens listened, responded, and participated in defining the right solutions. The initiative turned out to be a win-win situation for both the hospital and its patients.

By Abby Christopher

In 2003, Pomona Valley Hospital Medical Center (PVHMC) was frustrated with locating films, inconsistent reporting quality, and an increasing backlog of radiologists’ reports. These issues interfered with the level of service provided to the patient and referring physician. The hospital issued a request for proposal, seeking help to address these challenges. Key goals included improving workflow efficiency and productivity; changing to a filmless, paperless environment; preventing misplacement of films; and faster, more responsive patient care. “We were driven by the need to
I’ve been impressed with how well imaging and reports are integrated with this RIS/PACS system – even from remote sites.”

Johnson Lightfoote, MD, Director, Radiology, Pomona Valley Hospital Medical Center, California, USA

improve our radiology operations enterprise-wide,” says Kent Hoyos, PVHMC’s CIO (Chief Information Officer). Therefore, joint Siemens and PVHMC teams analyzed the causes and effects of these problems. Based on their results, the hospital decided to integrate its disparate imaging systems, the hospital information system (HIS), and the radiology information system (RIS). A role-based workflow was defined throughout the enterprise to govern all radiology processes, from patient registration, exam planning, image acquisition, postprocessing, interpretation and report dictation, to report and image distribution to referring physicians. An important tool in creating it was Siemens’ syngo® Suite. This suite of solutions provides trendsetting end-to-end imaging workflows for clinical imaging that are role-based, context-sensitive, and knowledge-driven – making information available to the right user in the right workflow context. syngo Suite is comprised of key building blocks that enabled PVHMC to build an enterprise-wide workflow and an entirely filmless, paperless environment. As a result of this strategy shift, PVHMC realized dramatic improvements not only in productivity, but also in collaboration among clinical colleagues. Referring physicians and patients experience improved service with minimized waiting times and faster report turnaround time. "With Siemens’ recommendations and IT solutions, we’ve improved workflow for our radiologists quite significantly,” says Hoyos. He recently experienced this firsthand when he had an X-ray for a shoulder problem and in less than an hour received a voicemail from his referring physician, who had quickly received the radiologist’s report, advising him to go to physical therapy.

Enterprise-wide and Beyond

syngo Suite supports a tightly integrated, RIS-driven picture archiving and communication system (PACS) that enables enterprise-wide communication as well as remote access. PVHMC’s RIS/PACS enables authorized hospital staff at different locations to simultaneously access the same reports, images, and patient information as a common point of reference for phone consults and other tasks. Such access boosts efficiency and improves the quality and timeliness of patient care. “I’ve been impressed with how well imaging and reports are integrated with this RIS/PACS system – even from remote sites,” says Johnson Lightfoote, MD, PVHMC’s Director of Radiology. Robert Ring, MD, one of PVHMC’s general radiologists, works remotely from a small coastal village in Maine several months each year. From June to October, Ring reads images and generates reports remotely between 5:00 a.m. and 10:00 a.m. east coast time. He uses a secure virtual private network (VPN) and a low-cost FiOS (Fiber Optic Services) connection with a bandwidth of ten Mbit/s down and two Mbit/s up to access the PVHMC RIS and PACS. This success motivated the hospital to set up eight of the hospital’s radiologists to work remotely. It even provides a RIS/PACS suitcase, containing a portable workstation to be used by radiologists for diagnostic reading while traveling. Since one can hardly expect all radiology data users in the enterprise to become experts in using RIS and PACS, PVHMC made the reports and images available throughout the enterprise or over the Internet through an easy-to-use, single point of access, Soarían® Clinicals. Neurosurgeons, orthopedic surgeons, and other specialists who require more sophisticated functions have access to the floating licenses of the syngo Studio Advanced viewing software.

Single-vendor Strategy

With Siemens’ help, PVHMC has deployed several of the syngo Suite modules to establish its enterprise-wide workflow. Combined syngo Suite solutions, including syngo Imaging for PACS, syngo Workflow with syngo Voice for RIS and dictation, as well as syngo Dynamics (a dedicated PACS and reporting solution used in cardiology and vascular ultrasound) have made PVHMC’s enterprise-wide workflow possible. PVHMC chose Siemens as a single-vendor solutions provider, rather than opting for a multi-vendor strategy, according to Herb Medford, manager of the hospital’s PACS. “I feel sorry for hospitals that work with multiple vendors in their imaging departments. If you have more than one, they finger-point, and this slows down the resolution of system problems,” says Medford. “As a community hospital, we needed someone we could partner with to manage the enterprise-wide approach. Otherwise, we would not be able to build or to afford the necessary IT support internally,” says Hoyos. “We’ve been a Siemens customer for 30 years, on the IT side as well as in imaging,” he adds.

The Transcription Bottleneck

CIO Hoyos established a committee to clearly identify where the bottlenecks were and how workflow could be improved across the continuum of care. “We have an enterprise team approach,” explains Hoyos. The Chief Medical Information Officer (CMIO), radiologists, referring physicians, PACS manager, and RIS manager, among others, including Siemens experts, participated in the committee. Part of the group’s mandate was to gather information on established hospital workflow processes. “We wanted to find out what steps we could eliminate and which steps needed improvement,”
“More information, in a timely manner, at the point of care, allows us to quickly make informed decisions.”

Gerald Goldman, MD, CMIO, Pomona Valley Hospital Medical Center, California, USA
Deepening Ties to Referring Physicians

PVHMC has forged a number of strategic relationships with referring physicians in the Pomona area, starting many years ago with a practice that was literally just across the street from the hospital. While being neighbors made the ferrying of paper documents and films relatively easy, PVHMC’s change to a filmless and paperless workflow has impressed Greg Dahlquist, MD, a primary care physician, whose practice has since expanded to multiple locations. “We’re getting phenomenally fast results [from PVHMC],” says Dahlquist. “Previously, we’d have to go to the radiologist to find a film and request a paper report. Now, we access images and reports from our offices.” Dahlquist’s Premiere Medical Group and other PVHMC strategic partners can view full reports and images remotely while speaking with radiologists and other clinicians on the phone. “I’ve also seen a dramatic improvement in report quality,” says Dahlquist. “syngo Workflow and syngo Imaging have helped PVHMC strengthen its ties to referring physicians. It’s helping us with our outreach strategy,” says Robert Jacoby, PVHMC’s Administrative Director of Radiology.

Keys to Ongoing Success

PVHMC has recently decided to outsource its disaster recovery backup system to Siemens and Siemens’ new strategic partner, Harris Corporation. The Siemens/Harris disaster recovery system will back up PVHMC’s server data at multiple locations via data centers throughout the USA, says Justin Aquino, PVHMC’s Senior Systems Analyst, Information Services. In collaboration with Siemens, PVHMC continues to refine the syngo Suite of solutions and to add and evaluate new solutions and updated modules. The hospital plans to implement Siemens’ Soarian EDM/HIM (Enterprise Document Management/Health Information Management). Soarian EDM provides efficient, Web-based access to clinical, financial, and administrative documents. HIM provides Web-based access to online medical records. Siemens helped PVHMC’s transition to an enterprise workflow and routinely responds to feedback from key stakeholders at the hospital. As PVHMC continues to expand and update syngo Suite and install Soarian Clinicals and other solutions, the hospital relies on Siemens for the journey towards workflow efficiency, productivity, and responsiveness to patient needs.

Stakeholders from different departments regularly meet with CIO Hoyos, and he and CMIO Goldman update each other on the progress of the integration and adoption of new solutions and share that input with Siemens. Regularly meeting and getting feedback is one of the keys to success, according to Hoyos. “The more you use the system, the more you learn about new possibilities you want to implement as you go along,” adds Davis. For PVHMC, adopting syngo Suite, Soarian Clinicals, and other Siemens solutions has clearly rallied and brought together departments that once operated independently. Since the hospital began the transition to an enterprise-wide workflow, the cooperation between IT and radiology has improved. PACS Manager Medford says, “We’re all in it together.”

Summary

Challenge:
- Backlog of radiologists’ reports
- Turnaround times for each patient report up to 72 hours
- Difficulty in finding and locating films
- Misplaced reports
- Overall workflow inefficiencies and lack of productivity
- Annual costs for physical film and film processing US$530,000
- 19 film librarians

Solution:
- Massive enterprise-wide workflow re-engineering initiative, enabled by RIS-driven PACS with syngo Workflow and syngo Imaging
- Speech recognition alternative to conventional transcription with syngo Voice
- Enterprise-wide workflow with worklist-defined reports
- Easy access to reports and images throughout the enterprise
- Easy access to patient information via Soarian Clinicals

Result:
- Savings of US$510,000 annually on film costs
- Turnaround times for each patient report reduced to two hours
- ICU rounds reduced from three hours to two
- Virtually no report backlog
- 80 percent of radiologists using syngo Voice to produce their reports
- Consistent, thorough reports
- Improved collaboration among colleagues, e.g., for consults, daily rounds
- Improved patient care and responsiveness
- Established teleradiology that allows PVHMC radiologists to work remotely

Pomona Valley Hospital Medical Center

Pomona Valley Hospital Medical Center (PVHMC), a 453-bed, not-for-profit community hospital, is located in Pomona, California, USA. With 190,000 radiological procedures, 24,000 patient admissions, 111,000 patient days, and 69,000 emergency room visits annually, PVHMC supports several centers of excellence for specialties that include oncology, cardiac care, and sports and family medicine.

Further Information

www.siemens.com/syngo
Proactive Tube Failure Prediction

China’s renowned Shandong Medical Imaging Research Institute has been relying on Siemens for most of its computed tomography equipment since 1984. When the facility decided to put its latest service innovation, the Guardian Program including TubeGuard, to the test, the results were both positive and enlightening.

By Justus Krüger
Definition family. As a result, tube breakdowns, or “hard downs,” are avoided, permitting instead a proactive tube exchange or “soft down.”

The benefit for the users: With TubeGuard, downtime becomes more predictable. That means a lower risk of workflow disruption and consequently, higher patient satisfaction. Planning downtimes ahead of time also means potentially less revenue loss, proactive rescheduling of patients and staff, and a safeguard for the users’ reputation.

Once TubeGuard has been installed, sensors proactively monitor the tube functions via real-time data flow with Siemens Remote Service (SRS) – the efficient and comprehensive infrastructure for medical equipment-related remote services. Based on TubeGuard’s complex algorithms and customer-specific system usage data, qualified SRS tube monitoring experts perform an ongoing assessment of remaining tube life. One example of monitoring is the measurement of cooling performance. The measurement via SRS is based on sensor data of oil temperature, gantry temperature, and oil pressure. If the cooling performance falls under defined limits and the tube could possibly fail, the customer will be informed within a specific time limit. As a result, the tube change can be made during a planned service visit, such as during prescheduled system maintenance – without causing unnecessary downtime, delays, and interruptions in workflow for Xu and his team.

Putting TubeGuard to the Test

When Xu first began working with TubeGuard, however, he wanted to find out for himself how precise the information obtained through it really was. “We were right in the middle of an extensive examination when we received a call from the Siemens Service Center telling us that our tube would fail within the next week,” he says. “Since it was the first time that we had received this kind of information, we did not immediately schedule the tube exchange. Instead, as agreed with Siemens, we observed the system to find out whether there would actually be a failure within the next few days – as a kind of validation.

Professor Xu Zhuodong, MD, Head, CT Department, Shandong Medical Imaging Research Institute, Jinan City, China

“A smooth workflow is absolutely central for us. The downtime of our equipment needs to be kept at a minimum.”

72 Medical Solutions · December 2009 · www.siemens.com/healthcare-magazine
Challenge:
- Accommodating approximately 200 patients in need of a CT scan daily, many traveling considerable distances
- Keeping CT and other imaging equipment up and running with minimum downtime despite heavy wear and tear
- Maintaining the excellent reputation of Shandong Medical Imaging Research Institute
- Maintaining patient satisfaction and comfort level

Solution:
- Siemens Guardian Program including TubeGuard for predicting and proactively avoiding potential CT tube failures
- Ongoing assessment via proactive and real-time remote monitoring with Siemens Remote Service
- Quality equipment backed up by quality service

Result:
- Ability to have necessary tube changes done during prescheduled service calls
- Disruptions of clinical workflow avoided
- Smaller risk of unscheduled downtime
- No breakdowns equals no waiting for patients
- Less revenue loss

Summary

Protecting a Good Reputation
According to Xu, the Shandong Medical Imaging Research Institute has always had an excellent relationship with Siemens – even before TubeGuard was available. “In the event of a tube failure, Siemens engineers would be onsite on the very same day and fix the problem for us,” he says. However, an unscheduled hard down could take between two and three days to fix, posing a serious disruption in the tightly scheduled workflow of Xu and his colleagues. “One scanner’s breakdown would cost us around 3,000 euros per day,” he explains. “The money is not the main problem, though. The most important thing for us is our institute’s reputation, and, above all, the satisfaction of our patients.”

Founded in 1975, the Shandong Medical Imaging Research Institute not only diagnoses patients, but also conducts clinical and medical research. Today, the institute has more than 265 staff members, including 89 professors and associate professors as well as 49 graduate students. “Our facility has a unique standing in China,” says Professor Wu Lebing, President of the Institute. “We have been using Siemens’ equipment for a quarter century now,” he adds, “and the ratio of Siemens’ systems in the mix has been rising steadily. That is, of course, due to the quality of the equipment – but also due to the quality of the service, which is equally important.”

The Siemens Guardian Program including TubeGuard makes this service even better. “With TubeGuard, Siemens has become the first company to provide real, scheduled, proactive service for CT tubes,” says Xu. “It’s a revolutionary innovation.”

Further Information
www.siemens.com/tubeguard

Justus Krüger lives in Hong Kong and Beijing. He works as a China correspondent for the Berliner Zeitung newspaper.
cost-effective healthcare
Cutting Budgets or Investing in Health?

By Lieven Annemans, PhD, Professor of Health Economics, Medical Faculties of Ghent University and Brussels University, Belgium

In the current economic situation, the voices pushing for budget cuts in healthcare are louder than ever. It is simply something we cannot escape: Everyone must contribute and search for savings potential. But other voices claim that the current economic conditions require investment more than ever. Keynesian economics teaches us in simple terms that investment and belief in the future help to relaunch economies. Hence, according to these voices, governments – and in particular, health authorities – should invest even more in healthcare. Isn’t this confusing? What should be done? Should we invest or try to save money? The answer is again simple: Both – and as much as possible. First of all, what we really should aim to do is find the best possible way to utilize the available financial resources. In order to apply economic thinking to healthcare, one should view the health sector as a productive sector, whose aim is to produce health by ensuring that people live longer and more healthily. And since “productive” goes hand-in-hand with “productivity,” society must try to gain as much health as possible with the available means. Therefore, priority must be given to those healthcare interventions (both preventive and curative) that result in the greatest amount of return health-wise, for the money that is invested. In other words, we should invest in cost-effective care. The top five goals to achieve this would include:

1) Cost-effective new technologies and drugs
2) Prevention programs for lifestyle improvement (healthy nutrition, physical activity, stopping tobacco use, etc.)
3) Better coordination of care
4) Evidence-based medicine
5) Better access to care for all

These five goals require investing money, but they are necessary to improve the health of our populations. Let’s take the first goal. If we want to produce more health with the available (financial) resources, then we must allocate the money to those interventions and programs that produce the most health benefits per invested euro or dollar or pound; that is, to the programs that are most productive and efficient. Money can only be spent once, and if we don’t spend it wisely, we miss the chance to do better things with that money. This means choosing new technologies that may require a strong investment but that also proportionally lead to an important health gain.

Unfortunately, many policy- and decision-makers do not apply this principle and tend to fall back on linear savings, which may have short-term benefits (so-called “quick wins”), but ignore the long-term goals of healthcare policy. For example, several managed care organizations (MCOs) in the USA have only looked at costs and not at effectiveness for years. They simply did not understand that focusing on cost alone leads to poorer health outcomes overall, which in turn is negative for the economy. But can you blame them? The way the U.S. health system was functioning all of that time, MCOs were automatically driven by profit increase, with short-term cost focus as a consequence. But this has nothing to do with quality or optimal care delivery. What the USA needs is decision-making based on cost-effectiveness analyses and health technology assessment. In such analyses, the best evidence regarding a technology (which may be a device, a drug, or a preventive program) is collected in order to provide information on its costs, its health effects, and the (potential) savings induced by this technology. Health effects are preferably expressed in QALY (quality-adjusted life years), a parameter that combines both life expectancy and quality of life. More and more studies are available providing information on the ratio between the costs and QALYs of health technologies, and increasing numbers of decision-makers are aligned with these concepts [Fig. 1].

The U.K. presents a good example with NICE, the National Institute for Clinical Excellence. Here, new technologies are assessed and appraised using criteria such as added therapeutic value and cost-effectiveness. The use of new technologies and pharmaceutical drugs is encouraged, even if they do not lead to savings, but if their cost can be justified by the amount of health (mostly expressed in QALYs) that is gained through their
use. However, NICE’s approach is also subject to criticism. Those who think that NICE is too strict argue that the full societal value of new technologies (e.g., avoiding absenteeism) is not accounted for, and that elements such as medical need are also not taken into account. Others argue that NICE is too tolerant of new and expensive technologies, but these are – not surprisingly – the same people who tend to forget about the goals of healthcare.

In Germany, the goal of an economic evaluation is to address the ceiling price at which a superior health technology in a given therapeutic area should continue to be reimbursed. To answer this question, the German Institute for Quality and Efficiency in Healthcare (IQWiG) has developed the efficiency frontier concept [Fig. 2]. The efficiency frontier plot is a graph of the value of health effects (on the vertical axis) provided by available interventions in a given therapeutic area against the net costs (on the horizontal axis) of providing these. The efficiency frontier line itself connects interventions on that plot in such a way that none of the points on the line indicates worse efficiency than any other point on the frontier. In other words, this approach does not look for costs per se, but rather for optimal cost-effectiveness ratios within a given disease area. In the figure, the points on the frontier are treatments 1, 4, 6, and 7. How much should be spent on a given disease area should be established by societal values and medical need. The latter is, however, not yet worked out clearly in the German context.

I mentioned lifestyle interventions as well. More and more studies show that such interventions are very cost-effective. Hence, they require greater investments.

Regarding equal access, international bodies such as the Organization for Economic Cooperation and Development (OECD) also emphasize that an effective health policy must not only aim to be efficient (i.e., spend the available means as well as possible), but should also guarantee equality (i.e., everyone who has the same health needs should be able to obtain the same care). Even non-altruists should understand that inequality leads to enormous societal losses (even

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**Facts & Figures**

**Regarding Lifestyle**

At least two-thirds of the adult population in the European Union are estimated to be insufficiently physically active for optimal health benefits. Initiatives designed to increase physical activity are therefore urgently needed. Current recommendations on physical activity that enhance health suggest that half an hour of moderately intense physical activity on most days of the week yields major health benefits for inactive populations. For effective prevention of being overweight and obesity, up to an hour of such daily activity is recommended.

**Regarding HTA**

Health Technology Assessment (HTA) is a multidisciplinary process that summarizes information about the medical, social, economic, and ethical issues related to the use of a health technology in a systematic, transparent, unbiased, robust manner. Its aim is to inform the formulation of safe, effective health policies that are patient-focused and seek to achieve the best value.

INAHTA (The International Network of Agencies for Health Technology Assessment) was established in 1993 and has now grown to 46 member agencies from 24 countries. The network stretches from North and Latin America to Europe, Asia, and Australasia. Its mission is to provide a forum for the identification and pursuit of interests common to health technology assessment agencies.

**Regarding Inequity**

The number of deaths that can be attributed to health inequalities in the European Union in 2004 is around 700,000 per year. This amounts to a loss of 11.4 million lifeyears. The number of cases of ill health is estimated at 33 million. Health inequalities also reduce life expectancy at birth by almost two years, and the average life expectancy in good health by almost six years.
health actions in various medical areas, and has conducted health economic studies in more than 20 countries. Professor Annemans is also the author of the book *Health Economics for Non-Economists: An Introduction to the Concepts, Methods and Pitfalls of Health Economic Evaluations*, a primer on health economic evaluation for medical staff. His main interests are epidemiological models, health technology assessment, retrospective/prospective health economic evaluations, and physician payment systems. He has published more than 100 papers in peer-reviewed journals, presented over 250 posters/papers at conferences, and given more than 300 lectures and trainings on health economic evaluation.

**References**


The opinions reflected in this article do not necessarily reflect those of Siemens Healthcare.
Further Reading

Siemens offers a variety of customer magazines and information channels. “Further Reading” introduces a selection of articles and topics featured that may be of interest to you. To learn more, follow the link below each article. To subscribe to any of the magazines, see page 85.

Magnetic Navigation for Comprehensive Cath Lab

The latest issue (no. 10) of the customer magazine AXIOM Innovations showcases the Marienhau Klinikum St. Elisabeth in Neuwied, Germany, where Burkhard Hügl, MD, and his staff established a new catheter lab equipped with an Artis zee® Magnetic Navigation system for interventional cardiac procedures. Thereby, the physician realized his vision of bringing state-of-the-art technology to heart patients.

When joining the hospital to establish an invasive cardiology unit, Hügl brought years of experience working with Siemens technology with him. Aware that electrophysiology was not very common in the region, he saw the potential offered in terms of serving patients and utilizing the latest technology. Hügl decided to integrate the AXIOM® Sensis XP recording system with the syngo® X workplace and Stereotaxis Magnetic Navigation. “Magnetic Navigation was the right fit for what we were planning to do here: Primarily for the general procedures associated with running something as complex as a cath lab, it was clear we needed high-quality X-rays and a good interface with all of the components working well together,” he explains.

Patient registration is done via AXIOM Sensis XP, which is linked to the hospital’s entire information network. The demographic data are then transferred to both the Artis zee imaging and Carto XP mapping systems. A big advantage for the physicians is that the level of radiation they had previously been exposed to has been significantly reduced. Now, they only enter the exam room at the beginning of a procedure to insert catheters and place the magnets and again at the very end to park them.

www.siemens.com/AXIOM-Innovations-navigation
Spanish Hospital Sees Ultra-integration Benefits

In May 2007, Carlos Haya Regional University Hospital in Málaga, Spain, became the first facility to install a Siemens Dimension Vista® system in its laboratory. As one of the largest hospitals in the country, the state-run, 1,200-bed facility was looking for a consolidated platform with more automation to satisfy its demanding workload while being able to offer a variety of testing methods. Since the installation, testing volume has increased to nearly six million per year—a growth rate of about six percent. Optimized laboratory workflow—a product of hundreds of interviews with laboratorians worldwide during the Dimension Vista Intelligent Lab System’s development—allows the facility to perform more tests, new kinds of tests, with fewer staff.

Vidal Pérez Valero, MD, Director of Clinical Analysis Service and the Diagnostic Management Unit at the hospital, appreciates Dimension Vista’s ultra-integration of four state-of-the-art technologies—photometry, nephelometry, V-LYTE® multisensor electrolyte detection, and LOCI® advanced chemiluminescence—in one workstation. As Valero explains, “Right now, it is a great advantage for us. Having these four technologies in a single platform is really important.”

The three Dimension Vista systems in the central lab of the facility in Málaga are connected by StreamLAB® Analytical Workcell, which has allowed Carlos Haya to add allergy testing, automated drug analysis, and drugs of abuse analysis, in addition to improved genetic and assisted reproduction testing. The hospital is now able to carry out more than 200 different testing methods thanks to the broad menu of the system. Valero sees measurable results: “More test requests are being made, new tests are being performed, and all of this is being handled by fewer staff.” In addition, the hospital has been able to redeploy resources to other lab areas.

Productivity and efficiency improvements are further advantages of the Dimension Vista system, with each analyzer providing a throughput of up to 2,000 tests with 200 primary tubes per hour to meet peak time demands. Technology consolidation has helped resolve previous response-related problems, providing further workflow benefits. Furthermore, Valero found Siemens to be supportive and helpful in training staff on the system and accommodating the hospital’s needs: “Siemens listens to the labs and investigates what they need. That’s one of the things to keep in mind when making decisions.” A case study about Carlos Haya Hospital can be accessed using the link below.

www.siemens.com/dimension-vista-casestudy
With growing awareness of genetics and other factors that increase a woman's risk for developing breast cancer, there is even greater demand for advanced breast imaging methods to supplement mammography. The Swedish Medical Center Institutional Review Board in Seattle, Washington, USA, recently performed preclinical trials using the ACUSON S2000™ Automated Breast Volume Scanner (ABVS). Its results have been published in a white paper. Automated breast volume scanning may be a revealing adjunct to mammography, which is the cornerstone of breast cancer early diagnosis for both detection and evaluation of the extent of breast cancer in high-risk patients. The technique automatically acquires intuitive coronal views for a comprehensive depiction of the breast.

The trials were done on patients who had known breast malignancies and had been examined with magnetic resonance imaging (MRI). Malignant masses, especially in women with dense breast tissue, may go undetected with mammography. MRI can visualize mammographically occult cancers. Handheld ultrasound exams can also detect tumors; however, conventional breast ultrasound is generally only used to evaluate a small area surrounding a palpable mass or a specific mammographic finding. But with the ACUSON S2000 ABVS, full-field volume imaging can be achieved, enabling views of the anatomical coronal plane, which was not possible before with conventional ultrasound.

ACUSON S2000 ABVS is a complete breast ultrasound imaging system, providing high-resolution handheld imaging with innovative applications such as fatty tissue imaging, and eSie Touch™ elasticity imaging. Furthermore, it allows biopsy procedures with ultrasound guidance. The system itself features an adjustable scanner with automated one-button pressure and locking mechanism to improve workflow by simplifying and expediting volume acquisition for consistent results. Workflow is then streamlined by providing image presets that are optimized to the patient’s cup size; the system automatically adjusts depth, frequency, focal zone placement, and overall gain.

After acquisition, images are sent to the ABVS Workplace for review, where they are presented through multiplanar reconstruction (MPR), which reconstructs secondary images from the acquisition volume in any plane, such as sagittal, coronal, radial, and anti-radial views. Highlighted advantages of the automated breast system include standardized, reproducible whole-breast imaging with 3D capability and retrospective multiplanar image review. The study also shows potential for better pre-operative assessment of patients with known breast malignancy. To download the full white paper, entitled Visualization of Mammographically Occult Breast Cancer – Two Cases, and the results of the preclinical trials, please use the link below.
Further Reading

Hospital operating rooms (OR) equipped with high-end imaging capabilities allow diagnosis and surgery to take place concomitantly. St. Bartolo Hospital in Vicenza, Italy, wanted to take this life-saving advantage and chose AXIOM® Artis U, a room-mobile unit from Siemens, for both its flexibility and its efficiency.

Hybrid rooms grant the ability to track the course of an operation in real-time. This opens new doors for surgeons dealing with high-risk patients or emergency cases. “We save time with a hybrid OR. The patient goes into surgery immediately to fix the life-threatening problem, and then we do imaging while they are still on the operating table so we can address other potentially serious problems while they are still under anaesthesia,” explains Alessandro Fabbri, MD, at the Division of Cardiac Surgery. AXIOM Artis U has created a new niche category between small mobile units and large, powerful stationery systems, enabling operations to be done more quickly, smoothly, and with more confidence. With its compact size, AXIOM Artis U is designed to fit into average-sized ORs and meet surgeons’ need to maneuver. Its image quality enables surgeons to see more quickly where to operate, and requires less contrast fluid and fewer X-rays per second than previous systems at St. Bartolo Hospital. According to Fabbri, interest in AXIOM Artis U is high, from both Italy’s aging population and from other surgeons, who “see what equipment you have and want it, too.”

A Decade of Dose Reduction

With the increasing performance of ever-refined scanning technologies, diagnostic opportunities and utilization of computed tomography (CT) are growing constantly. Thus, the excellent clinical results obtained with CT have to be weighed against radiation exposure. Siemens has been a pioneer in working to reduce radiation dose for many years, resulting in an impressive portfolio of innovations in scanner hardware, software, and imaging protocols that have cut patient radiation exposure to a fraction of what it once was. The cover story in the latest issue of SOMATOM Sessions, Siemens’ CT magazine, outlines a decade of key milestones, most recent developments, as well as feedback on some of the most important innovations from physicians in Germany and the USA who are working with them. “There’s more and more awareness about the amount of radiation used for CT scanning,” says Christoph Becker, MD, Professor of Radiology and Section Chief of CT and PET/CT (positron emission tomography) at University Hospital of Munich in Germany. “Siemens has thoroughly looked into this and is one of the first vendors to implement the tools we need to improve our scanning.”

Uwe J. Schoepf, MD, Professor of Radiology and Cardiology and Director of CT Research and Development at the Medical University of South Carolina, Charleston, USA, has implemented the latest dose reduction technology into his clinical routine: Iterative Reconstruction in Image Space (IRIS) introduces a correction loop in the image generation process that cleans up artifacts and noise in low-dose images. “With Siemens’ Iterative Reconstruction, I can save up to 60 percent of dose for a wide range of routine applications while maintaining excellent image quality,” explains the physician.

Iterative Reconstruction in Image Space (IRIS) represents the latest generation of Siemens’ dose saving features.
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<th>Date</th>
<th>Contact</th>
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<tbody>
<tr>
<td>ECR 2010</td>
<td>Vienna, Austria</td>
<td>Annual Meeting of the European Society of Radiology</td>
<td>March 4 – 8, 2010</td>
<td><a href="http://www.myesr.org">www.myesr.org</a></td>
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<td>ECCMID 2010</td>
<td>Vienna, Austria</td>
<td>20th Annual European Congress of Clinical Microbiology and Infectious Diseases</td>
<td>April 10 – 13, 2010</td>
<td><a href="http://www.escmid.org">www.escmid.org</a></td>
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<td>AEPC 2010</td>
<td>Innsbruck, Austria</td>
<td>44th Annual Meeting of the Association for European Paediatric Cardiology</td>
<td>May 26 – 29, 2010</td>
<td><a href="http://www.aepc2010.at">www.aepc2010.at</a></td>
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<td>EAACI 2010</td>
<td>London, UK</td>
<td>29th Congress of the European Academy of Allergy and Clinical Immunology</td>
<td>June 5 – 9, 2010</td>
<td><a href="http://www.eaaci2010.com">www.eaaci2010.com</a></td>
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<td>World Congress of Cardiology</td>
<td>Beijing, China</td>
<td>Scientific Session 2010 of the World Heart Federation</td>
<td>June 16 – 19, 2010</td>
<td><a href="http://www.worldheart.org">www.worldheart.org</a></td>
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<td>ESTRO 2010</td>
<td>Barcelona, Spain</td>
<td>European Society for Therapeutic Radiology and Oncology</td>
<td>Sep. 12 – 16, 2010</td>
<td><a href="http://www.estro.org">www.estro.org</a></td>
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<td>EANM’10</td>
<td>Vienna, Austria</td>
<td>Annual Congress of the European Association of Nuclear Medicine</td>
<td>Oct. 9 – 13, 2010</td>
<td><a href="http://www.eanm.org">www.eanm.org</a></td>
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