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Harald zur Hausen
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Use Your Innovative Power!

The global economy is in the midst of the most serious crisis since the Great Depression of the 1930s. It is my conviction that corporate strategy and product development can help in crisis recovery efforts. Innovation management is a key part of corporate strategy, both for us as your supplier and partner, as well as for you as a healthcare provider.

In times of crisis, it is easier to distinguish your facility through innovative products and services that excel in technological advantages and high quality. Therefore, instead of seeing the crisis as a threat, I suggest we see it as a chance for innovation and for changing outdated structures.

One area that holds great promise for future-proof investments is processes and structures. When times are tough, we all need to reinvent ourselves. Here is the chance to optimize and reform gridlocked, inefficient structures through innovations and information technology. And, this is not just about product innovations, but also about process innovations. Such innovations lead to increased quality, higher efficiency, and increased effectiveness, resulting in fewer costs and better profitability – if not right away, then when the crisis is over.

The new Imbanaco Medical Center in the Columbian city of Cali (see page 22) is one such example where the idea to build a new hospital came from the logistical and process limitations of the old facility, which was spread out over three city blocks. Imbanaco seized the chance and decided to design its new facility with improved workflows, lower costs, and better patient service in mind – focusing on long-term results.

Another example of a hospital looking at the sustainable profitability of its investments is the deployment of the syngo® DynaCT Cardiac software for atrial fibrillation therapy at Coburg Hospital in Germany. Not only has it been able to increase the success rate of catheter ablation therapy to 83 percent, it has also reduced costs by 52 percent per patient while treating twice as many patients. Read more about the results achieved in Coburg on page 70.

Innovation is no luxury, especially not these days; it is clearly an investment in the future. If you shrug off innovations as an unnecessary indulgence, you act like a farmer who, because of one poor harvest, stops sowing. Analyze the situation, observe, and then take the right measures.

Let’s weather the crisis – together!

Sincerely,

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

10 Strategic Alliance in Radiological Diagnostics and Therapy
For three years now, Siemens and the German Cancer Research Center have been applying their knowledge and expertise in the field of oncologic radiology in a strategic alliance. Otmar Wiestler, MD, Professor and Chairman of the Board, discusses the partnership’s topics and goals.

20 Pursuing new ways of thought, questioning old assumptions, believing in a vision for the future, and letting curiosity run free: Nobel laureate Harald zur Hausen in an exclusive interview for Medical Solutions.
Features

22 The Imbanaco Medical Center in Cali, Columbia, has teamed up with Siemens Healthcare to plan and build a new, completely integrated facility.

26 Just as hospitals have developed over the years, so has the service process. Medical Solutions accompanied a customer service engineer to the Royal Devon and Exeter Hospital, UK.

30 Based on psychological findings, color and light concepts are now being used in radiology, making many examinations easier for patients and practitioners.

36 Misdiagnosed or untreated childhood allergies can lead to serious problems in adulthood. Siemens’ 3gAllergy offers a simple, convenient, and accurate alternative to traditional skin testing.

40 Doctors on three continents spoke with Medical Solutions about the impact Biograph mCT could have on their practices and the lives of their patients.

46 In both Dr. Liliana Grinfeld’s personal and professional life, it’s the heart that counts. The Argentinean cardiologist talked about her journey from medical student to groundbreaking pioneer in her chosen field.

50 Radiologists and cardiologists around the globe extol the clinical and business virtues of the SOMATOM Definition Flash computed tomography scanner.

54 Siemens is facing the mounting cost pressure on customers with innovative, attractively priced, and high-quality products as well as sustainable services.

60 The advent of automated image acquisition in ultrasound – such as the ACUSON S2000 Automated Breast Volume Scanner – has the potential to improve clinical workflow.

64 The Children’s Cancer Hospital Egypt is changing the way pediatric oncology is practiced in the region and is achieving treatment success on par with that in the West.

70 syngo DynaCT Cardiac software makes atrial fibrillation treatment faster and more efficient and can also significantly save costs.

74 The introduction of syngo CAD Manager at the University Hospital in Munich, Germany, provides benefits for the facility, its physicians, and cancer patients.
Insights into the Brain

In a joint venture, researchers at the Wolfson Brain Imaging Centre (WBIC) at the University of Cambridge, UK, and the Cognition and Brain Sciences Unit (CBU) at the Medical Research Council (MRC) detected signs of awareness in patients whose behaviors meet the criteria that defines the vegetative state. With a MAGNETOM® Trio 3 Tesla (3T) magnetic resonance imaging (MRI) system, Adrian M. Owen, PhD, and his colleagues used functional MRI (fMRI) to investigate a 23-year-old patient who suffered from severe traumatic brain injury and met all of the diagnostic criteria for a diagnosis of vegetative state. Clinically, she demonstrated no evidence of awareness or purposeful response to command when she was asked to move or speak. However, when asked to perform several mental imagery tasks during fMRI, the responses were indistinguishable from healthy volunteers performing the same tasks. Hence, despite negative behavioral markers, it was possible to detect awareness without requiring the patient to move or speak. Though false negative findings in functional neuroimaging are common even in healthy volunteers, these reproducible, task-dependent responses represent a method that could help some noncommunicative patients use their residual cognitive capabilities to communicate their thoughts by modulating their neural activities. The WBIC is at the forefront of research for brain injury. It has been incorporated into the environment of a Neurosciences Critical Care Unit. Recently, the WBIC added another 3T MRI system, MAGNETOM Verio, to undertake magnetic resonance spectroscopy (MRS) in a range of metabolic disorders.

Its proximity to the Neurosciences Critical Care Unit of Addenbrooke’s Hospital allows the Wolfson Brain Imaging Centre to conduct crucial research in neurotrauma.

Bringing the User into Focus

Clinical staff members can experience an improvement in their daily workflows when using Siemens’ picture archiving and communication systems (PACS) and radiology information systems (RIS). The software’s well-developed, role-based portals apply to the individual requirements of each user and therefore, supply him or her with exactly the functions needed in the respective situation. This concept employs the new ‘User-Centered Design’ model. In the process of creating these user-friendly portals, first the diagnostic process is defined: Who is part of the workflow? What are the stakeholders’ tasks? Step two, the “Overview Use Case,” follows, concentrating on the typical user in order to supply the developers, designers, and testers with accurate impressions of the user. In the last step, the ‘User Goal Use Case,’ the interactions of the staff members with the system are portrayed and early prototypes of the system are sketched out by designers. During this three-step phase, product management, analysts, and designers work closely with selected end-users using different methods, such as onsite observation in the user’s real working environment, interviews, and evaluation of early prototypes. All this leads to a software that promises easier, faster operations: only relevant information is monitored and clicks as well as mouse paths are reduced. Additionally, the software has a strong focus on enabling both the organization and the users to meet their goals. The portals syngo® Portal Referring Physician¹, syngo Portal Radiologist, syngo Portal Transcriptionist¹, and syngo Portal Executive² can already be found on the market. With syngo Portal Referring Physician, the referring physician is, for instance, able to directly schedule an examination for his or her patient in a clinic or practice, which avoids time-consuming calls between the referrer, the patient, and the imaging provider.

syngo Portal Radiologist supports the radiologist all the way from viewing images and creating reports to holding clinical conferences. syngo Portal Transcriptionist contains the functions necessary for transcription or correction of radiology reports. syngo Portal Executive² is a business intelligence tool that points out trends, problems, and opportunities within an organization.

¹ Not available for sale in the U.S. ² Available with syngo Workflow SLR only
High-tech imaging procedures such as magnetic resonance imaging (MRI) and computer tomography (CT) can increase legal certainty in the juridical process – however, they are not routinely used in forensic medicine for many jurisdictions. The Ludwig Boltzmann Institute for Clinical Forensic Imaging in Graz, Austria, aims to overcome technical challenges in order to increase the acceptance of these methods in clinical forensic medicine. It is likely that Austria will become the first country to perform forensic radiological practices regularly in forensic medicine.

Clinical radiology focuses on diagnosis to assess therapeutic options for patients. Forensic medicine, in contrast, is concerned with the reconstruction of events after acts of violence and helps estimate the severity of injuries or the intensity of the contact. Especially when examining victims of violence who have fortunately survived an attack, modern diagnostic procedures may play a significant role and support the results of forensic examinations. Radiological exams noninvasively reveal injuries inside the body. For instance, although small blood specks in the victim’s eyes are often an indicator of strangulation, MRI could document injuries of the soft tissues of the neck that are otherwise not visible.

The advantages of integrating high-tech imaging into forensic medicine are undeniable and Professor Kathrin Yen, MD, Director of the Ludwig Boltzmann Institute, believes that the modern way of conserving evidence can also lead to shorter trials. The stress of interrogation would be reduced for the surviving victims while, regarding faked acts of violence, imaging would help improve legal certainty: “Such cases have been discovered with greater frequency lately. Specialized forensic medical knowledge is required for an objective analysis,” says Yen. People suffering from violent acts can turn to the clinical forensic ambulance of the Ludwig Boltzmann Institute, which is open 24 hours a day. “Due to the results of the examinations, legal measures and measures for the victim’s protection can be taken,” says Professor Josef Smolle, MD, President of the Medical University of Graz. With the examination report, physicians and victims also hold the evidence of abuse in their hands – documented forever while the visible evidence on their bodies will fade in time.

With the help of Siemens, the Institute wants to overcome technical challenges: “The results of the research must be made comprehensible to medical laypersons in court through visualization techniques, and it must be possible to represent them in a verifiable way,” explains Yen. In order to read the diagnostic findings in the necessary forensic way, the radiologist will also have to attend special training courses. To enforce the standardization of the deployment of modern diagnostic procedures, the institute will publish the results of its research so they can be of use worldwide, explains Yen. The university professor also states that the new situation of radiology and forensics working so closely together is essential for forensic radiological methods.

Due to the development of medical imaging in recent years, Eva Scheurer, MD, Acting Director of the Institute, thinks it is logical that MRI and CT be used in forensic medicine. And this could happen very quickly when the standards for clinical forensic radiology are defined for Austria.
Retaining the Proven While Embracing the New

The latest version of the Siemens cardiology picture archiving and communication system (PACS), syngo® Dynamics, is designed to offer even greater efficiency, accuracy, and increased capabilities for clinical procedures in the fields of cardiovascular imaging, vascular ultrasound, general imaging, and OB/GYN.

syngo Dynamics is a comprehensive multimodality diagnostic image review and evidence-based reporting system incorporating decades of Siemens experience in both clinical and administrative workflows. The solution focuses on dynamic image clip review and reporting for ultrasound and cardiovascular imaging modalities. Version 7.0 of syngo Dynamics already offered immediate data transfer between Siemens AXIOM® Sensis XP hemodynamics monitoring systems and the syngo Dynamics reporting and image management solution, as well as the ability to incorporate data from the GE Mac Lab® v6.5 hemodynamic system to support a multivendor environment. The upcoming new version 8.0 will include features to enhance the cardiology department workflow and address market demands. For example, a tool designed for administrative reporting of key performance indicators, such as resource utilization and physician productivity, will allow for greater transparency and support proactive department management. In addition, a new scheduling option allows users to better manage resources in cath and echo labs. In this version, the remote viewing application was redesigned to provide a look and feel similar to the workplace. The application offers a high level of performance – even in low-bandwidth settings – making it possible for physicians to conveniently access images from nearly any location.

Trendsetting Mammography Design

MAMMOMAT® Inspiration, the digital mammography platform designed by Siemens and designaffairs, has received the if Product Design Award 2009 and the red dot award: product design 2009. Both awards celebrate products that excel in a unique combination of functionalities, user friendliness, aesthetics, and meet all the criteria of an innovation. With more than 11,000 submissions from 61 countries, the red dot design award is one of the largest and most renowned design awards worldwide. For the if Product Design Award, MAMMOMAT Inspiration was one of the winning products selected from 2,808 applicants from 39 countries. MAMMOMAT Inspiration is the first mammography system to incorporate the MoodLight™ function. MoodLight is an LED glass panel that can be illuminated with freely selectable colors. They can be adjusted to the patient’s mood and preferences, thereby producing a comfortable, relaxing effect on the patient. Read more about this feature in the article “Color Palette for the Radiology Suite” on page 30 of this issue.

One of the key functions of syngo Dynamics is to support accurate reporting in cardiovascular imaging.

1 The information about this product is being provided for planning purposes. The product is not yet commercially available.
2 Reference viewing only.
News

A course that covers 4,500 kilometers (ca. 2,796 miles) in 64 days on foot, without a single day’s rest: an impossible distance for the average jogger. The experienced runners participating in the Transeurope-Footrace 2009, who ran from Bari, Italy, to Nordkapp, Norway, could make it – at least some of them. But how do their musculoskeletal systems and hearts change under such extreme conditions, and what processes do their brains undergo? These are the questions that Uwe Schütz, MD, of the University Hospital Ulm in Germany, wants to answer.

To do so, he started a unique research project in which he followed along on the entire course of the run with a trailer housing a MAGNETOM® Avanto magnetic resonance imaging (MRI) system. Each day, up to 11 participants were examined in this trailer.

“This run represented a unique study setting,” says Schütz, who specializes in sports medicine and radiology. “Because we were able to do progressive checks via MRI for the first time, and not just before and after examinations, we hope that we can better understand and trace the processes that take place in the body.” Schütz and his team examined a group of 44 test subjects from among the event’s total of 67 participants. They were split at random into three examination groups. In the first group, injuries to the lower part of the musculoskeletal system were monitored. In the other two examination groups, volumetric measurements taken via MRI were used to measure both how the heart adapts to long-term strain and the activity that takes place in specific regions of the brain, which are responsible for motivation and perceptions of pain. “We believe that those runners who can endure through to the end of the ultramarathon have especially good abilities to exert their will and suppress pain. Using functional MRI testing, we might be able to discover exactly that.” Schütz had the chance to prove these abilities in the remaining 30 test subjects who crossed the finish line in Nordkapp on June 21. The collected data will be analyzed and published in 2010 in collaboration with the Department for Sports Medicine at the University Basel, Switzerland.

MRI Shows the Limits of Endurance

Dedicated Ultrasound Solution for OB/GYN

The new ACUSON X300™ Premium Edition (PE) – Women’s Imaging ultrasound system features unique workflow tools as well as exceptional clinical performance across all modes, including 3D/4D imaging. Compact, highly portable, and easy to use, the system accommodates the needs of any clinical environment – from private practices to busy hospital settings. The system features syngo® AutoOB measurements, a unique workflow tool that automates routine biometry measurements of the fetus. This knowledge-based workflow application eliminates the time-consuming manual process of biometry measurements by saving up to 75 percent of the keystrokes. Not only does this help accelerate workflow, but this may also help reduce repetitive stress injury [RSI] among users. Furthermore, the system offers Advanced fourSight™ volume imaging technology providing a complete 3D/4D solution, and syngo Velocity Vector Imaging™ (VVI) for fetal echocardiography, a sophisticated 2D tracking algorithm that provides insight into fetal myocardial mechanics. To complete the solution, the syngo fourSight™ ViewTool technology provides easy offline analysis, remote review, manipulation, and storage of 3D/4D volumes, freeing the ultrasound system for additional patient exams.

Project leader Dr. Uwe Schütz and radiologist Dr. Christian Billich prepare their "ultramarathon MRI.” (Photo courtesy of University Hospital Ulm)
“Success needs a good strategy as well as chance and good luck. But what’s decisive is to persistently work on your own ideas and visions.”

Harald zur Hausen, MD, German Cancer Research Center, Heidelberg, Germany, Nobel Laureate in Medicine 2008

Overview:

12 For three years now, Siemens and the German Cancer Research Center have been applying their knowledge and expertise in the field of oncologic radiology in a strategic alliance.

16 The four pillars of the strategic alliance between the German Cancer Research Center and Siemens rest on a solid base.

20 Innovative people push the limits of our knowledge, thereby changing the world. Harald zur Hausen is one such person.
Strategic Alliance in Radiological Diagnostics and Therapy

For three years now, Siemens and the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) have been applying their knowledge and expertise in the field of oncologic radiology in a strategic alliance. Otmar Wiestler, MD, Professor and Chairman of the Board at DKFZ, discusses the partnership’s topics and goals.

By Hildegard Kaulen, PhD

**Professor Wiestler, what are the aims of the strategic alliance between the DKFZ and Siemens?**

**Wiestler:** We want to continuously improve imaging methods and link them to create a new level of imaging quality. This information can then be used for highly precise radiation therapy planning as well as monitoring therapy progress. We have agreed on various projects with these aims in mind. In fact, the alliance between us is extremely multifaceted. For example, Siemens and the DKFZ will work together to sound out the potential of high field strengths in magnetic resonance imaging [MRI] in cancer diagnosis. Siemens is providing a 7 Tesla system. The DKFZ commissioned a new building with complex steel cladding and a special foundation to house the unit’s 32-ton magnet. The two partners are also cooperating in radiation therapy.

In this field, Siemens is supplying the jointly developed ARTISTE® radiation therapy solution, which takes 3D cone beam computed tomography images just before and during the radiation therapy session to assess tumor position. Then, the therapist can adjust the therapeutic radiation to the specific tumor size and location. Soon, we will probably also try to combine an MRI unit with a source of radiation. And, in our third project, we are cooperating in the area of molecular imaging. To help treating physicians plan the radiation therapy more precisely, Siemens and the DKFZ are additionally developing a software platform that reconciles clinical images and methods into a single, coherent, big picture. Another part of our strategic alliance is the creation of the Integrated Diagnostics and Therapy Center, which will function as a link to the hospital. Here, all of the modern imaging data will converge for inclusion in cancer therapy.

**What brought the two partners together?**

**Wiestler:** Our strategic alliance is based on a longstanding cooperation in imaging and radiation therapy between the DKFZ and Siemens. The 160 MLC multileaf collimator that is used to shape the radiation field in the ARTISTE solution, is, for example, a joint development. Our future plans include forming a strategic alliance with the University Hospital Heidelberg as a third partner. The DKFZ is already in close contact with this hospital – for example, via clinical cooperation units and the National Center for Tumor Diseases.

In a strategic alliance, partners with shared interests and goals work
together. What makes this alliance so attractive to both sides?

WIESSLER: Cancer research and medical technology are predestined for strategic alliances. Both fields are interested in how technical developments can make diagnostics and therapy even more precise and more tolerable for patients. Because of the short development cycles, the business risk in this field is also easier to assess than, say, in the pharmaceutical industry, where ten to 15 years pass before a new product comes to market. During the same time span, medical technology makes swift advances, as past developments have shown us. In addition, the two partners are an ideal fit. The DKFZ provides Siemens with its large body of scientific expertise in cancer research. In return, the scientists at the DKFZ receive access to the latest generation of Siemens equipment and the opportunity to be involved in the further development of the hardware and software components. Clinical evaluation is tremendously facilitated through our close connection with the National Center for Tumor Diseases. The latest prototypes have to be tested on patients quickly, which is one reason why cooperation arrangements with clinical partners are so important. It doesn’t work without the patient.

Are these kinds of alliances also politically desirable? After all, one of the aims of the European Union is to become the most dynamic, most competitive, knowledge-based economic area in the world.

WIESSLER: It certainly makes sense to have political support. But whether a strategic alliance works doesn’t depend on politics. The strategic alliance between the DKFZ and Siemens is based on what the two partners bring to the table and how they live out the alliance. It’s all about complementary strengths in oncologic radiology and about dealing with each other in a true spirit of partnership. The outcome is a direct win-win situation for both partners. And, by the way, the idea for this cooperation came up during a meeting with Professor Erich Reinhardt, who, at the time, was the head of Siemens Healthcare. There was a desire to pool our efforts and develop intelligent new products that reach the patient quickly. That’s why we are working together on high-field magnetic resonance imaging, Adaptive Radiation Therapy, and molecular imaging. These ideas are also in line with the new role of imaging, which is increasingly becoming an instrument of holistic disease management, from the initial
findings through to monitoring the course of therapy.

You mentioned the inclusion of patients. How does the strategic alliance benefit patients?

WIESTLER: The patients are included right from the start through clinical studies. One of the alliance’s stated goals is to ensure that these promising new methods are put into clinical use quickly. We want to make lasting improvements in the quality of cancer care provided. And that definitely is something that benefits the patient.

Which types of cancer is the strategic alliance examining?

That depends on the individual projects. We are currently using the 7 Tesla MRI unit to scan patients with brain tumors. Our colleagues in that project are building on data collected using a conventional 3 Tesla MRI scanner. They are checking whether additional information can be gained from a scan at a higher field strength and if so, what that information entails. Alongside much improved anatomical resolution, these new units can also be used to depict molecular spectra in the smallest possible space. This permits highly precise tumor characterization. Plus, this unit is still in the prototype stage. Both partners are putting a lot of work into the further development of this new technology.

What are the plans for other kinds of cancer?

WIESTLER: In the area of lung cancer, we are working closely with the chest clinic here. We believe further development of Adaptive Radiation Therapy will particularly benefit lung cancer patients, whose tumors move with every breath. These tumor movements should be taken into account during radiation therapy in order to spare as much healthy tissue as possible. The aim, in this case, is to arrive at a radiation therapy that adapts to movement. Colon carcinomas and prostate cancer are similarly affected by changes in position, because they are shifted by the contents of the intestine and the bladder. Just like in lung cancer, radiation therapy is a key component in prostate cancer treatment. Because the organ is surrounded by sensitive structures, radiation should be applied as precisely as possible. Prostate cancer is currently the most frequently diagnosed type of cancer in men.

What about molecular imaging? Have there already been tangible results in this area?

WIESTLER: Molecular imaging provides information on the molecular composition and functional characteristics of the tumor. The requirements that apply to new tracers, however, are very strict. They have to be tumor-specific and it must be possible to make them visible. They have to be distributed throughout the body and find their target molecule. In addition, it is important for them to remain within the body long enough to supply a good positron emission tomography [PET] image. But, they also can’t be eliminated too slowly in order to avoid placing unnecessary strain on the patient. That's a challenging profile, and one that isn’t easy to fulfill. It’s no coincidence that marked glucose still remains the most frequently used PET tracer. But in our strong alliance with Siemens, I am really confident that we will master this challenge.

Should there be more strategic alliances like the one between the DKFZ and Siemens? Does this cooperation serve as a model for others?

WIESTLER: In Germany, we have strong research institutions and a thriving medical technology sector. We just have to get the results into the value chain faster. The connection between these two worlds carries a great deal of potential for the rapid transfer of innovative research into clinical applications. We need cooperative arrangements to achieve this, and they have to meet certain conditions in order to succeed. The alliance must be based on strong partners, as is the case between

Summary

Challenge:
- New developments in medical physics, medical technology, and radiation therapy should reach patients faster than before.
- Strategic alliances need strong partners with complementary expertise that ensures a win-win situation for them.

Solution:
- The strategic alliance between Siemens and the DKFZ is based on longstanding cooperation with shared product developments.
- Both partners established the prerequisites for the strategic alliance themselves, making them independent of short-term sponsoring programs.
- There are plans to bring the University Hospital Heidelberg into the strategic alliance as a third partner.
- The cooperation between the partners encompasses diagnosis and therapy for brain tumors, lung cancer, and prostate cancer, among others. The alliance aims to achieve better tumor characterization and integrate all image data into a shared data set that can then be used for a highly precise radiation therapy plan.
- Initially, the alliance will address the entire value chain for cancer: calculating the risk of disease, identifying cancer earlier and characterizing it precisely, planning and applying radiation therapy or other therapies optimally, and measuring therapeutic success.

Result:
- The strategic alliance aims to improve the quality of cancer care.
the DKFZ and Siemens, that complement each other in terms of their subject expertise. And, they have to bring a lot of tenacity to the table. Both DKFZ and Siemens are at the international cutting edge of their respective fields. Many political initiatives fizzle out because they are originally designed to run for just a few years, and when their time is up they can’t find subsequent financing. The special thing about the strategic alliance between Siemens and the DKFZ is that both partners have created the conditions for it on their own, not through an aid program. At the same time, raising funds from outside sources, as we have now done with DOT-MOBI, a sponsoring program run by the Federal Ministry of Research, is an important goal for the alliance.

What will the future hold in terms of content?
WISTLER: Our next goal will be to cover the entire value chain. That means calculating the risk of disease, identifying cancer earlier and characterizing it more exactly, planning and implementing radiation therapy and other treatments very precisely, as well as measuring therapeutic success. That’s how we will continuously become more successful in the fight against cancer. That is, after all, the big goal both partners had in mind when they entered into this arrangement.

Hildegard Kaulen, PhD, is a molecular biologist. After positions at Rockefeller University in New York and the Harvard Medical School in Boston, Massachusetts, USA, she has worked since the mid-1990s as a freelance science journalist for leading newspapers and scientific journals.

Further Information
www.siemens.com/oncology

Focused Expertise in Imaging and Radiation Oncology

The German Cancer Research Center and Siemens are breaking new grounds with the cooperation between a national research center and a commercial enterprise.

The four pillars of the strategic alliance between the German Cancer Research Center and Siemens rest on a solid base.
Modern architecture houses a 7 Tesla MRI system (top). The ARTISTE linear accelerator solution (bottom) is used for joint developments of DKFZ and Siemens.

Linking Research and Clinical Application

With a special role in the strategic alliance, the Integrated Diagnostics and Therapeutic Center (IDTC) coordinates and aligns all the clinical processes, from diagnosis to tumor characterization and radiation therapy planning, to monitoring therapy. Christian Thieke, MD, PhD, who heads the center, is both a physician and a physicist. He is on the staff of the DKFZ and the University Hospital Heidelberg. This dual role helps him in his duties as the head of the IDTC.

Thieke and his colleagues design the clinical studies that are necessary to transfer the results of the strategic alliance into clinical applications. They work together with the project partners to determine which of the newly developed methods should be considered for clinical trials and for which patients these methods promise the greatest success. They are involved in the clinical analysis of the imaging data and radiation therapy. That’s why the development of the software platform DIROlab (Diagnostic Imaging and Radiooncology) also falls within the IDTC realm. This is where the paths needed for the combined analysis of diagnostics and therapeutic data converge. The IDTC also brings new clinical issues to light. Working with additional partners, the Center is now involved in DOT-MOBI, a collaborative research project funded by the Federal Ministry of Education and Research, which aims to optimize radiological diagnostics and radiation therapy for cancer using molecular imaging.

“The Integrated Diagnostics and Therapeutic Center (IDTC) stands for the transfer of fundamental developments into clinical application.”

Christian Thieke, MD, PhD, Project Manager, Integrated Diagnostics and Therapeutic Center, German Cancer Research Center, Heidelberg, Germany
Everything in One Sweep

Computed tomography, magnetic resonance imaging, positron emission tomography: When a patient has cancer, various imaging methods are used, but the results are not always consistent. In addition, some data sets can currently only be evaluated using certain workstations, as is the case with magnetic resonance spectroscopy. The DKFZ group run by Oliver Nix, PhD, colleagues from the Bremen-based research institute Fraunhofer-MEVIS, and from Siemens are therefore working on developing a software platform that can be used to quickly and effectively bring together all information. This can then serve as the basis for precise radiation therapy planning, but therapy monitoring and analysis of the radiation treatment’s effectiveness also take on a new quality.

A differential image of the tumor and normal tissue can be used to generate a radiation therapy plan that is highly precise and fine-tuned to the patient. The software program is called DIROlab, for Diagnostic Imaging and Radiooncology. Because the system speeds up reporting as well as planning and analysis of radiation therapy, it also improves workflows. Nowadays, no physician can afford to spend hours of meticulous work putting together all findings, analyzing them by hand, and transferring them into the radiation therapy planning programs. In addition, a doctor shouldn’t have to have a degree in computer science to be able to use the software. Thus, DIROlab also aims to be an easy-to-understand computer assistant.

"With DIROlab, complex diagnostic information and radiation therapy can be combined to enable highly precise radiation planning."

Oliver Nix, PhD, Project Manager, Software Development for Integrated Diagnostics and Therapy, German Cancer Research Center, Heidelberg, Germany

More Targeted Radiation Therapy

Professor Wolfgang Schlegel, PhD

"We are connected through our long-standing cooperation with Siemens. Motion-adaptive radiation therapy is the logical next step."

Professor Wolfgang Schlegel, PhD, Department Head, Medical Physics in Radiation Therapy, German Cancer Research Center, Heidelberg, Germany

Radiation therapy is always a balancing act, aiming to eliminate the cancer while sparing the surrounding tissue. In Intensity Modulated Radiation Therapy, multi-leaf collimators shape the radiation field so the spatial distribution of the dose is closely adjusted to the target volume. At the same time, irregular overlapping subfields spare healthy tissue, affecting only the tumor. But because the tumor can shift over the course of several weeks of therapy, its position should be checked before every treatment session. To accomplish this, the DKFZ uses the ARTISTE® radiation therapy solution, in which the conical treatment beam also generates a computed tomography image. To further increase treatment efficacy and spare healthy tissue, Professor Wolfgang Schlegel, PhD, and his colleagues are working together with Siemens to develop motion-adaptive radiation therapy. This method aims to check the position of the tumor several times per second to ensure that the beam can be adjusted to the tumor’s delicate back-and-forth shifts. To this end, the verification image will no longer be generated with a megavoltage cone beam, but rather with a kilovoltage1 cone beam mounted at a 180-degree angle to the megavoltage radiation source. Imaging with a kilovoltage cone beam yields higher-contrast diagnostic images than a highly charged treatment beam. The appropriate flat-image detector for this configuration is still under development. In their clinical work, the project partners are focusing on tumors in the lungs, the prostate, and the spinal cord area. In the case of the lungs, tumor mass is especially prone to shifting due to breathing; in the prostate, the same is true due to the contents of the bladder or the intestine.

1 The information about this feature is preliminary. The feature is under development and not commercially available in the U.S., and its future availability cannot be ensured.
What a PET Scan Tells Us About a Tumor’s Biology

A positron emission tomography (PET) scan measures the local concentration of a radiopharmaceutical and captures – for instance, using the glucose-analog F-18 deoxyglucose (FDG) – the metabolic activity in the body. Using mathematical methods, the raw data can be dissected into individual steps that give researchers a better window into the biological processes taking place within the tumor. If FDG accumulates in the tumor, three processes are involved: good blood flow to the tumor, uptake of the tracer into the cancer cell, and metabolism within the cell.

Thanks to new software tools, Professor Ludwig Strauss, MD, and his team can separate these three processes from each other and correlate PET data with the activity of the molecules involved. By doing so, they are able to depict the dynamics of disease-specific molecular processes and gain an overview of vascular density, membrane transport, and intracellular metabolism. This is called parametric imaging. Within the strategic alliance, researchers are also examining the extent to which this information, together with the morphological data from other imaging processes, can be used for radiation therapy planning.

Strauss and his colleagues are also interested in new tumor-specific molecules that can be used as tracers. Currently, there are three tracers in use: FDG, F-18 misonidazole, and F-18-fluoro-3′-deoxy-3′-L-fluorothymidine (FLT). F-18 misonidazole is used to measure the tumor’s oxygen content, and FLT to measure the unchecked growth of the tumor cells.

"With mathematical processing of the PET scan, we add a wealth of new data on the disease-specific processes taking place within the tumor. This information can be used for precise, individualized radiation therapy planning."

High Magnetic Fields for Cancer Research

The strategic alliance also brought a MAGNETOM® 7 Tesla (7T) magnetic resonance imaging (MRI) system to the DKFZ. This system can visualize anatomical structures that are considerably smaller than one millimeter. For brain imaging, the quality of the 7T MR images is thus almost comparable to anatomic cross sections, which allows assessing cancer lesions in all their heterogeneity. The ultra-high field strength also helps to measure the tumor’s functional characteristics, such as blood flow or diffusion. With MR spectroscopy, it is even possible to detect tumor-specific metabolites, which can then be quantified to examine the metabolic activity.

All this information serves to optimize, for example, radiation therapy or to monitor the success of a chemotherapy. Together with their clinical partners, Professor Wolfhard Semmler and Michael Bock, PhD, of the DKFZ are also evaluating which cancer patients benefit from a 7T MRI scan, as the high field strength does not necessarily improve the diagnostic quality for all patients. At present, patients with brain tumors and metastatic brain cancer are the primary groups participating in the 7T MRI studies. In the future, there are plans to extend these studies to patients with prostate cancer and other types of cancer. For all patients, the 7T MRI images are compared with conventional 1.5T or 3T images to quantify how much additional information can be found in the high-field images. The University Hospital Heidelberg and the universities of Würzburg and Freiburg are also involved in this cooperative project.

"Our aim is to bring 7T MRI up to the same technical maturity that is common today for clinical oncologic applications at 1.5T and 3T."

Michael Bock, PhD, 7T MRI Project Manager, Department of Medical Physics in Radiology, German Cancer Research Center, Heidelberg, Germany

Some of the biomarkers referenced in this article are not currently recognized by the US Food and Drug Administration (FDA) as being safe and effective, and Siemens does not make any claims regarding their use.
A Man with Vision
Pursuing new ways of thought, questioning old assumptions, believing in a vision for the future, and letting curiosity run free: Innovative people push the limits of our knowledge, thereby changing the world. Harald zur Hausen is one such person. Scientific journalist Hildegard Kaulen met with the Nobel laureate in this exclusive for Medical Solutions.

He is a man of calm, unassuming energy: Professor Harald zur Hausen, MD, Dr. h.c., Nobel laureate in medicine, virologist, and long-time Scientific Director of the German Cancer Research Center (DKFZ), has achieved what only a few have accomplished. Through tenacious work, he proved a brilliant idea that was at odds with the prevailing doctrine, thereby paving the way for a vaccination that will protect countless women from cervical cancer. For his work, he was awarded the Nobel Prize in Medicine last year, the highest award given to any scientist. Since then, there have been radical changes in his life. He tells us that he has given more than 300 interviews and faces dozens of inquiries each day. He is astonished by the breadth of topics on which his opinion is solicited – almost as if he had become another person when the prize was granted, zur Hausen says, commenting on the hubbub surrounding him personally.

And yet, his scientific career got off to quite a bumpy start. Zur Hausen makes no secret of the fact that his first few years in the lab were not very exciting. But very early on, he developed the idea that viruses could cause cancer. The critical clue came from papers completed in the 1950s on bacteriophages. Phages are viruses that specialize in bacteria and integrate their genetic material into the host cell’s genome. So why wouldn’t there be human viruses that do something similar, driving the cells to respond with cancer?

Before zur Hausen could pursue the idea, however, he first had to learn the necessary tools of the trade. And the opportunity to do so came to him in a wastebasket. That’s where a letter addressed to his boss from the famous husband-and-wife research team of Gertrude and Werner Henle of Children’s Hospital in Philadelphia, Pennsylvania, USA, both of them originally from Germany, had ended up. In the letter, the two researchers inquired whether zur Hausen’s boss could provide them with a research assistant. When zur Hausen learned of it, he fished the inquiry out of the wastebasket and applied for the position. At that time, his superiors offered him little encouragement. “Just get to work,” zur Hausen says, was the standard sentence he heard at the time. And yet much of what he had initially planned was entirely too naïve. It was not until he worked for the Henles in Philadelphia, between 1965 and 1969, that he found an environment that motivated and inspired him. For that reason, zur Hausen now advises young scientists to select their jobs with greater care than he did in the early years of his career.

After his return to Germany, zur Hausen made a scientific breakthrough in the early 1970s. He was able to show that Epstein-Barr viruses accumulate in human tumor cells. This was proof that viruses can, in fact, remain within the genome of tumor cells and probably have something to do with cancerous growth. Over the next few years, zur Hausen and his team members proved that it was not, as originally presumed, the herpes viruses that caused cervical cancer, but rather human papilloma viruses. In 1983, they isolated the virus types 16 and 18, laying the groundwork for a vaccine against the second-most prevalent type of cancer in women.

Luck, a Good Strategy, and Communication
Asked what conditions are necessary to achieve success, zur Hausen gives a clear answer. Luck is important, he says, but a good strategy is much more so. One has to be able to develop hypotheses and consistently put them to the test. This is where he sees his own personal strengths: in his dedicated pursuit of his convictions. He also says the ability to communicate in person with others is
necessary for success. He always made time to speak with his colleagues and team members. Only when people speak to each other is it possible to shed light on a problem from all sides. And, it’s important to make sure the working group is not too large, or no one will have any time left to speak with all the others. For that reason, zur Hausen has never had more than five or six members in his core working group.

He answers the question of whether it is easier or harder to do innovative research these days with a double affirmative. It is easier, he says, because we have better technologies today. But it is also harder, because the pressure has increased. There is hardly any room left for unconventional ideas. People are forced to publish right away. It is difficult to work on a new idea without disruption for a longer period. That’s why zur Hausen considers giving leeway and supporting even uncommon projects highly important.

Intuition for Topics and Talents
In addition to his fine intuition for topics and talents, the Nobel laureate also has an extraordinary political and diplomatic aptitude. When he took up his position as the head of the DKFZ in 1983, the institution was under criticism. The DKFZ had been publicly accused of having deficient management and inadequate expert qualifications. The notion that a person with a pronounced scientific agenda had agreed to head up such an institution was astonishing at first. But zur Hausen was happy to join the DKFZ, where he saw two initial problems: The DKFZ had been founded without a clinic of its own and at that time, cancer was considered only from the viewpoint of carcinogens, with no other causes in mind. Zur Hausen accomplished a great deal in both areas and today, the DKFZ is among the leading cancer centers in the world.

In his acceptance remarks in Stockholm, zur Hausen told an anecdote about his three-year-old granddaughter: “When her parents told her about the Nobel Prize, and that her grandfather was getting it, she started to cry. With tears in her eyes, she told her parents she wanted a Nobel Prize, too. When I told the story to a colleague, he became thoughtful and said, ‘your granddaughter voiced the wishes of a legion of scientists. It’s just that most of us don’t want to talk about it or publicly burst into tears.’”

“Innovative research is easier these days, because we have better technologies. But also harder, because the pressure has increased.”

Harald zur Hausen, MD, Dr. h.c., German Cancer Research Center, Heidelberg, Germany, Nobel Laureate in Medicine 2008
The Imbanaco Medical Center in Cali, Columbia, has enjoyed ever-increasing demand for its services since its founding three decades ago. But in the process, its physical facilities have become a logistical nightmare. Now, Imbanaco has teamed up with Siemens Healthcare to plan and build a new, completely integrated facility that will improve workflow, lower costs, and provide even better patient services.

By Chris Kraul

Starting out in 1976 as a small clinic with a laboratory and X-ray system, the Imbanaco Medical Center (Centro Médico Imbanaco) has become one of southwestern Colombia’s largest, most dynamic and distinguished full-service hospitals. It is currently spread out over three city blocks, includes a 13-story and an 11-story tower, and offers the full panoply of medical services – from neurosurgery and angioplasties to neonatal care and kidney transplants. An average of 17,000 patients, family members, medical staff, and support employees flow through its doors every day. "We’re like a stadium in terms of the numbers of people who come and go," says Armando Gonzalez, MD, CEO of Imbanaco and one of 28
result, efficiency has suffered and costs have soared. On top of it all, the hospital hit a wall on further expansion long ago: More than half of its 37 clinical services are saturated, with no room for growth.

Intelligent Planning
Understandably, when Imbanaco’s shareholders decided to build a new hospital to consolidate its archipelago of facilities under one roof, their priorities included state-of-the-art workflow design and medical technology; but they also wanted to position Imbanaco for future growth in Colombia’s fast-moving medical environment. Those goals led Imbanaco to Siemens Healthcare’s Turnkey & Planning group, which in June of this year delivered floor plans for the new Imbanaco Health Clinic, a seven-story, US$80-million structure that will double the hospital’s current bed count to 300 and expand its floor space to 800,000 square feet (ca. 74,322 square meters). Construction of the distinctive triangular design, which includes two interior courtyards, is to begin by the end of 2009 and be completed in 2012. The partnership is a milestone for both parties. Imbanaco acquired access to Siemens’ “best practices” database, which the company has accumulated in consulting 200 other hospitals around the globe. A core element is the Siemens “workflow-optimized space concept,” which uses intelligent architecture and floor planning to minimize the time and maximize the efficiency of services hospitals give to patients.

“Siemens offered us what no other hospital services company did,” says Gonzalez. “Other medical supply and consulting companies sell sophisticated equipment and advice on how to profitably operate them, but none match Siemens’ ability to hand over a turnkey design that integrates all hospital functions.” The design also incorporates Imbanaco’s ecological imperatives, which include having sunlight in nearly every patient room and a plan for efficient processing of biowaste.

Pursuing Quality
Several factors have contributed to Imbanaco’s rise to prominence on the Colombian medical landscape. Since 1990, Cali’s population has doubled to three million, making it Colombia’s third largest city after Bogotá and Medellín. This has, of course, led to an increasing demand for health services. Other factors include Colombia’s landmark 1993 healthcare reforms, which mandated universal healthcare coverage. “The government is now reimbursing for some services to an extent that makes it profitable for private hospitals like Imbanaco to add them,” says Imbanaco’s Clinical Chief William Duarte, MD.

And then there is Imbanaco’s sterling medical reputation, capped by the 2007 Colombian award. “No dividends from the hospital’s profits have ever been paid out to the owners. Instead, all profits have been reinvested in new equipment and services as part of our single-minded pursuit of quality,” says Gonzalez. The hospital’s commitment to quality made Siemens’ executives all the more eager to launch its South American Healthcare Consulting, with Imbanaco as its poster child. The project started in the fall of 2008 by putting Siemens Healthcare’s consultants to work, analyzing Imbanaco’s existing layout and workflow practices. They spent four months analyzing the delivery of clinical services to find out which were most cost effective and assessed future trends so that the new facility’s design would be better...
Summary

Challenge:
• Dispersion of Imbanaco’s services over wide area due to rapid growth
• Inefficiency and duplication of basic support services
• Cramped waiting rooms of “saturated” clinics
• Infrastructure problems threatened reputation and potential for continued growth

Solution:
• Strategic deal with Siemens for design of a new US$80-million clinic
• Analysis of hospital’s workflow and overhead, technology trends, and impact of universal healthcare on bottom line
• Workflow-optimized layout plan emphasizing “clinical centers of gravity”

Result:
• Dedicated space allotted for current needs and future growth in services
• Environmental concerns and wishes accommodated
• Triangular, two-courtyard design for maximum natural light in patient rooms
• Hospital positioned for possible influx of foreign medical tourists
• Construction to begin in late 2009, with completion scheduled for 2012

The analysis confirmed that there was an enormous waste of hospital resources and squandered opportunities for growth. The spreading out of clinical functions was causing costly duplication of security, laundry, maintenance, orderlies, messengers, and other services, not to mention multiple inefficiencies and added stress for patients and staff.

Efficiencies by Design
Disorder was particularly evident in the cramped emergency room, where patients’ families struggled to make room for incoming gurneys with car accident and gunshot victims. Outpatients and their families shared elevators with trauma victims and maintenance workers. Overcrowding in the oncology clinic’s waiting room forced patients and family members to spend hours sitting in an adjacent stairwell.
“Our team members at Imbanaco achieve an enormous level of quality and patient satisfaction in spite of a physical structure that is bringing them problems,” says Siemens Project Manager Alfredo Almario. “They don’t have a single square meter to grow and allow extra storage, and families, doctors, and nurses too often share space with functions that should be separated. It’s a serious logistical problem.”

The Siemens market assessment found that four percent of Imbanaco’s patients – those with complex conditions like cancer or HIV, or those needing neurosurgery or transplants – produced 30 percent of the hospital’s revenue, but there was no way to increase capacity of those services because all of the clinic’s space was taken.

Almario says accommodating those patients is a critical factor in the new hospital’s design. The design that Siemens delivered lays out “clinical centers of gravity” – areas where the highest numbers of patients are diagnosed or treated – and positions them close to related services via a network of pathways to make workflow and space use as efficient as possible. The floor plan also makes room for several areas of future growth, from cancer treatment – which is now essentially topped out because of space limitations – to kidney dialysis, now limited to 48 patients at a time. Eventually, this will also allow Imbanaco to increase the number of doctors on its staff from the current 250 to over 400.

“As a market first-mover, Imbanaco realized the advantage of involving a medical technology provider from the conception phase on. This early involvement is essential to drive the hospital’s future performance with an integrated concept that synchronizes workflow, layout, and technology,” says Dr. Maik Kuehnhoff, General Manager, Siemens Healthcare Turnkey & Planning.

By partnering with Siemens from the very beginning in planning the new facility, Imbanaco Medical Center hopes to expand and retain its market leadership, open itself up for highly complex cases, take care of more emergencies, and establish new standards in the areas of cardiology, neurosurgery, dialysis, and chemotherapy.

Chris Kraul is a freelance writer based in Bogotá, Colombia, covering stories about a wide range of topics. A reporter for the Los Angeles Times for 22 years, he was most recently the Latin American bureau chief at the newspaper’s Bogotá office.

Further Information
www.siemens.com/healthcare-turnkey
At Your Service

Just as hospitals have developed over the years, so has the service process for keeping those facilities and their medical installations up and running at maximum efficiency. To demonstrate this innovative change clearly, Medical Solutions accompanied Customer Service Engineer Philip Tombs during a customer visit at the Royal Devon and Exeter Hospital, UK.

By Daniel Whitaker

Britain’s Royal Devon and Exeter (RD&E) Hospital has been at the forefront of medical best practice since it first opened on New Year's Day in 1743. Today, the hospital – which caters to more than 350,000 people across the surrounding county of Devon and beyond – has exchanged its original elegant Georgian building for a new brick-and-glass complex, but it still applies the best in contemporary medical techniques. There’s no better example of this than in the hospital’s medical imaging capability: From its ACUSON Antares™ ultrasound units to its two MAGNETOM® Avanto magnetic resonance imaging (MRI) scanners, the RD&E utilizes a full range of Siemens technology, whether for diagnosis or to aid therapeutic interventions, which are manufactured to the highest specifications and supported by Siemens services. This is why UPTIME Services, the service organization of Siemens Healthcare, provides numerous innovative and proactive services that enable the detection of parameter deviations in imaging systems before malfunctions occur and has set up sophisticated processes that offer highly effective support whenever a problem occurs.
Onsite Partners has to be solved. A very important element of the service process is the Customer Service Engineers (CSE) who visit the customer whenever needed. Philip Tombs, a Siemens CSE for the past 25 years, is one of those people.

Today, Tombs leaves his home in Saltash, England at 7:30 a.m., crossing the Tamar River, which divides the counties of Cornwall and Devon, and driving 80 kilometers (ca. 50 miles) to Exeter. There, he navigates the twisty roads of this Roman city until he reaches the RD&E. He checks his PDA that sets his assignments and provides any necessary information on the current state of the hospital’s systems. Tombs is one of around 150 Siemens Healthcare CSEs in the UK. With ten hospitals within his large geographical territory, Tombs says, “I’m an all-rounder, ready to face anything from a faulty switch to highly complex software issues.” More than 100 hours of factory training per year keep his systems knowledge and troubleshooting skills honed. There are times, however, when Tombs’ own high-level knowledge and experience aren’t quite enough.

Occasionally, particularly with new systems, Tombs may rely on the advice of the sophisticated service support chain. A call to the Support Center connects him with the most suitable expert for this particular system or application, who in turn has access to the Siemens Healthcare Knowledge Base, where all service cases that ever arose worldwide are logged. That way, Tombs gets all the specific information he needs onsite within a very short time so that he can best support the customer (see side bar on page 28).

Matching Counterparts
Tombs’ counterpart at the RD&E is Mike Stewart, the hospital’s Chief X-ray Engineer for the past 16 years. Stewart’s own extensive capabilities are clear from his “Aladdin’s cave” of an office/workshop, with more than 100 drawers of fuses, capacitors, and transistors. He knows some of the imaging systems well enough to have a Shared Services contract with Siemens, taking responsibility for maintaining everything but the generators in
the main X-ray room, for example. More systems are covered by full service agreements, so-called Performance Plans (for details, see side bar). But just as he is a customer to Siemens, Stewart cares for his own customers: both the RD&E’s Trust management and its patients. Both Tombs’ and Stewart’s familiarity with the Siemens systems is obvious as they check over one of the two SOMATOM® Sensation 16 computed tomography (CT) scanners. Senior Radiographer Liz Cox explains, “We call it the ‘polo mint’ – that name and its gentle colors help keep patients from feeling frightened of being placed inside.”

But just a few months earlier, work ground to a halt at 3:00 p.m. one afternoon as a CT scanner’s table jammed, rendering it unusable. Stewart called the Siemens Support Center. Speaking to a support engineer who, using the Siemens Remote Service (SRS) connectivity, accessed the system remotely together with the CT specialist Tony Barnes. Barnes was quickly able to read the scanner’s error logs, ascertain that the

How Service Support Works in Detail

Customer Service Engineers like Philip Tombs are the local ambassadors of a dedicated international service organization, UPTIME Services. UPTIME Services supports 60,000 Siemens customers to ensure that their medical equipment will enjoy maximum reliability and availability. Flexibility to client needs and the use of cutting-edge technology combine in two main functions:

• Error prevention via a proactive service approach
• A sophisticated support process in the instance of a malfunction

Both draw on Siemens Remote Service (SRS), which is the basis for a wide variety of innovative proactive services. Through proactive remote monitoring, fault detection, and repair via SRS, many onsite visits can be avoided. This not only saves time, but also contributes to environmental protection efforts since fewer onsite visits mean less fuel emission. Plus, which spare parts may be needed can be clarified prior to an onsite visit so that the parts are available when the service engineer arrives onsite. Analogous to the preventive medicine that physicians recommend to their patients, problems can be avoided before they even arise. The confidentiality of patient data is strictly provided with the security of the virtual private network (VPN) broadband connection certified according to ISO 27001.

For both Shared Services customers and CSEs, technical support is provided by the Siemens Support Centers, according to the issue or problem. Experts from the UPTIME Service Centers answer all kinds of customer requests in the local language of the respective country. Next, there are specialists working in regional support centers in three time zones. Finally, some complex technical problems are solved by experts in the Headquarters Support Centers that work closely with Siemens’ engineering departments.

Should parts be needed, they will come from one of three distribution centers: Frankfurt, Germany; Memphis, Tennessee, USA; or Singapore. Delivery speeds remain impressive, with 97 percent of all parts arriving onsite within 24 hours. Because customer needs vary, a range of maintenance Performance Plans are available. These are modular service packages covering proactive services and fast, technical onsite responses, as well as obsolescence protection programs and load-dependent solutions. In addition, Shared Services contracts are offered, which is a partnership solution between Siemens and its customers. Based on each service agreement, both contract types can include features such as Siemens Virus Protection to shield against software attacks with validated scan engines, Utilization Management with reference to industry benchmarks, and real-time proactive system monitoring with the Guardian Program™.

The newest innovative feature that UPTIME Services introduced is the Siemens Guardian Program including TubeGuard for the SOMATOM® Definition family of computed tomography (CT) systems. TubeGuard can predict the majority of potential CT tube failures by proactively monitoring the tube functions with more than ten sensors. For CSEs like Philip Tombs, this means even better remote preclarification and being able to arrive at the customer’s site with the tube in hand. Today, about three quarters of problems can be solved with a first visit.
frequency converter was disabled, and ensure that a new converter was onsite at 7:00 a.m. the next day. The spare part was flown in directly from one of Siemens World Distribution Centers in Frankfurt, Germany, to the UK’s East Midlands airport, then couriered to Exeter and deposited in the hospital’s blue Siemens “drop box.” Though Tombs was on hand if needed, Stewart fitted the new converter himself, and the scanner was being used for routine head and chest scans again by 9 a.m. That successful resolution shows how the RD&E-Siemens relationship is at once both close-knit and geographically wide-ranging. As Stewart notes, “Though I know Tony Barnes’ voice very well, I’ve never met him, and don’t know if I ever will. But knowing the backup is there is critical.”

Digital Service
While the RD&E and Siemens have been solid partners for over a decade, some things have changed. As he inspects the C-arm of an ARCADIS™ Varic mobile image intensifier, which has just been used for an orthopedic hip scan, Tombs enthuses, “From an engineering point of view, it’s an exciting time. Better reliability is driving wider application. Machines are becoming smaller, lighter, and less intimidating for patients.”

The switch from radiographic film to digitization has required a big change in servicing skills. Tombs admits that while he “still had to deal with chemicals” when he started to work as a support engineer, now there are fewer moving parts and thus, fewer mechanical problems. Conversely, though, digitization brings software as well as hardware challenges. The syngo® Workflow and Imaging applications help with this by fitting over Microsoft® XP and offering a common interface across different equipment. But Stewart and Tombs must constantly develop their networking capabilities. These skills are boosted whenever either of them travels to the Siemens Training Center, located at the headquarters in Erlangen, Germany. For Stewart, the training rooms, which are very similar to real hospital rooms, are a good way to get used to each new piece of equipment. For Tombs, even though his German doesn’t stretch beyond technical vocabulary and a restaurant menu, “Erlangen feels like home. I’ve come to appreciate sauerkraut with my schnitzel, and of course the excellent beer. And the neatness and efficiency of the country appeals to the engineer in me.”

The excellent long-term relationship between the RD&E and Siemens has a solid technical base. But Tombs adds, “Just because you know the technical side, it doesn’t necessarily mean you will be able to get on with the customers.” He feels that even though he has worked with customers for 25 years now, there are always new situations coming up and it is a constant learning experience with the customer.

Daniel Whitaker is an economics graduate and freelance journalist based in London. He writes about a wide range of business topics. Additionally, he acts as a consultant to the UK government and other clients on issues related to health policy.

Summary
Challenge:
- Avoiding breakdowns that could cause unexpected delays in the clinical workflow
- Maintaining the hospital’s cutting-edge level of medical imaging technology
- Making sure that customers with a Shared Services contract have state-of-the-art technical knowledge

Solution:
- The ability to perform proactive monitoring and repair, even before breakdowns occur, via remote monitoring of equipment
- Customized service agreements (Performance Plans or Shared Services) with assigned roles and responsibilities, assisted by remote technical support and rapid parts delivery
- Development of a successful long-term relationship between client and Siemens, which includes regular training

Result:
- Reliable operation of equipment, leading to greater and predictable clinical throughput
- An optimal balance between cost and access to maintenance, repair skills, and spare parts
- Mutual trust between customers and Siemens, who can identify and draw upon each other’s strengths

Further Information
www.siemens.com/uptime-services
The mechanisms of color perception have fascinated people for centuries, drawing the eye of researchers from Aristotle and Plato to Goethe. Based on more modern, psychological findings, color and light concepts are now also being used in radiology, making many examinations easier for patients and practitioners alike.

By Sonja Fischer, M.A.
The room is small and cramped. It is cold, and glaring fluorescent tube lighting shines down from overhead. It is reflected by the pallid linoleum floor, up onto grayish white walls where a yellowed poster of human anatomy is the only touch of color. The radiology system in front of the patient seems oversized, filling the entire space with its loud, pulsating noise. The patient would like nothing better than to just turn around and walk away.

Of course, every patient and every member of the hospital staff knows very well that the radiology department is not meant to be a spa and that the main goal here is capable imaging. But a pleasant atmosphere and an efficient working environment do not have to be mutually exclusive – on the contrary, in most radiological exams, it is important for the patient to relax so that the image quality is not limited by motion artifacts. The effects of color and light can be decisive in this regard, having an impact that far exceeds purely aesthetic concerns. Medical Solutions visited a diagnostic radiology center in the town of Butzbach, in the central German state of Hesse, and a breast screening center in Viborg, Denmark. These two facilities, working under vastly different conditions, have achieved the same positive experiences with the use of color and light installations.

Relaxation for Pain Patients

“We wanted to do something different, to bring patients out of this brutal examination situation,” reports radiologist Farschad Tabesch, MD, talking about the development of the Center for Diagnostic Radiology Butzbach, which opened in December 2008. “We had opted for a computed tomography [CT] unit and a magnetic resonance imaging [MRI] unit from Siemens, and then we sat down with the Siemens team to consider how we could work with colors and light in our MRI and CT rooms.” This collaboration led to a friendly, vividly colored setting instead of the typical bland clinical atmosphere. During every examination, Tabesch and his team use the “Healthcare Lighting” solution installed by Siemens Healthcare. With a special software program, they can choose from the full color spectrum at will and combine different tints. In the MRI room, the system works with a large number of small LED (light-emitting diode) lights mounted on the ceiling that light up the whole room in color. “We ask our patients what their favorite colors are. Most of them are surprised and quite excited, and then their perception of the system itself often fades into the background, especially with darker colors. To help counteract the loud noise, we give patients a choice of music, or they can bring their own,” Tabesch explains.

In the CT room, a number of light tubes – also operated via computer – have been installed along one wall. A backlit motif on the ceiling simulates a real sky, providing additional distraction. “Distracting patients is especially important to us in CT scans,” Tabesch says. “This is where we perform pain treatments using periradicular therapy [PRT] or facet blocks [FAB]. Patients come to us with a history of pain. Some of them are so tormented they can hardly get up the steps to the CT unit. And then, many of them are afraid to undergo the treatment. The light installation makes a huge contribution to helping these patients relax.”

Color Pioneers in Denmark

Mette Haaning, a radiographer at the breast screening center in Viborg, Den-
In 2007, the center bought the MAMMOMAT® Inspiration™ digital mammography platform from Siemens. Haaning was able to put her ideas into practice when MoodLight™ was developed, a large-format light panel that can be affixed right to the system itself as an additional feature. It also offers users a choice of the entire color palette, allowing them to set the colors for the individual patient. The breast screening center in Viborg is one of the first facilities to work with MoodLight. This puts the center squarely within a tradition of pioneering work in Denmark. The Copenhagen-based professor Niels Finsen, the father of rational light therapy, was first to prove that colors are clearly perceived as radiated energy by the human body and trigger clear responses within the body. Finsen was awarded the Nobel Prize in Medicine in 1903 for his work in this field. The facility in Viborg, however, takes a rather practical approach to color theory. “We use MoodLight all day, with every patient. In most cases, we have the system set to alternating mode, so the color automatically changes every 30 seconds. That’s because we would have a hard time doing something different for each patient,” says Haaning’s colleague Winnie Hedegaard, also a radiographer. And this is where the big difference between the Viborg facility and the diagnostic center in Butzbach comes in: While Tabesch examines between ten and 15 patients with the MRI unit and treats six to eight pain patients using the CT scanner each day, Haaning and Hedegaard scan every woman aged 50 to 69 in the entire region as part of the Danish mammography screening program. They perform more than 70 examinations a day. “At the same time, we don’t want the facility to feel like a train station,” Haaning says. “And I think we’re doing a good job of achieving that. I wouldn’t go so far as to say that MoodLight is the main cause. It’s just that we have established a friendly practice here; we talk to the patients and try to make the examination as pleasant as possible for them. When they come into the examining room and see the MoodLight shining out from behind the business-like system, it definitely contributes to the overall atmosphere.”

Patient Orientation is Worth-while

That means the general attitude and motivation levels of the staff are the key to greater patient orientation. Tabesch agrees: “The first step is to have the idea of addressing patients’ concerns in this way. It’s not enough to have a great light here and then treat the patients like numbers anyway. And nobody even thought about it in those terms earlier. Everybody just fixated on the results of the examination, on the pure image.” At the diagnostics center in Butzbach, hard facts also demonstrate the benefits of this kind of patient orientation. There, only about one percent of patients have to be sedated before undergoing an MRI scan. “I used to work at a ‘normal’ practice, where I always had two or three sedations each day. Here, almost all of our claustrophobic patients can make it through the procedure without sedation. Before, I often experienced cases where these kinds of patients just jumped right out of the unit – something that hasn’t happened here,” Tabesch reports. The distraction caused by the color system also works well with children, who usually have to be sedated for MRI scans. Plus, the images have fewer motion artifacts, meaning that fewer repetition sequences are needed. The light installation is also an important marketing tool for the private diagnostic center. Many patients who are not directly referred to the center hear about it through word of mouth and then stop by to see it for themselves. Most of them are very pleased and register there. Tabesch is also visited by other radiologists who want to see how Healthcare Lighting works: “All of my fellow radiologists who have come to see us were truly inspired to see how much can be achieved with this kind of unique feature. Some of them now want to put the concept into practice themselves.”

Positive Working Atmosphere

At the breast screening center in Viborg as well, the techs are convinced that MoodLight can contribute to improving the results of screenings. “One of the critical factors in obtaining good images in mammography is ensuring that patients.
CT-guided pain therapy is conducted in a room where a simulated sky and colored wall modules help to distract and calm patients before and during their treatment.

Summary

Challenge:
• Overcome cold, intimidating hospital atmosphere
• Look beyond mere results to accomplish both imaging excellence and supportive surroundings
• Positively distract patients from their suspected disease
• Cope with anxious, claustrophobic patients
• Additional strains for patients due to sedation in MRI
• Market private radiology centers

Solution:
• Create pleasant surroundings to reflect patient-centered care
• Respond to patients’ psychological predispositions
• Reasonable and effective application of color and light
• MoodLight panel for digital mammography platform MAMMOMAT

Inspiration
• Healthcare Lighting for radiology suites

Result:
• Colorful, appealing surroundings while imaging competence is maintained
• Content, relaxed patients contribute to achieving maximum imaging quality
• Reduction of sedation down to one percent in total
• Achievement of a competitive edge for private radiology centers
• Good working atmosphere and motivated staff
relax. That is just what our approach accomplishes,” Haaning says. And Hedegaard points out another important aspect: “Working in these surroundings is also more pleasant for us. I stand here in this room all day long, and MoodLight has a positive effect on me, too. I like it best when the light comes on in my favorite color – purple.”

Tabesch and his team can no longer even imagine working in a different environment. Here as well, everyone has his or her favorite color. The whole team plays around with the colors, trying out various effects. The radiologist feels his employees are more motivated thanks to the creative opportunities the light system offers and to the center’s friendly, open environment. All of them previously worked in different, conventional structures and feel that there is a major difference here. As Tabesch himself describes it: “Nowadays, when I walk into a normal hospital, where everything is just white and cold, and where I don’t see any colors, but only bright light, I am really put off by it.”

Sonja Fischer is an editor at Medical Solutions magazine.

Further Information
www.siemens.com/med-accessories
www.siemens.com/Inspiration
How Color Affects Us

Mrs. Wright, why are colors so important for human existence?
WRIGHT: Color means light. It is the source of life; it touches and expresses the soul of mankind. We are constantly under its influence, whether conscious or unconscious. People tend to take color for granted and see it only as a matter of appearance, as mere visual delight. But color is far more than that. It has a biological relevance that was developed over many million years of evolution. Nature uses color as a communication system, and it was not too long ago that our survival essentially relied on this system. For instance, the color of food told us whether it was edible; the color of an animal whether it was dangerous or poisonous. So, it is hardly surprising that we have innate and intense responses to color and that these are often difficult to verbalize.

In your approach, you make an attempt to verbalize the psychological effects of color. What are the basics?
WRIGHT: When light strikes the eye, each wavelength does so slightly differently. In the retina, these impulses of light are converted into electrical impulses that pass to the brain, where the secretion of hormones is stimulated. In simple terms, each color or each wavelength focuses on a particular part of the body, evoking a specific physiological response – for instance, a relaxed pulse – which in turn produces a psychological reaction – a feeling of ease, for example.

You are suggesting that there is a standardized, universal pattern of response to each color. Doesn’t each individual feel different about the same color?
WRIGHT: Well, the unconscious, psychological effect – which makes 80 percent of the whole impact – is the same for everyone. Red, for instance, is physically stimulating because it is the longest wavelength and requires the most adjustment in the eye. It is often said that surrounding people with red will raise their blood pressure, but there is actually little academic record of any experiments confirming this. Blue is the color of the intellect, and is deemed to lower the blood pressure. Certainly, it is a soothing, calming color and encourages reflection. However, the conscious sensations about colors, that is, the preference for certain colors, very well vary from person to person. But when one person likes blue and another doesn’t, this doesn’t mean that the color affects them in different ways, but that they perceive the same effect differently on the level of consciousness. That is, one likes the soothing effect of the blue, and another prefers the animating effect of a yellow hue.

So, when we want to work with color in radiology, would it be necessary to assess the preferences of each patient first, or can you recommend hues that are good to use for particular situations?
WRIGHT: I understand that assessing each patient is probably not feasible due to the time pressure, and I also don’t think it is necessary when color is applied carefully. However, I am generally reluctant to recommend colors in an absolute sense. There are only relative perceptions and no such thing as good colors and bad colors. As green is the most reassuring color, it is effective in situations where we are talking about a suspected life-threatening illness, as I would assume is often the case in radiology. But used in the wrong shade or in odd combinations with other hues, green can also communicate its negative perceptions and make you feel physically ill. So the effect of a color isn’t only a matter of its wavelength, but a matter of its intensity. Soft colors are soothing, strong shades rather stimulating.

You also want to make sure that the colors are combined harmoniously. Humans always respond to all the colors presented. A good way to balance colors is combining complementary colors, like yellow and violet.

Then using a lighting solution where hues and shades can be selected and combined freely, as some of our customers do, appears to be a good approach to attain balance and harmony.
WRIGHT: Certainly, and also for another reason – a lot of research shows that a color only keeps its positive effect as long as people are not surrounded only by this color and not longer than about 20 minutes. However, if you don’t have that lighting option, you should still think about good color combinations, for instance, with wall paint. And it’s wrong to believe that leaving the room plain white doesn’t have an effect relating to color psychology. Used solely, white is demanding for the eye and can be very harsh. It is uncompromising and too clinical, with no fine nuances.

Angela Wright studied psychological psychotherapy in the UK and began researching color psychology in the 1970s. Establishing links between patterns of color and patterns of behavior, she developed the “Colour Affects System” to apply color psychology objectively. The system was subjected to analysis at world-class academic institutions, such as the University College of London, and found to hold consistency. Wright’s 1995 book, The Beginner’s Guide to Colour Psychology, continues to sell steadily across the world. In her London-based consultancy, Colour Affects, Wright applies her system to major international companies, government institutions, and individuals.
Simple Blood Test Takes the Guesswork out of Allergy Diagnosis

Misdiagnosed or untreated childhood allergies can lead to serious problems in adulthood, including asthma. Up until now, determining the cause of an allergic reaction has been a diagnostic challenge, but Siemens’ 3gAllergy diagnostic test offers a simple, convenient, and accurate alternative to traditional skin testing.

By Amy K. Erickson
For millions of adults and children worldwide, allergies are nothing to sneeze at. Symptoms like runny nose, watery eyes, coughing, and congestion are not just miserable, they can negatively impact an individual’s quality of life and cause decreased work and school productivity. “In many instances, the underlying cause of problems such as otitis media, sinusitis, and swollen tonsils might be an allergy rather than an infection,” says Terrence Zipfel, MD, an allergist and otolaryngologist practicing in East Liverpool, Ohio, USA. His patients range from infants to adults who suffer from a variety of conditions affecting the ears, nose, and throat. Because respiratory disorders share so many common symptoms, correct diagnosis is key in order to give patients the right treatment. In order to do so, Zipfel uses the 3gAllergy™ diagnostic test from Siemens, a simple blood test that is setting new standards in allergy testing.

According to the American Academy of Allergy, Asthma and Immunology, allergic diseases affect as many as 40 to 50 million Americans, and more than half of all U.S. citizens test positive to one or more allergens. Allergic rhinitis, an inflammation of the nasal passages usually associated with watery nasal discharge and itching of the nose and eyes, affects between ten and 30 percent of all adults and as many as 40 percent of children in Europe, over 100 million people suffer from allergies.1

“Allergies can start when patients are not even a year old,” explains Markus Ollert, MD, an allergist with the Department of Dermatology and Allergy at the Clinical Research Division of Molecular and Clinical Allergotoxicology at the Technical University of Munich, Germany. An allergic reaction occurs when an allergen comes into contact with the body and the immune system produces an antibody called IgE. The IgE antibody triggers a chemical cascade that causes the various symptoms typical of an allergic reaction. The presence of these antibodies may also be an indicator of future allergies. “When a child reacts to milk proteins, for example, this causes the production of IgE antibodies,” explains Ollert. “When these antibodies are present at such an early age, they also can be a predictor of developing inhalant allergies later in life.”

Identification and Treatment

For many, allergies are much more serious than itchy eyes and a runny nose. “Symptoms can affect the quality of sleep and manifest in the form of mental fatigue, which can affect a child’s schoolwork or possibly contribute to the potential misdiagnosis of an attention deficit disorder,” says Zipfel. “If allergies go untreated, there is a higher probability that the patient will develop additional, more severe symptoms, including asthma.”

The progression from allergy to asthma is becoming a widespread health problem. Nearly 80 percent of all asthma cases are allergic asthma.2 Asthma accounts for one-quarter of all emergency room visits in the U.S. each year.3 In just 18 years, asthma has increased 100 percent in all age groups, and 160 percent in children up to four years of age.4 “It is important to use a test like 3gAllergy to give information to parents about allergies and asthma. When the 3gAllergy test detects an increase in allergen-specific IgE antibodies,” explains Ollert, “we have a good parameter that can be correlated with patient history and a physical examination to determine the allergens that cause the reaction. When we catch rhinitis early and give treatment such as immunotherapy at an early age, then it is possible to prevent the progression of rhinitis to asthma.”

Determining what a person is allergic to can be a diagnostic challenge. Traditional allergy testing can be a long and painful process, with small amounts of suspected allergens being injected into the skin’s surface on the arm or back. If a patient is allergic to a substance, redness or swelling will appear at the site of the skin prick. The test can be uncomfortable for everyone, but especially for young children. The Siemens 3gAllergy test offers a convenient and accurate alternative or complement to skin testing. It is the first FDA-cleared third-generation blood test for allergies. The technology can perform a full range of tests on a small sample of blood to help the physician identify allergies to pet dander, foods, grasses, house dust, insects, molds, weeds, parasites, and other substances. The 3gAllergy test measures allergen-specific IgE antibodies found in the blood at lower concentrations than any other test available.

If allergies go untreated, there is a higher probability that the patient will develop additional, more severe symptoms, including asthma.”

Terrence Zipfel, MD, Allergist and Otolaryngologist, East Liverpool, Ohio, USA

1 http://eaaci.net/site/content.php


3 American Academy of Allergy and Immunology http://www.aaaai.org/media/resources/media_kit/asthma_statistics.stm. last accessed Aug 29th, 2009

4 The US National Center for Health Statistics and The American Academy Of Otolaryngic Allergy.
Summary

Challenge:
- 40 to 50 million Americans affected by allergic diseases
- Allergies associated with decreased school and work productivity, recognized as a public health concern
- Progression from allergy to asthma, a growing problem worldwide
- Skin prick allergy tests are uncomfortable and time consuming
- Essential need to identify cause of an individual's allergic reaction to guide treatment

Solution:
- 3gAllergy test can identify allergic reaction with a large menu of allergens available, including food, animals, dust mites, molds, and a wide range of seasonal allergies
- Only a small amount of blood needed rather than numerous skin pricks
- Performing test in conjunction with physical examination and evaluation of the patient's medical history

Result:
- Improved patient care
- Earlier allergy detection and treatment could prevent the onset of chronic allergic conditions and progression to asthma
- Fast, accurate results increase office efficiency
- Identification of allergen allows treatment that may include eliminating the environmental cause, using medications to control symptoms, or immunotherapy to reduce sensitivity

Once allergies are identified, there are several possible treatments. It could be as simple as controlling house dust with filters, avoiding allergy-causing foods, limiting outdoor activities or minimizing exposure to animals. Additionally, patients may use medications to control symptoms. Immunotherapy, also called allergy shots, is used to reduce sensitivity to pollens, dust, mold, and other agents. Immunotherapy can reduce the risk of an allergy progressing to asthma.

The 3gAllergy Advantage

The 3gAllergy test, plus a physical examination and a detailed patient history, allows a physician to make an allergy diagnosis and determine which treatment steps are most appropriate. Siemens' proprietary liquid allergens are the key to making the 3gAllergy test sensitive, specific, and reliable. The liquid allergens increase the availability of binding sites and their accessibility to allergen-specific IgE antibodies in the patient's blood. The instrument's enzyme-enhanced chemiluminescent signal detection provides increased sensitivity, and the proprietary wash technique enhances specificity.

In 2005, Ollert published a paper in Clinical Chemistry that compared the 3gAllergy test with another blood allergy test on the market and the skin prick test. "We found that the Siemens test is more sensitive when compared to the other methods," explains Ollert. "Compared to skin testing, the 3gAllergy system shows a very high degree of sensitivity. Skin testing, however, is just a global response. With the Siemens system, you get a clear, cut, controlled result."

According to Zipfel, "Empirical diagnosis is practiced widely for allergy and sinus conditions, and there's a lot of inaccuracy in the process. Our practice has addressed this problem by introducing the 3gAllergy test in order to use solid measures to evaluate the origin of symptoms and receive objective data." Zipfel has been using the 3gAllergy test in his practice for nearly four years and sees about 150 to 180 patients per week. "The results that we can obtain from one needle stick are enormous," he says. "It can have a lifelong impact on a child and provide lifelong benefits. Although the test can help diagnose allergies, it can also help us rule out allergies as a source of symptoms. If that is the case, then other treatments such as antibiotics are prescribed."

Zipfel has also noticed that his staff benefits from using the 3gAllergy system. "From a staffing point of view, less time is needed to conduct the test. This increased efficiency in our office has enabled us to see more patients and perform a higher number of tests."

Siemens has the only platform solution that offers blood testing for allergies along with routine and specialized immunoassay testing on its IMMULITE 2000 XPi system.

Reference:
Siemens Healthcare and the Walt Disney Company have teamed up to create a children’s book to educate kids and parents about the diagnosis and management of allergies. *Mickey and the Giant Kachoo!* featuring Disney’s Mickey Mouse, highlights the 3gAllergy test from Siemens, which can help identify allergens that trigger allergic reactions. This test uses a small amount of blood, making it simpler than a traditional skin prick test, and carries no risk of a severe reaction.

According to the American Academy of Allergy, Asthma and Immunology, the prevalence of food allergies among children under the age of 18 increased 18 percent from 1997 to 2007. Kids with a food allergy are two to four times more likely to have conditions such as other allergies and asthma, making it important to be aware of all diagnosis and treatment options available.

“We want parents to know there is a simple option for their children to be tested for allergic reactions,” comments Dave Hickey, Executive Vice President Central Laboratory and Global Research and Development, Siemens Healthcare Diagnostics.

In the book, Mickey and the gang find out that Willie the Giant has allergies. “By reading a story with familiar Disney characters, children and parents will learn that allergies are common and there are options to help diagnose and manage them,” says Hickey.

The Siemens-Disney Alliance is a 12-year strategic technology and marketing alliance that paves the way for collaboration across several areas, including child education and awareness in healthcare. *Mickey and the Giant Kachoo!* was developed for the clinical laboratory and physician communities as part of an initiative that uses Disney storytelling to help kids understand health issues.

Previously, Siemens and Disney, both known for their commitment to innovation, collaborated on a healthy hearing kit for kids that is distributed by physicians and healthcare clinics. The alliance is a reflection of Siemens dedication to the delivery of quality healthcare and Disney’s legacy of caring for children.

*Mickey and the Giant Kachoo!* will be released in late 2009, with exclusive distribution for laboratories and clinicians. The first print run will be in English. To view a copy of the book online, go to www.siemens.com/allergy-Disney
Molecular CT: From Vision to Reality

As the first Siemens Biograph mCTs are coming online in clinics around the world, doctors on three continents spoke with Medical Solutions about the impact this revolutionary new system – which is breaking down barriers between radiology and nuclear medicine – could have on their practices and the lives of their patients.

By Ron French
If it’s possible to take a picture of the future, the gleaming green-and-white system in the Spectrum Health Lemmen-Holton Cancer Pavilion in Grand Rapids, Michigan, USA, is doing it. It’s a future of crisp, state-of-the-art computed tomography (CT) images and of positron emission therapy (PET) images that jump off the computer screen, revealing metastases that may have been missed in the past. It’s a future that accommodates larger patients and may ease imaging anxieties where throughput is an asset instead of a headache, and where PET and CT make each modality – and each modality’s experts – better and more efficient. It’s a future that Paul Shreve, MD, believes will finally bring to fruition the vision of the inventors of the PET/CT. “There’s a true integration of the modalities,” says Shreve, Medical Director of PET/CT at the Lemmen-Holton Cancer Pavilion. “It’s an improvement over anything available right now.” Siemens’ Biograph® mCT is more revolution than evolution, a game-changer providing clinical and economic efficiencies while breaking down barriers between radiology and nuclear medicine.

One of the first Biograph mCTs was delivered in May 2009 to the sparkling, six-story Lemmen-Holton Cancer Pavilion. Opened in 2008, the facility draws patients from Grand Rapids’ Butterworth Hospital and Helen DeVos Children’s Hospital, who can travel along underground pathways to the cancer center, and outpatients from a 13-county area of western Michigan. The center treats 40 percent of new cancer patients in the region, offering radiation treatment, medical oncology, chemotherapy, research, cancer multispecialty clinics, a genetic evaluation clinic, and research labs – all under one roof.

A Marriage of Two Disciplines

When it first opened its doors last year, everything about the glass-and-chrome facility was state of the art – even its PET/CT. The center’s Siemens Biograph 16 had been the best available on the market when it was purchased five years earlier, a “16-slice CT with the high-resolution LSO crystals,” says Shreve. But as good as that technology was, there were times when small metastases couldn’t be delineated from normal lumps. There were patients who weighed too much for the PET/CT. The modalities weren’t integrated seamlessly. Optimization and integration of PET and CT scans had been an unreached goal since the invention of the PET/CT in 1999. The machine brought together two disciplines, and the marriage was rocky at times. Even the name of the machine caused disagreement. “The initial debate was over whether to call it PET/CT or CT/PET,” says Rodney Hicks, MD, Director of the Centre for Molecular Imaging at the Peter MacCallum Cancer Centre in East Melbourne, Victoria, Australia. “In 2001, at the Academy of Molecular Imaging, you had radiologists saying that most of the
Molecular Imaging

“There’s a true integration of the modalities.”

Paul Shreve, MD, Medical Director of PET/CT, Spectrum Health Lemmen-Holton Cancer Pavilion, Grand Rapids, Michigan, USA

For all the wonders of combining the modalities, physicians trained in one specialty tended to use PET/CTs much the same way they used independent PETs and CTS. “A lot of people who don’t have CT training don’t use it as a CT scanner,” says Shreve. “They use it as a PET scanner and use the CT to localize the PET findings. But you can’t really localize things unless you know what you’re looking at; if you don’t know what you’re looking at on the CT, how can you localize?”

The Siemens Healthcare Biograph mCT finally resolves many of the technical limitations of past PET/CT hybrids, with a true integration of modalities that doctors familiar with the machine believe will break down barriers between nuclear medicine and radiology.

Optimal Flexibility and Efficiency

The improvements begin with the introduction of the industry’s highest resolution CT and continue with the capability of whole-body PET scanning in just five minutes – a new standard for the industry – while optimizing flexibility and efficiency.

Biograph mCT’s powerful ultraHD·PET technology delivers highly detailed images with up to four times as much contrast as earlier hybrids, offering two-millimeter (mm) uniform resolution throughout the field of view. Shreve describes it as “a special point-spread function reconstruction method plus time of flight, delivering a much better quality with the PET. Big patients have always been a problem with PET because images get degraded very quickly. With time of flight, we’re able to solve a lot of the scanner problems.” Those bigger patients can be accommodated with Biograph mCT’s unique short tunnel and 78-cm bore, capable of handling patients weighing as much as 500 pounds (227 kilograms), while also alleviating the stress of claustrophobic patients.

“It’s easier for the patients,” says Shreve. “We can accommodate bigger patients because of the gantry size; and there is a lower radiation dose to handle larger patients with no problem.”

The Biograph mCT’s unmatched isotropic resolution in CT, combined with one of the industry’s best rotation times, brings out crisp anatomical details in every scan – routine and advanced – limiting motion artifacts. It is available in detector configurations of 40-, 64-, and 128-slices, a first in integrated scanners.

For Shreve, Biograph mCT was an easy choice. “We’re a tertiary care center,” says
Challenge:
• Tumor detection and analysis of chemotherapy efficacy limited by resolution levels of standard PET/CTs
• Obese patients unable to use scanners, leading to delays in diagnoses or exploratory surgical procedures
• Long scan times leading to patient discomfort and inefficient and costly throughput

Solution:
• Biograph mCT’s highest isotropic resolution CT with an industry-best rotation time, limiting motion artifacts
• Powerful ultraHD-PET technology, delivering highly detailed images with up to four times more contrast than previous models
• Uniform two-mm resolution throughout the field of view
• 78-cm bore, capable of accommodating patients weighing as much as 500 pounds (227 kg)
• Unique short tunnel, relieving patient stress
• Whole-body PET and CT scans in as little as five minutes
• On-the-fly, integrated parameter changes for both CT and PET
• Increased memory capacity

Result:
• Improved detection of small tumors
• Quicker determination of effectiveness of treatment
• Fewer patients excluded from scans because of weight
• Faster throughput, increasing patient comfort and improving economic efficiencies

Summary
Molecular Imaging

Shreve. "We want to offer the highest level of service available." Bockisch, whose University Hospital in Essen, Germany, has a Biograph mCT on order, echoes Shreve’s belief in the new technology. "We assume it is the best machine you can buy today," says Bockisch. "We are very much interested in the high resolution of the PET, combined with the large field of view." Earlier PET/CT hybrids took Bockisch an average of 67 minutes per procedure; newer models cut the time to 35 minutes. Biograph mCT will shave more precious time off procedures, increasing throughput and potentially decreasing patient anxiety. "For the patient, the investigation will be faster – we can get better images and save radiation," he says.

**Breakthroughs in Ovarian Cancer**

The treatment of ovarian cancer highlights the advantages of the Biograph mCT. "We don’t have a terribly accurate way of assessing the burden of disease with CT scanning (alone) because the areas of disease can often mimic the loops of bowel," says Hicks. "There are many lumps that can masquerade as disease or be assumed to be normal structure when in fact they are tumors. It’s been difficult, short of looking directly into the abdomen and doing an operation, to actually appreciate the difference."

PET/CT hybrids have helped, but the size of visible tumors was limited by the technology. "Ovarian cancer can be difficult because of the nature of the small metastases in the intraperitoneal space in the abdomen and pelvis," explains Shreve. "Having very high sensitivity, high-quality PET images lined up with very high-quality CT images is very important, because you’re looking for very small metastatic deposits. Ovarian cancer can have a lower profile on PET, but then you can see it on CT if the CT image quality is very good. It requires optimization of both scans."

Biograph mCT may lower the size of visible tumors – a vast improvement for ovarian cancer identification, says Bockisch. With the improved spatial resolution, follow-up investigations can offer physicians a clear indication of whether patients are responding to chemotherapy. The increased resolution offered by the Biograph mCT is also a boon for cancer drug development, says Fadlo Khuri, MD, Professor and Chair of the Department of Hematology and Medical Oncology at Emory University in Atlanta, Georgia, USA. "A lot of these agents are unlikely to cause large changes in the contours of the tumor immediately, regardless of which vascular, epithelial, or even epidermal growth factor receptors they are targeting," he notes. "For us, it’s very attractive to have PET because it’s much more sensitive for studying tumor metabolism than what we’ve had prior to PET. We’ve had bone scans, and bone scans were nice in the bone; now we have something that tells us what the drugs are doing – in visceral tumors as well as bone."

The increased sensitivity of scans offered by Biograph mCT will make drug investigations more effective. "We’re able to get a simultaneous view of whether the agent is acting metabolically and anatomically," says Khuri. "I think that the future of drug development and response assessment in oncology is tied to the development of these modalities."

**Collaboration for Patient Benefit**

Biograph mCT provides a big step in the development of both modalities, and a giant leap in the integration of PET and CT – an integration that Bockisch believes will help specialists in nuclear medicine and radiology understand each other. "I think cooperation will develop like that in the future," he says. "If people work together, they start to understand each other better and respect the knowledge of each other more. The setting must be one of collaboration between equals, and of having respect for the modality of the other specialty. Our younger physicians have learned it that way. They don’t know the times when CT and PET were separate."

At the Lemmen-Holton Cancer Pavilion, Shreve and his peers have always
attempted to integrate the modalities – a practice that the Biograph mCT makes seamless. "It's truly an integration of the modalities," he says. The Biograph mCT is already making a difference in Grand Rapids. Staff members report that the new operating system is faster and has a much higher memory capacity.

"There's increased flexibility, allowing us to develop protocols that are more integrated," says Shreve. "In the past, we had to scan the neck and stop and change parameters; now the scan makes adjustments in both the CT and PET, changing parameters on the fly that are appropriate for the neck or chest, which is really nice. Again, it's less time for the scan and a shorter time for the patient – it's just one seamless, integrated process."

The Lemmen-Holton Cancer Pavilion is already planning to expand its hours to handle the increased number of patients referred to the center since the Biograph mCT was installed. "We do ten to 12 a day, and we're booked solid," says Shreve. "We have eight uptake rooms for one scanner." Shreve says he doesn't know what the future will hold, but he's sure it will involve the green-and-white machine that is getting so much attention, adding, "We're just now beginning to push it to its full capabilities with different operating parameters."

Ron French is an investigative reporter for the Detroit News who has written extensively about healthcare and economics. His series, "The General and the Beast," analyzing the devastating impact of healthcare costs on General Motors, won numerous awards. He lives in Okemos, Michigan, USA.
I thought my father was going to kill me,” Liliana Grinfeld recalls with a chuckle, explaining how proud he had been back in the 1970s when his cardiologist daughter latched on to the famous Cleveland Clinic, and how devastated he was when she decided to come back to her home country to practice. Today, Grinfeld is one of Argentina’s leading cardiologists. After returning to Argentina, the budding heart specialist would join René Favaloro, the legendary “father of the bypass.” Favaloro had also left the Cleveland Clinic and a lucrative practice in North America to return to his native South America. Grinfeld and Favaloro shared a hometown, La Plata, a mid-sized city about 60 kilometers (ca. 37 miles) south of Buenos Aires. As a friend of her physician father, the celebrated Favaloro would frequent her family home when she was a girl. Favaloro’s dream was to ensure for his countrymen the same quality of healthcare that he had helped develop in the United States. He established a foundation and a medical practice to pursue that goal. Grinfeld became part of the team. Soon, she would become a star in her own right — every bit the pioneer in the spirit of Favaloro.

“My father was a passionate physician, and my personality is very much like his. I never tire, and I love medicine.”

Liliana Grinfeld, MD, Chief of Hemodynamics and Interventionist Cardiology Service, Italian Hospital, Buenos Aires, Argentina
“I think we need more science and more art. More science and more experience. You need to do angioplasties. That’s the art of medicine.”

Liliana Grinfeld, MD, Chief of Hemodynamics and Interventionist Cardiology Service, Italian Hospital, Buenos Aires, Argentina

dad’s advice, Grinfeld initially decided to major in philosophy – but that lasted only a few months until her mother encouraged her to pursue her obvious calling. While she has certainly managed a successful career, Grinfeld admits that her father was right – at least in part. She often felt torn when leaving home to attend to patients. “When your child is sick and you have an angioplasty scheduled, you have to come in,” she said. “Your child is going to be okay. You know that.”

Grinfeld cites help from family and ultimately, the ability to hire a nanny as factors that favored her career when her children were young. But she still sees evidence of double duty among working mothers at the hospital. “When their kids get out of school, they come here,” she says. “They do their homework or whatever until their mothers are ready to go home.” A soon-to-be-released survey by the Argentinian Cardiology Foundation finds evidence of continued gender discrimination in hiring and salaries, notes Grinfeld.

Back to the Roots

The United States has its own glass ceiling, so it wasn’t a quest for equality that sent Grinfeld to Ohio – and the prestigious Cleveland Clinic – in the early 1970s. It was her father. “My father said, ‘You need to go to the States. The residencies in coronary and angiography here are no good,’” she recalls. “Those were probably some of the most wonderful times of my life. We worked like dogs, but I loved it. I was learning every day.”

Finishing her residency, Grinfeld stayed on part-time at the Cleveland Clinic – and she began building a reputation. “My father used to say that in Argentina, I was known as his daughter, but that in the United States he was known as my father,” she says smiling. Soon Grinfeld received what she called “an excellent offer” to sign on full-time in Cleveland, but Argentina and Favaloro spoke more forcefully. That’s when her rightfully proud father did a double-take. “I like my country,” Grinfeld explains. “If you ask me where I want to live, I will tell you here: Buenos Aires, Argentina. I understand that there are other places that offer more professional opportunities, and that are safer.” But, Grinfeld, like Favaloro, preferred her roots over life as a brain-drain expatriate. Taking the
concept even further, Grinfeld spends two days a week in her hometown La Plata attending to a private practice and working as a consultant for the Ministry of Health. Yet, the Cleveland Clinic experience would stay with Grinfeld for the rest of her life. “I think that after going to a center of such high quality, you keep it in your blood, in your soul,” she says. “You always strive to reach that level.”

Back in Argentina, Grinfeld began breaking down barriers. Perhaps the scariest was performing the country’s first angioplasty together with Dr. Jorge Belardi in the early 1980s. “We were in panic,” she recalls. “We kept calling each other on the phone the night before. I remember that we could inflate the balloon for eight seconds – that was the limit.”

**Striving to Be the Best**

Research has presented a particular challenge in Argentina. “In Argentina, resources are scarce, and the process to get them is very involved,” she notes. “If you are a full-time investigator, you have time for that. But that is not my case. In the United States, at Harvard and many other places, they will give you time for research and they will pay you extra. Here, we have time, but we are our own sponsors. Hopefully, we will wake up one day to find that this has changed.”

Grinfeld is part of a group of physicians who presented a genetic study of 100 angioplasty cases at the European Congress of Cardiology 2009; they funded the study themselves.

The status of Argentinean medicine may sometimes be difficult, but it is hardly desperate. Thanks to the efforts of people like Favaloro and successors like Grinfeld, Argentinean medical education has come a long way since the days when Dr. Grinfeld’s daughter had to leave the country for Argentina. For example, the Italian Hospital has an agreement with the University of Buenos Aires, which in turn, has struck a deal with the Argentine Society of Cardiology, to train young physicians.

Symbolized by its acquisition of top-of-the-line equipment like the Artis zee® interventional imaging system from Siemens, the Italian Hospital has become a regional, if not an international, center of excellence. “I always say that the Italian Hospital is the Cleveland Clinic of South America because we try to do the best,” says Grinfeld. “We try to maintain the best level in terms of academics, scientific research, patient care – everything.”

The Cleveland Clinic and Dr. Mason Sones also helped Grinfeld develop a level-headed philosophy of medical practice. Besides Favaloro, her mentors included the equally eminent Dr. William L. Proudfoot, who taught Grinfeld a lesson that she will never forget. “He always told me, ‘If what you read does not match your experience, don’t believe what you read,’” she says. “In the papers you can see a lot of things, but experience is key.”

With the better images and the maximized dose reduction provided by the Artis zee, Grinfeld can now more fully adopt this philosophy.

Experience also provides the foundation for Grinfeld’s philosophy as a physician. Her office is decorated with works painted by a stepson, who now lives and works in Rome – thus, inviting questions about art. As it turns out, she once became entangled in a debate with a formidable Argentinean cardiologist who argued that the profession needed less art and more science. She says she replied, “I think we need more science and more art. More science and more experience. You need to do angioplasties. That’s the art of medicine.”

She continues: “You also have to interact with your patients. It is an art of the heart, of the emotions, to keep your patients comfortable – even when there is nothing you can do for them. People at the end of their lives – not only in my specialty, but in others. Those with cancer, for example.”

Grinfeld admits that she loses sleep over setbacks: “We have patients who come here, and their hearts have stopped. You go and work two hours and the patient dies. That makes you feel very bad. I can never get over it. Not only when a patient dies, but also when you are supposed to open an artery and you cannot. You ask yourself: What did I do wrong? When you cannot open an artery, it is already written that the patient is going to die.”

But the realm of possibility, the artistic side, provides hope. “That’s why medicine is still an interesting career,” she says. “Because it is not an exact science. There is a lot of art.”

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*A former correspondent in South America for The Financial Times and Business Week, Bill Hinchberger is a writer who divides his time between São Paulo, Brazil, and Marseille, France. He has contributed to publications like The Lancet and Science, and reported for the Medical Education Network Canada.*

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**Further Information**

[www.siemens.com/angiography](www.siemens.com/angiography)
Uniting Clinical and Business Virtues

As the SOMATOM® Definition Flash computed tomography (CT) scanner debuts in its first worldwide installations, it is proving to be versatile, innovative, and reliable. And in the process, it is eliminating barriers to scanning even the most challenging patients, improving efficient use of healthcare resources through better diagnosis, streamlining workflow in key ways, and opening doors for CT to expand into new markets.

“Ask radiologists and cardiologists about the new SOMATOM Definition Flash computed tomography scanner, and first they will extol its clinical virtues: superb image quality; amazing speed; unprecedented dose protections. But what is becoming equally clear at medical centers around the globe is that it makes perfect business sense as well.”

By Catherine Carrington

As the SOMATOM® Definition Flash computed tomography (CT) scanner debuts in its first worldwide installations, it is proving to be versatile, innovative, and reliable. And in the process, it is eliminating barriers to scanning even the most challenging patients, improving efficient use of healthcare resources through better diagnosis, streamlining workflow in key ways, and opening doors for CT to expand into new markets.

“The big advantage of this scanner is that there are tailored protocols for all patients, including those with high heart rates, those who cannot hold their breath, trauma patients, obese patients, and pediatric patients,” says Nico Mollet, MD, PhD, a radiologist at Erasmus Medical Center, Rotterdam, the Netherlands. “SOMATOM Definition Flash also gives you additional findings, so it’s not only broadening the types of patients you can scan; it’s broadening the kind of information you get from the scan.”

The system gets its name from its flash-fast speed. Equipped with two detectors, two X-ray sources, and a gantry that rotates in 0.28 seconds, the scanner boasts a temporal resolution of just 75 milliseconds (msec). Moreover, thanks to a unique innovation, the patient table no longer needs to slowly inch forward during scanning. Instead, in low-dose Flash mode, it can glide along at 458 millimeters (mm) per second while the scanner integrates data from both detectors, achieving a gap-free scan even though each spiral is wide open. At the same time, the new scanner cuts radiation dose at every turn. Adaptive dose shielding blocks unnecessary X-rays at the beginning and end of each scan, cutting radiation dose by as much as 25 percent in every spiral scan.

Split-second Thorax

The result, says Mollet, is that SOMATOM Definition Flash can scan the entire thorax in less than one second at a radiation dose of under two millisievert (mSv). Consider, for example, a patient who comes into the emergency room with chest pain and...
Computed Tomography

SOMATOM Definition Flash delivers superb image quality at an amazing speed with unprecedented dose protections – and makes perfect business sense as well.
shortness of breath. In a split-second scan, SOMATOM Definition Flash can help determine whether the culprit is a pulmonary embolism, a clot that blocks blood flow into the lungs. If physicians also suspect a possible heart attack, the scan can be timed to coincide with an electrocardiogram, providing crystal-clear images of the coronary arteries. Include the aorta in the scan, and it’s possible to diagnose the third leading cause of chest pain, aortic dissection, in a single scan.

Rapid scanning is not only a clinical advantage; it also pays economic and operational dividends. Because SOMATOM Definition Flash is able to quickly evaluate patients with chest pain, it can help relieve overcrowding in the emergency room by identifying those who can be safely discharged home. Trauma patients can be scanned from head to toe in less than five seconds, quickly providing surgeons with the information they need. If patients are too sick to hold their breath or are on a ventilator, SOMATOM Definition Flash is fast enough to handle it. Even restless children are easier to scan, says Elliot Fishman, MD, Director of Diagnostic Imaging and Body CT, and a professor of radiology and oncology at Johns Hopkins Medical Institutions, Baltimore, Maryland, USA. “At Hopkins, we avoid using sedation for kids whenever possible,” he says. “Scanning will be much easier in Flash mode. It’s so fast, it just minimizes the chances of motion artifact.”

Cardiac Imaging Below One mSv

Nowhere is speed more important than in cardiac imaging. With its high temporal resolution, SOMATOM Definition Flash can freeze the motion of the heart. And in Flash mode, the scanner can capture all the information it needs during a single 250-msec pause between heartbeats, at a dose of less than one mSv. For patients with high heart rates or irregular heart rhythms, the scanner is also equipped with the Flash Cardio Sequence, which captures images during the resting phase of several cardiac cycles, guided by the electrocardiogram.

At Erasmus Medical Center, the speed and versatility of SOMATOM Definition Flash means that cardiac patients no longer need to be pretreated with beta blockers, medications that slow the heart rate and were once considered a must in order to achieve acceptable image quality. Starting an intravenous line, infusing the beta blockers and monitoring the patient is labor intensive and would otherwise tie up the scanner for some 15 minutes, Mollet says.

Cardiologist Stephan Achenbach, MD, a professor of medicine at the University of Erlangen in Germany, sees additional health system benefits. Perhaps 20 percent more patients can undergo cardiac scanning on SOMATOM Definition Flash than on a conventional CT scanner, he estimates. This can substantially reduce the number of patients going directly to cardiac catheterization.

Consider obesity, an increasingly common risk factor for heart disease. At some medical centers, obese patients are too much for the CT scanner to handle. SOMATOM Definition Flash is up to the challenge. The 78-centimeter gantry and the heavy-duty table can accommodate patients up to 660 pounds (ca. 300 kilograms). In addition, with two 100-kilowatt X-ray tubes, there is enough power to deliver the dose needed for good image quality even in large patients. SOMATOM Definition Flash can also be a centerpiece in marketing a cardiac program, in Achenbach’s opinion. “It can really position you as the site with the best scanner that has the best temporal resolution,” he says. “If the image quality is very high and you can do cardiac CT at a very low dose and have to turn away very few patients, it can definitely put you on the map as a cardiac CT center.”

In the future, SOMATOM Definition Flash could open new doors for cardiac CT. For example, some of the first users conduct studies that verify the scanner’s ability to evaluate myocardial perfusion. If the results prove accurate, CT myocardial perfusion imaging could be used to determine the clinical significance of obstructions in the coronary arteries, challenging nuclear scans for this purpose. At the same time, a radiation dose of less than one mSv raises the intriguing possibility of using SOMATOM Definition Flash for...
cardiac screening, for example, in people who have a strong family history of heart disease. “Because of the low dose, cardiac CT could become like a colonoscopy – you do it to make sure there’s nothing there,” says Fishman. “The issue has always been dose. But now that the dose is so low, CT coronary angiography could become part of a routine cardiac workup.”

**Dual Energy Dose Neutral**

Dual Energy CT captures the imagination with its ability to simultaneously scan at two different energy levels while automatically revealing hidden information on tissue composition, blood flow, and function. But its benefits stretch beyond the clinical: By improving the efficiency of diagnosis and guiding the best choice in therapies, Dual Energy also has enormous economic benefits for healthcare systems. Consider CT angiography. With a conventional CT scanner, it is difficult to differentiate the bright contrast material that illuminates the inside of the artery from calcium deposits in the artery wall. Dual Energy imaging can separate the two materials, revealing the true arterial contours. It overcomes a similar problem in the base of the skull, where thick bones interfere with visualization of blood vessels.

“With Dual Energy, bone removal is more elegant and can be done more quickly than with image reconstruction software,” says Maximilian Reiser, MD, Radiology Chair and Dean of the Medical Faculty at University Hospital of Munich, Germany. “It cuts the time by at least half and requires less operator control. When you’re short radiologists, that’s important.”

The new Selective Photon Shield makes that job even easier by better separating high- and low-energy images. This improves differentiation of bone and contrast material by up to 80 percent while cutting the radiation dose. Dual Energy can even avoid the need for a baseline scan before contrast injection. The radiologist can simply perform a contrast-enhanced scan and use Dual Energy techniques to remove the contrast from the image, creating a “virtual” non-contrast scan and cutting radiation dose by one-third to one-half. “We all recognize that the goal is to do the best study possible while using the lowest dose possible,” Fishman says. “This scanner makes that easy.”

Dual Energy also helps physicians choose the best therapies. For example, it can be used to detect whether a tumor is cancerous, based on whether it has developed a network of blood vessels to feed its growth. Similarly, it can gauge whether a tumor is responding to medications designed to shrivel that blood supply, so-called antiangiogenic therapy. By comparison, conventional CT can only determine whether the tumor itself shrinks in response to treatment. “We have found that the size may not change, even though the tumor no longer has a blood supply,” Reiser says. “If you see no reduction in size and think that’s a poor therapeutic result, you might stop therapy or increase the dose. Both would be a mistake.”

The ability to provide functional information in addition to anatomical detail means that Dual Energy imaging could reduce the need for multiple imaging tests under a variety of circumstances. That not only saves the patient from unnecessary radiation exposure but also improves workflow and reduces healthcare costs.

“For hospitals, it’s very helpful to have a one-stop shop,” Reiser says. “With Dual Energy, we frequently have enough information to make a diagnosis without additional tests.”

Further Information
www.siemens.com/SOMATOM-Definition-Flash

**Summary**

**Challenge:**
- Minimize radiation dose to patients
- Expand the range of patients who can successfully undergo CT scanning
- Improve patient throughput in the CT department
- Minimize unnecessary procedures
- Establish position as a cardiac center of excellence

**Solution:**
- Take CT capabilities to a new level through the installation of SOMATOM Definition Flash
- Establish protocols for patients with challenging clinical conditions
- Educate radiologists, cardiologists, and technologists in advanced imaging and dose reduction features unique to SOMATOM Definition Flash
- Educate referring physicians about expanded CT capabilities with SOMATOM Definition Flash

**Result:**
- Dramatic increase in the range of patients undergoing CT, including those with a high heart rate, arrhythmia, trauma, or ventilator dependency, as well as those weighing up to 660 pounds
- Faster patient throughput as a result of subsecond scan times and a reduction in need for breath-holding instruction and beta blocker administration
- Better diagnosis leads to fewer invasive procedures, including a 20 percent reduction in patients who go directly to cardiac catheterization
- Dramatic reductions in radiation dose, including cardiac scans of < 1 mSv
- Marketing program can promote premier status of SOMATOM Definition Flash: highest temporal resolution, crystal clear images of the coronary arteries, lowest radiation dose in the industry, ability to image nearly any patient
Weathering the Crisis Together

The financial crisis has affected the whole world – and the healthcare sector is no exception. Siemens is facing the mounting cost pressure on customers with innovative, attractively priced, and high-quality products and sustainable services, including consulting services. This means that medical facilities don’t have to skimp on quality, even during the financial crisis.

By Kathrin Schmich
These days, there is a widespread tendency to postpone investments and everyone is having to make do with leaner budgets – including the healthcare sector. In line with its role as a reliable partner in healthcare, Siemens is using its extensive portfolio to support customers in reducing uncertainty and weathering the crisis without disruptions. From the university hospital that integrates innovations from Siemens into its research to the physician’s practice with a fixed group of referring practitioners and a regular patient base – there’s something for everyone: consulting solutions for enhanced efficiency, attractively priced imaging and diagnostic systems, the latest technologies to streamline workflows, innovative financing solutions, and long-term, proactive services.

**Example: Consulting Services**

Not a specific product, but a toolbox comprised of a variety of measures to help customers get through tough economic times – that’s the approach of Healthcare Consulting.

Right now, many customers are worried that new projects and investments will jeopardize their productivity and efficiency. This is precisely the time for consultants from Siemens to come into play. Their aim is to show customers a way to remain or become competitive. A team of experts with all their skills and expertise can assist customers when it comes to making the right decisions on new investments and optimizing workflows – thereby, cutting expenses. Business segments are strategically developed in order to boost profits. And finally, the healthcare consultants’ tasks also include the optimization of resource management and the service spectrum. These skills were exactly what was in demand when the German Ruppiner Kliniken GmbH came to Siemens for advice. A team from Healthcare Consulting examined the hospital’s cardiac catheterization lab, which was considered extremely cost-intensive but also generated high revenues, to see if there was any room for improvement. An analysis of costs and benchmarking of three key processes within the lab created transparency with regard to economic efficiency in this key division of the hospital. By analyzing the collected data, the consultants were able to pinpoint areas where there was potential for optimization using that information to recommend specific action items for various process flows. The client was highly pleased with the result: “The depth of the analyses in this project far exceeded my expectations,” says Kurt J. G. Schmailzl, MD, PhD, Professor and Director of Medical Clinic A.

**Example: Molecular Imaging**

In the field of molecular imaging, the Siemens Biograph® mCT appears at first glance to be a high-end piece of equipment, but on closer inspection, it wins points for being a potential for savings. For example, a single Biograph mCT can be used by two departments, radiology and nuclear medicine. It offers premium position emission tomography (PET) scanning with high definition and time of flight, tightly integrated with Siemens’ top-of-the-line computed tomography (CT) – available in configurations up to 128 slices. With premium capabilities for both radiology and nuclear medicine, Biograph mCT is a true shared services model, which means that only one operator, one schedule, and one service agreement are needed to serve both departments.

For those facilities that are not yet offering molecular imaging, Biograph 16 and Symbia® E and S represent cost-effective ways to gain access to the new technology. All three systems enable high-quality molecular imaging in PET or SPECT (single photon emission computed tomography). For healthcare providers with a limited budget, Biograph TruePoint 16-slice PET-CT might be the right solution. It is an affordable, dependable imaging system that offers high-definition PET and routine ten-minute full-body scanning with high levels of patient comfort. “The introduction of this particular system is critical as we continue to search for the balance between innovation and access. The likelihood that universal adoption of PET-CT technology will increase with accessibility is a shared industry vision. As an industry leader, it is our responsibility to make that vision more readily attainable,” says Michael Reitermann, CEO of Siemens Healthcare in the USA. “Biograph TruePoint 16-slice PET-CT is a means to achieve that end, with high-performance technology housed in an economical package.”

**Example: Computed Tomography**

In the area of computed tomography (CT), the SOMATOM® Definition Flash premium scanner significantly accelerates workflows, from cardiac CT to rational chest examinations. By eliminating the cumbersome pre-scan administration of
Financial Crisis

MAGNETOM® ESSENZA met all the requirements."
Siemens developed MAGNETOM ESSENZA, an innovative and affordable 1.5 Tesla (1.5T) magnetic resonance imaging (MRI) system, for customers who have to cover the full range of diagnostics on a slim budget. The total costs of MAGNETOM ESSENZA are considerably lower than of conventional systems, making it one of the most affordable all-new 1.5T MRI systems on the market today.

In addition to the low initial investment associated with the system, customers benefit from additional savings potential:

- The costs of installation, power, and setup are up to 25 percent lower.
- Once installed, the system is optimized so that facilities may save as much as 50 percent on their energy bills, compared to older systems.

While other 1.5T MRI systems may require up to 110 kilovolt-amperes (kVA), MAGNETOM ESSENZA operates at just 45 kVA. The unit’s innovative zero helium cooling system pushes costs down further. In addition, its Tim® (Total imaging matrix) technology gives physicians access to all clinical applications, at outstanding image quality – and in significantly less time. For example, a full scan of the central nervous system can be performed in less than ten minutes.

Example: Lab Systems
In the field of diabetes, which has now become a widespread disease, there is great potential for savings thanks to another innovation from Siemens: DCA Vantage™. This unit is an analyzer for immunoassays at the point of care, working practically at the touch of a button. Its greatest advantage is the potential it offers for saving time and lowering the overall cost of managing diabetic patients.

Using the analyzer, a physician can see a patient, view the HbA1c and albumin/creatinine results, and discuss a treatment plan.

Solution:
- Weathering the crisis together – Siemens and its customers
- Investing in affordable and sustainable products (e.g., Biograph 16, Biograph mCT, SOMATOM Spirit, SOMATOM Emotion, SOMATOM Definition Flash, Symbia E and S, MAGNETOM ESSENZA, AXIOM Luminos RF Classic, AXIOM Luminos dRF, MULTIX Swing with mFD, DCA Vantage, SpecTrack)
- Proven Excellence: Enabling customers to buy preowned, refurbished systems
- Improving the clinical workflow with special programs and services (Siemens Performance Plan, Siemens Guardian Program, Siemens Remote Services, Healthcare Consulting)
- Innovative financing solutions

Result:
- Reduction of costs (e.g., energy bills)
- Improved clinical workflows
- Enhanced patient care
- Reliable partnership with Siemens
Financial Crisis

reduced,” says Professor Yvan Palmers. “What is important to consider is not the cost of purchase, but the cost of ownership.” Due to the digitization connected with the reorganization of the Depart-

Example: Refurbished Systems

“In today’s world of declining reimbursement from insurance and Medicare, you have to find a way to decrease your upfront expenditure on equipment and increase profitability. Siemens offers high-quality refurbished equipment for 30 percent reduced purchasing costs.”

Example: Radiography and Fluoroscopy

Speed is also a major factor with the radiography system MULTIX Swing® 1 with mobile flat detector (mFD). It is the basis for completely digital imaging, which offers substantial advantages over conventional radiography: For one thing, there are no additional costs for the use of X-ray film and chemical developers, and for another, the unit was engineered to drastically reduce the number of workflow steps involved – from the previous 27 to just six. In addition, the digital image is available after just a few seconds and can be sent and archived electronically. Furthermore, the portable flat detector is impressive for its ease of use and just as flexible as conventional cassettes. With all these advantages, MULTIX Swing with mFD is not only the lowest-priced solution for digital radiography – it also covers the whole spectrum of general and specialized radiography applications.

With the new, analog remote-controlled fluoroscopy system Luminos RF Classic®, the user benefits from innovative functions and proven technology – all at an excellent price. Luminos RF Classic not only offers the essential features to meet the various imaging requirements applicable to fluoroscopy and radiography, the unit also can be flexibly configured to meet both advanced clinical needs and budget constraints. With Luminos RF Classic, Siemens has met the desires of many customers for user-friendly, simple systems. For example, its intuitive touch user interface makes a major contribution to ensuring that workflows are understandable and can be executed quickly, thereby considerably accelerating the examination workflow. All of this makes Luminos RF Classic a solid, long-term investment.

Luminos RF Classic also has a digital sibling. Versatility in utilization is the key for AXIOM® Luminos dRF. As a fully digital two-in-one system, AXIOM Luminos dRF revamps the traditional use of the fluoroscopy suite. Its 43 x 43-centimeter flat detector can be used for traditional fluoroscopy examinations, but also for high-resolution radiographic imaging and even for interventional studies. Workflow is significantly enhanced while costs can be reduced at the same time. Only six months after the installation of AXIOM Luminos dRF at Ziekenhuis Oost-Limburg (ZOL) in Genk, one of the largest nonacademic hospitals in Belgium, benefits were highly visible: “Costs for filming, printing, room rental, maintenance, cassette handling, and staff can be reduced,” says Professor Yvan Palmers. “What is important to consider is not the cost of purchase, but the cost of ownership.” Due to the digitization connected with the reorganization of the Depart-

1 Not available in the U.S.
says Paul Gililland, PA, Supervisor of Nuclear Medicine at Austin Heart, Texas, USA. He is just one of many satisfied customers who have acquired refurbished systems from Siemens. In this segment, Siemens is focusing on customers who, while they might not be able to afford the latest models, still do not want to compromise on quality and service. They can have both – in the form of refurbished, preowned models. All system components undergo an extensive refurbishment process, and only when the full process has been completed are they awarded the Proven Excellence quality seal. The process follows international standards and safety regulations.

Example: Financing

The Siemens Financial Services’ portfolio of financial solutions is well positioned to help the healthcare sector weather economic fluctuations and deliver superior levels of patient care. Working in partnership with Siemens Financial Services, the business tailors new, flexible ways of financing healthcare projects, including managed services, the bundling of new and refurbished equipment in one deal and pay-per-use or pay-as-you-earn models with customized payment plans to the hospital’s cash-flow projection.

The Chinese Hebei Qian An People’s Hospital, founded in 1949, planned to invest in three items of medical equipment – 16-slice CT, MRI, and radiation therapy. A team from Siemens Financial Services created a tailored leasing solution that enabled the hospital to acquire equipment within its specified delivery time and cash flow requirements. The hospital chose a Siemens “one-stop-shop” solution – combining the equipment, service, and a lease financing arrangement, tailored to suit the hospital’s budget.

Reflecting on the results, hospital Director Zhang Hong Tu is convinced that his hospital made the right decision in choosing Siemens as a partner: “By using the solutions offered by Siemens, we have experienced impressive revenue growth. Choose Siemens Finance and Leasing is our recommendation for a reliable and trustworthy partner.” By now, there are already four repeat orders from this hospital to Siemens, using the Siemens Financial Services’ leasing solution.

Example: Services and Support

With four central programs – Information and Communication, Continuing Education and Training, Upgrades and Migration, and Services and Support – the customer care program “Customer Care. Life.” helps to ensure performance, productivity, and patient satisfaction over the entire product lifecycle. System availability and optimized workflows are always important, but in situations like the current one, they can even be the crucial deciding factor. With a wide range of services, Siemens helps customers safeguard their competitive edge, enhance their economic efficiency, and raise patient care to an ideal level. Flexible service agreements tailored to customer needs – referred to as Siemens Performance Plans and Shared Services contracts – can help customers use their systems optimally, for a longer term or more often, over the entire product lifespan. Depending on the service agreement, regular updates and upgrades are delivered. This is an especially appealing option when cost reasons mean that fewer diagnostic and therapy systems are available. The fact that the costs of a product can be calculated over the entire life cycle is another advantage that Performance Plans and Shared Services contracts can offer. This has a positive effect on customers’ budgeting processes. Both types of service agreements can include options such as the Siemens Guardian Program™, which offers continuous real-time remote monitoring of the system, helps to reduce downtime, and ensures that there are fewer interruptions during day-to-day work. With the new option TubeGuard, it is possible to predict a tube failure and prevent a hard down of the system. As soon as a discrepancy occurs, the Siemens Remote Service (SRS) platform reports it to the Siemens Service Center. The experts there are able to resolve many problems through remote access, and if not, they can use SRS to determine which replacement parts are needed. At the Tübingen University Hospital, Germany, Siemens monitors workflows involving CT, MRI, and angiography systems – and users are highly satisfied. “Here, we all appreciate the competent, proactive Siemens service,” emphasizes Claus D. Claussen, MD, Professor and Medical Director of Diagnostic and Interventional Radiology.

Quality up, Costs down

Siemens Healthcare is a worldwide leader when it comes to enhancing efficiency in healthcare through innovative products and services. For the customer, this leads to improved clinical, financial, and business results. Innovations that boost efficiency by optimizing technical, clinical, and administrative processes in healthcare are critically important – and never so much as during a crisis. “Especially now, our approach of ‘quality up, costs down’ is exactly right,” Siemens Healthcare CEO Hermann Requardt, PhD, says, “Siemens aims to be a dependable long-term partner to its customers – and that also includes continuing to stand by them in tough times.”

Kathrin Schmich works in the editorial department of Medical Solutions.

Further Information

www.siemens.com/healthcare
A New Frontier for Ultrasound

The advent of automated image acquisition in ultrasound has the potential to change the role of this modality forever. Siemens’ ACUSON S2000 Automated Breast Volume Scanner (ABVS) is one of the first representatives of automated ultrasound systems developed to improve clinical workflow and take the operator dependence and variability out of ultrasound. Medical Solutions talked to Frank Stöblen, MD, one of the early adopters of this new technique.

By Andrea Röder

Mammography is the gold standard in breast imaging. However, it does have its limitations, especially in women with dense breast tissue. How do you assess the role of ultrasound for these patients?

STÖBLEN: For one, dense breast tissue increases a woman’s risk of breast cancer considerably. This has been proven in many clinical studies around the world. Secondly, dense breast tissue makes the radiographic detection of small lesions more difficult – so we are actually faced with a dual challenge. This is why I always consider ultrasound as a meaningful adjunct to mammography when I have a patient with dense breasts. There have been studies on the evaluation of how many more carcinomas can be detected when combining mammography with ultrasound. However, the results vary from region to region because there is no worldwide standardization of breast screening programs. The breast cancer screening procedures in the United States are different from those in Europe or in Japan.

What are the main differentiators of the various screening programs?

STÖBLEN: In many countries in Europe, screening mammography will be conducted every two years. In addition, the images require a double examination, with two independent radiologists analyzing the results. In the United States, the screening programs usually include an annual to biannual mammography starting at the age of 40, without double examination. However, I don’t know of any screening program that includes a standard breast ultrasound. In any case, the German screening protocol currently requires the specification of breast density according to the BI-RADS®1 density classification. This is important information to pass along to referring physicians and oncologists for continued surveillance and could ultimately lead to subsequent interval ultrasound examinations.

When do you routinely perform an ultrasound examination?

STÖBLEN: Whenever a patient comes to see me for a curative examination, for example, a mammography examination, which is not a part of the predefined...
Screening protocol. I usually provide an additional ultrasound for women with a density according to BI-RADS 3 and 4 to make sure that I have seen it all.

Where do you see the role of automated breast volume scanning?

STÖBLEN: I believe that this technique will play an important role in early detection. Patients with suspicious findings on mammography would automatically undergo automated breast ultrasound to better select further diagnostic procedures that might deliver additional information.

Automated breast volume ultrasound can also be used for examining high-risk patients, for example, women with a family history, women with increased genetic risk factors, or women who have had or are undergoing cancer treatment.

Clinical studies need to be conducted to determine the benefits of automated volume ultrasound for young women, who tend to have denser breast tissue than older women.

You are participating in an international multicenter clinical trial that will compare automated breast volume scanning with handheld, physician-performed ultrasound examinations.

STÖBLEN: Yes, 1,500 patients will be examined in six leading breast imaging centers in the United States, Europe, and Japan. We will be conducting blind evaluations comparing the new automated technique with a handheld ultrasound when it comes to breast lesion ultrasound: How sensitive is the new method? How specific? How efficient is the automated acquisition? We also hope to be able to define a specific workflow for optimal ABVS performance and usage in the clinical routine.

What was your first impression of the ACUSON S2000™ ABVS?

STÖBLEN: The system is a fascinating advancement of conventional, handheld ultrasound offering many advantages – for example, the reproducibility of images independent of the sonographer. In addition, it allows the complete coverage of the breast. Its automated image acquisition technique allows the examination to be performed without the physician present. The system delivers volumes of the breast that allow an evaluation of the images in all three dimensions. And finally, image analysis and reporting are performed at a workstation off the ultrasound system, increasing the system’s patient throughput.

Reproducibility and standardization are becoming increasingly important in ultrasound. Do you agree?

STÖBLEN: The advantages of the reproducibility of examinations are quite obvious. In most countries, it is entirely up to the physician as to what he includes...
Ultrasound Breast Scanning

Andrea Röder is responsible for external communications, press, and media relations at Siemens Healthcare’s Ultrasound Business Unit headquarters in Mountain View, California, USA.

Further Information
www.siemens.com/breastcare

Do you think that the introduction of automated breast volume ultrasound will pave the way for the profession of a dedicated sonographer to be introduced in Europe and other places in the world?
STÖBLEN: Yes, automated breast ultrasound examinations could mark the beginning of a new, more physician-independent acquisition procedure, much like what is already done today in other radiology techniques. North American institutions have always had sonographers, who are usually very skilled and experienced. The automated acquisition of the full volume combined with the reproducibility of the images may introduce this standard in other countries, too, because it makes the results independent of the person who acquires the data. That way, the physician’s time would not be tied up with image acquisition.

Do you see any other applications for automated ultrasound acquisition?
STÖBLEN: Absolutely. If automated volume acquisition proves to be efficient in breast imaging, I could imagine that the automated acquisition technique might be used for imaging other organs – for example, the thyroid or the liver, and also for the examination of peripheral vessels.

One of the major trends that influences general imaging is structured reporting, that is, the increased usage of standardized examination protocols. And automated acquisition techniques will ideally complement this trend. Knowledge-based workflow applications, such as computer-aided analysis supported by expert databases of real clinical cases, will lead to significant improvements in workflow efficiency.

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You have had the ACUSON S2000 ABVS system in clinical use for some time now. What’s your assessment so far?
STÖBLEN: Compared to earlier generations of the system, I have noticed a great improvement in image quality. The concept of integrating the flexible arm construction to hold the transducer pod to design a multiuse system, which can also perform automated breast volume ultrasound, is very convincing. It allows us to use the examination room for other ultrasound examinations as well. If I need to perform a biopsy, I can do that right away with the same system using either the 14 or 18 MHz handheld transducers. Another factor that is increasingly influencing decision-making is, of course, reimbursement. Having the opportunity to expand the application versatility of our current systems with automated breast volume ultrasound is ideal from an economical point of view.

Volume imaging provides the unique coronal view of the breast. How important is this in your daily work?
STÖBLEN: I am trained in both radiology and surgery. This is why I can estimate the value of the coronal view, which has not been available using conventional ultrasound. It allows a surgical view of the breast, allowing the physician to go through the breast slice by slice, from the nipple all the way down to the chest wall. This is why it provides a more comprehensive and easily understandable representation of the global anatomy and architecture of the breast. The coronal view is extremely helpful in surgical planning, in preoperative, interdisciplinary councils of an intervention.

“ABVS offers views of the breast that couldn’t be generated with handheld 2D-ultrasound.”

Frank Stöblen, MD, Diagnostic Radiologist, diavero Diagnostic Imaging Center, Essen, Germany

in the documentation. This may require another physician to completely evaluate the case on the basis of limited or very short image sequences. In the case of breast ultrasound, the automated image acquisition delivers full-volume images, which allow analysis and postprocessing at a workstation. Not only does this enable the presentation of the results to a larger audience or panel, it also offers views of the breast that couldn’t be generated with a handheld 2D-ultrasound.

The ACUSON S2000 Automated Breast Volume Scanner reduces operator dependence and variability.

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“ABVS offers views of the breast that couldn’t be generated with handheld 2D-ultrasound.”

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The Children’s Cancer Hospital Egypt is changing the way pediatric oncology is practiced in Egypt and the Middle East. As a center of excellence with state-of-the-art facilities, clinicians, and protocols, the charity hospital provides free care to patients and is achieving survival rates on par with those in the West.

By Ward Pincus

A Vision for Pediatric Oncology in Egypt

Since the state-of-the-art, 400,000-square-foot Children’s Cancer Hospital Egypt (CCHE) opened two years ago, it has joined the Great Pyramids as one of the must-visit destinations for foreign dignitaries coming to Cairo.

Providing free treatment to children newly diagnosed with cancer, the 180-bed hospital with a 300-person outpatient clinic is the only pediatric oncology center of excellence of its kind in the Middle East – a distinction that makes it one of the most high-profile charitable institutions in Egypt and the surrounding region.

Jonathan Bailey Associates, the award-winning healthcare facility design firm, incorporated the latest concepts in acute pediatric oncology care to create a facility that is elegantly childlike in order to inspire hope in children and their families as well as to operate cost-effectively on the technological cutting-edge.

From its design to its construction to its outfitting, the facility – which is funded entirely from donations – was developed and built to the highest Western standards of care by an international team of experts from the United States, Sweden, Germany, Lebanon, and Egypt.

The building’s exterior is futuristic, with extensive use of glass and hand-carved sandstone, yet is shaped to evoke the traditional Nile River sailboat, the felucca. It also features an enormous glass dome that caps the main reception area and bathes it in light. The liberal use of natural light and playful color in the interior, alongside a large and growing collection of paintings, reflect the well-recognized impact of the environment on treatment outcomes.

Complementing the architecture and interior design are world-class clinicians and protocols, as well as state-of-the-art medical equipment from Siemens, including everything considered standard for a pediatric oncology center of excellence. This includes a 40-slice positron emission tomography-computed tomography (PET/CT) scanner; the latest-generation linear accelerators enabling Image-Guided Radiation Therapy (IGRT), Intensity-Modulated Radiation Therapy (IMRT) and Stereotactic Radiation and Radiosurgery Therapies (SRT/SRS); a 1.5 Tesla (1.5T) open-bore magnetic resonance imaging (MRI) system for whole-body imaging; a fully integrated, cutting-edge forward and inverse treatment planning software platform as well as many other complementary diagnostic and treatment solutions for oncology.

The radiology department is equipped with the most advanced conventional and interventional X-ray devices, diagnostic ultrasound, computed tomography (CT), and nuclear-medicine-based gamma cameras. Six state-of-the-art operating theaters, a clinical pharmacy, multi-specialist clinics, and a multidisciplinary laboratory with a cord blood lab, cytogenetics, immunophenotyping, and molecular biology complement the facility. CCHE’s high-profile status in Egypt is reflected in the dignitaries serving on its Board of Trustees, including Board President Suzanne Mubarak, the First Lady of Egypt, and Board Vice President Dr. Ahmed Fathy Sorour, speaker of the Egyptian Parliament. The hospital’s regional prominence was demonstrated...
when it won the United Arab Emirates’ Health Foundation Prize, sponsored by the World Health Organization. The award is well deserved: The hospital, which has treated more than 3,330 patients since it opened and expects to serve 2,500 children in 2009 alone, expects to achieve significantly higher survival rates, at a level on par with child cancer survival rates in the West.

Rapid Implementation

The history of the hospital began in 1995 as an idea. It accepted its first donations in 1998 and witnessed groundbreaking in 1999. By March 2004, the electrical-mechanical and interiors phase had begun, and by early 2007, the building was largely complete – with just short of a decade having passed since the first donations were made. Hospital management was eager to begin serving patients, so the auspicious date of July 7, 2007 was selected for the hospital’s opening. After the Bill of Quantity was jointly fixed in December 2006, Siemens had only six months left for procurement, shipment, installation, and training until the opening.

“We succeeded with Siemens in squeezing the duration of equipment implementation into one-third of the originally proposed time,” recalls Professor Mohamed Hany Hussein, MD, Chief Executive Officer of CCHE. Siemens’ commitment to the project deadline impressed hospital administrators. “For the past three years, we have felt that the relationship between the hospital and Siemens is not one of client and contractor, but rather one between partners,” says Hussein.

Khaled El Noury, MD, Deputy Director General of Operations at CCHE, notes that it was the close cooperation between Siemens and the hospital that enabled the facility to meet the scheduled launch date, particularly the willingness of Siemens to go above and beyond its contract obligations. “If both parties had abided ‘only’ 100 percent by the terms of the contract agreement, the July 7th opening wouldn’t have been realized,” says El Noury. With its global expertise in turnkey solutions, Siemens was able to deliver the complex 8,000-item medical equipment solution, even under the tremendous time constraints. Drawing on both its local and international resources and its extensive list of supply partners, Siemens provided a single-window contact to hospital management during the medical equipment supply, installation, testing, training, and commissioning phases. “It has been an enormous challenge for Siemens to set up this hospital in time. An engaged project team as well as orchestrating international competencies in a streamlined virtual organization was one of the key success factors,” says Gunter Barthel, the Siemens business manager in charge of the project.

The workflow-oriented solutions continue to deliver benefits in improved patient care, faster diagnostic and treatment times, and enhanced productivity through more efficient data processing and management. Training, equipment maintenance, and upgrades are all easier and more cost effective because of the syngo® user interface used on all imaging modalities. Siemens’ supply partners on the project included Dräger, Steris Corporation, Hill-Rom, Sirona, and Maquet. Added to the equipment turnkey was a five-year maintenance contract on the equipment, which means that the hospital faces only negligible equipment downtimes and enjoys the latest upgrades to equipment as they become available.

Precision and Efficiency

At the heart of the equipment tender was the need to provide precision and efficiency throughout the diagnosis, treatment, and assessment phases, especially regarding radiation therapy. While these characteristics are important in all oncology activities, in the field of pediatric oncology, they are even more crucial.

“In our practice, we have set a tolerance level of three millimeters across the body, although some centers allow five or even seven millimeters. Since our patients are children with smaller organs, errors can easier affect healthy parts of the organs at risk, and critical organs can be closer to the target volumes. As a result, we

“For the past three years, we have felt that the relationship between the hospital and Siemens is not one of client and contractor but rather one between partners.”

Professor Mohamed Hany Hussein, MD, Chief Executive Officer, Children’s Cancer Hospital Egypt, Cairo
need to have a very high level of accuracy,” explains Mohamed Saad Zaghlol, MD, Chairman of Radiation Oncology at CCHE.

Given the importance of this requirement, the radiation therapy equipment included the ONCOR Expression™, the first linear accelerator in Egypt with a cone beam CT imaging package. “This linac allows us to quickly verify the position of the target and the position of the organs at risk and delineate the complete volumes, rather than having to rely on 2D images with overlaying structures,” says Zaghlol. “ONCOR Expression means we can be sure that the exact volumes are irradiated.” This results in faster treatment times and better patient outcomes.

ONCOR Expression’s leading-edge technologies enable high-quality treatment applications, such as IMRT, IGRT, and SRS/SRT – the last of which can limit the error tolerances to only one millimeter.

**IMRT and IGRT Planning**

Another component of the equipment package was the KonRad™ Inverse Planning Software, which is ideal for treatment areas where an accurate and highly conformal dose is essential and where organ or healthy tissue sparing is a key requirement, such as with the brain, head and neck, pituitary, and pelvis. “KonRad is an easy, user-friendly IMRT planning system that allows us to design and implement a large number of segments of the IMRT plan within a short time. Plus, it lets us optimize the dose to the tumor volume whilst sparing the organs at risk – all within a short delivery time,” says Zaghlol. “That’s because it gives better distribution with fewer radiation units than other planning systems. And segments are fewer in number while giving a better distribution. This decreases the time for application, so our patients do not need to stay long on the treatment systems. Because our patients are children, many require anesthesia during treatment, so clearly the length of the treatment session is very important.”

The effectiveness of KonRad is enhanced by the LANTIS™ Oncology Information System, a complete electronic medical
Pediatric Oncology

record (EMR) system. Zaghlol explains that, after the physicist and physician have approved the KonRad plan, the agreed-upon treatment is conveyed to the ONCOR linac systems through LANTIS. Having all imaging tools and patient database information available in one workplace, the hospital can deliver a higher level of accurate and efficient patient care.

Precision is also a crucial part of the diagnostic and assessment process, according to Raef Riad, MD, Consultant in Nuclear Medicine at CCHE. He says the Siemens Biograph® TruePoint™ PET·CT scanner is very user friendly, and coregistering of CT images with PET images is easy to handle, providing greater clinical accuracy and speed for lesion specification.

For Mohamed Awad Aggag, MD, medical imaging consultant and Director of Medical Imaging at CCHE, the Siemens Open-Bore MRI MAGNETOM® Espree 1.5T is ideal for a pediatric oncology hospital: “It puts our patients at ease because of the wide and short gantry and shorter examination times. It is much more comfortable than a standard MRI. You can use multiple coil combinations to scan a very large field-of-view. It means you can scan 140 centimeters without moving the patient. This, and the shorter scan time are great benefits, since many of our patients are not in good health and it’s not easy to move them.” And from a clinician’s point of view, Aggag says, “The high definition of the image from the first look makes diagnosing and reporting pathology easier.”

The 4D radiation therapy workflow at the hospital is streamlined through the use of the Siemens syngo MultiModality Workplace package, which provides seamless integration with the hospital’s HIS (hospital information system), as well as a 4D viewing module, dual timepoint fusion, localization, reference point management, and simulation tools. The syngo easy-to-use interface across all Siemens’ imaging modalities reduces the need to adapt to various tools and enables users to concentrate on their patients.

“We do all of our post-processing with the syngo MultiModality Workplace, where information from the CT is reformatted into 3D or even 4D [motion] for navigation,” says Aggag. “It can produce 3D, axial, and coronal images and allows us to compare the volumetry of a tumor before and after therapy.”

Maximizing Building Performance

Siemens Healthcare wasn’t the only Siemens sector involved in the hospital’s development. In a separate, earlier tender, Siemens Industry won the electromechanical and building infrastructure con-

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Mohamed Saad Zaghlol, MD, Director of Radiation Oncology, Children’s Cancer Hospital Egypt, Cairo
Pediatric Oncology

Challenge:
- Short lead-time to complete complex and hospital-wide medical equipment delivery and installation ahead of hospital opening
- Clinical requirements for high-precision radiation treatments that accommodate pediatric oncology’s small error tolerance
- Efficient treatment and diagnosis sessions to accommodate unique needs of pediatric oncology patients
- Efficient workflow management

Solution:
- Medical equipment turnkey package that provides single point of contact on complex acquisition and implementation process
- Biograph TruePoint PET-CT with hybrid modality integration for clinical accuracy and speed to diagnosis
- ONCOR Linear Accelerator with leading-edge technologies enabling high-quality treatment applications such as IMRT, IGRT, and SRS/SRT
- KonRad Inverse Planning Software, clinically proven to enable accurate tumor irradiation while protecting organs at risk
- syngo MultiModality Workplace to facilitate efficient processing of images from multiple modalities for enhanced clinical workflow and greater efficiency

Result:
- Saving time and money while delivering enhanced clinical and patient outcomes
- Opening day deadline met with first patients admitted
- Leading-edge radiation therapy planning and equipment technology enables hospital to achieve error tolerance limit of three millimeters, and just one millimeter for SRS
- Highly sensitive, clear, and precise assessment and treatment delivery helps hospital achieve a significantly better treatment outcome
- Rapid image acquisition and treatment delivery across nuclear medicine, radiology, and radiation therapy platforms enhance workflow and contribute to increasing treatment numbers

Summary

Ayda Youssef, MD, Radiologist; Magdy Hafez, MD, Radiologist.

tract and provided the facility with the latest in infrastructure solutions. Reda Atta, Head of the CCHE Engineering Department, says that the hospital’s design consultant had set very strict guidelines regarding the building infrastructure, “and Siemens met them all.” But the story of CCHE does not end with the current hospital complex. Hany Hussein outlines CCHE’s next initiatives, which he hopes will be realized with the help of partners such as Siemens. These include plans for a bone marrow transplant program, building a guesthouse for patients’ families, constructing two satellite hospitals, and developing a research institute. “In pediatric oncology,” he says, “besides treating and healing patients, success in this field comes through researching the biology of the disease.”

Further Information

www.siemens.com/oncology

Ward Pincus is a freelance business and economics writer based in Dubai, UAE.
Atrial fibrillation is a cardiac arrhythmia that, given the aging population, is sending an increasing number of patients to physicians. Currently, catheter ablation is the only treatment that provides a long-term cure. syngo DynaCT Cardiac software provides cardiologists with a tool that not only makes treatment faster and more efficient, but can also result in significant cost savings. This has been proven in a study at Coburg Hospital, Germany.

By Martina Lenzen-Schulte, MD
Catheter ablation procedures place high demands on the entire cath lab team. More efficient treatment planning better utilizes both the cath lab facilities and the skills of the experts.

Given the pessimistic economic mood, those asking for high-tech investments in their operations are currently being advised with resignation to “tighten their belts and save money.” This does not apply to Professor Johannes Brachmann, MD, Head of the II. Medical Clinic for Cardiology, Angiology, and Pneumology at Coburg Hospital (Klinikum Coburg). Although his department is already equipped with four highly modern catheter labs, expansion with an additional interventional angiography lab is about to take place.

This hospital is willing to generously invest in equipment purchases, due in no small part to the fact that Brachmann can prove the organization saves money through such investments. The innovative syngo® DynaCT Cardiac software is the story here. It is being used in Coburg in the treatment of cardiac arrhythmia, specifically atrial fibrillation, and is revolutionizing C-arm angiographic imaging during catheter ablation.

**Lowering Costs, Saving Time, Improving Workflow**

Immediately prior to a catheter intervention, this new method generates a threedimensional image of the patient’s heart within seconds, as well as an image quality almost on par with computed tomography (CT). It also supports mapping to locate electroanatomical points critical for the procedure. As a result, the examination costs and time previously required for the mandatory CT examination have been eliminated, along with the time required to transport the patient to the CT system. In addition, more than half of the patients do not have to be admitted to the hospital a day before the intervention. “Using a group of 25 patients, we found that these three factors alone resulted in a cost reduction of approximately 52 percent compared to the conventional procedure,” says Brachmann, explaining the savings. He can even calculate it down to the last cent: “Assuming an eight-year investment period, the hospital can recoup up to 500,000 euros during this time.” His calculations only assume a 20-percent annual increase in the number of patients. However, in the second year in which syngo DynaCT Cardiac is being used at Coburg, the facility may double the number of patients it treats. Instead of 200 catheter ablations (due to atrial fibrillation) performed annually, it is conceivable that 400 will be performed in 2009. This doubling is primarily due to the improvements in workflow. Savings and profit could therefore be even higher.

**Economics in the Service of Effective Care**

That a cardiologist juggles numbers like an experienced economist is no contradiction in Brachmann’s view: “It is completely unrealistic to hope that physicians can make progress with existing therapy resources if we ignore the financial aspects. For me, however, it is not simply...
Cardiology

“We have been able to increase the success rate of catheter ablation therapy to 83 percent.”

Professor Johannes Brachmann, MD, Director, II. Medical Clinic for Cardiology, Angiology, and Pneumology, Coburg Hospital, Germany

Treating Liver Tumors Faster

One-third of all liver transplants in Australia and New Zealand are performed at the Royal Prince Alfred Hospital (RPAH) in Sydney. John Magnussen, MD, Head of the Research Department and an interventional radiologist, as well as Richard Waugh, MD, Head of the Radiology Department of the RPAH, wanted to know whether the use of syngo® DynaCT-supported angiography would improve workflow and reduce costs. Malignant tumors of the liver are localized via angiographic display and occasionally selectively treated prior to liver transplant. The conventional procedure always required arterial portography using CT (CTAP). Thanks to their excellent image quality, the slice images from syngo DynaCT are on par with CTAP, making the CT examination unnecessary.

As a result, all diagnostic and therapeutic activities can be performed in the interventional suite. The improved workflow and cost savings can be quantified as follows:

- Instead of two hours, the intervention takes only 40 minutes
- Previously, the catheter was misaligned in ten percent of patients and had to be corrected; this took an additional 1.75 hours
- Personnel costs (e.g., for transportation to the CT) have been reduced by 83 percent, the cost for routine consumables is down 31 percent
- Costs for keeping patients overnight have been virtually eliminated

In total, the use of syngo DynaCT software has helped reduce the cost for diagnosing and treating liver tumors by an average of 33 percent.
tor for stroke in a sustainable, preventative manner. Strokes cause the highest number of disabilities among the elderly and represent one of the greatest drains on our healthcare system.

In Germany, however, there are only 60 centers offering such treatment, and only a few hospitals have the same capacity as Coburg and can treat more than 100 patients annually. It was in Coburg that the syngo DynaCT Cardiac software was codeveloped and installed for the first time worldwide. "As much as we welcome having this unique feature for our hospital, for patients, we hope that other facilities will soon ramp up their capacity," says Brachmann. At present, only one percent of those affected can be treated using ablation. However, more than one million patients are already suffering from atrial fibrillation. It is the arrhythmia most frequently responsible for hospital admissions because those affected lose consciousness. Medications not only are less efficient, but many patients also only respond to them after ablation therapy. Blood-thinning substances such as Markumar® help suppress the formation of blood clots in the fibrillating atria of the heart. However, they are poorly tolerated and carry with them the risk of serious bleeding, including in the brain.

**Patient Advantage: Greater Comfort, Less Radiation Exposure**

Catheter ablation using syngo DynaCT Cardiac is more than just an ideal combination of cost reduction and improved workflow. Its real benefit to the physician and patient is medical in nature. The excellent 3D images before and during the intervention represent a 70-percent reduction in radiation exposure for the patient because the CT scan has been eliminated. Using syngo iPilot, the physician sees where the tip of the catheter is located, making orientation much easier. There is reason to believe that this will further reduce the rate of complications for this intervention. A clear scientific answer to this question will have to wait until the data from the German ablation registry have been evaluated. To date, information on more than 8,000 interventions has been entered. The same is true for the success rate, which is approximately 60 to 70 percent. This means that two-thirds of patients are free of atrial fibrillation after catheter ablation. However, in some cases, the intervention has to be repeated. "In Coburg, we have been able to increase the success rate to 83 percent," states Brachmann. The more the side effects of this intervention are reduced and its effectiveness is increased, the sooner it will be indicated. He continues, "When advising patients, it is becoming increasingly easier for us to enumerate the advantages of catheter ablation. This is important because many patients are under severe psychological strain due to atrial fibrillation. It also affects job performance should they, for example, begin to panic because their heartbeat suddenly goes crazy."

**New Applications in Sight**

"It is already apparent that this technique’s high level of success has significantly accelerated cardiologists’ learning curve for this electrophysiological intervention," stated Brachmann. As someone who trains future cardiologists, he particularly appreciates this advantage. Even experienced specialists are taken with it: "Everyone who has seen the new system in action here is impressed," the pioneer says.

Greater comfort and fewer complications will also expand the application spectrum for ablation. Improved imaging during the procedure is already helping to better master arrhythmias that previously were difficult to handle, such as the bundle branch block. And Chronic Total Occlusion (CTO), previously the domain of surgeons, can now be treated in the catheter lab. Coburg is a lead participant in the corresponding studies. Clearly, there is no need for belt tightening right now.

**Summary**

**Challenge:**
- Handle the growing number of cases for catheter ablation through better use of existing resources
- Improve the structuring of interventions
- Avoid unnecessary imaging and time-consuming transports

**Solution:**
- Current, high-resolution imaging immediately before and during catheter ablation
- syngo DynaCT Cardiac, a software that provides real-time, three-dimensional images of the heart for interventions in conjunction with C-arm angiography and enables continuous adjustment of orientation directly in the cath lab

**Result:**
- Cost savings up to 50 percent or up to €500,000 over the course of eight years
- Potential savings of 30 minutes per intervention, allowing for more interventions
- Up to 70 percent less radiation exposure for the patient
- Increased treatment success because the cardiologist’s orientation is improved during the intervention
- Lower rate of complications is expected

**Further Information**

www.siemens.com/DynaCT

**Further Information**

Martina Lenzen-Schulte, MD, is a physician, author, and medical journalist. She writes for medical magazines and the general media. For her medical journalism, she recently received the 2009 Helmut Stickl Award from the German Academy of Pediatrics (Deutsche Akademie für Kinder- und Jugendmedizin).
In(telligent) Postprocessing Harmony

Second reader tools are seamlessly integrated into clinical care at the University of Munich, resulting in workflow enhancements.

By Kimberley Davidson

The Hospital of Ludwig-Maximilians-University (LMU) in Munich, Germany, is one of the largest in Europe, with 2,300 beds and 9,000 employees. There are two major hospital locations, Großhadern and the Downtown Campus, with 44 specialty clinics, departments, and institutes that cover a wide range of care services and specialties. The Department of Clinical Radiology at LMU Munich provides services to nine hospitals, two outpatient centers, and various conventional and interventional radiology suites. It operates 12 computed tomography (CT) scanners and 11 magnetic resonance imaging (MRI) systems, and has a comprehensive information technology (IT) infrastructure, with three picture archiving and communication systems (PACS) functioning in a heterogeneous, but fully integrated data network.

You can see the gleam of excitement in the eyes of Peter Herzog, MD, chest radiology fellow at the Institute of Clinical Radiology, as he describes the institution’s imaging and information technology infrastructure. Herzog heads the Computer-Aided Detection (CAD) group, which is responsible for evaluating new technologies and supporting their transition into clinical care. Consequently, he was excited about the opportunity to install a server-based solution to provide centralized CAD processing for use in the PACS reading workflow.

**CAD Integration**

Herzog’s relationship with CAD began in 2001 and continued as he became involved with the development of tools and techniques. He conducted several scientific studies focusing on clinical evaluation and improvement and presented the results at international congresses, including the Radiological Society of North America (RSNA), European Congress of Radiology (ECR), and the World Congress for Medical Physics and Biomedical Engineering. Over this period of time, he has seen CAD progress steadily. “CAD is unique because it’s more than visualization; it’s information,” says Herzog. “CAD performance has really evolved from prototype level to a question of quality in the tight imaging workflow of today.”

Starting in 2007, the Hospital of LMU Munich successfully integrated two CAD applications, syngo® Lung CAD and syngo CXR (chest X-ray) CAD1, into the PACS-based clinical reading workflow. syngo Lung CAD is an automated detection software for diagnostic chest CT examinations. It searches for possible solid nodules in the lungs starting from three millimeters in size. syngo CXR CAD is used for the analysis of digital radio-

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1 Not available for sale in the U.S.
graphic images of the thorax. The tool helps detect potential nodules from eight to 30 millimeters in diameter. All chest CT and chest X-ray scans are automatically sent to syngo CAD Manager, a software platform for CAD processing with syngo Lung CAD and syngo CXR CAD. After CAD processing is complete, the results are distributed back to the corresponding PACS, where the fully analyzed scan can be retrieved from the image server with the CAD results for display at the PACS workstation. The entire process is fully automated and does not require user interaction before the physician starts reading the case. Adapted display layouts are adjusted so the CAD results do not interfere with the reading workflow, where the radiologist first looks at the study and then at the CAD results. “CAD can now be considered an integral tool in our daily work,” Herzog states. “If you read 50 chest CT exams a day, each containing 150 slices or more, you are reviewing 7,500 images. You want to examine every relevant lesion so that it is not overlooked, and with CAD, you can feel more on the safe side.”

Complementary Detection Spectrums

The usage of CAD tools can substantially help reduce the number of lesions missed during routine chest CT and X-ray reading, according to Herzog. However, CAD cannot replace the careful review of the exam by the radiologist. “CAD points to a possible finding in an exam, but it’s up to the physician to decide which lesions are actionable,” says Herzog. “It is important to be aware that CAD also comes up...
Dr. Peter Herzog can easily upload the reviewed images directly to his PACS workstation.

Summary

Challenge:
• Detection of lung nodules in chest CT and chest X-ray studies

Solution:
• Use of syngo Lung CAD and syngo CXR (Chest X-ray) CAD in the PACS reading workflow

Result:
• With CAD on PACS, the second reader CAD results are available enterprise-wide shortly after the scan is performed

Further Information
www.siemens.com/CAD

with false positive marks that have to be dismissed by the radiologist." Based on the specifics of the finding as well as on the clinical context, many nodules may not be clinically actionable, but good clinical care still requires looking at each finding and reviewing pulmonary nodules according to relevant guidelines. "We use CAD on every case, because I am not aware of a case where detecting nodules is irrelevant," he says.

"The complementary relationship with CAD is really beneficial," continues Herzog. "For lung CT exams, CAD focuses on small lung nodules, while large lesions that are over two centimeters are easily identifiable by a radiologist. The detection spectrums of the human reader and CAD are complementary and not substitutable." When reviewing chest X-ray, CAD helps identify larger nodules that are partially obscured by superimposed structures, he adds.

The impact on reading time is minimal, especially when using chest X-ray CAD. With CAD for chest CT, the radiologist needs to navigate to the areas detected by CAD, so there is a slight increase in reading time. Generally, the reading time varies based on a number of clinical parameters. For example, if the initial interpretation is done in five to ten minutes, then CAD, with a typical number of findings, may require an additional 30 seconds to one minute. "However, the added diagnostic confidence is well worth the time spent," says Herzog.

He continues to be excited about the advancement of CAD and is closely monitoring its usage in other healthcare fields. "In the future, the use of CAD will be a standard of care in almost all modalities," he says.

Kimberley Davidson is a communications specialist for Siemens Healthcare and Syracuse University graduate, based in Malvern, Pennsylvania, USA.
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Where’s Parker’s X ray?

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Answers for life.
After gaining independence in 1947, India adopted the welfare state approach, which was dominant worldwide at that time. India’s leaders envisaged a national health system in which the state would play a leading role in determining priorities and financing and would provide services to the population. Set up by the Indian government in 1943 to investigate and recommend improvements to the Indian Public Health System, Bhore Committee noted in 1946 that “if it were possible to evaluate the loss which this country annually suffers through the avoidable waste of valuable human material and the lowering of human efficiency through malnutrition and preventable morbidity, we feel that the result would be so startling that the whole country would be aroused and would not rest until a radical change had been brought about.” This statement has, unfortunately, not been heeded by India’s leaders, which has
been reflected in three significant facts: the low level of investment and allocation of resources to the health sector over the years—about one percent of GDP with clear declining trends over the last decade; the uncontrolled and incredibly rapid development of an unregulated private health sector in the recent past; and, as a result of the first two facts, the undermining of roles and responsibility such as stewardship and governance. A healthcare policy statement only came about after the Alma Ata Declaration of the World Health Assembly in 1978, which advocated “Health for All” by the year 2000.

The inequity in the access to and distribution of public health services has been a concern because of the extent of impoverishment that many Indian households face due to ill health. According to a national survey, 61 percent of India’s poor use public facilities for health services, compared to 33 percent who reported to be non-poor. The poor benefit from centrally funded vertical programs such as immunization, antenatal care, tuberculosis, malaria, and leprosy.

The single most vital component of healthcare is pharmaceutical drugs, as they account for a substantial part of household health expenditures. The market for drugs, particularly in the allopathic category, has been growing rapidly in India in terms of production, trade, investment, and employment. However, the industry is characterized by supplier-induced demand, uncertain demand from the patients, oligopoly elements, monopoly profit, and other factors. This has far-reaching implications on the healthcare of the masses, whose essential problem lies in lack of purchasing power, lack of access, and lack of knowledge regarding modern medicine.

Estimates from the above-mentioned survey revealed that three-fourths of the total out-of-pocket health expenditure are spent on drugs. However, the component of drugs and medicines in the overall budget of both the central and state governments is only a minor share. In all, roughly ten percent of the national health budget goes into procuring drugs.

Enacted in 1948, the Employees’ State Insurance (ESI) Act was the first major legislation on social security in India. The scheme applies to power-using factories employing ten persons or more, and non-power and other specified establishments employing 20 persons or more, with employees earning up to US$150 per month being covered, along with their dependents. The current coverage stands at 84 million employees and 353 million beneficiaries across 22 states and union territories. The benefit package goes beyond the cost of medical care to include cash benefits (sickness, maternity, and permanent disablement of self and dependent) as well as other benefits such as funeral expenses and rehabilitation allowance.

“The essential problem in providing healthcare services for the masses lies in lack of purchasing power, lack of access, and lack of knowledge regarding modern medicine.”

N. Ravichandran, PhD, ASIA Fellow, Health Unit Ateneo School of Business, Ateneo De Manila University, Philippines

1 National Sample Survey, 52nd round
Facts & Figures

The central government, through the main council of the Ministry of Health and Family Welfare and various committee recommendations, has shaped health policy and planning in India. It is being implemented through one of India’s five-year plans with a programmatic approach. The central government designs national programs and the states’ governments are required to implement them. However, there is a clear demarcation between the central and state governments’ provision of health services. The states fully finance hospital services and primary healthcare facilities. Meanwhile, family welfare programs are fully financed by the central government. And national disease control programs are funded on a 50:50 sharing arrangement. However, in many cases, the states’ contribution turns out to be about 75 percent, and the states have to bear all administrative costs, including staff salaries. Out of the total expenditure on medical education and research, the central government’s share is a little over 40 percent. Thus, by and large, the states fully finance all curative care services.

Regarding private spending on healthcare, the National Health Accounts matrix reveals that 71 percent of the health budget is contributed by the private sector, of which households alone spend 68.8 percent. This is because the government’s health sector policies encourage the growth of the private healthcare sector, especially for curative services, by investing resources in medical education, providing subsidies and tax exemptions, and offering soft loans to set up hospitals. So even though public sector spending on healthcare is less, it has a major role in terms of planning, regulating, and shaping the delivery of health services in the country. Such public provisioning is considered essential to achieve equity and to reduce the gaps associated with health. As a result, the public health system has grown over time across the country with 137,311 sub-centers (mainly dispensaries manned by paramedics), 22,842 PHCs (Primary Health Centers), 3,043 CHCs (Community Health Centers), 4,048 hospitals, and a workforce of 345,514 (statistics from 2001-02). There is a strong case to markedly increase public sector spending on health, as stated in the National Health Policy 2002 and the National Common Minimum Program (CMP) 2004. In addition to this, the Ministry of Health and Family Welfare implements certain schemes itself, such as the Central Government Health Scheme (CGHS) and national disease-control programs, through the states’ governments. A large part of the Ministry’s budget is passed on as grants-in-aid to states for implementing various national health programs. Even though the size of the central health budget has grown considerably, transfers to states as a proportion of the total budget of the Ministry has declined from nearly 57 percent to 44 percent. This shows the increasing role that the central government has been assuming in the delivery of health services.

To overcome the country’s inequity, inequality, and budget deficits, the government has initiated a mix of mandatory social health insurances, voluntary private health insurances, and community-based health insurances. However, social security for medical emergencies is not new to India. It is a common practice for villagers to take a piruvu (collection) to support a household with a sick patient. Health insurance as we know it today was revised in 1972, when the insurance industry was nationalized. Private and foreign entrepreneurs were allowed to enter the market with the enactment of the Insurance Regulatory and Development Act (IRDA) in 1999. The penetration of health insurance in India has been low. It is estimated that only about four to six percent of all Indian citizens are covered under any form of health insurance. In terms of the market share, the size of the commercial insurance market is barely two percent of the total health expenditures in the country. Thus, health insurance is really a minor player in the health ecosystem.
Total Expenditure on Healthcare/Capita (US$): 55

Number of Dentists per 10,000 Resident Population: 0.7 (2006)

Public Expenditures on Healthcare as % of Total Expenditures on Health: 22.6

Number of Physicians per 10,000 Resident Population: 6 (2006)

Number of Hospital Beds per 10,000 Resident Population: 7 (2006)

Number of Nurses per 10,000 Resident Population: 8 (2006)

Population in Thousands: 1,140,300

Life Expectancy at Birth (2006):
Men: 68.1
Women: 65.8

Total Expenditure in Healthcare as % of GDP: 5.0
of the employees are also covered under this scheme. Benefits under the plan include medical care at all levels and home visits/care as well as free medicines and diagnostic services. In providing financial risk protection to the poor, the Indian government announced a revised Universal Health Insurance Scheme (UHIS) in 2004 for BPL (Below Poverty Line) families. Under this scheme, for a premium of US$7.5 per year per person, US$12 for a family of five, and US$15 for a family of seven, healthcare for an assured sum of US$650 is provided. To make the scheme more saleable, the insurance companies provided for a floater clause that made any member of the family eligible for the Mediclaim Policy. Yet, in the last few years of its implementation, the coverage has been minimal. The reasons are many: Public sector insurance companies required to implement this scheme find it unprofitable and do not promote it; to meet their targets, many field officers pay premiums under fictitious names; identifying eligible families is problematic; the poor find it difficult to pay the entire premium in one payment for a future benefit, foregoing current needs; the paperwork required for enrollment and claims is cumbersome and time-consuming; there is a limited supply of service providers, particularly because government hospitals are not permitted to treat patients insured under this scheme; and lastly, there have been setbacks due to health insurance companies refusing to renew the previous year’s policies.

For the majority of Indian citizens, the public health system is out of reach due to distance, lack of money, or lack of confidence in the system. The organizational structure requires a villager to travel an average distance of 2.2 kilometers (km; ca. 1.4 miles) to reach the first health post for getting a common pain reliever, over 6 km (ca. 3.7 miles) for a blood test, and nearly 20 km (ca. 12.4 miles) for hospital care. Given the poor road connectivity in rural India, the unreliability of finding the provider at the health center, and the indirect costs for transport and lost wages, many of the poor opt for local, self-proclaimed “physicians.” Furthermore, even when initial care is accessed, continuity of care is not guaranteed. This has resulted in the dilution of the concept of the integral nature of health where curative services are a continuum of preventive and promotive healthcare. The Indian government’s policy governing the National Health Programs (NHP) is that services being provided under them are free for all. Theoretically, therefore, regardless of income, all citizens are eligible to avail themselves of services free of charge, including treatment for...
vector-borne diseases, tuberculosis, leprosy, cataract blindness, and HIV/AIDS, among others. However, the suboptimal functioning of the delivery system due to gross underfunding has led to huge out-of-pocket expenditures being incurred by individual households in seeking services "guaranteed" to them under the NHP.

There are four obvious flaws in the Indian healthcare system as it exists today: First, by and large, it offers traditional indemnity, under which the insured first pay the amount and then seek reimbursement. Under indemnity, all known diseases or health conditions are excluded; therefore, such policies typically turn away large numbers of care seekers, and those most in need of insurance, that is, the sick, are ineligible for any financial risk protection against the diseases from which they are suffering. Second, the system is fee-for-service-based. This is advantageous for the provider, since he bears no risk for the prices he charges for services rendered by him. Such a system usually entails increased costs. Third, the system is based on risk-rated premiums. This again puts the risk on the insured. Under such a system, women in the reproductive age group, the old, the poor, and the ill pay higher amounts and are thus, victims of discrimination. Last but not least, the system is voluntary, making it difficult to form viable risk pools for keeping premiums low.

An important public health function that governments are expected to perform is expanding access to preventive and promotive education. This does not mean simply disseminating disease-specific messages to raise awareness among people for behavior change, but includes a range of other aspects, such as laws for the use of helmets to prevent road accident injuries or providing nutritional information to consumers regarding food products or raising awareness of risky behaviors and exhorting people to adopt healthy lifestyles. In India, the interventionist role of the state in this case is negligible, although some information, education, and communication activities are carried out under the NHP. This is a serious omission given the huge treatment costs that will be required to cope with the increases in noncommunicable diseases. Moreover, as most people are unaware of the free services under the National Health Programs, a large number of them continue to go to the private sector for treatment.

In developing countries like India, healthcare has been a neglected issue in the overall policy framework. With low public budgets, providing universal social security to the population is difficult. At the same time, households spend a significant portion of their income on food, leaving little for healthcare. Further, it is also clear that there is an urgent need to restructure the budgeting system to make it more functional – amenable to review of resource use in order to take corrective measures in time, and flexible enough to have the capacity to respond to local needs. Unless such restructuring takes place, the challenge of meeting healthcare needs in India will continue to be difficult.

Providing healthcare to all Indian citizens at their doorsteps has been a "mantra" in India for the last 60 years, but the words have yet to be translated into actions. Unfortunately, health education seems to be lacking at both the supply and demand side. This has resulted in high morbidity and mortality. The service delivery mechanism is always on war footing, fighting health problems due to this lack of preventive vision, which makes the system more costly. Therefore, there is a strong need for capacity building in improving community health with preventive perspectives, which would yield better health all around.

The opinions expressed in this article do not necessarily reflect those of Siemens Healthcare.

In developing countries like India, healthcare has been a neglected issue.”

N. Ravichandran, PhD, ASIA Fellow, Health Unit Ateneo School of Business, Ateneo De Manila University, Philippines

Dr. N. Ravichandran has been working as a teacher and researcher in the areas of health management and health policy research for the past 15 years. He is currently an ASIA Fellow at the Ateneo School of Business, Ateneo De Manila University, Philippines, with a focus on health equity and health poverty management. Prior to this assignment, he was Head/Faculty in Charge with the International Institute of Health Management Research, New Delhi and Associate Professor at the Indian Institute of Health Management Research in Jaipur. He earned his master’s degree and PhD from the International Institute of Population Sciences and the Tata Institute of Social Sciences, both in Mumbai. He is the author of several books on health management and its related subjects.
Further Reading

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Standardized Results While Meeting Individual Needs

West Virginia University Hospitals (WVUH), a group made up of five institutions located in various regions across West Virginia, USA, meticulously evaluated the hospitals’ need for new coagulation instrumentation. The goal of standardizing test results across the health system while meeting the individual needs of each facility pushed this evaluation forward. Based on the diverse sizes of the five facilities, annual laboratory test volumes can be as high as 1.5 million tests per year and as low as 200,000 annual laboratory tests. Because WVUH institutions serve as reference laboratories for most of West Virginia and patients are referred to WVUH for trauma, transplant, oncologic care, neurosurgery, high-risk obstetrics, and numerous other specialties, demand is high. WVUH are also committed to maintaining the highest level of hemostasis expertise and cutting-edge technology in order to deliver high-quality care.

When the decision was presented as to which coagulation instrumentation WVUH should implement, the hospital system chose equipment that would enable it to maintain its high level of hemostasis expertise. As part of that decision, each hospital’s needs were addressed, and they agreed that the equipment needed to be reliable and that vendor service was to be efficient. The hospitals opted for two BCS® XP Coagulation Analyzers from Siemens, based on the reliability of the equipment, the history of prompt attention to needs, and the continued dedication to improvements. WVUH was impressed by the new computer options on the BCS XP System, offering advantages for managing users of the system, tracing, data, and improving security regarding system backups.

The health system reports a smooth implementation and overall satisfaction. Patricia Miller-Canfield, MD, WVUH pathologist, notes, “Choosing hemostasis equipment from Siemens was a wise choice for our system. We have formed a relationship and a partnership that includes high-quality instruments and reagents, rapid and reliable service, and skilled customer support.” A full case study about the implementation can be accessed with the link below.

www.siemens.com/coagulation-casestudy
Further Reading

The primary reason for increasing the magnetic field strength in magnetic resonance imaging (MRI) is to take advantage of the linear relationship between field strength and signal-to-noise ratio (SNR). When increasing the signal that is obtained in MRI, there is improvement in either spatial or temporal resolution – or in both. In pediatric imaging, there are a number of unique challenges that can be overcome with the assistance of improved spatial and/or temporal resolution.

The challenges of high-field MRI remain relevant in the pediatric setting. They involve the altered T1 contrast, artefacts, and safety issues, including specific absorption rate (SAR). These challenges also create opportunities with improvement in MR angiography, arterial spin labeling (for example, with syngo® ASL), functional MRI, susceptibility-weighted imaging (for example, with syngo SWI), and MR spectroscopy, all of which have distinctive applications in pediatrics. The four main challenges in imaging children are: (1) anatomical challenges, (2) developmental issues, (3) physiological challenges, and (4) behavioral challenges.

In their review, Michael Ditchfield, MD, and his coworkers from The Royal Children’s Hospital in Parkville, Australia, address basic considerations for pediatric 3 Tesla (3T) MR imaging, list the frequent and potential future applications, and discuss the challenges and restrictions in an article published in the Siemens MR magazine MAGNETOM Flash.

3T MRI in Pediatrics: Challenges and Clinical Applications

With worldwide sales exceeding 6,700 units, the SOMATOM® Emotion computed tomography (CT) system remains the most popular CT system around the globe. From the United States over to Europe and to Japan, Siemens’ customers on various continents have shared their success stories. A combination of excellent image quality, leading-edge clinical applications, efficient CT workflow, and a continuing focus on increasing system uptime have helped contribute to SOMATOM Emotion’s success.

Siemens’ CT magazine, SOMATOM Sessions, recently reported on the system’s success by conducting interviews with clinics and hospitals around the world. The result is a series of testimonials highlighting the diverse applications SOMATOM Emotion offers. Pavel Elias, MD, PhD, from the University Hospital Hradec Králové in the Czech Republic noted, “We examine practically the complete noncardiac spectrum of patients on our SOMATOM Emotion 6 – from patients with diffuse lung disease to those with cerebral ischemia.” CT Section Chief YuKang Chang, MD, from the Chie Mei Medical Center, Luiying, Tainan in Taiwan reports similar success: “The system enables us to scan and process patients’ images very fast. For emergency cases at night, we use only this system.” A total of eight success stories can be found using the link below.

1 Based on the number of systems sold worldwide.

SOMATOM Emotion around the Globe

www.siemens.com/SOMATOM-Emotion-Globe

www.siemens.com/MAGNETOM-Flash-Pediatrics

Anomaly of the bile duct shown with MRI. The MR cholangiopancreatography (MRCP) shows a choledochoele, a rare abnormality of cystic or diverticular dilatation of the terminal intramural portion of the common bile duct.
Healthcare providers are required to continue building their information technology (IT) strategies around solutions that support patient safety initiatives and create an integrated electronic health record (EHR). Highlighting the ongoing challenges this process involves for hospitals, an article in the June 2009 issue of Healthcare Informatics journal focuses on the US market and questions how healthcare IT vendors can respond to their customers’ requirements. Editor David Raths takes a critical look at the Siemens strategy in developing and implementing Soarian®, the IT platform that integrates clinical, financial, diagnostic, and administrative processes to help clinicians improve efficiency in the management and delivery of healthcare services.

Janet Dillione, CEO of the Health Services business unit at Siemens Healthcare, is standing up to the question, giving a personal and self-reflective insight into her role in a both pioneering and drawn-out project. After all, the Siemens vision of integrating medical imaging and laboratory diagnostics has influenced and reshaped the development of Soarian significantly. Dillione expresses her belief in the future of Soarian as a leading healthcare IT platform, but also admits that some acquisition and product development processes have not gone as quickly as she would have liked. For the future, Dillione regards one important missions of Health Services to be “cognizant of the fact that we’re actually building a larger IT platform so that we’ll be able to play in that future world of personalized medicine.”

Dillione believes that the technology transition from the former Siemens product line, INVISION®, to Soarian has positioned Siemens Healthcare ahead of other healthcare information technology providers. Soarian’s main feature is its capability to automate hospital workflows and help with process redesign to overcome miscommunications and delays. However, the next challenge is to convert the large customer base still on the former platform, INVISION, to Soarian, and in the process, to respond to the customers’ potential skepticism toward new technologies in a supporting way.

Raths also asked renowned healthcare IT research analysts and consultants to give their visions of the future in their markets, assess the potential in Soarian, and estimate the attitudes of healthcare CIOs towards implementing and testing new technology. Please use the link below to read the whole article.

www.healthcare-informatics.com/Siemens
## Trade Fairs & Congresses

<table>
<thead>
<tr>
<th>Title</th>
<th>Location</th>
<th>Short Description</th>
<th>Date</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIU</td>
<td>Shanghai, China</td>
<td>30th World Congress of the Société Internationale d’Urologie</td>
<td>Nov. 1 – 5, 2009</td>
<td><a href="http://www.siu-urology.org">www.siu-urology.org</a></td>
</tr>
<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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**Feedback to the editor should be addressed to:**

by mail: Siemens AG, Healthcare Sector, CC C81, Doris Pischitz, Chief Editor Medical Solutions Henkestrasse 127, 91050 Erlangen, Germany

by e-mail: editor.medicalsolutions.healthcare@siemens.com

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Local Contact Information

Asia/Pacific:
Siemens Medical Solutions
Asia Pacific Headquarters
The Siemens Center
60 MacPherson Road
Singapore 348615
Telephone: +65 9622-2026

Canada:
Siemens Canada Limited
Healthcare Sector
2185 Derry Road West
Mississauga ON L5N 7A6
Canada
Telephone: +1 905 819-5800

Europe/Africa/Middle East:
Siemens AG, Healthcare Sector
Henkestr. 127,
91052 Erlangen
Germany
Telephone: +49 9131 84-0

Latin America:
Siemens S.A., Medical Solutions
Avenida de Pte. Julio A. Roca No 516,
Piso 7
C1067ABN Buenos Aires
Argentina
Telephone: +54 11 4340-8400

USA:
Siemens Medical Solutions U.S.A., Inc.
51 Valley Stream Parkway
Malvern, PA 19355-1406
USA
Telephone: +1 888 826-9702