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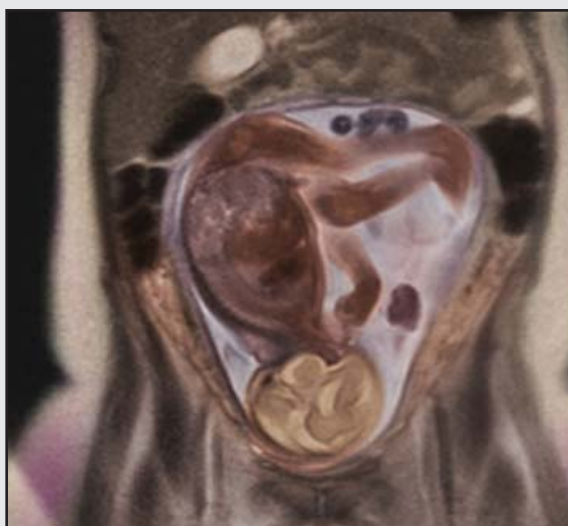
MRI Helps Detect Life-Threatening Pregnancy Complication

A new study claims that magnetic resonance imaging (MRI) is a highly accurate means of identifying potentially life-threatening placenta accreta, the leading cause of death for women just before and after giving birth.

Researchers at the University of California, San Diego (UCSD; USA; www.ucsd.edu) conducted a retrospective study to evaluate the accuracy of MRI in diagnosing placenta accreta in 108 patients who underwent MRI evaluation at UCSD between 1992 and 2009. The women participating in the study were referred for MRI based on a suspicious prenatal ultrasound, clinical examination, or significant risk factors for the condition (including placenta previa, uterine scarring, prior cesarean births, and pregnancies after the age of 35). The researchers were able to compare the MRI images with surgical and/or pathology results in 71 of the 108 cases; when correlated with surgical and pathology findings, MRI was found to have a 90.1% accuracy rate in detecting the presence of accreta. The study was presented at the annual meeting of the Radiological Society of North America (RSNA), held during November-December 2009 in Chicago (IL, USA).

"MRI is a useful and accurate adjunct to ultrasound for diagnosis of placenta accreta," said study presenter and coauthor Michele Browne, M.D. "Women at high risk for placenta accreta, such as those who've had multiple cesarean sections, should undergo ultrasound. And if ultrasound is inconclusive, MRI should be considered."

"Having placenta accreta is not necessarily a bad prognostic indicator for the pregnancy," said lead researcher radiologist Reena Malhotra, M.D.



"It is not knowing about the condition that is potentially life threatening. Accreta needs to be diagnosed ahead of time so that delivery can be planned."

Placenta accreta is a severe obstetric complication involving an abnormally deep attachment of the placenta, through the endometrium and into the myometrium; there are three forms of placenta accreta, distinguishable by the depth of penetration. The placenta usually detaches from the uterine wall relatively easily, but women who encounter placenta accreta during childbirth are at great risk of hemorrhage during its removal. Severe cases, particularly when undiagnosed, may lead to massive hemorrhage requiring blood transfusion, hysterectomy, or death of the mother.

Image: Colored magnetic resonance imaging (MRI) scan of a fetus during the 36th week of pregnancy (Photo courtesy of Simon Fraser / SPL).

MRI Detects Breast Cancer at Earlier Stage

Magnetic resonance imaging (MRI) combined with mammography detects nearly all tumors at an early stage, thereby reducing the incidence of advanced stage breast cancer in high-risk women.

"Earlier stage breast cancers are more likely to be curable," said lead researcher Ellen Warner, M.D., M.Sc., medical oncologist in the department of medicine, division of medical oncology at Sunnybrook Health Sciences Center (Toronto, Canada; www.sunnybrook.ca). "We can be fairly confident that if screening with MRI finds cancers at a much earlier stage, it probably also saves lives," added Dr. Warner, who presented details of these results at the CTRC-AACR San Antonio [TX, USA] Breast Cancer Symposium, held December 9-13, 2009.

The researchers separated 1,275 women at high risk for breast cancer into two groups: One group was screened with MRI scanning plus mammography, and the second, a control group, received conventional screening by mammography. Participants had the defective BRCA1 or BRCA2 gene mutation,

which suggests a very high lifetime risk of developing breast cancer.

Dr. Warner and colleagues tracked the women over several years to determine which screening method detected cancer at a considerably earlier stage. Forty-one cases of breast cancer were diagnosed in the MRI group compared with 76 diagnoses in the control group. There were proportionately fewer advanced breast tumors, and more early cancers among women who screened with MRI compared with those not screened with MRI.

Furthermore, cancer size was smaller in the MRI group. The average size of invasive cancers in the MRI group was 0.9 cm compared to 1.8 cm in the control group. Three percent of cancers in the MRI group were larger than 2 cm in diameter compared with 29% of those in the control group.

"These results will hopefully convince high-risk women and their healthcare providers that breast screening with yearly MRI and mammography is a reasonable alternative to surgical removal of their breasts, which is commonly done to prevent breast cancer," Dr. Warner said.

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CT Imaging of Egyptian Mummies Reveal Heart Disease as Ancient Disorder

A new imaging study revealed that atherosclerosis, hardening of the arteries, was common in ancient Egyptians, contradicting a hypothesis that vascular disease is a modern affliction caused by modern-day risk factors such as sedentary lifestyles and stress.

Michael Miyamoto, M.D., a graduate of the University of California (UC) San Diego School of Medicine (USA; <http://medicine.ucsd.edu>) and assistant clinical professor, recently returned to the United States following an expedition to Egypt to evaluate the prevalence of cardiovascular disease in 3,500-year-old mummies. Results of his study were presented during the American Heart Association 2009 Scientific Sessions held in Orlando, FL, USA, in November 2009 and published simultaneously November 17, 2009, in the *Journal of the American Medical Association (JAMA)*.

"Our findings show that atherosclerosis is not strictly a disease of modern humans caused by unhealthy lifestyles," said Dr. Miyamoto, a cardiologist and coinvestigator of the study. "In fact, it is possible that humans have a genetic predisposition to the development of atherosclerosis. Our findings remind us of the value of preventive medicine in eliminating or controlling manifestations of heart and vascular disease."

In 2009, Dr. Miyamoto and a team of cardiologists and Egyptologists carefully examined 22 mummies from the Museum of Egyptian Antiquities using a six-slice computed tomography (CT) scanner. In the mummies with identifiable arteries, more than half had calcifications in the walls of their arteries. Those who died after the age of 45 showed the highest degree of calcification. Vascular disease was observed in both male and female mummies. "As the mummy CT images appeared on the monitor, we were struck by the fact that our project was made possible by combining the advanced technologies of two different eras – the science of mummification in ancient Egypt and modern imaging," said Dr. Miyamoto. "In a real sense, this was a scientific collaboration that spanned great time and distance."

The oldest mummified Egyptian exhibiting the greatest degree of atherosclerosis was Lady Rai. The nursemaid to Queen Ahmose Nefertiti, Lady Rai lived to an age between 30 and 40 years old circa 1530 B.C. To put this in perspective, Lady Rai lived about 300 years before the time of Moses and 200 years before King Tutankhamun.

Amazed by their findings, the cardiologists asked the Egyptian preservation

team to share data about the lifestyle of ancient Egypt. In general, all who were later mummified served in the court of the Pharaoh or as priests or priestesses. With respect to diet, eating duck, beef, and other poultry was not uncommon. Since refrigeration was unavailable, salt was widely used for meat preservation. Tobacco was not available and without mechanical transportation, they were likely physically active.

This study was funded by Siemens Healthcare (Erlangen, Germany; www.medical.siemens.com) and the Bank of Egypt.



Image: The mummy of Esankh, male (1070-712 BCE), undergoes CT scanning (Photo courtesy of Dr. Michael Miyamoto / UC San Diego).



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FDA Addressing Concerns of Excess Radiation Exposure During CT Perfusion Imaging

As part of an ongoing investigation into cases of excess radiation during computerized tomography (CT) perfusion imaging of the brain, the U.S. Food and Drug Administration (FDA; Silver Spring, MD, USA; www.fda.gov) has provided imaging facilities and practitioners with interim recommendations to help prevent additional problems.

The FDA issued an initial safety notification in October 2009 after learning of 206 patients who had been exposed to excess radiation at Cedars-Sinai Medical Center (Los Angeles, CA, USA; www.csmc.edu) over an 18-month period. Since then, the FDA, working with state and local health authorities, has identified at least 50 additional patients who were exposed to excess radiation of up to eight times the expected level during their CT perfusion scans; these cases so far involve more than one manufacturer of CT scanners. Based on its investigation to date, the FDA is providing interim recommendations for imaging facilities, radiologists, and radiologic technologists to help prevent additional cases of excess exposure.

These recommendations include the guidance for facilities to assess whether patients who underwent CT perfusion scans received excess radiation; that facilities should review their radiation dosing protocols for all CT perfusion studies to ensure that the correct dosing is planned for each study; and that facilities should implement quality control procedures to ensure that dosing protocols are followed every time and that the planned amount of radiation is administered.

Additionally, radiologic technologists should check the CT scanner display panel before performing a study to make sure the amount of radiation to be delivered is at the appropriate level for the individual patient. If more than one study is performed on a patient during one imaging session, practitioners should adjust the dose of radiation so it is appropriate for each study. The FDA is also advising manufacturers to review their training for users, reassess information provided to health care facilities, and put into place surveillance systems to identify problems when they arise.

"The FDA is making progress in the investigation of this problem," said Jeffrey Shuren, M.D., acting director of the FDA's Center for Devices and Radiological Health. "While we do not know yet the full scope of the concern, facilities should take reasonable steps to double-check their approach to CT perfusion studies and take special care with these imaging tests."

A perfusion CT study involves sequential acquisition of CT sections during intravenous (IV) administration of an iodinated contrast agent. Analysis of the results allows the physician to calculate the regional cerebral blood volume, the blood mean transit time through the cerebral capillaries, and the regional cerebral blood flow. CT perfusion imaging may provide information about the presence and site of vascular occlusion, the presence and extent of ischemia, and tissue viability. Potential advantages of CT perfusion imaging are that it can be performed using standard CT scanners, which are more widely available and less expensive than magnetic resonance imaging (MRI), and it is less invasive than CT angiography.

High-Definition CT Technology Installed at Russian Medical Rehab Center

A rehabilitation center is the first hospital in Russia to join leading hospitals around the globe in installing a powerful, high-definition computed tomography (CT) scanner. The scanner provides excellent CT clarity, allowing clinicians to diagnose quickly, and confidently using significantly less X-ray radiation than previous CT technology.

GE Healthcare (Chalfont St. Giles, UK; www.gehealthcare.com), a unit of General Electric Co. (Fairfield, CT, USA), announced the installation of Russia's first high-definition computed tomography (CT) scanner, GE Healthcare's flagship Discovery CT750HD, at the Center of Medical Rehabilitation by the Russian Ministry of Health in Moscow led by Prof. Konstantin V. Lyadov.

The Center of Medical Rehabilitation is the first hospital in Russia to join leading hospitals around the globe in installing this powerful groundbreaking high-definition CT technology. The scanner sets a new standard for CT clarity, allowing clinicians to diagnose quickly, and confidently using significantly less X-ray radiation than previous CT scanners.

"We are delighted to have the first Discovery CT750 HD in Russia as part of Center of Medical Rehabilitation's investment in cutting edge technology. This exciting development of high definition CT improves our ability to see fine anatomical detail in what can be difficult to image diseases," said Prof. Valentin E. Sinitsyn, Moscow Medical Academy & head of the Diagnostic Centre in Federal Medical & Rehabilitation Centre.

Vyacheslav Grischenko, general manager Russia and CIS, GE Healthcare said, "With this outstanding technology, high-definition image quality can be achieved without increasing the X-ray dose to which patients are exposed. For some cardiac patients, for example, this can mean a valuable alternative to the traditional invasive angiogram. It is less invasive and less expensive."

The new scanner uses a breakthrough garnet gemstone CT detector, the first new CT detector technology in 20 years. The gemstone detector can improve image clarity by up to 33% for routine body imaging and up to 47% for cardiac imaging, and helps improve doctors' ability to see the difference between various types of tissue.

In addition to providing better image clarity, the new scanner is designed to reduce the amount of X-ray dose for patients by up to 50% for full-body scans, and up to 83% for heart scans.

The Discovery CT750 HD improves image quality while reducing dose up to 50% across the entire body, maintaining GE Healthcare's position as a leader in low dose technology. Superior image quality at the lowest possible dose is a key priority for GE Healthcare. GE Healthcare follows the ALARA (As Low As Reasonably Achievable) principle for dose man-

agement and offers a variety of dose reduction and optimization features on its CT scanners. GE has now begun shipping Discovery CT750 HD scanners to customers around the world.

Healthymagination is GE's global business strategy announced in May 2009. It aims to help healthcare providers deliver better healthcare to more people at lower cost. GE committed US\$3 billion worldwide, for 100 innovations that lower cost, increase access and improve quality, as well as to \$2 billion to finance information technology (IT) and access rural & underserved areas, and to \$1 billion for partnerships, content, and services.

Image: The Discovery CT 750 HD scanner (Photo courtesy of GE Healthcare).



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New MRI Technology Provides a Third More Productivity

The combination of two different magnetic resonance imaging (MRI) technologies provide patient-centered care and significantly improves productivity across the entire MRI workflow.

Siemens Healthcare (Erlangen, Germany; www.medical.siemens.com) Tim (Total imaging matrix) technology and with its new Dot (Day optimizing throughput) engine were recently introduced in the new Magnetom Aera 1.5 Tesla and the new Magnetom Skyra 3T scanners at the 95th Scientific Assembly and annual meeting of the Radiological Society of North America (RSNA), which took place from November 29 to December 3, 2009, in Chicago, IL, USA. These two new scanners are the first to incorporate both Tim and Dot technology. Siemens will also demonstrate additional innovations, such as the Tim Dockable Table, for easy patient preparation outside the scanner room, and an all new coil architecture incorporating DirectConnect coil design, providing cableless coils for fast and easy set up and higher signal-to-noise ratio (SNR).

The Siemens-unique Tim technology was launched in 2003. Since then, more than 4,000 Tim systems have been sold. Tim 4G is the latest version of Tim and the most advanced generation of coil technology. After conventional and array technology, Siemens pioneered Integrated Panoramic Array technology in 1997 and the Tim technology in 2003. Tim 4G is now the 4th generation, offering ultra-high-density coils, DirectRF and other features for improved flexibility, accuracy, and speed. Tim 4G technology provides newly designed ultra-high density coils with an array of up to 204 coil elements that utilize up to 128 channels. As a result, the user will have enough channels to support imaging with ultra-high-density coils, excellent image quality with high signal-to-noise (SNR) is routine and high processing speed improves productivity even further. Additionally, without coil or patient repositioning the Tim coils allow covering the complete anatomy of the patient from whole body coverage (up to 205 cm) to smallest details.

Today's healthcare environment is increasingly faced with less staff, less reimbursement, and less time. With this radiofrequency (RF) solution, Siemens was able to focus on productivity across the entire MRI workflow and thus developed the Day optimizing throughput (Dot) engine. Dot multiplies the power of its Tim technology, resulting in greater image consistency, improved diagnostic confidence, greater ease of use, and increased productivity.

Tim has new patient-adaptive technology, enhancing image quality and acquisition speed, as well as raising productivity in everyday practice and provides a completely redesigned RF system and an all-new innovative coil architecture that packs more coil elements into a smaller space (up to 204 coil elements with 48 channels as standard configuration), unlocking the possibility of higher element configurations and higher SNR. The result is high-resolution imaging that holds up even when zooming in on multistation images.

With up to 128 channels, Tim provides enough channels to utilize ultra-high density coils.

Tim enables increased resolution and a total field of view (FoV) of up to 205 cm with no coil or patient repositioning. With Tim, the most flexible parallel imaging is offered enabling simultaneous parallel acquisition in two directions for fast, high-resolution three-dimensional (3D) data in a breath hold and this is supported by inline multiplanar reconstruction (MPR) capabilities.

The DirectConnect coil design provides cable-less coils for fast and easy setup and higher SNR. For flexible coils, one-hand operation with SlideConnect makes patient set-up even easier. For superb coverage of the patient's anatomy, the Tim coils allow the user to select exams, not coils. Tim's coils can be integrated to support large anatomic coverage, for instance, combining head, neck, body, and spine coil elements to create a neurovascular array. Furthermore, the new coils are exceptionally lightweight (18-channel body coil of approximately 1 kg) and easy on the patient.

The new Tim Dockable Table comes with an integrated, removable spine 32-channel coil. It is completely Tim-compatible, with integrated DirectConnect and SlideConnect coil ports. Critically ill, physically challenged, bariatric patients and other immobile types of patients can be prepared outside the scanner room and wheeled in for the exam. The table holds up to 250 kg, even when mobile. For patient safety, handrails are integrated into the Tim Dockable table. It is easily docked to the magnet and allows faster exam set-up and higher patient throughput.

DirectRF, Tim's new all digital-in/digital-out design, integrates all RF transmit and receive components at the magnet, eliminating analog cables for true signal purity. This compact and efficient design enables an immediate feedback loop for real-time sequence adaptation.

TimTX TrueForm enables optimized RF transmission for excellent B1 homogeneity and scalability to higher numbers of transmit channels to empower new applications. Dot makes it easy to get the best possible results for virtually any type of patient, providing uniquely customized, optimized scans configurable to patient condition or clinical question. Dot proposes optimized exam strategies, requiring only confirmation prior to scanning. Dot adapts to each patient's breath-hold capacity and then links to the user's best scanning protocol to match. Personalized, high-quality exams can be easily reproduced, even when conditions change. Dot can also be customized easily to reflect the standards of care of each individual institution.

With intelligent automated workflows customized to your standards, scans are completed faster and more easily, with less chance of errors or repeats. Dot links proper protocols and proce-



dures, so that the optimal FoV is instantly estimated. Furthermore, automated positioning and alignment of slices can provide fast and robust image quality across all patients. Dot also integrates AutoVoice Commands into the scan process, ensuring the synchronized timing of breathing and scanning, while lowering variability and stress for the MRI technologist.

Dot offers optimized engines for brain, cardiac, abdomen, knee, angiographic, and oncology exams. Both systems provide 70-cm open-bore design together with the innovations: Tim and Dot, thereby providing ease of use, and is designed to bring extra value across the entire imaging process. Tim supplies the power needed for excellent image quality, while Dot takes away the complexity inherent in MR scanning.

The 70-cm open-bore design of Magnetom Aera and Skyra can accommodate a large variety of patient sizes, shapes, and conditions. The friendly and open appearance helps to reduce sedation rates, minimizes stress for claustrophobic patients, and leads to higher throughput and more referrals. Moreover, the super-short magnets allow many studies to be completed with the patient's head outside the bore while still supporting a full 50-cm FoV (45 cm in z-direction).

The 3T Magnetom Skyra is also optimized with Siemens TimTX TrueForm design for excellent B1 homogeneity. Clear, sharp images can be viewed with 50% more imaging volume and TimTX TrueForm provides the foundation for multichannel transmit array capabilities at 3T.

With syngo.via imaging software, productivity in MR reading is increased by up to 50%. syngo.via sorts the images automatically, prepares the case, and every step is guided the way the user wants it. syngo.via uniquely integrates imaging modalities and information technology (IT), making it possible to access and share information anywhere. Protocol planning can now be done remotely and all the information needed is transferred to the scanner automatically. Tim and Dot together with syngo.via should dramatically increase productivity in MR by transforming the whole workflow from planning, scanning, to reading and result sharing.

Image: The Magnetom Aera 1.5 Tesla MRI scanner with Tim and Dot technology (Photo courtesy of Siemens Healthcare).

Remote Imager Designed to Provide Disease Data

A remotely operated X-ray system that has the potential to provide diagnoses of infectious respiratory diseases for millions in developing countries may also provide data for the discoverers and developers of drugs to cure such diseases.

The device is called Remi-d, and it is the product of efforts by the not-for-profit World Health Imaging, Telemedicine and Informatics Alliance (WHITIA; Chicago, IL, USA; www.worldhealthimaging.org); Merge Healthcare (Milwaukee, WI, USA; www.merge.com), a radiology workflow solutions provider; and manufacturer Sedecal (Madrid, Spain; www.sedecal.com).

The aim is to deploy Remi-d worldwide, according to Ivy Walker, CEO at WHITIA, paving the way for health screenings for those who may otherwise have no timely diagnosis. The system is still being customized, but was demonstrated at the 2009 Radiological Society of North America (RSNA)

annual meeting, held in Chicago, IL, USA, in November-December 2009. Field-testing will follow, and the system will then be submitted for regulatory approval.

The data collected by Remi-d, frequently from areas where radiologists and technologists are few, may also help provide early warnings of disease outbreak. "Beyond just the remote imaging in developing countries, we'll see conditions and variations not seen in the developed world," said Ms. Walker. "Especially with tuberculosis – there are more drug-resistant strains emerging. We see where it's popping up."

Although at this early stage of development no programs yet exist for making Remi-d data available for drug discovery, they are also on the WHITIA agenda, according to Ms. Walker. "We're working on a protocol to collect information. There's currently little consistency across diagnoses of tubercu-



losis; little sharing of data. Hope to share with public health authorities and the World Health Organization [Geneva, Switzerland]. We would provide the platform technology to do that."

Image: The Remi-d device booth (Photo courtesy of the World Health Imaging, Telemedicine, and Informatics Alliance - WHITIA).

Radiography System Offers Fast Previews and Cycle Times

A direct radiography system provides real-time previews, fast cycle times, a unified look and feel for computed radiography (CR) and digital radiography (DR) exams, and streamlined workflow procedures through its NX workstation and MUSICA2 image processing.

Agfa HealthCare (Mortsel, Belgium; www.agfa.com/healthcare), a leading provider of diagnostic imaging and healthcare information technology (IT) solutions, announced the availability of its DX-D 500 n direct radiography system in North America. In combination with Agfa HealthCare's CR systems, the DX-D 500 n addresses the needs of the full spectrum of general radiology exams.

"Agfa HealthCare's DX-D solutions deliver fast cycle times, which can result in accelerated productivity, improved patient comfort, and efficiency in radiography departments. Providers and patients benefit from consistent image quality, the potential for dose reduction, and streamlined workflow," said Dirk Debusscher, vice president imaging. "Because Agfa HealthCare is the only company to offer needle quality in both its DR and CR detectors, choosing Agfa HealthCare's DX-D and CR systems can assure providers of high imaging quality, as well as enhanced productivity."

In sites including Dortmund, Germany and Le Mans, France, the DX-D 500 blends Agfa HealthCare's award-winning NX MUSICA2 image processing with needle technology flat panel detectors designed to deliver excellent image quality and productiv-

ity. MUSICA2 image processing, which comes with a four-year track record of industry leadership in image enhancement and fine detail visualization, analyzes image data before applying contrast and density to image details, allowing the DX-D 500 to deliver near-instant previews on the NX acquisition workstation.

Designed for hospital departments and imaging centers that manage up to 125 exams daily, the system offers patient comfort along with diagnostic confidence. Patients appreciate shorter exam times, while radiologists can rely on receiving the quality images they need for rapid diagnosis. The DX-D 500 n allows for fast and efficient upright imaging through a high-quality wall stand, while panels fixed in the table deliver added versatility. The system's cassette-less workflow allows radiographers to preview images, complete studies in a limited number of steps and quickly return to patients. Needle-based panels offer high image quality and the potential for lower dose, which can translate into higher diagnostic confidence, flexibility, and speed.

"Agfa HealthCare's DX-D DR systems and CR systems offer providers complete imaging solutions to meet their digital image capture requirements. The result is sharp, consistent images, workflow efficiency, integration, and ease of use," said Michael Green, president and CEO, Agfa HealthCare-North America. "No matter where providers are in their digital migration, Agfa HealthCare has the solutions to complement

their workflow and operations models. They can easily build on their NX experience with the DX-D 500 n or begin a new family of Agfa HealthCare DR and CR solutions."

DX-D 500 is not available in North America; instead, the DX-D 500 n is available for sale in

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Agfa HealthCare, a member of the Agfa-Gevaert Group, is a leading provider of IT-enabled clinical workflow and diagnostic image management solutions, and systems for capturing and processing images in hospitals and healthcare facilities.

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Ultrasound Found to Predict Tumor Burden, Survival in Melanoma Patients

Researchers have shown for the first time that patterns of ultrasound signals can be utilized to identify whether or not cancer has started to metastasized in melanoma patients, and to what extent. The discovery enables clinicians to decide on how much surgery, if any, is required and to predict the patient's probable survival. Dr. Christiane Voit, from Charité-Universitätsmedizin Berlin, the Medical University of Berlin (Germany; www.charite.de), told Europe's largest cancer congress, ECCO 15 – ESMO 34, in Berlin, Germany, on September 23, 2009, "We have identified two ultrasound patterns of lymph node metastasis in melanoma patients which can identify correctly any amount of tumor cells in the sentinel lymph nodes in 75-90% of cases before proceeding to surgery on the sentinel lymph nodes."

Dr. Voit, who is a dermatologist and head of the diagnostic unit at the Skin Cancer Center at Charité-Universitätsmedizin Berlin, reported that although her research needs to be confirmed in multicenter, randomized clinical trials, it had the potential to spare patients unnecessary surgery, particularly if it was combined with ultrasound-guided fine needle biopsy of lymph nodes rather than conventional surgery.

Since 2001, Dr. Voit and her colleagues in Germany and The Netherlands have included 850 melanoma patients in a prospective study to investigate the use of ultrasound in diagnosis and treatment planning. They have already demonstrated that ultrasound-guided fine needle biopsy of sentinel nodes before conventional sentinel node surgery can identify up to 65% of patients in whom the cancer has started to spread. This study showed how far ultrasound patterns correlate

with disease progression, tumor burden, survival, and prognosis in the first 400 of these patients with stage I/II melanoma and with the longest follow-up.

Before having sentinel node surgery, the patients were investigated using ultrasound, and these results were checked against the results of the subsequent surgery. The researchers found that two ultrasound patterns together could accurately identify the amount of cancer cells in the lymph nodes in 80% of cases.

A balloon-shape ultrasound pattern with or without loss of central echoes (where the lymph node has lost central echoes or still has some residual central echoes, but these are traveling toward the rim, giving an asymmetrical shape to the center) was an indicator in up to 83% of cases of a large amount of cancer cells in the sentinel node. "This ultrasound pattern was a late sign, only occurring in cases of advanced metastasis," said Dr. Voit.

A pattern of peripheral perfusion (where small blood vessels start to surround the lymph node) was an early sign of a small number of cancer cells present. "The early signs are signs of first disruption of the normal lymph node architecture by an early stage metastasis. The most important one is peripheral perfusion, which shows angiogenesis [the formation of new blood vessels] is occurring," she explained.

The researchers found that these two ultrasound patterns could predict overall survival. Estimates for overall survival after five years for patients with stage I/II is between 50% - 90% depending on the state of the tumor. Dr. Voit discovered that 93% of patients with neither of these ultrasound patterns, 87% of patients with periph-

eral perfusion, and 56% of patients with balloon shapes with or without loss of central echoes, survived for at least five years; survival without cancer spreading to other parts of the body was 74%, 60%, and 26%, respectively.

Dr. Voit said, "for the first time we have established that ultrasound patterns can be used as criteria for diagnosing disease progression and tumor burden. Balloon-shaped lymph nodes with or without loss of central echoes and peripheral perfusion are independent prognostic factors for survival."

Discovering if cancer has spread to the lymph nodes is the most important factor influencing the prognosis and treatment of melanoma patients. Physicians typically excise one or two key lymph nodes, called sentinel nodes, and use these as an indicator of whether or not the cancer has spread to the other lymph nodes. If the sentinel node is free of cancer, patients do not need to have more extensive lymph node removal.

However, only 20% of patients who have a sentinel node biopsy have cancer that has metastasized there, and therefore the procedure, which can be accompanied by side effects such as chronic swelling and seroma, is unnecessary for 80% of patients. Using ultrasound first to detect the presence or not of sentinel node metastases could be a noninvasive way of limiting the numbers of patients who require subsequent surgery or simply watchful follow-up care, according to the investigators.

ECCO 15 – ESMO 34 is the 15th congress of the European Cancer Organization and the 34th Congress of the European Society for Medical Oncology.

Stereotactic Treatment of Tumors Potentially Exposes Patients to Less Radiation

Researchers reported that image-guided technology has clinical advantages over earlier fixed-beam approaches to stereotactic radiosurgery (SRS) or stereotactic radiotherapy (SRT) for treating cancer.

The researchers conducting the study were from the University of California, Irvine (UCI) Medical Center (USA; www.healthcare.uci.edu) and utilized image-guided RapidArc radiotherapy from Varian Medical Systems (Palo Alto, CA, USA; www.varian.com). RapidArc, Varian's technology for delivering volumetric modulated arc therapy (VMAT), enables clinicians to deliver a highly precise image-guided intensity-modulated treatment quickly, often with just one revolution of the treatment machine around the patient.

"We found that we can deliver RapidArc treatments much more quickly, with an average of 76% less 'beam on' time, and also using 31% fewer monitor units, which could limit unintended and undesired radiation exposure to patients," said Daniel C. Schiffner, M.D., chief resident in the UCI department of radiation oncology, in November 2009 at the annual meeting of the American Society for Radiation Oncology (ASTRO) in Chicago, IL, USA. "The reduction in monitor units

is important because it limits the degree to which patients are exposed to radiation leakage from the treatment machine. In addition, less 'beam on' time improves our clinical workflow, improves patient comfort during treatment, and limits the potential for patient and organ motion during the treatment session, which can allow more accurate dose targeting."

In addition to being faster and requiring fewer monitor units, RapidArc treatments were found to conform to the shape and size of a targeted tumor at least as well as dynamic, fixed-beam approaches to intensity-modulated radiotherapy (IMRT), SRS, and SRT. "Treatment with RapidArc VMAT using a single arc produced similar dose conformity and homogeneity compared with earlier, more time-consuming approaches," said Dr. Schiffner.

Since 2008, clinicians at UC Irvine have been using Varian's Trilogy medical linear accelerator to treat tumors with either SRS or SRT, using a dynamic form of IMRT delivered from multiple beam angles. The department acquired RapidArc technology in early 2009, "permitting us to treat complex targets with a single arc," Dr. Schiffner said. "The technology makes it possible to dynamically shape

the beam, and at the same time vary the dose delivery rate and the speed of rotation around the patient. By varying those elements, RapidArc achieves the significant time savings."

Dr. Schiffner and a team of colleagues reported on a study that compared the two treatment approaches for eight patients with 13 lesions. "All of the RapidArc plans were delivered in a single arc, while IMRT plans required 7-14 fields for delivery," said Dr. Schiffner. "The clinically important advantages we saw lead us to recommend the use of image-guided RapidArc to optimize the delivery of SRS and SBRT for intracranial and extracranial targets."

Varian Medical Systems is a world-leading manufacturer of medical devices and software for treating cancer and other medical conditions with radiotherapy, radiosurgery, proton therapy, and brachytherapy. The company supplies informatics software for managing cancer clinics, radiotherapy centers, and medical oncology practices. Varian is a key supplier of tubes and digital detectors for X-ray imaging in medical, scientific, and industrial applications and also supplies X-ray imaging products for cargo screening and industrial inspection.

Digital Radiography Technology Improves Patient Care and Departmental Workflow

A new mixed detector digital radiography (DR) system's patient-focused design enables healthcare facilities to automate X-ray examinations, improving patient care and enhancing departmental workflow.

Toshiba Medical Systems (Tokyo, Japan; www.toshiba-medical.co.jp) an industry leader in X-ray technology, reached a significant milestone in installing its 100th Radrex-i X-ray system worldwide at Aurora Health Care's (Milwaukee, WI, USA; www.aurorahealthcare.org) newly opened Aurora Wilkinson Clinic (Oconomowoc, WI, USA). Toshiba presented the Radrex-i mixed detector DR system at the 2009's Radiological Society of North America (RSNA) annual meeting, held in Chicago, IL, USA, November 29-December 4, 2009.

In total, Aurora Health Care has purchased four Toshiba Radrex-i DR systems. Three of the Radrex-i systems are used at its newly opened Aurora Wilkinson Clinic located on the Aurora Summit Medical Center campus in Oconomowoc, WI, USA. One system is used for general radiology, and another is used for chest imaging. The third system, which includes autostitching capabilities, is used for orthopedic work, including long-leg and scoliosis studies. The fourth Radrex-i system will be installed in the new hospital emergency department (ED) being built at Aurora Summit Medical Center, near the clinic. This hospital is scheduled to open in Spring 2010.

"We purchased the Radrex-i to help reduce radiation exposure, while also improving patient throughput and workflow at our high-volume Aurora Wilkinson Clinic," explained Jay Lundberg, manager of capital equipment technology, Aurora Health Care. "The orthopedic department at the clinic is very busy, and the Radrex-i is already helping to image patients safely and quickly with outstanding image quality."

The Radrex-i mixed detector system utilizes two high-resolution detectors, a 43-cm x 43-cm fixed detector located in the tilting wall stand and a 35.5-cm x 43-cm removable detector in the table, to provide dual detector performance with portable detector flexibility. The mixed detector system is engineered to dramatically increase room utilization and overall operational efficiency, with the portable system completing the work of two rooms in only one. The flexibility of the mixed detector solution also provides leading healthcare providers, such as Aurora Health Care, with the suitable configuration for any challenge a radiology department may face.

The comprehensive Radrex-i features a table with 272 kg weight limit, a 600 kHU X-ray tube, and an 80 kW generator, allowing hospitals to image a variety of patients, including bariatric patients. The X-ray system enhances workflow with the RexView, a color liquid crystal display (LCD) screen located on the overhead tube crane (OTC), allowing technologists immediate access to review the image and determine if they have what is needed for diagnosis.

The system's automated features also save time

by automating the technologists' selection of the right exam and quick positioning of the X-ray system. These features include: (1) autotracking to eliminate the need to manually position the X-ray tube detector by providing synchronization for table and wall-stand tracking; (2) autocollimation to save crucial time for the patient and technologist by automatically selecting the correct collimation size for the patient's body part; (3) autoprogram to eliminate the need for the technologist to manually select the program on the generator by automatically selecting the correct program; (4) lastly, an auto-center-stop to provide visual guidance for fast, simple detector centering.

"The 100th installation of the Radrex-i worldwide is a testament to the patient-focused design and the system's ability to improve patient out-



comes and enhance technologist efficiency," said Robert Micer, director, X-ray vascular business unit, Toshiba.

Image: The Radrex-i X-ray system (Photo courtesy of Toshiba Medical Systems).

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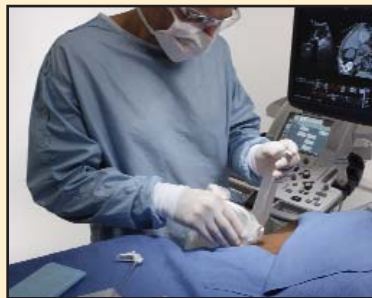
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Tracking Cancer-Killing Particles with MRI

Researchers have created a single nanoparticle that can be tracked in real time with magnetic resonance imaging (MRI) as it zeroes in on cancer cells, tags them with a fluorescent dye, and destroys them with heat. The all-in-one particle is one of the first examples from an emerging field called "theranostics," which develops technologies physicians can use to diagnose and treat diseases in a single procedure.

The research, performed by investigators from Rice University (Houston, TX, USA; www.rice.edu) and Baylor College of Medicine (BCM; Houston, TX, USA; www.bcm.edu), was published online in December 2009 in the journal *Advanced Functional Materials*. Tests up to now involve laboratory cell cultures, but the researchers reported that MRI tracking will be especially beneficial as they move toward tests in animals and people. "Some of the most essential questions in nanomedicine today are about biodistribution – where particles go inside the body and how they get there," said study coauthor Dr. Naomi Halas. "Noninvasive tests for biodistribution will be enormously useful on the path to FDA [U.S. Food and Drug Administration] approval, and this technique – adding MRI functionality to the particle you're testing and using for therapy – is a very promising way of doing this."

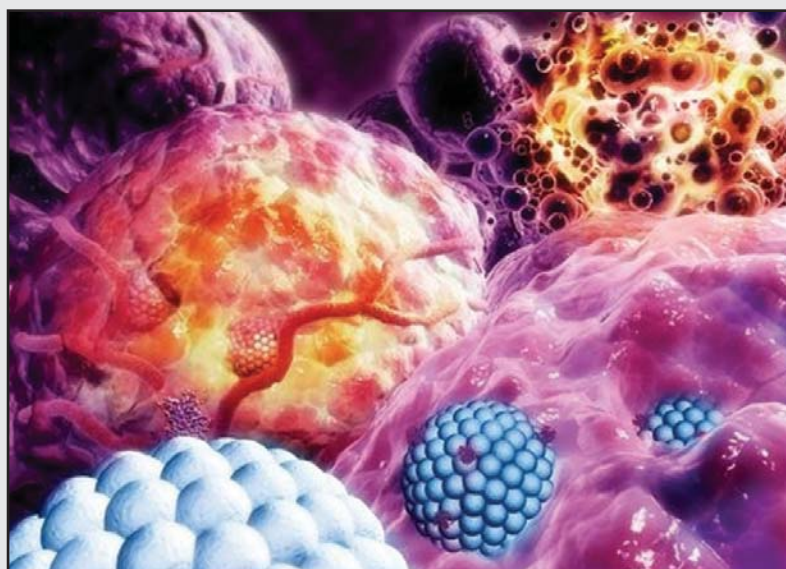
Dr. Halas, a Rice professor of electrical and computer engineering and professor of chemistry and biomedical engineering, is a pioneer in nanomedicine. The all-in-one particles are based on nanoshells – particles she invented in the 1990s that are currently in human clinical trials for cancer treatment. Nanoshells harvest laser light that would normally pass harmlessly through the body and convert it into tumor-killing heat.

In designing the new particle, Dr. Halas teamed up with Dr. Amit Joshi, assistant profes-

sor in BCM's division of molecular imaging, to engineer nanoshells by adding a fluorescent dye that glows when struck by near-infrared (NIR) light. NIR light is invisible and harmless, so NIR imaging could provide clinicians with a means of diagnosing diseases without surgery.

In looking for ways to attach the dye, Dr. Halas' graduate student, Rizia Bardhan, discovered that dye molecules emitted 40-50 times more light if a tiny gap was left between them and the surface of the nanoshell. The gap was just a few nanometers wide, but rather than waste the space, Ms. Bardhan inserted a layer of iron oxide that would be detectable with MRI. The researchers also attached an antibody that lets the particles bind to the surface of breast and ovarian cancer cells.

In the laboratory, the scientists tracked the fluorescent particles and confirmed that they targeted cancer cells and destroyed them with heat. Dr. Joshi stated that the next step would be to destroy whole tumors in live animals. He estimates that testing in humans is at least two years away, but the ultimate goal is a system where a patient gets a shot containing nanoparticles with antibodies that are customized for the patient's cancer. Utilizing NIR imaging, MRI, or a combination of the two, clinicians would observe the particles' progress through the body, identify areas where tumors exist, and then destroy them with heat. "This particle provides four options – two for imaging and two for



therapy," Dr. Joshi said. "We envision this as a platform technology that will present practitioners with a choice of options for directed treatment."

Ultimately, Dr. Joshi hopes to develop specific versions of the particles that can attack cancer at different stages, particularly early stage cancer, which is difficult to diagnose and treat with current technology. The researchers also expect to utilize different antibody labels to target specific forms of the disease. According to Dr. Halas, the team has been careful to choose components that are either already approved for medical use or are already in clinical trials. "What's nice is that every single component of this has been approved or is on a path toward FDA [U.S. Food and Drug Administration] approval," Dr. Halas noted. "We're putting together components that all have good, proven track records."

Image: Nanoparticles destroying tumor. Artwork showing nanoparticles (blue) containing cytotoxic drugs, targeting tumor cells (purple), leading to their destruction (orange cells at upper left and upper right) (Photo courtesy of Medi-Mation).

Analyzing Structural Brain Changes in Alzheimer's Disease

In a study that has the potential to improve diagnosis and monitoring of Alzheimer's disease (AD), scientists have developed a fast and accurate method for quantifying subtle, subregional brain volume loss using magnetic resonance imaging (MRI) technology.

The study is published the week of November 16, 2009, in the *Proceedings of the [U.S.] National Academy of Sciences (PNAS)*. By applying the techniques to the newly completed dataset of the multi-institution Alzheimer's Disease Neuroimaging Initiative (ADNI; www.adni-info.org), the scientists demonstrated that such subregional brain volume measurements outperform available measures for tracking severity of AD, including widely used cognitive testing and measures of global brain-volume loss.

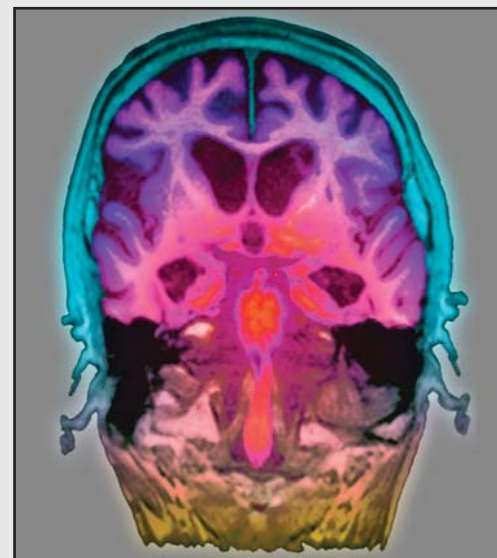
The typical pattern of brain atrophy resulting from Alzheimer's disease has long been known through autopsy studies, but exploiting this knowledge toward accurate diagnosis and monitoring of the disease has only recently been made possible by improvements in computational algorithms that automate identification of brain structures with MRI. The new methods described in the study provide rapid identification of brain subregions combined with measures of change in these regions across time. The methods require at least two brain scans to be performed on the same MRI scanner over a period of several months. The new research

demonstrated that changes in the brain's memory regions, in particular an area of the temporal lobe called the entorhinal cortex, offer sensitive measures of the early stages of the disease.

"Loss of volume in the hippocampus is a consistent finding when using MRI, and is a reliable predictor of cognitive decline," said Anders M. Dale, Ph.D., professor of neurosciences and radiology at the University of California (UC) San Diego School of Medicine (USA; <http://medicine.ucsd.edu>), who led the study. "However, we have now developed and validated imaging biomarkers to not only track brain atrophy, but distinguish the early stages of Alzheimer's disease from changes related to normal aging."

The researchers at dozens of sites across the United States studied nearly 300 patients with mild cognitive impairment, 169 healthy controls and 129 individuals with AD and then measured rates of subregional cerebral volume change for each group. Power calculations were performed to identify regions that would provide the most sensitive outcome measures in clinical trials of disease-modifying agents.

"The technique is extremely powerful, because it allows a researcher to examine exactly how much brain-volume loss has occurred in each region of the brain, including cortical regions, where we know the bad proteins of Alzheimer's disease build up," said study coauthor James Brewer, M.D., Ph.D., a



neurologist and assistant professor in the Departments of Radiology and Neurosciences at UC San Diego. "We are particularly excited to use the techniques in new clinical trials, but also to reexamine old clinical trial data where global measures of brain shrinkage were applied. These new findings suggest that such global measures are less sensitive than regional measures for detecting the changes specific to Alzheimer's disease – the changes these drugs are targeting."

Image: Colored magnetic resonance imaging (MRI) scan of a vertical section through the brain of a 65-year-old patient with Alzheimer's disease (Photo courtesy of Sovereign, ISM / SPL).

PET Helping Parkinson's Research

A large-scale study conducted to gauge the effectiveness of dopamine cell transplantation in Parkinson's disease patients has shown significant improvements in motor skills and brain function.

Reported in the January 2010 issue of *The Journal of Nuclear Medicine (JNM)*, the study's findings demonstrated that transplanted cells were viable and integrated well with the host brain tissue. Furthermore, these cells produced dopamine that helped support the brain and led to an improvement in motor symptoms. These improvements were sustained over a four-year study period.

"This study provided new insights into the time course of transplantation outcome," said David Eidelberg, M.D., study coauthor and director of the Neuroscience Center at the Feinstein Institute for Medical Research (Manhasset, NY, USA; www.feinsteininstitute.org). "Comprehensive long-term clinical follow-up, together with molecular imaging, allows for a more realistic appraisal of this kind of intervention for Parkinson's disease."

Researchers reported long-term clinical and imaging outcomes after transplantation from 33 patients who

originally participated in a one-year, double-blind, placebo-controlled trial of embryonic dopaminergic cell implantation for Parkinson's disease. Clinical improvement in motor ratings, as well as increased brain uptake of 18F-fluorodopa (18F-FDOPA), the radiotracer that is widely used to investigate the function of dopamine grafts, was seen at one, two and four years after the transplantation surgery.

Parkinson's disease belongs to a group of conditions called motor system disorders, which are the result of the loss of dopamine-producing brain cells. The four primary symptoms are tremor – or trembling in hands, arms, legs, jaw, and face; rigidity – stiffness of the limbs and trunk; bradykinesia – slowness of movement; and/or postural instability – impaired balance and coordination.

Parkinson's disease typically affects people over the age of 50. Early symptoms are subtle and occur gradually. There is presently no cure; however, a variety of medications provide dramatic relief from the symptoms. Innovative surgical interventions such as cell transplantation and gene therapy are currently being evaluated for patients with medically refractory symptoms.

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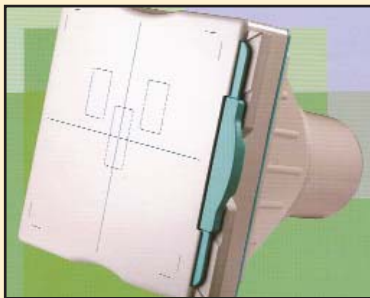
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UNIVERSAL RETROFIT KIT EDGE Medical Devices

The Quix kit upgrades RAD tables, wall stands, U-/C-arm and other positioning devices to DR with either single- or dual-detector configurations. An additional touch screen operator console is designed for DR workflow, image processing, export, print, and DICOM storage.

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ULTRASOUND ECM

The Exago features a wide range of probes, and allows for fast and reliable diagnoses. The compact and portable Exago includes an interchangeable battery, and offers the capacity for upgrades on both hardware and software.

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Intensity-Modulated Radiotherapy for Rectal Carcinoma Patient

A Belgium hospital is among the first hospitals in the world to pioneer radiotherapy treatments using arc therapy, performing its first treatment using fast and efficient application. A 56-year-old male rectal carcinoma patient was treated in just 75 seconds, over four times faster than possible using traditional fixed-beam treatments.

The technology, RapidArc radiotherapy, was administered at Ghent University Hospital (Ghent, Belgium; www.ugent.be), and developed by Varian Medical Systems, Inc. (Palo Alto, CA, USA; www.varian.com). "This treatment would have taken more than five minutes using conventional intensity-modulated radiotherapy, and such time-savings are very important both for the well-being of the patient and the efficiency of the hospital," said Prof. Marc van Eijkeren, head of Ghent University Hospital's department of radiation oncology. "We were able to achieve an increase in dose to the tumor while using far fewer monitor units of radiation to achieve this. Indeed, there was threefold reduction in monitor units used, which is helpful in tissue sparing and increasing patient comfort. We are a busy uni-

versity hospital and we are under constant strain to deliver advanced IMRT [intensity-modulated radiation therapy] treatments within our standard 15 minutes treatments slots. With RapidArc, that will no longer be a problem as we will be able to offer advanced conformal treatments to more patients while reducing our treatment slot times."

Prof. van Eijkeren reported that the patient's treatment involved treating the rectum, pelvis, and lymph nodes in a single arc – or revolution – of the Clinac iX medical linear accelerator. All such rectal treatments will now be carried out using the RapidArc technique, and the team at Ghent plans to begin using RapidArc for other cancers in the pelvic region.

Physicist Leen Paelinck reported that the Eclipse treatment planning software was fast and simple to use, reducing the planning time substantially. "The planning process involves contouring, optimization, calculation, and evaluation, and Eclipse enables us to undertake this process more quickly than was previously possible," said Leen Paelinck.

Prof. van Eijkeren noted that his hospital's long history with advanced techniques such as arc therapy comes from its goal of gaining greater tumor control and fewer side effects. Ghent University Hospital serves more than 1.5 million people in the northern regions of Belgium. "Ghent University Hospital is unique in its long experience in volumetric intensity-modulated arc treatments and its adoption of RapidArc as the best solution for this patient and others is a significant step forward," stated Vincent Ronfle, Varian's regional sales manager. "Such milestones are helpful in understanding the present and future applications of this technology in our efforts to improve treatments for patients."

RapidArc delivers a volumetric intensity-modulated radiation therapy treatment in a single or multiple arcs of the treatment machine around the patient and makes it possible to provide advanced image-guided IMRT two to eight times faster than is possible with conventional IMRT. Since its introduction last year, more than 270 RapidArc systems have been installed in hospitals globally.

Adding Noise Shown to Improve Mammogram Accuracy

A research team has shown that an obscure phenomenon called stochastic resonance (SR) can improve the clarity of signals in systems such as radar, sonar, and even radiography used in medical clinics to detect signs of breast cancer. It does this by adding carefully selected noise to the system.

The result has been a distinct improvement in the system's ability to correctly identify precancerous lesions, plus a 36 percent reduction in falsepositives. The inventors have developed an innovative method of calculating precisely the correct type and level of noise to add to existing noise in radiography or a similar system. "We see a broad spectrum of applications for this technology," stated research assistant Prof. Hao Chen, from Syracuse University (SU; NY USA; www.syr.edu). "If a system's performance is unsatis-

factory, we add noise to the system based on a specific algorithm that can significantly improve system performance."

A patent covering the technology has been issued to Prof. Chen, Prof. Pramod K. Varshney and research professor James Michels. All are associated with SU's L.C. Smith College of Engineering and Computer Science.

In mammography studies conducted by doctoral candidate Renbin Peng, the challenge was to identify clusters of microcalcifications in breast tissue. These early signs of precancerous conditions average only 0.3 mm in size and offer only slight contrast with surrounding tissue. In addition to improving detection of these lesions, the researchers have reduced false positives by more than one-third.

While the current focus of the research group is on medical uses of stochastic resonance, other applications are expected in enhancing audio, video, geophysical, environmental, radar, and other signals. The group has been receiving support from the U.S. Air Force Office of Scientific Research. Ongoing investigations by the Syracuse group are expected to produce further improvements in the efficiency and robustness of the SR-based detection techniques.

An article by the inventors on the theory of stochastic resonance effect in signal detection was published by *IEEE Transactions in Signal Processing* in July 2007. Another article, covering the mammography studies, coauthored by Mr. Peng, was published in *IEEE Journal of Selected Topics in Signal Processing* in February 2009.

CT Scanner Intelligently Adapts to Clinical Needs

A computed tomography (CT) system is the world's first adaptive scanner, which adjusts itself intelligently and dynamically to the patient, aiding in dose protection, as well as adapting to new dimensions and space. Recognized as one of the leading pediatric healthcare centers in the United States, St. Louis Children's Hospital (MO, USA) is further enhancing its nationally renowned pediatric care program with the installation of a Somatom Definition AS computed tomography (CT) scanner from Siemens Healthcare (Erlangen, Germany; www.siemens.com/healthcare).

Although CT is a vital medical imaging tool in diagnosing illness and disease in children, there is always a concern over the amount of radiation dose a pediatric patient receives. Medical institutions, such as St. Louis Children's Hospital, strive to provide the best medical imaging exams as possible, while ensuring one of the best methods for its patients. The addition of the scanner provides the link between dose protection and imaging excellence for the Hospital's young patients.

"In light of recent studies on radiation dose and best practices for dose reduction, it is essential to employ a CT scanner that can not only ensure some dose reduction, but provide one

of the fastest scan speeds, while still maintaining optimal imaging performance," said Dr. Marilyn J. Siegel, of the division of diagnostic radiology and professor of radiology and pediatrics, St. Louis Children's Hospital. "This latest addition to our CT family allows Children's Hospital to better serve our young patients with safe, effective, quality care."

In the July 2009 issue of the journal *Radiology*, a team of researchers evaluated the potential effectiveness of adaptive collimation in reducing CT radiation dose owing to z-over-scanning (one of the factors responsible for radiation burden in spiral CT examinations) by using dose measurements and dose simulations. The data revealed that by using adaptive section collimation, a considerable dose reduction of up to 10% was achieved for cardiac and chest CT when measurements were performed free in air and of 7%, on average, when measurements were performed in phantoms. For scan ranges smaller than 12 cm, ionization chamber measurements and simulations indicated a dose reduction of up to 38%, according to the team's findings.

The researchers concluded that adaptive section collimation allows considerable reduction of unnecessary exposure owing to z-over-scanning in spiral CT. It can be com-

bined in synergy with other means of dose reduction, such as spectral optimization and automatic exposure control. "Siemens' unique Adaptive Dose Shield helps to address the dose issue by dynamically assisting in blocking the unnecessary dose before and after the spiral scan, ensuring that the only dose applied to the patient is dose that is clinically relevant," said Kulin Hemani, vice president, computed tomography, Siemens Healthcare.

CARE Dose 4D, Siemens' real-time dose modulation, assists in guaranteeing an unparalleled combination of maximum image quality at minimum dose for every patient in every spiral scan. The entire Somatom Definition AS family of scanners comes with adaptive dose shield and set of pediatric protocols to provide optimal patient care.

The scanner is able to adapt to the space constraints many facilities face today. Featuring a large bore



and high-capacity patient table, the scanner requires very little floor space, with an 18-m² footprint. This allows the scanner to fit into rooms that have traditionally been too small for high-end CT scanners.

The technology combines components in a dynamic manner, such as a large-volume coverage area with a 200-cm scan range and up to 330 ms rotation. These features allow even the most clinically challenging patients (i.e., trauma patients) to be imaged rapidly, from head to toe, with minimum difficulty.

Image: The Somatom Definition AS computed tomography (CT) scanner (Photo courtesy of Siemens Healthcare).

Physiological Factors Linked to Image Quality of Multidetector CT Scans

A large multicenter international trial revealed that the image quality of multidetector computed tomography (MDCT) scans, used for the noninvasive detection of coronary artery disease, can be significantly affected by patient characteristics such as ethnicity, body mass index (BMI), and heart rate, according to new data.


The large multicenter international trial study included 291 patients with coronary artery calcification and found that compared with examinations of white patients, studies of black patients had significantly poorer image quality.


"Physiologic factors such as high heart rate, arrhythmia, obesity, and high coronary calcium burden with motion continue to limit the diagnostic accuracy of MDCT as compared with conventional invasive coronary angiography. Our study is significant because we found a relevant influence of BMI, heart rate, ethnicity, and breathing arti-

fact on the degradation of image quality," said Melvin E. Clouse, M.D., a professor of radiology, department of radiology, Harvard Medical School (Boston, MA, USA) and Beth Israel Deaconess Medical Center (Boston, MA, USA; www.bidmc.org), and lead author of the study.

MDCT scans have been implemented in a variety of patients with suspected coronary artery disease because of its diagnostic accuracy and reliability. However "the diagnostic ability of any imaging method is directly dependent on image quality," said Dr. Clouse. "With this new knowledge combined with new and advanced CT scanners, we have the potential to improve image quality of coronary CT angiography, further making the test even more accurate and independent of patient characteristics," he said.

This study appears in the January 2010 issue of the *American Journal of Roentgenology (AJR)*.







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ULTRASOUND SCANNER Echoston

The Epidot color doppler compact system offers a high-resolution LCD display, wide scanning depth range, and 256-frames/screens cineloop memory. Additional features include a large, versatile trackball, independent report pages, and various display modes and scanning methods.

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CR DIGITIZER Examion

The CR 360 includes a single-plate CR reader, flexible phosphor screens, and a PC-based review station. The compact system is designed for centralized and decentralized workflow environments, and can be used in the exam room.

LINKXPRESS.COM MII-04-10 210



MAMMOGRAPHY SYSTEM Hologic

The M-IV screen-film system is designed to provide enhanced imaging and operating efficiency, as well as maximum patient comfort. Key features include biangular X-ray tube, self-adjusting tilt paddle, and automatic exposure control.

LINKXPRESS.COM MII-04-10 211



IMAGING TABLE Hotborn Medical Equipment

The DH-10G electric orthopedic navigation table features a full carbon fiber headrest, nonmetallic tabletop, and a wide range of adjustment functions. Other benefits include a skid-proof hook, cable controller, fixed board connect with tractor, and emergency brake.

LINKXPRESS.COM MII-04-10 212

Novel CT System Tailor-Made for Children

An innovative computerized tomography (CT) system helps examine pediatric patients, who frequently have difficulty holding their breath or staying still during a scan.

The Aquilion ONE 320-detector row CT system is the world's first dynamic volume CT, and utilizes 320 ultra-high-resolution detector rows to image an entire organ in a single gantry rotation that can capture a section of up to 16 cm. The system is designed for pediatric patients, who with smaller vessels, lower bone density, and less body fat, have different imaging needs than adults. A volume acquisition mode exposes patients to less radiation, providing safer pediatric exams by lessening the need for sedation. The Aquilion ONE also features SUREExposure pediatric software, which uses protocols selected based on the patient's age, size, and type of exam to ensure they receive only the radiation required to obtain a clear diagnostic image.

The Aquilion ONE is available with a pediatric

kit that includes child-friendly accessories and features, including iStation, an audio-visual instructional tool to help children maintain breath-hold during exams by displaying animated movies specially designed to teach them when to hold their breath and relax them during the exam; colorful designs and images on the system's exterior, creating a more visually compelling and child-friendly looking system; pediatric accessories such as child-size table straps and infant cushion to provide a stable, comfortable exam for pediatric patients of all sizes; and a small replica of the Aquilion ONE allowing children to interact with the CT and understand more about the imaging process, alleviating fears about the exam. The Aquilion ONE CT system and the SUREExposure pediatric software are products of Toshiba Medical Systems (Tokyo,



Japan; www.toshiba-medical.co.jp).

"Toshiba recognizes that children have different imaging needs than adults and that limiting radiation and sedation is crucial for safe pediatric exams," said Doug Ryan, senior director of the CT business unit at Toshiba. "We developed the Aquilion ONE and SUREExposure Pediatric to guarantee the best care is provided to all patients, no matter the size."

Image: The Aquilion ONE CT system (Photo courtesy of Toshiba Medical Systems).

Further Steps Taken to Provide Clear Guidelines for PET Radiopharmaceuticals

U.S. officials have announced publication of a final regulation on current good manufacturing practices (cGMPs) for the production of positron emission tomography (PET) imaging agents, as well as a guidance document describing acceptable approaches that would enable PET drug manufacturers to meet the requirements in the proposed regulation.

"We are pleased that FDA [U.S. Food and Drug Administration (Silver Springs, MD, USA; www.fda.gov)] has issued cGMPs for PET drugs, which are so important to the diagnosis and treatment of patients with heart disease, cancer, and other life-threatening illnesses," said Michael M. Graham, Ph.D., M.D., president of SNM (Society of Nuclear Medicine; Reston, VA, USA; www.snm.org) and director of nuclear medicine at the University of Iowa Carver College of Medicine (Iowa City, USA).

The new FDA guidelines, which took effect December 11, 2011, are aimed at ensuring that PET drugs meet all requirements of safety, identity, strength, quality, and purity. The cGMP guidance document describes acceptable approaches that would enable PET drug producers to meet regulatory requirements. All PET drug manufacturers will be required to submit a new drug application (NDA) or abbreviated new drug application (aNDA) for all PET drug products in routine clinical use by the date of implementation. In the interim, U.S. facilities must continue to comply with U.S. Pharmacopeia <823>, which sets standards for the production of PET drugs.

SNM worked in concert with other medical organizations to provide FDA input and review on the cGMP guidelines. "This is a major step forward," said

Dr. Graham. "Having a well-defined structure in place benefits manufacturers, physicians, and patients by ensuring the highest quality drugs possible."

Through its Clinical Trials Network, SNM will offer educational programs on the new regulation. Representatives from FDA will discuss the new guidelines with the molecular imaging and manufacturing community at two upcoming events. FDA representatives will present a special session during the Clinical Trials Network Workshop, which will be held Feb. 1, 2010, at SNM's Conjoint Mid-Winter Meetings in Albuquerque, NM, USA. In addition, FDA representatives will present a half-day workshop at SNM's annual meeting, June 5, 2010, in Salt Lake City, UT, USA. To date, more than 130 manufacturing sites have registered with the Clinical Trials Network.

Portable Ultrasound System Designed for Busy Hospital Settings

A portable ultrasound system is effective, durable, and built to withstand the demands of busy hospital environments. With its small footprint, the system can easily be carried from room-to-room, to a satellite office, operating room or to an offsite location for immediate use and diagnostics.

SonoSite, Inc. (Bothell, WA, USA; www.sonosite.com), a specialist of hand-carried ultrasound for the point-of-care settings, announced that the company has completed the launch of the 2.7-kg NanoMaxx ultrasound tool in Europe. The latest system to join SonoSite's suite of specialized products for point-of-care visualization, the NanoMaxx system, made its debut during fall exhibitions, road shows, and key events hosted in France, Germany, Italy, Spain, the United Kingdom, and a number of other countries.

SonoSite hosted various events to introduce the NanoMaxx system. At these gatherings, physicians from multiple medical specialties participated in a day of clinical education and hands on scanning led by key opinion leaders in the industry. "This was a great opportunity for physicians to learn more about the NanoMaxx system and to be educated on the latest ultrasound prac-

tices, especially with risk management and patient safety practices becoming more stringent in the hospital setting," said Mike Fernandez, SonoSite, general manager, Europe, and Latin America. "With the ability to expedite workflow, guide interventional procedures, and provide visualization and diagnostics at any point-of-care location, the NanoMaxx system is truly a powerful tool that will raise the standard of healthcare practices around the globe."

Physicians praised the technology at the launch events. "The NanoMaxx is very intuitive to use. You can just turn it on and start scanning, without having to reference through the manual. It is a good quality, practical machine that fits well into the marketplace for basic scanning, said James Pettit, M.D., a consulting interist, Hull Royal Infirmary (UK).

"The NanoMaxx helps us to apply and develop the 'telepresence' concept. If the patient can't come to us, we have to visit them and offer the best care and attention," noted Alberto Hernández Abadía, M.D., Hospital Central de la Defensa, Unidad de Telemedicina



(Madrid, Spain).

"Our evaluation of the NanoMaxx proved that it has a useful place in a busy radiology department. As well as the obvious benefit of being a 'pick up and go' scanner for mobile and emergency exams, it worked well for general imaging, MSK [musculoskeletal], and interventional procedures. Everyone liked the fast, simple, and intuitive user interface. The NanoMaxx is a useful addition to the Sonosite range," stated Simon Elliott, M.D., consultant radiologist, Freeman Hospital (Newcastle-upon-Tyne, UK).

Image: The NanoMaxx ultrasound system, shown with wall mount option (Photo courtesy of SonoSite).

U.S. Authorities Investigate CT Brain Perfusion Scans Overdoses

U.S. officials have notified healthcare professionals that it has become aware of radiation overexposures during perfusion CT imaging performed to aid in the diagnosis of stroke at a particular facility, the patients receiving radiation doses that were approximately eight times the expected level. While this event involved a single kind of diagnostic test at one facility, the magnitude of these overdoses and their impact on the affected patients were significant.

This situation may reflect more widespread problems with CT quality assurance programs and may not be isolated to this particular facility or this imaging procedure (CT brain perfusion). If patient doses are higher than the expected level, but not high enough to produce obvious signs of radiation injury, the problem may go undetected and unreported, putting patients at increased risk for long-term radiation effects.

US Food and Drug Administration (FDA; Silver Spring, MD, USA; www.fda.gov), working with state and local health authorities, has identified at least 50 additional patients who were exposed to excess radiation of up to eight times the expected level during their computed tomography (CT) perfusion scans. These cases so far involve more than one manufacturer

of CT scanners. Some of these patients reported hair loss or skin redness following their scans. High doses of radiation can cause cataracts and increase the risk of some forms of cancer.

Based on its investigation to date, the FDA is providing interim recommendations for imaging facilities, radiologists, and radiologic technologists to help prevent additional cases of excess exposure. These recommendations include: (1) Facilities assess whether patients who underwent CT perfusion scans received excess radiation. (2) Facilities review their radiation dosing protocols for all CT perfusion studies to ensure that the correct dosing is planned for each study. (3) Lastly, facilities implement quality control procedures to ensure that dosing protocols are followed every time and the planned amount of radiation is administered.

Radiologic technologists check the CT scanner display panel before performing a study to make sure the amount of radiation to be delivered is at the appropriate level for the individual patient. If more than one study is performed on a patient during one imaging session, practitioners should adjust the dose of radiation so it is appropriate for each study.

The FDA encourages every facility

performing CT imaging to review its CT protocols and be aware of the dose indices normally displayed on the control panel. These indices include the volume computed tomography dose index and the dose-length product. For each protocol selected, and before scanning the patient, carefully monitor the dose indices displayed on the control panel. To prevent accidental overexposure, the facility should make

sure that the values displayed reasonably correspond to the doses normally associated with the protocol. This should be confirmed again after the patient has been scanned. Patients should follow their doctor's recommendations for receiving CT scans. While unnecessary radiation exposure should be avoided, a necessary CT scan has benefits that outweigh the radiation risks.

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CT SCANNER IMTEC

The ILUMA Elite cone beam scanner offers a large field of view, adjustable dose positions, and medical-grade components. The scanner provides enhanced images with a lower dose than spiral CT, and is considered ideal for surgical navigation scans.

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CABINET X-RAY SYSTEM Kubtec

The Xpert 20 self-contained, shielded system requires no warm-up time and offers DICOM-compliant, user-friendly software in a cabinet. The system features AEC, auto-calibration, automatic window leveling, and the ability to send multiple images with annotations to PACS.

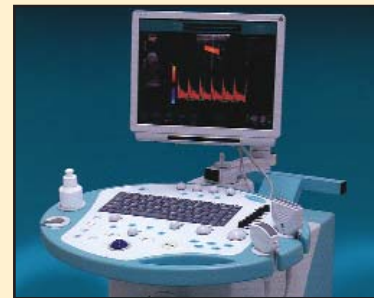
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DR SYSTEM Landwind Medical

The DR30M provides efficient APR function, fast bedside imaging, and automatic image processing. Other key benefits include DICOM compatibility, enhanced DR image quality, simple operation, and increased throughput and user productivity.

LINKXPRESS.COM MII-04-10 215



ULTRASOUND SCANNER Medelkom

The SLE-1100 digital system features a 15-inch flat LCD monitor, and simultaneous B and M imaging for all probes. Applications include pediatrics, obstetrics, neonatology, abdomen, urology, gynecology, breast, and cardiology.

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New Flash CT System Reduces Radiation Dose By 90%

A new computed tomography (CT) system can image 10 times as fast as other clinical units, with up to 90% dose reduction in radiation compared to conventional imaging.

New York University (NYU) Langone Medical Center (New York, NY, USA; www.med.nyu.edu) is the first hospital in the U.S. Northeast to offer one of the world's fastest and most radiation dose-efficient computed tomography (CT) scanner. The Siemens Healthcare (Erlangen, Germany; www.medical.siemens.com) Somatom Definition Flash scanner's dual source technology allows NYU Langone Medical Center to provide new levels of patient care, especially for trauma, pediatric, cancer, and cardiac patients.

"The new CT scanner allows us to produce high quality diagnostic images in the least amount of time and with the least amount of radiation," said Michael Recht, M.D., a professor of radiology and chair of

the department of radiology at NYU Langone Medical Center. "NYU Langone Medical Center already offers advanced low-dose technology, but now with Flash CT, we are thrilled to be able to offer our patients some of the most advanced technology in the world, combined with the unmatched expertise of our radiologists."

With its two rotating X-ray tubes, the Flash CT's enhanced speed and power allows children and overweight adults to be screened more effectively. Flash CT also turns off the radiation when it comes close to sensitive tissue areas of the body such as the thyroid gland or breasts, or lens of the eye. It also eliminates the need for a baseline scan prior to iodine injection, so the patient does not have to be scanned twice. Because of its speed, patients do not need to hold their breath, lay completely still during an exam or take a beta-blocker to slow the speed of the heart to



get clear images. Pediatric patients benefit because they do not have to be sedated during the procedure.

"The dual energy technology of the new Flash CT provides higher contrast between normal and abnormal tissues making it easier to see abnormalities while reducing radiation," said Alec J. Megibow, M.D., MPH, FACR, professor of radiology at NYU Langone Medical Center.

"Because we can now analyze findings by chemical composition, we predict that the unique information from this scanner may also better able predict which patients will have the best response to a proposed treatment regimen."

Image: The Somatom Definition Flash CT scanner (Photo courtesy of Siemens Healthcare).

Spectral Domain OCT System Incorporates High Resolution Fundus Camera

The fundus, or inner lining, of the eye includes the retina and the blood supply to it. It can be photographed with specially designed cameras through the dilated pupil of the patient.

The 3D OCT-2000 system is an optical signal acquisition and processing method. A spectral domain optical coherence tomography (OCT) system incorporates a high-resolution fundus camera and a user-friendly color touch-screen display.

A product of Topcon (Tokyo, Japan; www.topcon.com), the new 3D OCT-2000 system has a compact, space-saving design. It captures micrometer-resolution, three-dimensional (3D) images

from within optical scattering media (e.g., biological tissue). Commercially available OCT systems are employed in diverse applications, such as in diagnostic medicine, notably in ophthalmology, where it is used to obtain detailed images from within the retina.

Intuitive FastMap software enables dynamic viewing of the OCT data and provides 3D, 2D, and fundus images simultaneously. Pinpoint registration indicates the location of the OCT image within the fundus image. In addition, the compare function allows users to view serial exams in a comparison view and apply different analytical tools.

The seamless integration of 3D OCT-2000 with Topcon's Eye Route Image Management System provides connectivity and access to images anywhere, at anytime. "At Topcon we strive to be the leading provider of clinical information, technology and connectivity. The multitouch experience that we are pioneering, underlines our visionary approach in enhancing workflow and communication within the ophthalmic industry," commented Katrin Teigeler, vice president, marketing at Topcon.

Topcon Medical Systems, Inc. (TMS) is a supplier of ophthalmic diagnostic equipment and image management solutions.

Auto X-Ray Exposure System Delivers Quality Images at Minimum Dosage

An innovative, dose-efficient X-ray technology can reduce patient dose by as much as 40%, without compromising image quality.

The new technology is available on General Electric (GE) Healthcare (GE, Chalfont St Giles, United Kingdom; www.gehealthcare.com) Innova systems, and is powered by GE proprietary auto exposure (AutoEx) software, a sophisticated system that uses real-time image information to optimize the all-digital image chain parameters, including X-ray technique and spectral filtration. With AutoEx, effective patient thickness is calculated in each exposure; technique and spectral filtration are then automatically chosen to provide the patient with optimized exposure management at the lowest radiation dose, while providing the physician with the image quality needed. Thus, for a given setting, the system offers radiologists the capability to potentially reduce dose by managing, customizing, and personalizing radiation dose for each individual patient and procedure.

Another feature instrumental in reducing radiation in Innova systems is the flat-panel detector, which provides a high detective quantum efficiency (DQE), a parameter internationally accepted as the best index of detector performance in the contrast- and dose-limited imaging done in actual clinical studies (high DQE enables better-quality images at the same dose, or the same-quality image at a lower dose). Integrated spectral fil-

ters in the Innova collimator allow the filtration of soft radiation out of the beam, which helps to minimize skin dose to the patient and scatter radiation to staff, while maintaining image quality and sharpness. A further advantage of the Innova systems is InnovaSense patient contouring, a feature that further extends dose efficiency by minimizing detector-to-patient distance, allowing fast positioning, excellent image geometry, and less radiation exposure. The AutoEx feature is available on the Innova 2100IQ, 3100 IQ, 4100IQ, 2121IQ and 3131IQ X-ray systems.

"We are incredibly proud of the scientific advances we've made with introduction of the AutoEx system," said Hooman Hakami, President and CEO of interventional systems at GE Healthcare. "Because of the potential for this technology to improve the quality of patient care by reducing dose exposure for patients, our Innova products have been validated under our healthymagination initiative."

The GE healthymagination initiative is a six-year program that will redirect half of the GE US\$1 billion healthcare research and develop-



ment budget toward driving down the cost of healthcare, while boosting access to improved care through technology and service innovations around the world. The four priorities of the new initiative are acceleration of the development of healthcare information technology; design and production of high-tech yet affordable healthcare products; broader access to underserved patients; and support of consumer-driven health. Development of low-cost digital X-ray machines, portable ultrasound systems, low-dose computerized tomography (CT) scanners, and more affordable cardiac equipment have been cited by GE as ways to deliver on these promises.

Image: The Innova 4100 IQ X-ray system (Photo courtesy of GE Healthcare).

MRI Safety Risk for Patients with Pacemakers Identified

U.S. researchers have found that certain cardiac pacemakers may inadequately stimulate a patient's heart while undergoing a magnetic resonance imaging (MRI) scan due to the magnetic pulses concurrent with the electronic pulses from the pacemaker. This inadequate stimulation is potentially dangerous for the patient undergoing the MRI scan.

MRI is an imaging technique that utilizes a magnetic field instead of ionizing radiation to produce a detailed image of internal body structures. MRI systems expose patients to very strong magnetic fields that can interfere with implanted cardiac pacemakers. Physicians are instructed by pacemaker manufacturers and MRI system manufacturers not to expose patients with pacemakers to MRI scans. MRI can damage the pacemaker's electronic system and cause burning of heart tissue at the tip of the pacemaker lead, due to an increase in temperature from the MRI. Both risks can result in incorrect or absent stimulation from the pacemaker.

However, some cardiologists

have published special protocols that describe how to allow patients with cardiac pacemakers to receive MRI scans. Some have stated that for specific patients, the diagnostic benefit from MR imaging versus other pacemaker compatible imaging modalities outweighs the risks.

U.S. Food and Drug Administration (FDA; Silver Spring, MD, USA; www.fda.gov) researchers Drs. Howard Bassen and Gonzalo Mendoza evaluated the risk of pacemakers causing unintended cardiac stimulation following exposure to a simulated MRI magnetic field by measuring electrical voltage produced at the tip of the pacemaker lead, where it would touch the interior of the heart.

Dr. Bassen and Dr. Mendoza found that when exposed to the strong, "gradient," magnetic field, the pacemaker could deliver a drastically altered pulse and stimulate the heart inappropriately, which could have devastating consequences for the patient. "MRI systems emit several types of extremely intense magnetic fields and have caused injury to patients due to inter-

actions with pacemakers," said Dr. Bassen. "Cardiologists who choose to scan patients with cardiac pacemakers must assess the risks versus the benefits of the scan."

The study's findings were published in December 2009 in BioMed

Central's open access journal *BioMedical Engineering Online*.

Each year in the United States alone, patients undergo some 40 million MRI procedures. There are also 10 million pacemaker users in the United States.


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MRI SYSTEM Time Medical

The Hybrid MONA orthopedics/MSK and Pediatrics system offers an open design that ensures both patient comfort and ideal anatomical positioning. The cost-effective system allows for the transfer of extremity exams, and provides an alternative to a whole body MRI system.

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PRE-FILLED SYRINGES Covidien

The OptiMark contrast medium pre-filled syringes are intended to reduce syringe preparation time, as well as improve user efficiency. The syringes also may help reduce the risk of nosocomial infection the transmission risk.

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ULTRASOUND SIUI

The Apogee 1000 digital color doppler system features a laptop design, auto freeze function, and both AC/DC and battery power supplies. The system is designed for OB/Gyn, cardiology, urology, peripheral vascular, abdomen, and orthopedic imaging.

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Targeted Breast Ultrasound Can Reduce Biopsies for Women Under Forty

Targeted breast ultrasound of suspicious areas of the breast, including lumps, is a safe, reliable, and cost-effective alternative to invasive biopsies for women under age 40, according to the recent findings of two studies.

The research was presented December 3, 2009, at the annual meeting of the Radiological Society of North America (RSNA), held in Chicago, IL, USA. "By performing high-quality breast ultrasound, we can reduce the number of expensive and avoidable invasive diagnostic procedures in young women," said senior author Constance D. Lehman, M.D., Ph.D., professor and vice chair of radiology at the University of Washington (Seattle, WA, USA; www.washington.edu) and director of imaging at the Seattle Cancer Care Alliance. "We don't want to be overly aggressive with this population."

The researchers conducted two studies in which targeted ultrasound was used to differentiate between potentially cancerous masses and benign findings in young women who had detected breast

lumps or other focal (specific) areas of concern in their breasts. The first study included 1,123 ultrasound examinations of women under age 30, while the second included 1,577 ultrasound examinations of women ages 30 to 39.

Across both studies, all instances of cancer at the site of the clinical concern were positively identified through targeted ultrasound. Moreover, all negative ultrasound findings accurately identified benign changes in the breast. The only malignant tumor not identified by ultrasound was an unsuspected lesion outside of the targeted examination area. That cancer was detected by a full breast mammogram.

The incidence of malignancy among women in their 30s was 2%. The incidence of malignancy among women younger than 30 was 0.4%. "Surgical excision or needle biopsy of tissue can be painful, expensive, and frequently unnecessary in these age groups, which have very low rates of malignancies," Dr. Lehman said. "In most cases,



monitoring with targeted ultrasound is a very safe alternative." She added that ultrasound should be the diagnostic tool of choice for young women seeking care for breast lumps and other suspicious focal signs and symptoms. "It is time we used ultrasound to reduce unnecessary morbidity and costs associated with more aggressive invasive approaches," she concluded.

Image: A conceptual image showing the ultrasound biopsy of a breast cancer tumor (Photo courtesy of Mark Miller / SPL).

Prenatal Ultrasound Use in Pregnant Women Increased 55%

Current use of prenatal ultrasounds in women with single pregnancies is 55% greater than in 1996, even in low-risk pregnancies. More than one-third (37%) of pregnant women now receive three or more ultrasound tests in the second and third trimesters of a given pregnancy. The increase in the use of multiple ultrasound scans per pregnancy has been more pronounced in low-risk than high-risk pregnancies, suggesting a need to review current practices.

Current guidelines recommend two ultrasounds in an uncomplicated pregnancy – one in the first trimester and one in the second to screen for fetal and genetic anomalies.

The new data, published in the January 2010 issue of the *Canadian Medical Association Journal (CMAJ)*, included almost 1.4 million singleton pregnancies between 1996 and 2006 in Ontario,

Canada's most populous province. It included both low-risk and high-risk pregnancies, the latter defined by the presence of a maternal comorbidity, need for genetics counseling, or a prior complicated pregnancy. The study accounted for the recent introduction of first trimester nuchal translucency scanning.

The investigators discovered that almost one in five of all pregnant women – including those at low-risk of complications – now receive four or more ultrasounds in the second and third trimesters. "Our findings are consistent with a growing body of evidence suggesting that some health interventions most beneficial to high-risk individuals are frequently directed at apparently low-risk populations," reported Dr. John You, from McMaster University (Hamilton, Ontario, Canada; www.mcmaster.ca) and coauthors.

Obstetricians practice in the highest medical-legal risk environment and may feel the need to reassure patients with a safe and relatively cost-effective ultrasound test. "While the benefits of prenatal ultrasound in high-risk pregnancies may be more clear, the value of repeat ultrasounds in low-risk patients is not," wrote the authors. Since the detection of minor benign findings is increasingly more common with technological advances such as pregnancy ultrasound, they can cause anxiety and lead to invasive procedures such as amniocentesis. Increasing screening in low-risk women may also be contributing to increasing healthcare costs."

The investigators concluded that more careful use of prenatal ultrasounds in low-risk women is required, but there should be careful discussion over the best approach to balance frequency and medical need.

Particle Characterization System Critical to Development of Brain Tumor Illumination

A particle characterization system is proving to be a creative research tool for advanced healthcare applications such as gene therapy and selective-target carrier molecules.

MR Technique Detects Condition in Women that Often Goes Undiagnosed

In women with lower urinary tract symptoms an imaging technique called dynamic magnetic resonance imaging (dMRI) allows clinicians to diagnose pelvic organ prolapse – a condition that frequently goes undiagnosed on static MRI and at physical examination.

Pelvic organ prolapse is comparatively common and occurs when the pelvic floor muscles become weak or damaged and can no longer support the pelvic organs. If left untreated, living with prolapse can be a challenge, both physically and emotionally, as the symptoms can disrupt day-to-day life. Dynamic MRI is performed while the patient performs a straining maneuver, such as bearing down. Static MRI is performed while the patient is at rest.

The study performed at New York University (NYU) Langone Medical Center (New York, NY, USA; www.med.nyu.edu), included 84 women with lower urinary tract symptoms who underwent dynamic and static MRI scans for a suspected urethra abnormality. Ten of the 84 patients were found to have an abnormality of the urethra.

“However 33 patients were diagnosed with pelvic organ prolapse, of whom 29 were diagnosed exclusively on dynamic imaging,” said Genevieve L. Bennett, M.D., assistant professor of radiology at NYU Langone Medical Center and lead author of the study. “Dynamic imaging allows for the detection of pelvic organ prolapse, which may not be evident at rest but only detected when the woman strains. The results of our study show that in women with lower urinary tract symptoms who undergo MRI for evaluation of a suspected urethra abnormality, the addition of dMRI permits detection of pelvic organ prolapse that may not be evident on static at rest images and that may also go undetected at physical examination,” she said.

This study appears in the December 2009 issue of the *American Journal of Roentgenology (AJR)*.

The University of Washington (Seattle, WA, USA; www.washington.edu) researchers reported that accurate zeta potential and particle size measurements were critical to their successful development of fluorescent, tumor-targeting iron oxide nanoparticles. Able to safely cross the blood-brain barrier and selectively illuminate brain cancer cells during a magnetic resonance imaging (MRI) scan, the innovative molecules resulting from this research should make brain cancer imaging much safer.

“Safe molecular penetration of the blood-brain barrier depends on a particle’s size, fat content, and electric charge. It wasn’t until we obtained the Zetasizer Nano in 2006 that we were able to efficiently measure, monitor, and optimize these properties and develop nanoparticles that deliver the desired half-life in blood but remain stable long enough to support imaging,” explained Prof. Miqin Zhang, from the University of Washington’s department of materials science and engineering. The Zetasizer Nano system was developed by Malvern Instruments (Malvern, UK; www.malvern.com).

The blood-brain barrier protects the brain from infection. Current imaging techniques require the injection of both dyes and a drug to forcefully open the barrier. Prof. Zhang and her team have formulated particles approximately 33 nm in diameter. Three times smaller in wet conditions than anything previously formulated in the lab, these particles can naturally penetrate the blood-brain barrier without exposing the patient to the risk of infection, and represent a highly significant advance in brain cancer imaging.

The Nanoparticle Lab within the University

of Washington’s department of materials science and engineering focuses its research on cancer diagnosis and treatment through imaging enhancement and targeted and controlled therapeutic payload delivery. This is accomplished by use of nanoconjugates or multifunctional nanovectors. A nanoconjugate is a chemically modified nanoparticle serving as a “vehicle” that carries biomolecules to target cells. The term “nanovector” here refers to a nanosized entity that plays a functional role in the perspective of therapeutics.

Malvern Instruments provides a range of complementary materials characterization tools that deliver interrelated measurements reflecting the complexities of particulates and disperse systems, nanomaterials and macromolecules. Analytic instruments from Malvern are used in the characterization of a wide variety of materials, from industrial bulk powders to nanomaterials and delicate macromolecules. A wide range of innovative technologies is combined with intelligent, user-friendly software. These systems provide industrially relevant data enabling the customers to make the connection between micro (such as particle size) and macro (bulk) material properties (rheology) and chemical composition (chemical imaging).

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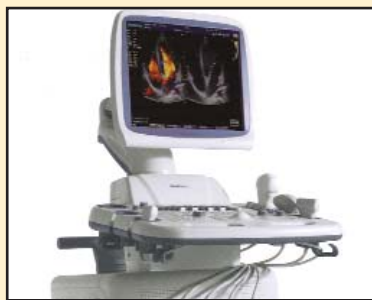
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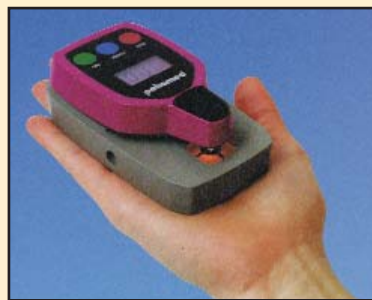
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DENSITOMETER Pehamed

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MRI SYSTEM Toshiba Medical Systems

The Vantage Titan 3T open-bore system includes noise-reduction technology, as well as a 71 cm opening for increased patient comfort and decreased claustrophobia. Other key benefits include Fresh Blood Imaging, CIA, Time-SLIP, and Time and Space Angiography (TSA).

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IMAGE PROCESSING UNIT Vatech

The Xmaru 1210P portable unit provides enhanced image resolution quality, as well as a wider 13" x 11" active image area. The compact and lightweight unit is considered ideal for extremity imaging, along with pediatric imaging applications.

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Radiotherapy Developments Improve the Quality of Treatments for Patients with Head and Neck Cancer

Clinical studies suggest that sophisticated treatments such as intensity-modulated radiotherapy (IMRT) and image-guided radiotherapy (IGRT) are enabling radiation oncologists to enhance post-treatment health-related quality of life for patients with head and neck cancer.

In an educational session for radiotherapy professionals, delivered by two noted experts during the November 2009 annual meeting of the American Society for Radiation Oncology (ASTRO) in Chicago, IL, USA, Avraham Eisbruch, M.D., professor at the University of Michigan (Ann Arbor, USA; www.umich.edu), discussed how careful implementation of IMRT in the treatment of head and neck cancer can achieve high tumor control rates while minimizing xerostomia, a dry mouth condition that occurs when salivary glands are damaged.

Citing a new report summarizing results from the Radiation Therapy Oncology Group (RTOG; www.rtog.org), RTOG-0022, a multi-institutional study comparing IMRT with earlier forms of treatment for head and neck cancer, Dr. Eisbruch reported that IMRT for head and neck cancer achieved important goals in reducing treatment toxicity, notably xerostomia, and in yielding a high tumor control rate of 90%.

For patients enrolled in the

study and treated with IMRT, only 55% experienced grade 2 or worse xerostomia at six months after treatment, as compared with 84% of patients treated with earlier forms of radiotherapy – a reduction of 35%. For the IMRT group, the percentage of patients with grade 2 or worse xerostomia decreased steadily, to 25% at 12 months and 16% at 24 months. "This kind of improvement over time is not something we had been seeing with conventional forms of radiotherapy," said Dr. Eisbruch, who served as chair of RTOG-0022. "Also, emerging data are suggesting that we can get improvements in broader aspects of posttreatment quality of life by using IMRT, beyond reducing xerostomia," Dr. Eisbruch said. "Several studies comparing IMRT with conventional radiotherapy found that the IMRT patients did better not just in terms of dry mouth, but also other quality of life dimensions, including swallowing and nutrition."

According to Dr. Eisbruch, RTOG-0225, another multi-institutional study looked at IMRT with or without chemotherapy for head and neck cancer, and also reached positive conclusions. "That group reproduced the excellent results that individual treatment centers had been reporting, namely, a 90% loco-regional progression-free survival with minimal grade 3 and no

grade 4 xerostomia."

IMRT involves shaping radiotherapy treatment beams so that they deliver a dose pattern that matches the size and shape of a targeted tumor while minimizing exposure of surrounding healthy tissues and organs. This approach has been widely adopted by radiation oncologists for the treatment of diverse forms of cancer. Ongoing clinical studies are now maturing, allowing long-term outcomes to be assessed, and validating IMRT based on clinical data.

Lei Dong, Ph.D., associate professor of medical physics at the MD Anderson Cancer Center (Houston, TX, USA; www.mdanderson.org), detailed at the meeting how new image-guidance technologies additionally enhance the accuracy of IMRT treatments by enabling clinicians to correct for patient set-up uncertainties and anatomical changes over a course of treatment.

"Clinicians naturally want to take advantage of the more conformal dose distributions that IMRT makes possible by reducing the treatment margins around a tumor, to protect more healthy tissues," said Dr. Dong. "When we do that, it is important to ensure that the treatments are targeted very precisely, so the tumor receives the high dose treatments, and the dose to surrounding tissues and organs is kept as low as possible."

Dr. Dong discussed the issue of

basing radiotherapy treatment plans on single computed tomography (CT) scans taken during treatment simulation. "Internal motion can affect the accuracy of tumor definition if the CT scan is acquired while the patient is swallowing," he said, referencing a study he worked on with colleagues from M.D. Anderson Cancer Center.

According to Dr. Dong, stereoscopic X-ray imaging and volumetric cone-beam CT imaging, two imaging techniques enabled by Varian's (Palo Alto, CA, USA; www.varian.com) On-Board Imager kV imaging device, make it possible to customize patient positioning just prior to each daily treatment. In addition, frequent imaging can alert clinicians to changes in a patient's anatomy over time, so that a new treatment plan can be developed partway through a course of treatment whenever warranted – a process called adaptive radiotherapy.

"Preliminary studies have shown that combining IGRT and adaptive IMRT replanning can improve the overall quality of the treatment plan, and most importantly, reduce unnecessary doses to normal organs surrounding the tumor, such as the parotid glands and oral cavities," Dr. Dong said. "Combining IGRT with IMRT creates a powerful tool for high precision radiation therapy."

Philips Showcases Interventional X-Ray Radiology Advances

Innovative image-guidance technologies in the field of interventional radiology and oncology are increasing the range and quality of minimally invasive therapies.

Among the solutions Philips Healthcare (Philips, Eindhoven, The Netherlands; www.philips.com) are developing to integrate images from different sources into a single, combined image, are the Allura Xper FD20 biplane mixed cardiovascular X-ray system, which combines a full range of advanced interventional tools and seamless multimodality for catheterization lab integration, offering a balance between superb image quality and low X-ray dose during lengthy procedures. Advanced optional tools support image-guided procedures, allowing clinicians to synchronize live fluoroscopy with previously acquired imaging datasets to help reduce contrast media use and X-ray dose, compared to standard two- (2D) or three-dimensional (3D) navigation.

The PercuNav image fusion and instrument navigation system functions as a global positioning system (GPS) for medical instruments, providing 3D visualization and navigation tools to guide instruments to desired targets, even when the target is hard to see or difficult to reach. The PercuNav tracks the tips of flexible and rigid instruments while inside the patient and displays the instrument position, orientation, and trajectory on preprocedure and intraprocedure images. The system can also generate and display fused multimodality images to leverage

the combined advantages of resolution, contrast, and real-time feedback from different modalities.

A new suite of interventional tools enables computerized tomography (CT)-guided procedures on the Philips Brilliance iCT CT scanner platforms. Two software packages facilitate interventional procedures in the CT gantry room - Continuous CT (CCT) and CT Fluoroscopy. Continuous CT biopsy mode enables the clinician to perform gantry room scans using a foot pedal to keep their hands free to focus on the procedure, and includes a remote monitor for viewing. Each exposure is a 240° axial scan centered beneath the patient, to shield the clinician's hands from direct X-ray exposure. CT Fluoroscopy provides real-time guidance for interventional procedures, at up to eight frames per second. Exposure time and dose displays keep the interventional radiologist aware of exposure levels throughout the procedure while viewing a single-fused image.

"Across most surgical disciplines, minimally-invasive methods are becoming the standard since the procedures can help reduce overall healthcare costs and improve efficiencies," said Bert van Meurs, senior vice president of Interventional X-ray at Philips Healthcare. "However, this growth requires a significant amount of knowledge as techniques and technologies evolve. Built upon our strengths in advanced imaging and long history in collaborative partnerships, Philips is committed to delivering image-guided interventions and



therapy solutions that help ease the demands of complex procedures."

Image: The Allura Xper FD20 X-ray system (Photo courtesy of Philips Healthcare).

Reasonable Alternative to Biopsy of Palpable Breast Lesions Evaluated

Short-term follow-up is a practical alternative to invasive biopsy of palpable breast lesions with benign imaging features, especially in younger women with probable fibroadenoma (noncancerous tumors that frequently occur in women during their reproductive years), according to recent research.

The study detailed in the December 2009 issue of the *American Journal of Roentgenology (AJR)*, was performed at the University of Virginia (Charlottesville, VA, USA; www.virginia.edu), and consisted of a group of 320 women with 375 palpable masses with benign features for which short-term

follow-up was recommended. "We found that only one case of cancer was diagnosed for which short-term follow-up had been recommended," said Jennifer A. Harvey, M.D., lead author of the study.

"Our study of palpable breast lesions with benign features showed an acceptably low prevalence of breast cancer - low that short-term follow-up is a reasonable alternative to biopsy," continued Dr. Harvey. "Application of the results of our study may reduce the number of biopsies that result in benign findings. There is also significant cost savings associated with using short-term follow-up rather than immediate biopsy."

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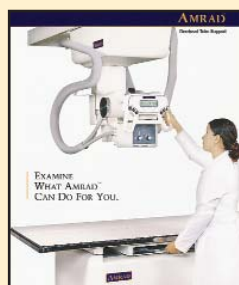
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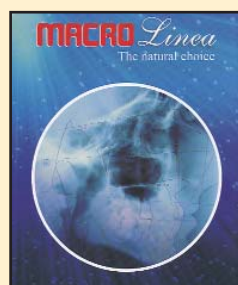
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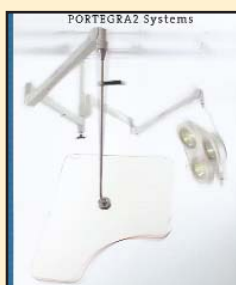
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X-RAY EQUIPMENT Macrotec

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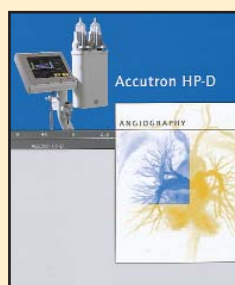
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RADIATION PROTECTION SYSTEM MAVIG

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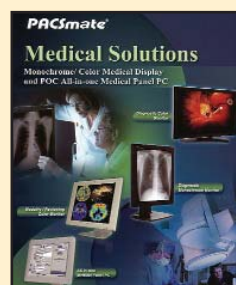
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DOUBLE-HEAD INJECTOR Medtron

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LCD MONITORS PACsmate Technology

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MRI VISIBLE OBTURATOR SenoRx

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Diffusion Tensor Imaging Reveals First Evidence of Brain Rewiring in Children

A new imaging study demonstrated reading remediation improves children's reading skills and positively alters brain tissue.

Carnegie Mellon University (CMU; Pittsburgh, PA, USA; www.cmu.edu) scientists Dr. Timothy Keller and Dr. Marcel Just have uncovered the first evidence that intensive instruction to improve reading skills in young children causes the brain to physically rewire itself, creating new white matter that improves communication within the brain.

As the researchers reported December 9, 2009, in the journal *Neuron*, brain imaging of children between the ages of 8 and 10 demonstrated that the quality of white matter – the brain tissue that carries signals between areas of grey matter, where information is processed – improved substantially after the children received 100 hours of remedial training. After the training, imaging indicated that the capability of the white matter to transmit signals efficiently had increased, and testing showed the children could read better.

"Showing that it's possible to rewire a brain's white matter has important implications for treating reading disabilities and other developmental disorders, including autism," said Just, the professor of psychology and director of Carnegie Mellon's Center for Cognitive Brain Imaging (CCBI).

Dr. Thomas R. Insel, director of the National Institute of Mental Health, agreed. "We have known that behavioral training can enhance brain function. The exciting breakthrough here is detecting changes in brain connectivity with behavioral treatment. This finding with reading deficits suggests an exciting new approach to be tested in the treatment of mental disorders, which increasingly appear to be due to problems in specific brain circuits," Dr. Insel said.

The CMU study was designed to discover what physically alters in the brains of poor readers who make the transition to good reading. They scanned the brains of 72 children before and after they went through a six-month remedial instruction program. Using diffusion tensor imaging (DTI), a new magnetic resonance imaging (MRI) brain imaging technique that tracks water movement in order to reveal the microscopic structure of white matter, Drs. Keller and Just found a brain change involving the white matter cabling that wires different parts of the brain together.

"Water molecules that are inside nerve fibers tend to move or diffuse parallel to the nerve fibers," explained Dr. Keller, a CCBI research scientist and author of the first developmental study of compromised white matter in autism. "To track the nerve fibers, the scanner senses areas in which many water molecules are moving

along in the same direction and produces a road-map of the brain's wiring."

Earlier DTI studies had shown that both children and adults with reading difficulty displayed areas of compromised white matter. This new study shows that 100 hours of intensive reading instruction improved children's reading skills and also increased the quality of the compromised white matter to normal levels. More precisely, the DTI imaging illustrated that the consistency of water diffusion had increased in this region, indicating an improvement in the integrity of the white matter tracts.

"The improved integrity essentially increases communication bandwidth between the two brain areas that the white matter connects, by a factor of 10," Dr. Just said. "This opens a new era of being able to see the brain wiring change when an effective instructional treatment is applied. It lets us see educational interventions from a new perspective."

Out of the 72 children, 47 were poor readers and 25 were reading at a normal level. The good readers and a group of 12 poor readers did not receive the remedial instruction, and their brain scans did not show any changes. "The lack of change in the control groups demonstrates that the change in the treated group cannot be attributed to naturally occurring maturation during the study," Dr. Keller

noted.

Drs. Keller and Just also discovered that the amount of change in diffusion among the treated group was directly related to the amount of increase in phonologic decoding ability. The children who showed the most white matter change also showed the most improvement in reading ability, confirming the link between the brain tissue alteration and reading progress.

Further analyses indicated that the change resulted from a decrease in the movement of water perpendicular to the main axes of the underlying white matter fibers, a finding consistent with increased myelin content in the region. Although the investigators caution that additional research will be necessary to uncover the precise mechanism for the change in white matter, some previous findings indicate a role for electrical activity along axons in promoting the formation of myelin around them, providing a reasonable physiologic basis for intensive practice and instruction increasing the efficiency of communication among brain regions.

"We're excited about these results," Dr. Just said. "The indication that behavioral intervention can improve both cognitive performance and the microstructure of white matter tracts is a breakthrough for treating and understanding development problems."

Imaging Identifies Role of Allergies in Chronic Sinus Disease

Exposing patients with chronic sinus disease to allergens and then obtaining repeated images by X-ray or ultrasound revealed that nasal allergies might be involved in some cases of chronic sinus disease, according to a recent report.

Chronic disease of the maxillary sinus (the sinus cavity located in the mid-face beneath the cheeks, on either side of the nose) is common and affects a wide population of adults and children, according to the study's investigators. "Although the involvement of hypersensitivity mechanisms, and especially of nasal allergy, in chronic disease of the maxillary sinuses has been recognized, the diagnostic procedures for this disorder and the relationship vary," the author noted, in his article published in the December 2009 issue of the journal *Archives of Otolaryngology-Head & Neck Surgery*. "There is a dearth of information regarding the direct causal involvement of hypersensitivity mechanisms of the nasal mucosa and potential consequences within the maxillary sinuses."

Zdenek Pelikan, M.D., Ph.D., from the Allergy Research Foundation (Breda, The Netherlands), evaluated 71 patients with chronic maxillary sinus disease and 16 control individuals with allergic rhinitis but no history of sinus disease. The patients with sinus disease underwent a total of 135 nasal provocation tests, in which allergens were applied to the linings of their nasal cavities, and 71 control challenges in which only phosphate-buffered saline was applied. In the control patients, 16 positive nasal provocation tests were repeated. Before and repeatedly after these tests and challenges, images were taken of the maxillary sinuses using both radiography and ultrasonography. Changes to the skeleton, air fluid level, thickening of the mucus membrane in the sinus, and other parameters were noted.

Of the 71 patients with sinusitis, 67 developed 104 positive nasal responses to the provocation tests. Of these, 89 were accompanied by considerable changes to the maxillary sinus on radiographs and 83 were

also associated with significant changes on ultrasonograms. No significant changes on radiographs or ultrasonograms were noted during the 71 saline control tests on patients with sinus disease, or during the 16 nasal provocation tests conducted on control patients without sinus disease.

"The possible involvement of allergy, and especially of nasal allergy, in some forms of sinus disease has already been reported in the literature," Dr. Pelikan noted in the article. "There are a number of anatomic and physiologic similarities between the nasal mucosa and mucosa of the maxillary sinuses."

The maxillary sinuses open into the nasal canal through a valve known as the ostium. If mucus membranes in the nasal cavity are swollen, the ostium can become blocked, trapping fluids in the sinus.

"In conclusion, nasal allergy may be involved in chronic disease of the maxillary sinuses in some patients," Dr. Pelikan concluded. "Nasal challenge with allergen combined with ultrasonography, and if necessary, also with one of the radiographic imaging methods may be a useful supplement for the diagnosis of this disorder in the clinical practice, especially in children. The confirmation of involvement of nasal allergy in patients with chronic disease of the maxillary sinuses would indicate an additional treatment of the nasal allergy."

Neuroimaging Technique Identifies Patients at Risk for Alzheimer's in Healthy Brains

Brain imaging can offer a window into risk assessment into for diseases such as Alzheimer's disease (AD). A recent study demonstrated that genetic risk is expressed in the brains of even those who are healthy, but carry some risk for AD.

The results of this study were published in the November 2009 issue of the *Journal of Alzheimer's Disease*. Investigators used automated neuroimaging analysis with voxel-based magnetic resonance (MRI) imaging diffusion tensor imaging (DTI) techniques to characterize the impact of an AD-risk gene, apolipoprotein E (ApoE4), on gray and white matter in the brains of cognitively healthy elderly from the KU [University of Kansas] Brain Aging Project.

The investigators discovered that healthy elderly individuals carrying a risk-allele of the ApoE4 gene had reduced cognitive performance, decreased brain volume in the hippocampus, and amygdala (regions important for memory processing), and decreased white matter integrity in limbic regions. These types of brain changes are also found in people with AD. Therefore, brain

changes, typically found in AD patients, are also evident in nondemented individuals who have a genetic risk of later developing AD.

Lead investigator, Robyn Honea, D.Phil., research assistant professor, University of Kansas School of Medicine (Wichita, USA; www.kumc.edu), department of neurology, Alzheimer's and Memory Group, commented, "It is important to note that findings of imaging phenotypes of risk variants, such as with this gene, have been shown in a number of studies. The unique element of our study is that we used several new neuroimaging analysis techniques. In addition, the individuals in our study have been well-characterized in a clinical setting."

This research was conducted in the laboratory of Jeffrey M. Burns, M.D., associate professor in the department of neurology at the University of Kansas Medical Center. He is the director of the Alzheimer and Memory Center and the Alzheimer's Disease Clinical Research Program. Dr. Burns serves as the lead investigator of the Brain Aging Program.

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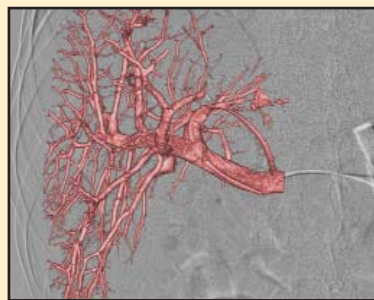
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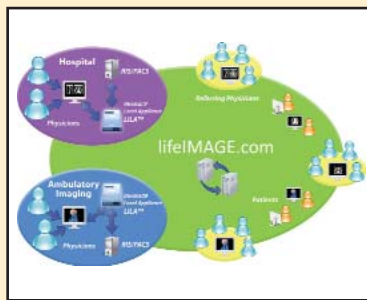
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VISUALIZATION TOOL GE Healthcare

The Innova Vision overlays 2D fluoroscopic images and 3D models from multiple modalities. The application enables the guidance of guide wires, catheters, coils, and other devices by visualizing them in a real-time 3D model.

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TRAUMA IMAGE EXCHANGE LifeImage

The Trauma Image Management & Exchange (TIME) is designed to improve the way diagnostic imaging information is shared during emergency transfers. The TIME tool allows for instant sharing of information between surgical teams and other care providers.

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RIS PACKAGE Medinformatix

The RIS package encompasses scheduling, registration, and technologist and radiologist workflows. Other key benefits of the user-friendly software include billing, EDI, custom reporting, and collections, and it can be easily customized for specific requirements and workflow.

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Breast MRI Technique Enables Enhanced Breast Cancer Detection

A fully automated morphologic system has been designed for the detection and analysis by a radiologist of suspicious breast lesions.

The launch of Invivo Corp.'s (Orlando, FL, USA; www.invivocorp.com) ONCAD for DynaCAD marks the availability of the first U.S. food and Drug Demonstration (FDA)-cleared, system, presented in December 2009 at the Radiological Society of North America 2009 annual meeting in Chicago, IL, USA.

Developed in partnership with leading experts in breast magnetic resonance imaging (MRI), ONCAD for DynaCAD uses a patented mathematical algorithm to analyze the entire breast and draw a physician's attention to abnormal morphology during a contrast-enhanced breast MRI. Not only ONCAD's fractal mathematics and proprietary algorithms enhance the detection of both invasive and noninvasive lesions, but also the approach delineates the extent of the disease by measuring margin sharpness to determine the degree of lesion vascularization. The suspicious lesions are marked with a color overlay, light pink for moderate suspicion and dark pink for highly suspicious lesions, an important data point in a physician's assessment.

Studies have shown that while breast MRI procedures are cost-effective screening techniques for high-risk patients and have a higher sensitivity than mammography, the many images generated have low specificity. ONCAD provides physicians with an objective quantification of the margins of suspicious lesions by employing shape- and texture-based filters to improve specificity. The results are integrated in an automated DynaCAD hanging. Because ONCAD provides physicians with more visual information, they are able to detect suspicious lesions that may be imperceptible to the human eye, thereby improving their diagnostic confidence.

The introduction of ONCAD for DynaCAD is one of several advanced clinical solutions recently brought to market by Invivo Corporation. Early in 2009, Invivo unveiled their DynaCAD for Prostate

solution, combining new analysis and interventional options for patients with elevated or rising prostate-specific antigen (PSA) levels and negative transtrectal ultrasound (TRUS)-guided biopsy results. DynaCAD for Prostate provides the physician with a comprehensive, customizable set of visualization tools for performing real time analysis of prostate MRI studies. DynaCAD for Prostate and DynaTRIM then enable a physician to conduct targeted MRI interventions of suspicious areas within the prostate gland, reducing the number of cores acquired during biopsy.

Compared to published cancer yield rates of up to 15% with third TRUS-guided biopsies, DynaCAD for Prostate produces a 59% detection rate with a maximum of four MRI-guided biopsy cores.

In 2009, Invivo announced the release of three new technologies: their Luminescence Breast Coil System, DynaCAD version 2.1 with QuickClick Segmentation, and DynaSuite Neuro Advanced MR Workstation.

Invivo designed the Luminescence Breast Coil system, a modular diagnostic and interventional coil set that provides improved image uniformity, and performance and superior signal to noise ratio. The 16-channel system provides quality images, ease of use, and excellent patient experience as breast MRI procedures increase for screening high-risk populations.

DynaCAD version 2.1 with QuickClick Segmentation was previewed at the RSNA annual meeting in 2008. The software platform maintains the core functionalities that offer speed, power, flexibility, features quantification tools, rendering, and BI-RADS Reporting making it easier for a physician



to read MRI studies and generate reports. QuickClick Segmentation offers a visualization system with automated site-specific measurements, snapshots, and finding reports while maintaining the ability for a physician to customize their reading and reporting style.

The DynaSuite Neuro Advanced MR Workstation is a high-performance solution for the rapid and repeatable interpretation of MR Neuro images. The solution is capable of integrating anatomical, functional MRI (fMRI), and three-dimensional (3D) vascular imaging with basic analysis to produce a dynamic, 3D model within the SmartFusion review.

Invivo is a pioneer of progressive MRI coils, clinical visualization systems, and MRI-compatible interventional devices. Invivo designs, manufactures, and markets value-added medical instruments that enhance MR image quality, improving physicians' diagnostic confidence and patients' imaging experience.

Image: A screenshot of ONCAD for DynaCAD (Photo courtesy of Invivo).

Software Management Solutions Boost Hospital Efficiency

Integrated surgical, anesthesia, recovery room, and emergency department (ED) software solutions offer high-acuity care automation, promoting patient safety and enhancing hospital efficiency.

The Picis CareSuite family of high-acuity solutions includes, among others, the Picis ED PulseCheck, a comprehensive emergency department information system (EDIS) that allows control of virtually every aspect of the ED, including helping caregivers promote safer care delivery and decrease the risk of litigation by reminding them to document important items that ensure proper care, particularly for high-risk patients. Examples include reminders for reevaluation and vital sign range checks (when discharging a patient with abnormal vital signs) and reminders for open orders when discharging or admitting patients.

The Picis operating room (OR) Manager is a comprehensive OR documentation management system that automates patient data and caregiver workflow throughout the surgical process, including enterprise-wide patient and surgical team scheduling and tracking, preference card maintenance, nursing documentation, supply chain management, cost tracking and management, and much more.

The Picis SmarTrack is an interactive tool that speeds and simplifies the tracking of surgical patients through the perioperative process, from the patient's arrival in the perioperative suite through discharge. It tracks the status and locations of patients and resources, and compares their progress to user-defined care paths and critical checkpoints. The proactive system notifies staff when a patient is not moving predictably through the perioperative process.

The Picis Anesthesia Manager helps clinicians manage large volumes of data in the OR by assembling critical data for a complete overview of the patient's status. By automating the intraoperative and postoperative recovery anesthesia documentation, the Anesthesia Manager provides a more complete, accurate, and legible record that enhances accountability and saves both time and money.

The Picis Perioperative Dashboard helps increase OR efficiency by allowing real-time queries resulting in cross-facility visual indicators, covering key aspects of perioperative efficiency. This includes delays and turnaround time analysis, as well as quality aspects such as surgical care initiative compliance, concurrency, and patient satisfaction. Nursing staff can use this information to positively impact the day's schedule, and nursing directors can view incomplete documentation and billing completeness; surgeons can check on how a delay will impact their case start, and anesthesia care providers can check that concurrencies are appropriate and case times do not overlap.

"Within six months of implementing PulseCheck in the emergency department, we decreased patient wait time by an hour and captured \$1.5 million in additional charges - paying for the system," said Dino Rumoro, D.O. of Rush University Medical Center (Chicago, IL, USA;

www.rush.edu). "We can pinpoint where patients are spending their time and improve our processes and patient throughput. Our staff has the option of transferring patients to various areas of the emergency department based on the patient's level of acuity, therefore averting long delays and maximizing staff productivity."

The Picis CareSuite family of products, which also include a Critical Care Manager, the Extelligence OR and Anesthesia Managers, and other modules, are a product of Picis (Wakefield, MA, USA; www.picis.com).

Image: A screenshot from the Picis Operating Room Manager software solution (Photo courtesy of Picis).

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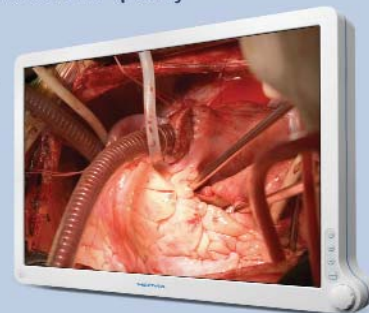
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TRACKING CAMERA NordicNeuroLab

The EyeTracking Camera provides the hardware to produce a video of the subject's eye in an MR environment. The obtained composite video signal can be used to monitor or, with the help of sys tracking software, record and analyze eye movements.

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IMAGING WORKSTATION Royal Philips Electronics

The Integral Breast Workspace includes the MammoDiagnost VU, multi-modality breast applications, and DynaCAD Enterprise Solutions for enhanced data analysis. The system is designed to address the need for integrated image and information management.

LINKXPRESS.COM MII-04-10 238



MEDICAL DISPLAY Projection Design

The F22 Wuxga medical features DICOM compliance and preloaded medical calibration settings. User-friendly software allows for remote monitoring and control of multiple projectors, including automated calibration of displays.

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DR SOFTWARE SERVICE Siemens Healthcare

The syngo CXR CAD Software as a Service (SaaS) is designed for DR system users to receive CAD results via remote processing. The service is intended to simplify user workflow, as well as increase efficiency and productivity.

LINKXPRESS.COM MII-04-10 240

Medical Imaging Repository Enables Access to Longitudinal EHRs

A unified, patient-centric longitudinal electronic health record (EHR) data center streamlines clinicians' access to medical images and results.

The Agfa IMPAX Data Center delivers enterprise visualization of clinical imaging data, providing the EHR with a centralized clinical imaging repository. Interoperability is achieved by adhering to and leveraging the Integrating the Healthcare Enterprise (IHE) technical framework (www.ihe.net) and supporting a vendor-neutral view of previously fragmented healthcare information. An added benefit is the solution's efficient information technology (IT) infrastructure, which can contribute to lower cost for information-driven EHRs, health information exchanges (HIEs), and comparative research.

The IMPAX Data Center solution also helps providers achieve meaningful use and qualify for

incentives available through the American Recovery and Reinvestment Act (ARRA), addressing 13 specific ARRA requirements, including clinical decision support at the point of care, medical device interoperability, multimedia support, dynamic and ad-hoc quality reports, protection of sensitive healthcare information, implementation of one clinical decision rule, and electronic exchange of clinical information. The Agfa IMPAX Data Center is a product of Agfa HealthCare (Mortsel, Belgium; www.agfa.com/healthcare).

"Agfa HealthCare's IMPAX Data Center integrates diagnostic imaging and data silos throughout an enterprise, allowing a single point of integration for the EHR, as well as a single point of access for specialists and referring and primary



care physicians," said Don Dennison, director of eHealth and regional health business at Agfa HealthCare. "Providers have an unprecedented opportunity to view patient data in one integrated solution in their EHR or EMR (Electronic Medical Record)."

Image: The Agfa IMPAX Data Center (Photo courtesy of Agfa HealthCare).

PACS Updated with DICOM Interface Implementation Toolkit

A picture archiving and communications system (PACS) now has a toolkit with the latest Digital Imaging and Communications in Medicine (DICOM) standard supplements.

Merge Healthcare (Milwaukee, WI, USA; www.merge.com) announced the release of MergeCOM-3 Version 4.1, with the latest standard supplements to its industry-leading DICOM interface implementation toolkit. As a member of the DICOM Standards Committee, Merge has maintained a policy of incorporating all significant changes to the DICOM standard within three months of adoption by the Committee.

"This release of MergeCOM-3

further demonstrates the investment we are making into standards-based interoperability and health information exchange," said Justin Dearborn, CEO of Merge Healthcare. "Driving early adoption of standards in specialized areas such as ultrasound CAD [computer-aided detection] is a critical first step in delivering a cost-effective and relevant IT infrastructure for healthcare providers."

Version 4.1 adds support for the following DICOM standard supplements: Supplement 43 – storage of three-dimensional 3D ultrasound images; Supplement 119 – instance and frame level retrieve SOP [standard

operating procedure] classes; Supplement 126 – colon computer-aided detection SR SOP Class.

Additionally, the MergeCOM-3 HL [Health Level] 7 Toolkit now provides full dictionary support for all v2 releases of the standard, giving customers the ability to implement interfaces for any HL7-enabled medical device or information system.

Because of its dedication to the advancement of open standards software development, MergeCOM-3 is widely used in medical devices and systems today. Earlier in 2009, Merge added support for the HL7 standard as well, making the MergeCOM-3 toolkit the only source for DICOM/HL7

development. MergeCOM-3 is available for a variety of operating systems and programming platforms, including Microsoft Windows XP, Microsoft Windows Vista, Linux and Unix operating systems; C/C++, C#/.Net, and Java programming platforms; supporting both 32- and 64-bit run-time environments. The most recent version of MergeCOM-3 toolkit and related documentation is available for download at www.mergecom3.com.

Merge Healthcare develops software systems that automate healthcare data and diagnostic workflow to create a more comprehensive electronic record of the patient experience.

Siemens Releases PACS System for Image and Video Analysis

A new picture archiving and communications system (PACS) software package provides easy access to visuals from computerized tomography (CT), magnetic resonance imaging (MRI), and ultrasound sources.

The Siemens syngo.plaza automatically identifies the type of source image used and then, in line with the case complexity, calls up the corresponding 2D, 3D, or 4D applications. Through no-click integration to syngo.via – a proprietary imaging software – users can then access the appropriate syngo.via applications directly through syngo.plaza. Combined with a unified user-interface, this allows for a smooth transition between different applications, helping to speed up the reading workflow. Users can also use syngo.plaza to master complex multimodality cases through access to syngo.via and

syngo multimodality workplace applications. Patient jacket functionality makes it easy to view patient history at a glance, including prior exams, reports, and digital imaging and communications in medicine (DICOM) presentation states.

Siemens syngo.plaza offers two viewing modes for users; the first is a preconfigured intuitive interface, and the second is a customizable option that allows users to define and use the layouts they prefer. The timesaving SmartSelect tool enables users to access their most frequently used functions directly in the diagnostic screen, without taking their eyes off the images. Additionally, syngo.plaza's innovative system architecture allows clinicians to access the software either within their facility or remotely. The Siemens syngo.plaza is a product of Siemens Healthcare (Erlangen, Germany;



www.siemens.com/healthcare).

"Customer-focused innovation runs in our veins here at Siemens, and syngo.plaza is a true example of that," said Arthur Kaindl, CEO of image and knowledge management at Siemens Healthcare. "For the first time, we are now offering fast and accurate multimodality reading on one single workplace, with one intuitive user interface. And we are helping to protect our customers' investment, as already existing hardware components can be leveraged."

The Siemens syngo.plaza offers users the ability to leverage their existing hardware components, func-

tionality, and storage configurations. In addition, users can easily adapt to changes in their own environment, enabling their PACS to grow in-line with their needs and budget. Scalable storage allows syngo.plaza to adjust its shape to users' requirements, offering multiple solutions ranging from dedicated to shared storage, from single to multiple archives, and from a single workplace to an enterprise PACS, all without compromising performance.

Image: The Siemens syngo.plaza PACS solution (Photo courtesy of Siemens Healthcare).

EMR System Increases Patient Compliance

An electronic health record (EMR) platform facilitates provider adoption while improving quality, streamlining workflow, reducing costs, and improving patient observance of treatment regimens.

The AssistMed Duet and Orchestra integrated Software as a Service (SaaS) platforms include a certified EMR, a personal health record and patient adherence-management module, a practice management system, digital pen-forms, dictation with speech recognition, and natural language processing. The core of the system is AssistMed Exchange, an EMR that facilitates all functions for those who dictate, transcriptionists, editors, and managers. It is highly scalable and can be interfaced with virtually any other healthcare information system (HIS). The Exchange is the hub for forms integration, document management, research inquiries, coding applications, and other related healthcare management tasks. AssistMed also offers a transcription and editing service that has the advantage of an integrated exchange dictation and transcription platform with back-end speech recognition, which also enables an interface with other information systems.

The Duet and Orchestra integrated software platforms are products of AssistMed (Beverly Hills, CA, USA; www.assistmed.com), and have been certified by the U.S. Certification



Commission for Health Information Technology (CCHIT; Chicago, IL, USA; www.cchit.org). They also qualify for U.S. federal reimbursement for the adoption of EMR systems before 2015.

"We are committed to providing physicians with an electronic medical records platform that meets or exceeds established standards. Our solution is flexible enough to conform to a physician's existing workflow with a unique technology that leads to faster adoption and higher productivity," said Leonardo Berezovsky, M.D., CEO of AssistMed.

The American recovery and reinvestment act (ARRA) stimulus package was enacted by the 111th United States Congress in February 2009, based largely on proposals made by President Barack Obama and is intended to provide a stimulus to the U.S. economy in the wake of the economic downturn. The measures are nominally worth US\$787 billion, of which \$19 billion is earmarked for healthcare technology. The act also includes federal tax cuts, expansion of unemployment benefits and other social welfare provisions, and domestic spending in education, health care, and infrastructure, including the energy sector. As of the end of August 2009, 19% of the stimulus had been outlaid or gone to American taxpayers or business in the form of tax reductions.

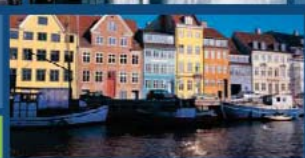

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DIAGNOSTIC SOFTWARE TomTec Imaging Systems

The M'ATH solution enhances the accuracy of arterial measurements in vascular examinations. The software is intended for use in the advanced analysis of atherosclerosis (IMT, distensibility, plaque analysis), to provide accurate results.

LINKXPRESS.COM MII-04-10 241



MAMMOGRAPHY DISPLAY Totoku

The MS51i2 5MP display features calibration function, as well as simultaneous display of 1276 shades of gray. Other key benefits include hardware pivot function, dual link input, LED indicator, stabilizing system, high contrast, and wide viewing angle.

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INTERACTIVE PEN DISPLAY Wacom

The DTZ-2100 offers a viewing angle of 170° and adjustable stand rotation and recline for a range of comfortable working positions. The display's pen is cordless and battery-free, allowing for enhanced performance and user productivity.

LINKXPRESS.COM MII-04-10 243



VISUALIZATION SOFTWARE Ziosoft

The Ziostation features thin-client architecture that eliminates the need for stand-alone workstations or specialized servers. The software can meet specific needs, minimizes network traffic by streaming only requested data, and enhances workflow and user proficiency.

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4K Technology Provides Most Accurate View Inside the Human Body

Ultra-high resolution digital cameras with 4,096 (4K) lines of resolution, four times the resolution of high definition (HD), are providing unprecedented realism to surgery documentation.

Steven F. Palter, M.D., an obstetrician, gynecologist, reproductive endocrinologist and fertility specialist at North Shore Syosset Hospital (NY, USA; www.northshoreli.com), in conjunction with RED Digital Cinema Camera Company (Lake Forest, CA, USA; www.red.com), Sony Electronics (Tokyo, Japan; www.sony.com), and the University of Southern California Cinema Arts School (Los Angeles, USA; cinema.usc.edu), presented a demonstration of endoscopic gynecologic surgery documented for the first time using a RED one digital camera with 4K technology.

The diagnostic images were presented in a specially built digital theater with a projector designed to run "ultra-HD" movies in high-end movie theatres. The images from that surgery were shown at the 65th annual meeting of the American Society for Reproductive Medicine (ASRM), held during October 2009 in Atlanta (GA, USA), with the 3,500 reproductive medicine specialists in attendance able to visualize the surgery as if they were standing in the operating room.

"Through the use of this digital



technology, Hollywood is moving from observation to immersion – you're not just watching something, you are there," said Dr. Palter. "The images are the sharpest, most detail-rich and color-correct endoscopic images ever created anywhere; there is not a more accurate view inside the human body. It's a prime example of how Hollywood film technology can be used to transform medicine by enabling doctors to see more accurately inside the body to study and treat disease."

The session also included a projection of the largest HD three-dimensional (3D) surgical images ever, generated by a method developed to attach the Red One 4K camera to a laparoscope. The images were converted into a 4K digital cinema movie that was projected on the top-of-line Sony SRX-R220 projector.

Image: The RED ONE digital camera (Photo courtesy of RED Digital Cinema Camera Company).

Mobile Access Device Delivers Images to iPhones, Blackberrys

A fast and convenient imaging application runs through a mobile device's browser with no additional software installation required. AccelarAD (Atlanta, GA, USA; www.accelarad.com) introduced mobile.accelarad.com at the 95th Scientific assembly and annual meeting of the Radiological Society of North America (RSNA), held from November 29 to December 3, 2009, in Chicago, IL, USA, providing the power and convenience of handheld device access to images stored on its SeeMyRadiology.com (www.SeeMyRadiology.com) cloud-based imaging platform.

Authorized users simply log into the SeeMyRadiology.com website where they are presented with access to the images they are authorized to view. All information is transmitted encrypted via https for security, and the system is fully Health Insurance Portability and Accountability Act (HIPAA)-compliant. "Today, physicians are more mobile than ever before within the health-care environment and beyond. Medical images are a crucial part of how they practice medicine," said Arman Sharafshahi, president of AccelarAD. "However, image access on handheld devices has typically been difficult because of large image file size and frequent storage in multiple locations using different image management systems."

Now, with SeeMyRadiology.com and mobile.accelarad.com, according to Mr. Sharafshahi, accessing images anywhere is simple across the entire spectrum of care, from radiologists and physicians to patients. After SeeMy

Radiology.com users store images on the SeeMyRadiology cloud archive, they may be accessed by any authorized user who logs into the AccelarAD website. "Universal image access is that easy with SeeMyRadiology.com," said Mr. Sharafshahi.

Mobile.accelarad.com's performance has been tested on the most recent iPhone and Blackberry product releases. Introduced in 2009, SeeMyRadiology.com is a complete Software as a Service (SaaS) solution that eliminates the barriers inherent in most picture archiving and communications system (PACS) solutions to image access across departments within the enterprise and among unrelated entities. Unlike other solutions, SeeMyRadiology.com is a true multitenant SaaS with built in encryption and compression for image routing, sharing, viewing, and archiving.

SeeMyRadiology.com provides high levels of data security and requires no expensive information technology (IT) maintenance. Once a study is easily uploaded into the SeeMyRadiology.com cloud, each of the four care-spectrum groups has access to the data and cloud tools and services customized to their needs.

Accelarad is a medical imaging cloud computing company. Its flagship product, SeeMyRadiology.com, is changing the way hospitals, physicians, and patients share, access and work with diagnostic images. Accelarad was the first in the imaging industry to provide cloud-computing solutions.

Software Solution Allows Enhanced Oncology Patient Management

A comprehensive chemotherapy software solution enables patients to become more involved in managing their own care. The Aria Medical Oncology system is an all-inclusive information and image management system that aggregates patient data into a single, organized, oncology-specific medical chart, helping clinicians effectively manage treatment for patients undergoing medical or radiation therapies. Automated cancer staging, pharmacy preparation and dispensing, and full clinical trials back-office support simplify oncology processes. A rule-based decision engine includes automated safeguards that check for potential contraindications and dose limits, and recommends dose delays for chemotherapy (if advisable), based on accepted treatment guidelines.

The system supports digital imaging and communications in medicine (DICOM), which facilitates the transfer of digital medical images, radiation therapy treatment plans, and patient history data between systems. Aria supports conventional

computerized tomography (CT), cone-beam CT, Positron emission tomography (PET), and magnetic resonance imaging (MRI) images for precise and consistent patient setup. An interface engine uses industry-standard HL7 communication protocols to exchange patient records with other hospital and clinical information systems. By delivering data and information from pharmacy, laboratory, pathology, radiology, and hospital information systems, the Aria system helps the caretaker staff make informed patient treatment decisions. The Aria for Medical Oncology system is a product of Varian Medical Systems (Palo Alto, CA, USA; www.varian.com)

"The system's toxicity evaluation sheet records the side effects a patient has when taking chemotherapy and we can record how well they are and how much they weigh each time they come in for a consultation," said Claire Blessing, M.D., consultant clinical oncologist at Churchill Hospital (Oxford, United Kingdom; www.churchilljv.com), who is coordinating the implementation of the system in the UK's Thames Valley Cancer Network. "This is all on the same patient record as you use to prescribe chemotherapy. So, when a patient is with me, I have it displayed on the screen in front of me and the patient can also see it. We also give the patient a record book to take home and they become much more involved in managing their treatment."

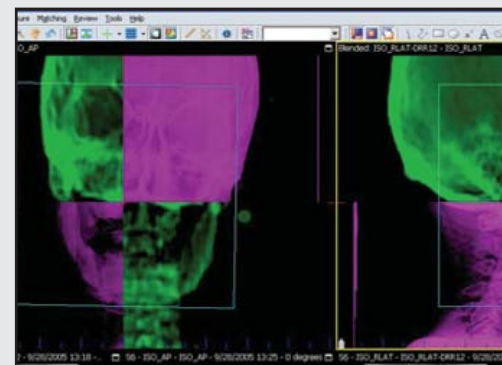


Image: A screenshot from the ARIA medical oncology system (Photo courtesy of Varian Medical Systems).

Workflow System Designed to Meet Accreditation Requirements

A picture archiving and communication system (PACS) has been integrated with communication and workflow tools to help radiology departments meet accreditation requirements. Agfa HealthCare (Mortsel, Belgium; www.agfa.com/healthcare), a leading provider of information technology (IT)-enabled clinical workflow and diagnostic imaging solutions, reported that it has expanded its technical integration of Impax 6.0 radiology PACS with qiVue and caseVue workflow, quality improvement, and communications products from peerVue (Sarasota, FL, USA; www.peervue.com), a provider of niche healthcare software solutions.

Agfa HealthCare will become a reseller for peerVue's qiVue, a workflow, quality, and communication system, and caseVue, a teaching file and content management solution, enabling Agfa HealthCare to offer qiVue and caseVue to its Impax radiology PACS customers. The integrated Agfa HealthCare/peerVue solution allows radiology departments to meet increased regulatory and quality challenges while providing an easy-to-use, tightly integrated workflow.

The solution helps enable radiology departments to meet requirements for accreditation by the American College of Radiology (ACR; Reston, VA, USA) and is in compliance with The Joint Commission's [U.S.] National Patient Safety Goals. The functionality includes critical results reporting, peer review, emergency department discrepancy management, technologist quality control,

and teaching files.

"Teaming with peerVue supports our strategy of providing customers with the tools and the technology they need to improve the delivery of patient care and efficiency," said Lenny Reznik, director, enterprise imaging and information, Agfa HealthCare, U.S. "It allows them to comply more easily with recent changes in accreditation requirements, using a streamlined workflow. This single-vendor integrated solution helps meet customer needs to support best practices while reducing complexity."

QiVue and caseVue are integrated into IMpax workflow, providing physicians with single sign-on access to peerVue's web-based applications directly from the Impax desktop and allowing them to launch their Impax viewer from peerVue's application. This allows radiologists to be more efficient through simple point-and-click reporting of study discrepancies and other quality control and communication-related activities directly from the Impax desktop.

"Agfa HealthCare and peerVue have expanded their relationship, recognizing the growing need of healthcare providers to have tools and technologies that make it easier to track, report, and notify referring communities and accreditation organizations of critical results and quality related events," said Kyle Lawton, president and CEO of peerVue LLC.

PeerVue provides software and service solutions to integrate, streamline, and distribute clinical informa-

tion and images across the healthcare enterprise. PeerVue strives for continuously measurable improvements in healthcare practice by assisting both IT vendors and care delivery organizations in delivering care with measurably increasing levels of quality.

Agfa HealthCare, a member of the Agfa-Gevaert Group, is a provider of IT-enabled clinical workflow and diagnostic image management solutions, and systems for capturing and processing images in hospitals and healthcare facilities.

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Covidien Announces New Source for Vital Medical Isotopes

Covidien (Dublin, Ireland; www.covidien.com), a leading global provider of healthcare products, and the Polish Institute of Atomic Energy (IAE POLATOM; Otwock-swierk, Poland; www.iea.cyf.gov.pl/nowa/index.ph) have announced an agreement to augment and further diversify Covidien's supply of molybdenum 99 (^{99}Mo).

The addition of the IAE POLATOM'S Maria research reactor to Covidien's global supply chain is expected to help Covidien deal with the worldwide supply shortage of ^{99}Mo , used to produce the medical isotope Technetium 99m ($^{99\text{m}}\text{Tc}$), a vital medical isotope used in over 80% of all nuclear medicine diagnostic and functional studies of organs and anatomical systems. The Maria research reactor, located approximately 30 km southeast of Warsaw (Poland), first operated from 1975 until 1985, when it was taken off line for a complete redesign; the reactor resumed normal operations in 1993. Maria is thus considered a relatively new reactor, compared with the other five aging reactors that supply most of the world's medical isotopes.

The announcement was made just two days before the High Flux Reactor (HFR) in Petten (The Netherlands) was scheduled to begin a six-month shutdown for planned repairs. The remaining operating reactors supplying Covidien are the BR2 reactor in Belgium, the Osiris

reactor in France, and the Safari reactor in South Africa. Canada's National Research Universal (NRU) reactor has been shut down for repairs since May 2009. When both were operating, the HFR and NRU reactors typically provided approximately 65% of the world's supply of medical isotopes. "This is an historic agreement. It is the first time in decades that a new reactor has been brought into the global supply chain for medical isotopes," said Timothy R. Wright, president of the pharmaceuticals division of Covidien. "We are excited that we will now be working together to provide more than a million patients around the globe with access to a critical medical isotope during this serious shortage."

$^{99\text{m}}\text{Tc}$ is a metastable nuclear isomer of technetium-99, meaning that it does not change into another element (transmute) upon its decay. $^{99\text{m}}\text{Tc}$ is a gamma ray emitting isotope used in nuclear medicine imaging procedures such as single photon emission computed tomography (SPECT), and is well suited to the role since it emits readily detectable 140 keV gamma rays, which is close to the wavelength emitted by conventional X-ray diagnostic equipment. Half-life for gamma emission is six hours, meaning that 93.7% of $^{99\text{m}}\text{Tc}$ decays to ^{99}Tc in just 24 hours. This short half-life of the isotope allows for scanning procedures, which collect data rapidly, but keep total patient radiation exposure low.

Merge Healthcare Announces Partnership with Orion Health

Merge Healthcare (Milwaukee, WI, USA; www.merge.com) has announced that it has signed a reseller agreement with Orion Health (Santa Monica, CA, USA; www.orionhealth.com), a leading provider of clinical workflow and integration solutions in healthcare. Orion Health has licensed Merge technology to bring medical images and information into its physician portal solutions.

The portal platform provided by Merge, called Cedara WebAccess, provides access to radiology results and images from anywhere within a health information exchange (HIE), without opening separate applications or copying data. The images and information are displayed within a "zero-client" HIE portal that is intuitive and requires no additional hardware or bandwidth.

"We are thrilled to work with Orion Health to bring more comprehensive diagnostic data into their

solutions," said Antonia Wells, president of Merge's original equipment manufacturer (OEM) business. "This partnership is a further affirmation of the value in our standards-based integration approach, multisource data consolidation and zero-footprint viewing technology. We believe it will provide Orion Health customers like hospitals and HIEs with a quick return on investment."

"An integrated medical record helps healthcare organizations improve the quality of care by bringing more complete information into medical decision making at the point of care," said Paul Viskovich, president of Orion Health North America. "Our customers find that images are a particular challenge, and have been asking us for imaging integration. Merge's extensive experience in this arena makes them the best partner to help us deliver this to our customers."

Ultrasound Market in India Projected to Grow

In 2008, the ultrasound market in India was valued at US\$108 million. It is forecast to grow at a compound annual growth rate (CAGR) of 13% over the next seven years to reach \$250 million in 2015, according to a recent market report. During this period, the market is expected to be driven by a rapidly developing healthcare infrastructure in rural India and the increasing use of portable ultrasound systems in new applications such as critical care and vascular surgery.

GE Healthcare (Chalfont St. Giles, UK) leads the ultrasound systems market in India with a 33% market share in terms of revenue. GE maintains its leadership largely due to its broad product pricing range. GE's sales efforts are equally focused on both its high-end and low-end systems. The company keeps gaining market share in terms of units due to its large customer base that buys low-end systems. Philips Healthcare (Best, The Netherlands), Siemens Healthcare (Erlangen, Germany), and Toshiba Medical (Tokyo, Japan) follow GE with a combined share of 39%. These companies rely on brand loyalty and extended service contracts for their customers. Other companies include Hitachi (Tokyo, Japan), Esaote (Genova, Italy), Larsen & Toubro (L&T; Mumbai, India), Sonosite (Bothell, WA, USA),

and Mindray Medical (Shenzhen, China).

The demand for miniaturization of ultrasound systems, improved handling of the devices, a decreasing price trend, and the use of ultrasound as a primary screening method for breast cancer will be the key factors influencing and driving the volume of ultrasound procedures in India.

High import duties and the misinterpretation of the prenatal diagnostics techniques (PNDT) Act will remain the challenges faced by the ultrasound systems market in India, according to the report analysts. However, with a booming population, an increased awareness of the advantages offered by portable color ultrasound systems, and an ever increasing number of radiologists and physicians, India will continue to present growth and investment opportunities for ultrasound manufacturers in the future, the analysts reported.

The market report was published by Bharat Book Bureau (Navi Mumbai, India; www.bharatbook.com). Bharat Book Bureau, a market research information aggregator, provides reports, company profiles, newsletters, country information, and online databases to corporate, consulting firms, academic institutions, government departments, and agencies, globally, including India.



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Agfa to Acquire European Contrast Media Company

Agfa Healthcare (Mortsel, Belgium; www.agfahealthcare.com) is expanding their radiology systems offering with a new range of pharmaceuticals for diagnostic imaging.

Agfa HealthCare, a leading provider of diagnostic imaging and healthcare information technology (IT) solutions, reported that it has signed an agreement with Curagita Holding, AG (Heidelberg, Germany; www.curagita.net) to acquire all the shares of its subsidiary Insight Agents, GmbH (Heidelberg, Germany; www.insight-agents.com). Insight Agents is a European developer and producer of contrast media, with business activities primarily in Germany. The final acquisition price is expected to be approximately EUR 10 million.

Contrast media are chiefly used during medical imaging examinations with X-rays, computed tomography (CT) scans, and magnetic resonance imaging (MRI), either to highlight specific anatomic structures (mostly vessels) or to perform functional imaging. Contrast media is now a multibillion Euro market served by both large and small companies.

"The purchase of Insight Agents is an important strategic step towards future growth opportunities," stated Christian Reinaldo, president of Agfa HealthCare. "Agfa HealthCare is a strong player in the radiology market with both Imaging and IT solutions. Today, we further enhance our diagnostic imaging business with a set of products that are increasingly used for diagnostic imaging procedures. These products are a logical addition to our portfolio of film, chemicals, and printers and will be distributed through our extensive logistics and dis-

tribution network."

"The acquisition of Insight Agents allows us to offer to our customers a broader range of products for medical imaging," stated Dirk Debusscher, vice president imaging at Agfa HealthCare. "Agfa HealthCare has always been a leader with its film and print solutions. The decision to purchase a new line of business was made to ensure that we continue to offer a range of diagnostic imaging products over which we have full control, enabling us to deliver the highest quality radiology solutions, on time, all of the time."

Curagita Holding is the leading independent radiology services company in Germany, managing a cooperative radiology group of 300 radiologists. The objectives of the cooperative are to save costs, to implement quality combines, and to use marketing and contracting synergies as a powerful group generating value added for referring doctors, patients, and insurances. By group purchasing of contrast agents, consumables and equipment/IT,

including maintenance contracts, the costs of participating radiologists as well as of health insurances are significantly reduced.

Insight Agents develops, produces, and markets contrast media. The company headquarters is located in Germany, which is the biggest national contrast media market in Europe. Further branches of the company, which are headed by experienced industrial managers, are located in Belgium, France, UK, Italy, Austria, Switzerland, Spain, Mexico, and other countries. Insight Agents plans to extend its product range to include a full and globally marketable range of generic contrast media.

Agfa HealthCare, a member of the Agfa-Gevaert Group, is a provider of IT-enabled clinical workflow and diagnostic image management solutions, and systems for capturing and processing images in hospitals and healthcare facilities. The healthcare division has sales offices and agents in over 100 markets worldwide.

Varian to Assemble X-Ray Tubes in China

Varian Medical Systems, Inc. (Palo Alto, CA, USA; www.varian.com), a supplier of X-ray tubes and flat panel digital image detectors, has been given certification to assemble and service X-ray tubes in China to support its growing customer base of X-ray equipment manufacturers and service organizations.

Varian's facility in China will use and support the state-of-the-art X-ray tube technology and imaging components developed at the company's X-Ray Products headquarters in Salt Lake City, UT, USA.

Varian X-Ray Products manufactures its X-ray tubes and flat panel detectors for digital imaging at its plant in Salt Lake City. In addition to the new facility in Beijing, Varian's X-Ray Products group assembles and services X-ray tubes in Willich, Germany, and in Charleston, SC, USA, where its aftermarket business is headquartered. Varian's Beijing facility also produces systems for treating cancer with radiotherapy and radiosurgery.

Varian X-Ray Products is a supplier of X-ray tubes and digital detectors for X-ray imaging in medical, dental, veterinary, scientific, and industrial applications. X-Ray Products is a business unit of Varian Medical Systems. Varian is a world-leading manufacturer of medical devices and software for treating cancer and other medical conditions with radiotherapy, radiosurgery, proton therapy, and brachytherapy.

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110th Annual Meeting of the American Roentgen Ray Society. May 2-7; San Diego, CA; USA; Web: www.arrs.org

ICR 2010 - 26th International Congress of Radiology. May 9-12; Shanghai, China; Web: www.icr2010.org

91st German Radiology Congress. May 12-15; Berlin, Germany; Web: www.drg.de

7th Annual Sports Medicine Imaging Conference. May 13-15; New York, NY, USA; Web: https://tools.med.nyu.edu/RadCourses

American College of Radiology (ACR) Annual Meeting & Chapter Leadership Conference. May 15-19; Washington DC, USA; Web: http://acr.org

48th Annual Meeting of the American Society of Neuroradiology (ASNR) & NER Foundation Symposium 2010. May 15-20; Boston, MA, USA; Web: www.asnr.org/2010

39th Annual Meeting of the Japanese Society for Interventional Radiology. May 20-22; Tokyo, Japan; Web: www.

secretariat.ne.jp/ivr2010

Cardiovascular CT, Concord Conference. May 21-22; Sydney, NSW, Australia; Web: www.cctatconcord.com

HOSPITALAR 2010. May 25-28; Sao Paulo, Brazil; Web: www.hospitalar.com

18th Annual Meeting of the European Society of Thoracic Imaging. May 28-30; Bern, Switzerland; Web: www.essti-society.org

JUNE 2010

ESGAR 2010 - European Society of Gastrointestinal and Abdominal Radiology. June 2-5; Dresden, Germany; Web: www.esgar.org

SIIM 2010 - The Society of Imaging Informatics in Medicine - Annual Meeting. June 3-6; Minneapolis, MN, USA; Web: www.siim2009.org/siim2010

2010 Annual Meeting of the Society for Nuclear Medicine (SNM). June 5-9, Salt Lake City, UT, USA; Web: www.snm.org

UKRC 2010 - United Kingdom Radiological Congress. June 7-9; Birmingham, UK; Web: www.ukrc.org.uk

47th Annual Meeting of The European Society of Pediatric Radiology. June 7-11; Bordeaux, France; Web: www.espr2010.org

International Conference on Complications in Interventional Radiology (ICCIR 2010). June 10-12; Pörschach, Austria; Web: www.iccir2010.org

SIRM 44th National Congress - Società Italiana di Radiologia Medica. June 11-15; Verona, Italy; Web: www.sirm.org

European Society of Musculoskeletal Radiology (ESSR) 2010 Annual Scientific Meeting. June 17-19; Lille, France; Web: www.e SSR.org

11. Münchner Neuroradiologie Symposium. June 17-19. Munich, Germany;

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14th Annual Meeting of the Clinical Magnetic Resonance Society (CMRS). June 24-27; Orlando, FL, USA; Web: www.cmrs.com

JULY 2010

RADaim 2010. July 23-25; Broadbeach, QLD, Australia; Web: www.phoenixconf.com

20th Annual Conference on Musculoskeletal Ultrasound 2010 - 24th International Ultrasound Week. July 21-25; Cancun, Quintana Roo, Mexico; Web: www.fmri.org.mx

7th Annual Meeting of the Society for Neurointerventional Surgery (SNIS). July 26-30; Carlsbad, CA, USA; Web: www.snisonline.org

AUGUST 2010

EUROSON 2010 - 10th International Congress on Interventional Ultrasound. August 22-25; Copenhagen, Denmark; Web: www.euroson2010.org

European Society of Cardiology (ESC) Congress 2010. August 28 - September 1; Stockholm, Sweden; Web: www.escardio.org

SEPTEMBER 2010

ESTRO 29 - Annual Meeting of the European Society for Therapeutic Radiology and Oncology. September 12-16; Barcelona, Spain; Web: www.estro.org

ASUM 2010 - 40th Annual Scientific Meeting - Australasian Society for

Ultrasound in Medicine (ASUM). September 23-26; Gold Coast, QLD, Australia; Web: www.asum.com.au

OCTOBER 2010

CIRSE 2010 - Cardiovascular and Interventional Radiological Society of Europe. October 2-6; Valencia, Spain; Web: www.cirse.org

6th World Congress on Ultrasound in Emergency and Critical Care. October 4-9; Rome, Italy; Web: www.winfocus.org/world

19th Symposium Neuroradiologicum. October 4-9; Bologna, Italy; Web: www.symposiumneuroradiologicum.org

EANM 2010 - Annual Congress of the European Association of Nuclear Medicine. October 9-13; Vienna, Austria; e-mail: info@eanm.org; Web: www.eanm.org

20th Annual Meeting, Society of Radiologists in Ultrasound (SRU). October 22-24; Las Vegas, NV, USA; Tel: (1) 703-858-9210; E-mail: info@sru.org; Web: www.sru.org

JFR 2010 - Journées Françaises de Radiologie. October 22-26; Paris, France; Web: www.sfrnet.org

52nd annual meeting of the American Society for Radiation Oncology (ASTRO). October 31 - November 4; San Diego, CA, USA; Web: www.astro.org/Meetings

NOVEMBER 2010

2010 Chicago Multidisciplinary Symposium in Thoracic Oncology. December 9-11; Chicago, IL, USA; Web: www.thoracicsymposium.org

Medica 2010. November 17-20; Dusseldorf, Germany; Web: www.medica.de

RSNA 2010. November 28 - December 3; Chicago, IL, USA; Web: www.rsna.org



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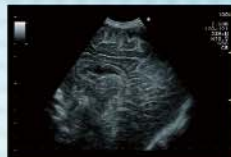
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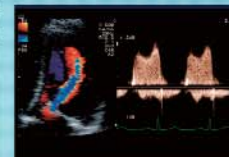
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PROSOUND $\alpha 10$

- Hochqualität der Bildarstellung zur Erleichterung der Diagnose
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 - Direktionaler Fluß eFLOW
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PROSOUND $\alpha 10$

- Calidad de imagen superior que facilita el diagnóstico
 - Armónicas de banda ancha
 - Flujo direccional (eFLOW)
 - Procesamiento adaptivo de imágenes AIP
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L' $\alpha 10$ è confortevole per il paziente e offre anche all'operatore delle funzioni che agevolano il suo lavoro, come l'Image Optimizer che ottimizza la luminosità di tutte le immagini B-mode.

PROSOUND $\alpha 10$

- Qualità di immagine superiore che rende facile la diagnosi
 - Immagini di Armonica con tecnologia a larga banda
 - Flusso Direzionale eFLOW
 - Procesamiento adaptativo d'immagini (AIP)
- Disegno ergonomico - più facile da usare.
 - Image Optimizer
- Valutazione preventiva - meglio per il paziente.

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