Universities of Michigan, Utrecht report Ingenia's clinical benefits

dStream architecture brings paradigm shift in clinical imaging

MultiTransmit boosts spine imaging at St. Vincent's, Sydney

Ingenia
The first-ever digital broadband MR system

Not for distribution in the U.S.A.
Welcome to this restyled FieldStrength issue!

In this issue of FieldStrength, Philips is proud to introduce Ingenia, a new MR system in 1.5T and 3.0T versions that is optimized for image clarity, speed and expandability. Be sure to read about the great results seen by some of our first Ingenia users.

User reports from around the world demonstrate how Philips MR customers are optimizing quality and speed according to their imaging needs, and utilizing our systems to dramatically boost productivity and workflow.

This issue also features the Philips IntelliSpace Portal, an exciting new way to do processing, analysis, reporting and sharing of data.

We hope you enjoy this issue of FieldStrength, with a new layout style to better present the results of our remarkable MR systems!

The FieldStrength team
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By Gene Saragnese Executive Vice President & GM Imaging Systems, Philips Healthcare

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With the next generation of imaging, Philips is helping to position radiologists to guide the clinical process with authority and confidence, while achieving more precise care, better outcomes and lower costs. At RSNA, you will be introduced to the first digital broadband MR, the world’s first PET/MR, an integrated multi-modality workstation, an integrated approach to oncology through the first simultaneous CT and PET/CT launch, Panorama HFO Oncology Configuration, iU22 xMATRIX, iDose and SyncRight, new propositions in Ambient Experience, to name just a few.
Dear Friends,

When I joined Philips, I did it because I wanted to be a part of an organization that develops meaningful, long-term relationships with its customers. I'm here because I believe that this company gets it; in the end, it's about real people and their needs. Remembering that inspires us every day to develop meaningful innovations that make a big difference in people's lives.

I'm proud to say that our new product introductions at RSNA 2010 are the most outstanding that I have seen in my career. These new offerings go to the heart of what we believe: that better collaboration, enabled through advanced technology, will fuel a revolution in imaging science; one that leads to better outcomes and lower costs. We call this revolution: Imaging 2.0.

Every day, radiologists are handling larger and larger workloads, while mastering increasingly more diverse imaging technologies that move beyond the diagnostic space into therapeutics. In this next generation of imaging, Philips is enabling new levels of collaboration between radiologists and referring physicians. We're opening up new perspectives, so you can perform procedures that are less invasive, less expensive and safer for patients. You'll experience hybrid systems that provide impact beyond that of any single modality, and systems that build lifetime value for your investment by optimizing workflow and making it easy to upgrade to the latest advancements.

These brand-new offerings are examples of our philosophy made real, in solutions and services that meet your needs, while continuing to bring sense and simplicity to your work.

Fifteen years ago I began my career in healthcare in MR and I can tell you that the newest MR offering from Philips represents something we have never seen before in the industry. Ingenia* is the first digital broadband MR system in the world providing unparalleled image quality and radically reduced set up time. Because we want to keep you as a customer for life, the Ingenia platform is designed to provide outstanding lifetime value. Quite simply, Ingenia was designed for clarity, speed and expandability.

At the heart of Ingenia is dStream architecture. dStream's DirectDigital RF technology digitizes the MR signal at the patient to avoid any signal loss in the MR data acquisition chain, and FlexStream workflow increases throughput and system versatility.

Ingenia delivers on our promise of the next generation in imaging. It completes five routine exams – brain, spine, knee, shoulder and liver – in 3D in less than eight minutes. In every application, digitization at the patient results in higher SNR, which combines with other Philips innovations to redefine your imaging capabilities.

As you look forward towards new possibilities, you'll appreciate that Ingenia is designed to meet your current and future needs also for oncology imaging. The magnet's high homogeneity, combined with the exceptional linearity of the gradient coil, makes the Ingenia ideally suited to address general diagnostics through therapy planning.

Ingenia has a large 55 cm homogeneous field of view and a 70 cm bore, which makes it easier to image obese patients. Its high geometric fidelity increases the accuracy of image fusion/registration and multi-station imaging, while the magnet's superb homogeneity enables excellent spectroscopy, even in challenging areas like off-center assessment of liver lesions.

We promise systems that build lifetime value for your investment by optimizing workflow and making it easy to upgrade to the latest advancements, and Ingenia certainly delivers there as well. Ingenia's dStream architecture eliminates workflow disturbances, shortening exam and processing time. And the number of channels is no longer determined by the MR system, but by the RF coil. This eliminates the need to upgrade the system to accommodate more channels.

In fact, Ingenia with digital coil management architecture was engineered from the ground up to push the boundaries of what MR can be. When you see the Ingenia, you'll see how we're changing expectations, and what is possible with MR.

My team and I have a lot more to show you at RSNA 2010. I hope that you will be able to experience all the new technologies we have designed to position the radiologist as the key collaborator in patient diagnosis and care.

Ingenia tells the story: clinical collaboration and integration; patient focus and safety; and improved economic value. These are the three pillars of Imaging 2.0 – a new era in imaging. Welcome to the revolution.

Gene Saragancse
Executive Vice President & GM
Imaging Systems, Philips Healthcare

* Pending 510(k), not available for sale in the U.S.A.

FieldStrength 5
Ingenia
the first-ever digital broadband MR system
Introducing Ingenia: the first-ever digital broadband MR system

Philips wide-bore MR system with Xtend imaging space and dStream architecture delivers elevated clinical performance, accelerated patient management and improved economic value.

Philips is proud to launch Ingenia 1.5T and 3.0T MRI systems* with dStream architecture at this year’s meeting of the Radiological Society of North America (RSNA), knowing that Ingenia changes expectations by delivering image clarity, speed and expandability.
The demand for accessible, affordable healthcare has never been greater, and variation in physical condition, size and age of patients challenges MRI scanners to provide consistently high-quality exams with high levels of patient comfort. MRI use is rising rapidly for routine cases and increasing in emerging areas like oncology and cardiology, while reimbursements are declining. In response to these trends, Philips introduces Ingenia, the first-ever digital broadband MR system.

**Designed for higher image clarity and more patient comfort**

Based around a wide-bore magnet, Ingenia offers a more comfortable scan for patients, with performance similar to what you expect from a 60 cm system. The Xtend imaging space delivers industry-leading homogeneity for a 70 cm bore system for high quality imaging in very large FOVs of up to 55 cm.

At both 1.5T and 3.0T, Ingenia incorporates dStream architecture. dStream digitizes the signal directly in the coil to capture the purest signal for best image clarity, which results in SNR improvements of up to 40%. In the redesigned coils, use of fiber optic cable maximizes the amount of data that can be rapidly sent across a single connector – no matter the number of channels. The accompanying reduced coil weight and more coil flexibility make an MR exam easier for operators and patients.

**Speed gained by focus on convenience in every detail**

Simplified patient and coil handling help to speed up exams, increasing productivity by as much as 30%. Ingenia features an integrated FlexCoverage posterior coil underneath the length of the tabletop, so patients can be scanned from neck to toe, with larger coverage across the entire FOV. And all coils are optimized for maximum parallel imaging benefits with new dS-SENSE.

The new dS HeadNeckSpine coil solution offers a more comfortable, open experience, and enables better imaging for patients who are unable to lie flat by its distinctive ability to be tilted from the tabletop. This truly allows imaging of kyphosis patients in a more comfortable way.

The dS Torso coil solution includes the lightweight FlexCoverage anterior coil with 60 cm coverage, which flexes not only left to right, but also foot to head, a unique way to maximize SNR and parallel imaging performance without strapping the patient. All coils use the same single connector – no matter the coil element count – that connects directly with an optical connector to the table.

dStream now combines both image clarity and speed into routine exams. Total scan time can be reduced to less than eight minutes in exams of brain, spine, liver, knee, or ankle.

**Channel independence and MultiTransmit**

With dStream introducing digitization within coils, discussions on system channels are history. The number of channels no longer depends on the system; dStream makes Ingenia channel independent. Moving from 8-channel coils to 128-channel coils does not require a major hardware upgrade of the RF platform. This means Ingenia is forward compatible and is ready for future expansion of clinical capabilities, providing a more secure future for your practice.

Ingenia 3.0T also incorporates MultiTransmit patient-adaptive scanning. MultiTransmit uses multiple RF sources to improve image contrast and uniformity, consistency and speed. The next generation of this technology, MultiTransmit 4D that adds the dimension of time, will be available in the course of 2011. This enables real-time adjustments of RF pulses in cardiac imaging and uses a unique algorithm to image the beating heart at 3.0T with consistency and ease.

The Philips Ingenia system: see it at RSNA or visit

`www.philips.com/Ingenia3.0T`

`www.philips.com/Ingenia1.5T`

* Pending 510(k), not available for sale in the U.S.A.
Ingenia 3.0T benefits results and workflow in neuro MR

First Ingenia 3.0T* experiences at University of Michigan show “incredible” image quality, greater patient comfort, and vastly improved workflow.

The University of Michigan (Ann Arbor, Michigan, USA) is the first installation of the revolutionary new Ingenia 3.0T MR system: a large FOV wide bore system, featuring dStream architecture for superb digital signal, and vastly simplified coil and patient handling.

Suresh K. Mukherji, MD, FACR, Professor of Radiology and Chief of Neuroradiology at the University of Michigan Health System, says the Ingenia system is fantastic. “It has addressed many needs in MR, and Ingenia image quality is incredible. It’s the best I’ve ever seen on a 3.0T system.”

Improved image quality, speed and expandability

According to Dr. Mukherji the digital dStream architecture is a major innovation that not only benefits image quality but also speed and workflow. “Placing the patient on the table is much easier. Ingenia has the posterior coil embedded in the table, which just makes life much easier. Also the lightweight FlexCoverage anterior coil is easy to position. It has a very simple coil plug to put in, very accessible to the technologist,” says Dr. Mukherji. “In addition, the system automatically selects the coil elements for optimized signal. Then dStream’s digitization in the coil and the use of fiber optic cable provides a clearly higher SNR, which can be used to reduce scan times.”

Ingenia’s Xtend imaging space provides increased homogeneity and image quality, and enables larger FOV. “Before Ingenia, we could not scan with the large FOV as needed in thoracic spine. Thanks to Xtend we can do that now with much better homogeneity and image quality,” adds Dr. Mukherji. “And, of course the 70 cm wide bore and large FOV allow us to scan more patients. With Ingenia’s improved workflow and efficiency, we expect that we’re going to be able to do more patients, more patient types and more body parts than we’ve done in the past, and that hopefully translates into better diagnosis and better treatment care for patients.”

“Ingenia image quality is incredible. It’s the best I’ve ever seen on a 3.0T system.”

* Pending 510(k), not available for sale in the U.S.A.
“The digital dStream architecture is a major innovation that benefits image quality, speed and workflow.”

Ingenia impacts neuro MR results
Dr. Mukherji believes that Ingenia has the potential to vastly improve neuro and head/neck imaging. “The field of view, homogeneity and image quality are much better. I think we’re going to be able to do more imaging of the lumbar spine, and better thoracic spine imaging, especially in obese patients and patients with degenerative changes. Also the higher speed benefits these patients, who often have difficulty lying still on the table. Making this easier and shorter for these patients will, in turn, benefit imaging results.”

Dr. Mukherji recalls, “We scanned one subject on Ingenia who could never have been scanned on a 60 cm system. The Ingenia wide bore is one major advantage here. He had a fair amount of adipose tissue and he couldn’t fit in the magnet. Many short, stout people have a lot of lordosis, and we have had problems with the dielectric effect in these cases. That is completely addressed on Ingenia due to MultiTransmit.”

Dr. Mukherji is also very excited about doing physiological and biological imaging such as fMRI, perfusion and spectroscopy. “We do these on a regular basis, but I expect them to be further improved with Ingenia. When we went from 1.5T to 3.0T, we saw a substantial improvement, and I think that’s going to be the case when we transfer these from our current 3.0T to Ingenia.”

“Ingenia 3.0T delivers large FOV for total thoracic spine coverage in a single station.

“Because of the dStream digital RF architecture, the image quality and the improvements in patient workflow, I really feel that Ingenia is one of the best, if not the best 3.0T system available for neuro imaging,” says Dr. Mukherji. “Digital RF design and the dStream concept are clearly the future.”
Ingenia whole body capabilities an advantage in oncology imaging

Ingenia 1.5T* experiences in Utrecht demonstrate excellent clinical performance and easier operation

The world’s first Ingenia 1.5T MR system is now installed at University Medical Center (Utrecht, The Netherlands). Clinicians at UMC Utrecht immediately recognized the benefits of dStream digital broadband and a wide-bore system for breakthrough clinical performance. Accelerated patient management with Ingenia enables higher throughput and patient comfort, with major workflow improvements, fewer clicks, SmartAssist and more.

“Philips’ Ingenia is a channel-independent digital broadband MR system combining simplified coil and patient handling with superb imaging. Taro Takahara, MD and Thomas Kwee, MD (Tokai University School of Engineering, Japan, and UMC Utrecht, The Netherlands) report that some major features of Ingenia 1.5T benefit oncology imaging.

“In oncology, whole body DWI (DWIBS) is rapidly gaining importance for imaging without contrast agent and without ionizing radiation,” says Dr. Takahara. “Ingenia may have a high impact for this purpose. Ingenia’s whole body imaging capabilities, and the dStream technology that provides increased SNR, are crucial for diffusion-weighted imaging. In addition, the 70 cm wide bore allows us to scan most obese patients.”

Coils are easy to use, provide high quality

“The dStream concept considerably smooths the way whole body MRI examinations are performed, providing more comfort to the patient, and improving overall workflow,” Dr. Takahara says. “The newly developed coils for this system are very impressive, and I was thrilled when I heard about the FlexCoverage posterior coil located underneath the tabletop. The system automatically selects the coil elements to use for best SNR in the FOV. Every anterior coil is very lightweight and can be easily put

“Ingenia, the 70 cm system with highest homogeneity on the market, can have significant impact on oncology exams.”

* Pending 510(k), not available for sale in the U.S.A.
onto the patient and connected to the table directly, which is a huge advantage for both patient and technologist.”

“In addition,” adds Dr. Kwee, “SNR is dramatically increased, since each coil has a converter to immediately digitize the signal, which is then transferred through fiber optical cable.”

High impact in oncology exams
Ingenia allows high resolution images with higher SNR, thanks to the new dStream architecture. It also offers good gradient linearity and excellent fat saturation. All this brings clearer visualization of lesions and helps to detect more potential lesions.

Regarding Ingenia’s whole body imaging capability, Dr. Kwee says, “Ingenia is the 70 cm system with highest homogeneity currently on the market, thanks to its Xtend imaging space. This can have significant impact on oncology exams.”

“Ingenia is well suited for state-of-the-art MR exams of a certain body area (e.g. liver or pelvis) and also for whole body MR examinations. Furthermore, its design and easier workflow make it suitable for imaging obese patients and patients who cannot tolerate a long MR examination.”

**DWIBS work enhanced by Ingenia technology**
Dr. Takahara performs a great deal of diffusion weighted whole body imaging (DWIBS) in oncology patients. With Ingenia, a tabletop extender is no longer required because the Ingenia system offers a large scanning range. “We can now scan more than two meters in the z-direction. The Xtend technology provides a very large homogeneous field of view (55 cm) for extended coverage.”

“In addition, whole body scanning can be done by a sophisticated automatic sequence,” he says. “We just need to start the sequence. Then dS-SENSE parallel imaging automatically performs the reference scan in a few seconds, and SmartSelect automatic coil element selection is very convenient when we perform a multi-station scan.”

“Clearly, SNR has been increased significantly,” says Dr. Takahara. “So, overall, the combined features of the Ingenia system improve workflow, patient comfort, and image quality. When we have more clinical data, we hope to be able to confirm that this improves diagnostic performance.”
IntelliSpace Portal enhances the power of your imaging

Frank Hoogenraad, PhD, MR Product Manager at Philips Healthcare, says, “With imaging systems having more processing needs, Philips’ vision is one of easy and fast processing, efficiency and collaboration. IntelliSpace Portal offers advanced processing of scanner data to facilitate data analysis, while enhancing collaboration between physicians and across departments. It’s just one of Philips’ smart solutions designed to improve clinical care.”

The IntelliSpace Portal enables workflow throughout the department with access to data, processing, and collaboration tools anywhere.
Data from imaging scanners requires different types of processing. At the same time the amount of information and increased complexity of some processing is growing. Philips has developed the IntelliSpace Portal to overcome data and processing workflow issues and enhance the power of your imaging.

**Access anywhere**
The IntelliSpace Portal enables the radiologist to focus on the analysis and diagnosis. It removes the requirement to go to the “right” location to deal with data and processing because the processing capabilities and data are where the radiologist prefers to work.

In a traditional workflow setup for advanced processing, each workstation serves specific CT or MR scanners. In more richly equipped hospitals, advanced processing becomes disruptive when the data and the right processing tools are available only in certain processing rooms. Conversely, IntelliSpace Portal is a multimodality advanced visualization server; it harbors processing capabilities for MR, CT and NM data, and has a large capacity to store enormous amounts of data. But more important is that the IntelliSpace Portal turns a radiologist’s preferred location into a state-of-the-art workspace.

The Workspace Portal thus places both the radiologist and the technologist in the center, allowing them to do their work without being hampered by constraints of location, specific workstation capabilities or data availability, for improved efficiency and workflow.

**Collaborative workflow**
In addition, the IntelliSpace Portal enables the radiologist to communicate on advanced results with direct peers or referring physicians. Advanced views can be created and easily sent through email or other means. The recipient only needs one click to generate the same advanced view on the data, including capabilities to further manipulate the specific results. This offline collaboration can then be turned into real-time collaboration by sending a request for interaction to a colleague. When the receiver accepts, both see the same results in real time on their screen, while one controls the screen.

The radiologist now is able to more easily and less disruptively collaborate and communicate on specific patient cases.

**Rich clinical applications**
IntelliSpace Portal is designed to not only address the core needs in multimodality viewing and processing, but to also offer new dedicated tools for emerging needs in the fields of oncology and MSK imaging. In the Oncology package, Tumor Tracking gives clear analysis of lesions over time to help determine the effectiveness of treatment. Because patients may undergo different types of scanning procedures, Tumor Tracking can be used with a mix of MR, CT and NM data. An important value addition of MR data is the delineation of soft tissue surrounding the tumor. Therefore, fusion or overlay of data is an important feature within Tumor Tracking.

Cartilage Assessment is another new clinical package of the IntelliSpace Portal. Cartilage Assessment helps assess cartilage tissue integrity from T2 relaxivity values. The measurement tool in this package uses a method to partition the cartilage into equal segments, providing a reproducible manner of relaxivity quantification.

**Administrative benefits focus on simplicity**
A hospital or MRI center with an IntelliSpace Portal only has a single product to maintain. The facility’s own computers are turned into workstations, limiting the number of “boxes” in the hospital. The IntelliSpace Portal is scalable and can serve from small MRI practices up to enterprise-wide deployment.
3D imaging of the knee takes a step forward

“The high resolution and the ability to reformat the 3D data help us assess the cruciate ligaments much more effectively.”

Dominik Huber, MD
Fast 3D TSE sequence provides higher resolution knee imaging at MR Institut, Zurich

The MR Institut (Zurich, Switzerland), a private clinic within the Schulthess Clinic, is dedicated to orthopedics, rheumatology and the musculoskeletal system, focusing on joint and spine work. The MR Institut uses an Achieva 3.0T TX and is getting referrals from Schulthess clinic and from other facilities as well.

In his busy practice, Dominik Huber, MD, radiologist at MR Institut, competes with a large university hospital and a private hospital in the area. Dr. Huber recently implemented a fast 3D scan for his orthopedic patients. “We are introducing 3D imaging in MSK, currently focusing on the knee and shoulder joint,” says Dr. Huber. “We plan to expand 3D imaging to all major joints, such as the elbow, wrist, hip and ankle.”

3D TSE provides higher resolution and reformatting in any plane
Dr. Huber’s 3D TSE knee sequence is used with the 8-channel SENSE Knee coil and lasts on average about six minutes. This is longer than a single routine 2D sequence, but it has the potential to replace three individual 2D scans. One 2D scan only provides images in one plane, while one 3D scan provides both higher spatial resolution and the possibility to reformat into any desired orientation.

Dr. Huber says his 3D TSE sequences are characterized by high spatial resolution (usually 0.6 x 0.6 x 0.6 mm), which is a particular advantage when assessing the cartilage surfaces and smaller joint structures. In addition, the 3D dataset can be reformatted in any given plane. “The standard planes are reconstructed by the technologist on the console. On a separate workstation I then do the reporting, analysis and further reformatting that is needed to view the plane that is most appropriate to the joint and to the problem of the patient. This dynamic reformatting is done much like the analysis of large CT data sets and is the most important advantage of using the 3D technique: you don’t need to acquire as many planes separately and if you would like to tilt the image plane a little, you can really optimize that without another acquisition.”

Cartilage, ACL, meniscus scans benefit from 3D TSE
In knee imaging Dr. Huber recognizes three particular areas where these fast 3D sequences are an advantage. “First of all, in cartilage imaging the higher spatial resolution of 3D sequences allows me to see more subtle lesions much more effectively, especially when differentiating the two main bundles of the anterior cruciate ligament (ACL), as these can be assessed separately. When examining the meniscus, we particularly see the reformatting being advantageous for visualizing radial and complex meniscal tears.”

3D TSE knee sequence enhances sports medicine imaging
“We currently use the 3D TSE sequence in roughly 25% of our cases,” says Dr. Huber, “mainly in younger individuals who may have a sports injury or other smaller injury. Patients are expected to lie still during the complete scan, because if motion occurs, the 6-minute scan is lost. We see 3D techniques being used more and more in orthopedics, and we plan to begin using it for other joints besides knee and shoulder, because it can increase the value of the exam.”

CONTINUE
Old tear of posterolateral bundle of ACL

22-year-old male athlete with a sensation of slight instability on exertion and a history of a skiing injury in the past. The ACL (anterior cruciate ligament) appears to be in continuity on the primary sagittal image. However, two separate reconstructions (in the plane of the ACL and perpendicular to it) show only the anteromedial bundle of the ACL. The torn posterolateral bundle of the ACL is not visualized.

Currents, Dr Huber adds two to three routine sequences to the exam, such as a basic 2D T1-weighted sequence, because detection of certain bone marrow changes and fracture lines can be easier on the conventional images. “However,” he says, “we hope to reach a situation where the 3D scan is so robust that it can be the only scan needed for a complete, high quality exam that can help increase our productivity.”

Achieva 3.0T TX provides exceptional image quality

The MR Institut has been using its Achieva 3.0T system for two years, and recently upgraded to Achieva 3.0T TX with MultiTransmit technology. MultiTransmit reduces dielectric shading by using multiple RF sources to adapt the RF signal to the individual patient, to obtain more uniform, consistent images.

“In my view, MultiTransmit makes a big difference in our spine and pelvic/hip exams,” says Dr. Huber. “We’ve seen big improvements in the signal-to-noise ratio and in the uniformity of our images for a given imaging time since we began using MultiTransmit six months ago.”

Dr. Huber says 3.0T is becoming the standard for orthopedic imaging, whereby the significant gain in signal-to-noise ratio can be used for either increasing spatial resolution or decreasing imaging time for enhanced productivity. “I don’t think many people prefer buying a 1.5T anymore. Going to 3.0T was a big improvement for us. I even think it will become the standard for all imaging, not just MSK.”

Meniscal cyst

36-year-old male runner with increasing pain posteromedially. There is an extensive horizontal tear of the medial meniscus with an associated meniscal cyst. The full extent of the cyst and its relationship to the posterior horn of the affected meniscus is particularly well seen on the reconstruction in the axial meniscal plane.

“In my view, MultiTransmit makes a big difference in our spine and pelvic/hip exams.”
MultiTransmit boosts spine imaging at St. Vincent’s

Patients with chronic and acute spine conditions are benefiting from the upgrade of the Achieva 3.0T to TX performance

The patient demographics of St. Vincent’s Public Hospital, Sydney, Australia includes many immuno-compromised patients – for example post-transplant – and these patients seem to be particularly prone to the B1 inhomogeneities that lead to dielectric shading, especially in the area of the spine. After the MultiTransmit upgrade, however, the Achieva 3.0T has become the preferred choice for all spine exams at St. Vincent’s.
MR helps visualize a broad range of spine pathology
St. Vincent’s consultant neuroradiologist Joga Chaganti, MD, has long been an advocate of MR as the system of choice for imaging the spine. “The excellent resolution and soft-tissue contrast of MRI make it particularly attractive for imaging spinal tissues such as bone marrow, joints and ligaments which support stability within the spine, as well as the spinal cord itself and the layers surrounding it,” he says. “Patients referred to our hospital for a spine exam can be suffering from any one of a broad range of conditions from lesions within the spinal cord, intra-dural tumors and extra-dural compressions such as spontaneous epidural hematomas which can lead to severely disabling conditions like paraplegia. The beauty of MRI is that it enables all these conditions to be investigated on just one modality by providing a direct visualization of the pathology.”

Due to budgetary constraints, the hospital was later in investing in an MRI system than some other institutions. When they did, in 2007, they went for what they considered to be the best available on the market – the Achieva 3.0T. “From the start we were very impressed with the system, which provided an extremely high standard of imaging performance. Compared with other systems I had worked with, the image quality is superb. The flexibility to fully optimize parameters such as contrast and resolution, as well as the flexibility of the parallel imaging were also key factors in our choice for the Achieva,” explains Kirsten Moffat, St. Vincent’s MRI Manager. They did, however, experience some reservations with spine scans, which make up around 30 to 40% of the exams they perform.

“We are now able to perform most full spine scans in two stations, instead of the three stations needed previously.”

4-year-old with pain
A 4-year-old with left buttock pain and radiating pain in the left leg underwent MRI to evaluate for possible myelopathy. Images show no abnormality. MultiTransmit provides increased image uniformity and speed, allowing a 2 stack whole spine acquisition in 2:27 min. per station.
A high proportion of the patients referred to St Vincent’s are immuno-compromised, for example transplant patients. The MRI staff noted that some of these patients seem to be particularly prone to the B1 inhomogeneities that lead to dielectric shading, especially in the area of the spine. “Fortunately, by taking advantage of the MultiTransmit technology that Philips has made available for the Achieva 3.0T, we were able to fully overcome this challenge,” she points out, and it has inspired a new research study to try to understand this potential connection.

**Achieva 3.0T TX meets special needs of St. Vincent’s**

MultiTransmit technology has been generating a lot of positive reactions from users. The team at St. Vincent’s was particularly impressed with the reports in 2009 on the Achieva 3.0T TX from the University of Bonn, Germany – the first hospital to install the TX. “We also solicited the advice from the local Philips Healthcare organization and the consensus was that the best solution for us would be the upgrade to MultiTransmit, which was completed in March 2010,” recalls Ms. Moffat.

“The performance of the system with MultiTransmit can only be described as phenomenal.”

**Post laminectomy**

Post-operative exam of a 56-year-old immuno-compromised patient with possible infection. Sagittal STIR shows bilateral laminectomy L5 epidural granulations. Recurrent/remanent disc at L4/5 is causing thecal sac compression. The MultiTransmit image shows increased uniformity supporting diagnostic confidence. With MultiTransmit scan time is reduced from 5:44 to 3:09 minutes.

**Possible cord compression**

Images show the thoracic spine part of a whole spine exam to visualize possible cord compression. MultiTransmit provides increased speed and consistent image uniformity.
“The performance of the system with MultiTransmit can only be described as phenomenal,” says Dr. Changanti. “In spine imaging, we now have a much more homogeneous B1 field that virtually eliminates the effects of dielectric shading even in the most challenging patients. The result is much better image quality with fewer flow artifacts.”

The St. Vincent’s team also encountered SAR limitations with conventional 3.0T spine imaging, and acquisition times could be quite long. With severe spine conditions, this often resulted in considerable patient discomfort leading to poor image quality due to patient movement and, in the severest cases, the patients were not able to complete the exam. MultiTransmit enables reduction of local SAR, increasing scanning speed by up to 40%. “We are now able to schedule 30-minute time slots for complete spine exams. Other spine exams have gone from a half hour to less than 20 minutes, which is a big benefit for critically ill patients who can’t tolerate a long examination,” points out Ms. Moffat.

Given the patient demographics, most scans are full spine scans for cord compression or infection. Depending on the clinical indications, sagittal STIR, sagittal T1, axial T1 or axial T2 scans with or without fat saturation may be performed. And depending on indications from these scans a contrast-enhanced T1 scan with fat sat may also be added.

“Thanks to the improved B1 homogeneity, we are now able to perform most full spine scans in two stations (cervical-thoracic and thoracic-lumbar), instead of the three stations we needed previously,” adds Ms. Moffat. “So if a critically ill patient is only able to tolerate one sequence, we are able to still acquire most of the cervical-thoracic area in one take.”

**Powerful tools give an additional boost to spine imaging**

The upgrade has also enabled the St. Vincent’s team to expand its research interests, especially in areas such as diffusion weighted imaging (DWI) and diffusion tensor imaging (DTI). “In the past, DWI was used predominantly for stroke but there has now been a huge paradigm shift in DWI which has become a kind of functional imaging technique,” explains Dr. Chaganti. “If a patient is referred to us with, say a collapsed vertebra, we really can’t tell initially whether it is an osteoporotic compression or some internal malignancy. In such a scenario, DWI is being extensively used at St. Vincent’s to evaluate these conditions by looking at the ADC values. Our experience suggests that a figure of around 1.9 to 2.1 indicates that a highly cellular lesion could be responsible for the collapsed vertebra. In this way we can confidently identify the pathology behind the condition.”

The team is also evaluating the use of DWI for characterizing edema. “In standard imaging, any bright areas in the spinal cord could be due to ischemia, demyelination or tumor, and again DWI seems to be able to play a valuable role in identifying the edema as cytotoxic or vasogenic. We’re currently evaluating our findings on this,” says Dr. Chaganti. “We also plan to use DTI in the future in the cervical and thoracic cord as we believe this to be a very attractive technique.”

“After the MultiTransmit upgrade we were able to fully overcome the inhomogeneity challenges presented by our special patient groups.”
Large health system benefits from multiple scanners for breast MRI

Breast MR and MR-guided biopsy are daily practice at WellStar Health System using 3.0T, 1.5T and High Field Open Philips MR scanners

Utilizing 12 Philips scanners in five hospitals and seven imaging centers, WellStar Health System (Atlanta, Georgia, USA) scanned more than 27,000 patients last year. An average of 74 exams a month were for breast patients, referred primarily from breast surgeons in the area for initial diagnosis, pre-surgery, follow-up and monitoring.

“The surgeons around here are convinced of the importance of MRI to check for contralateral lesions.”

Barbara Ruplin, RT (R) (MR), clinical imaging specialist at WellStar, explains, “The surgeons around here are convinced of the importance of MRI after diagnosis to check for contralateral lesions, and we accommodate patients by having a center as close as possible for their breast exam.” She says the decision on where to send patients for breast scans is generally one of convenience and patient preference.

WellStar’s 3.0T, 1.5T and Panorama HFO systems meet the needs of the health system very nicely, she says. “The doctors love the image quality on the 3.0T system, and we get good resolution on our 1.5T as well. Our two HFOs are very helpful for claustrophobic women and very large women; some have traveled up to 60 miles to be scanned on one of our HFOs.”

Steve Brantley, MD, mammographer for Quantum Radiology, one of the largest radiology groups in Georgia, says he directs most of his breast imaging to WellStar’s 3.0T system. “The 3.0T is a workhorse because of its speed and robustness. We get much better SNR, and the images are homogeneous in nature. The pathology is much more apparent to us at 3.0T.”

Biopsy work made easier with MammoTrak

At WellStar Kennestone Hospital, an Achieva 3.0T system and MammoTrak patient support system enable high quality breast imaging, and MammoTrak offers more efficient use of the MRI system, specifically if the technologist needs to spend more time with the patients as in breast biopsies. WellStar Kennestone Hospital has performed 270 breast biopsies so far, 100 of which were in fiscal year 2010.
“We perform MR-guided biopsy on any woman with a lesion that isn’t visible by mammogram or ultrasound,” says Ms. Ruplin. “MammoTrak saves us time in the imaging room and allows us to undock from the scanner and slide the patient into another room for removal of the instruments and recovery. The lighted 7-channel coil really makes a difference, as does the ability to adjust the grid so we can biopsy more posterior lesions.”

Protocols consistent
WellStar radiologists want consistency in the scans across the health system, but scan protocols are slightly adjusted for each field strength, says Ms. Ruplin. “We do an axial T2 with fat suppression on every scanner, and we’re using the VISTA high resolution T2 3D sequence on all our systems, as well as a T1 axial high resolution, and a dynamic high resolution e-THRIVE, and we add an oblique sagittal high resolution e-THRIVE of each breast, to open up the axillary area. Then we do reformats of our first dynamic in the sagittal plane.”

“If the patient has implants, the silicone sequence is added, which is a dual-inversion recovery that is optimized for silicone, and dual inversion for each breast in the sagittal plane. About 15 patients a year have a rupture exam only, which is a T1 axial high-res, a T2, and the silicone sequence.”

“Protocols are standardized across the system, but when new sequences or techniques come out we evaluate them and incorporate them at the radiologist’s discretion,” Ms. Ruplin adds. “I also check NetForum on a regular basis to see if other Philips users have anything better.”

Philips driving 3.0T breast MRI
Next year, WellStar will open a new outpatient pavilion on the Kennestone campus, which will include an Achieva 3.0T TX with MultiTransmit. “The 3.0T TX really improves homogeneity in breast imaging at 3.0T,” says Ms. Ruplin.

Dr. Brantley agrees. “After our experience with our current 3.0T we realized there was no going back, so we’re putting a 3.0T TX in the new center. I think Philips is on the right track with breast MRI, and our breast surgeons are becoming believers in the continued development of breast MRI. They’ve made breast MRI and MR-guided biopsy an integral part of their work.”

Follow-up after lumpectomy – Achieva 3.0T
50-year-old female with a history of left breast ductal carcinoma in situ, status post lumpectomy, radiation, and hormonal therapy. Images show that the breasts are composed of dense fibroglandular tissue. Diffuse T2 hyperintensity seen in the left breast is fibroglandular tissues, likely a sequela of prior radiation. Diagnosis is BI-RADS 2, benign. Achieva 3.0T, MammoTrak with 16-channel SENSE Breast coil. High resolution VISTA 0.76 mm x 0.76 mm x 0.76 mm in 2:46 min. Dynamic e-THRIVE of same resolution in 1:06 min. per dynamic.

“The doctors love the image quality on the 3.0T system.”
“MammoTrak saves us time in the imaging room and allows us to undock from the scanner and slide the patient into another room for recovery.”

“After our experience with our current 3.0T we realized there was no going back, so we’re putting a 3.0T TX in the new center.”

**Family history of breast cancer and multiple cysts – Achieva 1.5T**

39-year-old female with strong family history of breast cancer and multiple cysts. In the left breast, a mass measuring 6 mm is seen at the 2 o’clock anterior position and recommendation for MRI-guided biopsy was given. Diagnosis is BI-RADS 4. Achieva 1.5T with 7-channel SENSE Breast coil. Axial e-THRIVE sequences were employed along with high resolution T2 VISTA and oblique sagittal e-THRIVE.

**Palpable mass after mastectomy, TRAM flap – Panorama HFO**

48-year-old female with a history of lobular carcinoma left breast, post mastectomy and TRAM flap reconstruction in 2008, now presents for MRI with a palpable mass 11 o’clock radiant of the reconstruction. In the images the post left mastectomy changes and TRAM flap reconstruction are clearly visualized. No abnormal areas are seen, specifically involving either the chest wall or at the 11 o’clock radiant. Diagnosis is BI-RADS 2, benign. Panorama HFO, ST SENSE Breast coil used.
Ambient Experience (AE) lets patients choose an environment for their exams, with lighting, pictures and music to calm their anxieties and give them a sense of control over an otherwise uncontrollable situation. At Winter Park Memorial Hospital, a Florida Hospital, (Winter Park, Florida, USA) and Kosair Children’s Hospital (Louisville, Kentucky, USA) AE is helping both patients and technologists have positive MR scan experiences.
Elise MacCarroll, Director of Ancillary Services at Winter Park Memorial Hospital, reports that the facility scans 10 to 15 patients a day on a Panorama HFO, and uses AE for all types of scans. “AE gives patients more control; it lets them make a choice. Many are anxious or have never had an MRI, but when they choose their own scanning environment, it takes their mind off the exam itself and puts them at ease.”

The hospital’s scan room was designed by a Philips Ambient Experience team and is completely clutter-free. “All you see is the scanner, which is almost a work of art with AE,” says Ms. MacCarroll. “Our patients love that they can fill the whole room with colors, images, music. And our techs are happy because it calms the patients, so they often have less need for sedation.”

**AE a great marketing tool**

Winter Park Memorial Hospital’s recent promotion campaign targeting patients was centered on AE. “Our number of scans increased 150% the first year,” she says. “I always tell people that AE allows you to market your MRI. Consumers often don’t know the difference between the many modalities of imaging, but when they know they have to have an MRI, and they have an option of choosing their environment, it just changes the whole game.”

Overall, Winter Park Memorial Hospital has had a very good experience with AE. “It’s a very beneficial thing for the hospital, a wonderful tool for our patients and techs, and a positive return on our investment. You can’t ask for more than that.”

**AE and KittenScanner help nervous children and parents**

Mary L. Bostock, RT (R) (MR) at Kosair Children’s Hospital, scans 15 to 20 children a week on two Achieva 1.5T systems with AE. Kosair also uses the Philips KittenScanner, which allows children to “scan” a toy on a scanner replica that’s just their size. “Both the AE and the KittenScanner are really exciting for the kids,” says Ms. Bostock. “It gives them a sense of empowerment. Someone is actually letting them make a choice.”

When scanning pediatric patients, who tend to get fidgety or frightened during a scan, sedation is sometimes necessary. But Ms. Bostock says that being able to calm and appease their young patients can avoid having to sedate them. She refers to a case of a young girl who needed a long abdominal scan. “This 4-year-old first played enthusiastically with the kitten scanner. Then she carefully selected her AE theme. And then she made it through the scan without sedation, which is very rare for someone her age. Dad was with her and the little girl’s relaxation helped him too. I think it calms the parents as much as the kids, and calming the parent calms the child.”

“The kids think AE is really cool. They want to take it home and put it in their bedroom.”
Partnering to implement and maintain improvements in MRI utilization

Philips Utilization Services provides decisive support in managing change that increased patient throughput and satisfaction

Yutaka Akane, CEO of the Medical Satellite Yaesu Clinic in Tokyo, Japan, had a successful record as a businessman before he started in radiology. He spotted a gap in the market: to deliver top-class, cost-effective, private radiology services. His goal now is to become the Japanese market leader. Central to that goal is always ensuring the best possible performance of staff and equipment. Naturally, this includes using the MRI systems for the greatest, long-term benefit of both the patients and the business.

The Medical Satellite Yaesu Clinic has locations in the Yaesu and Kanda neighborhoods of Tokyo. In Yaesu, the MRI suite has an Intera 1.5T and an Achieva 1.5T system. With a traditionally higher patient load, the management selected the Yaesu site to improve first. The main changes were to be achieved in a Kaizen event, a project that optimizes a small, self-contained process in a single burst of change. These are particularly useful for organizations new to the Lean and Six Sigma quality improvement methodologies.

The Kaizen team in Yaesu brought management, radiologists, technologists, nursing staff and administrators together with local and international consultants from Philips. In February 2009, the investigations started with the data and statistics gathered for the systems and made available through NetForum. Philips Utilization Services helped analyze examination and patient changeover times, to pinpoint where the potential could lie.

“20% of the success is down to the technical changes. The rest is the result of managing the change process.”

A careful approach for confident change

Most obvious was a scatter of long changeover times between examinations. These were often because of patients arriving late or not showing up. The experienced Philips team helped develop scripts to ensure the relevant patient contact data were collected at registration, and for phone calls to confirm the appointment a day in advance. “Many people were hesitant,” says Mr. Satoshi Isogai, Administrator. “But having someone from outside, who could say how other clinics successfully dealt with such issues, helped overcome this threshold.” The pilot phase proved it could reduce missed appointments. And this success convinced them to change the process permanently.

This approach characterized the Kaizen event in Yaesu. Changes were piloted and refined. Once a change was proved possible, it was introduced more widely. For example, patient changeovers could be slower than necessary. “Increasing awareness of each other’s processes helped

User experiences

Yutaka Akane, CEO and Satoshi Isogai, Chief Administrator brainstorm the potential for improvement
“Having utilization data and an objective view reinforced the improvements until they became self-sustaining.”

<table>
<thead>
<tr>
<th></th>
<th>MR1</th>
<th>MR2</th>
<th>MR3</th>
<th>MR4</th>
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<tbody>
<tr>
<td>Initial</td>
<td>After 8 months</td>
<td>Initial</td>
<td>After 8 months</td>
<td>Initial</td>
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<tr>
<td>Change-over time (min.)</td>
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<td>21</td>
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<tr>
<td>Scan time</td>
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<td>24</td>
<td>36</td>
<td>28</td>
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<tr>
<td>Number of patients</td>
<td>21</td>
<td>19</td>
<td>11</td>
<td>12</td>
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us align nurse and technologist workflows.” says Ms. Yoko Komiyama of the nursing staff. They tried out an integrated workflow for a few hours, and then fine-tuned this on one scanner. When they were confident of the improvement, they extended it to the second system. Overall, they reduced average changeovers from 11 to 4.5 minutes.

Controlling and extending the benefits
Preserving such successes became part of the weekly management team meetings. In the early stages, the local Philips consultant supported these meetings by providing observations and feedback on the performance data. “Having utilization data, and an objective view as part of the team kept us on our toes,” says Mr. Takashi Tabuchi, chief technologist. “This reinforced the improvements until they became self-sustaining.” The crowning endorsement for the success in Yaesu is that the in-house Kaizen Team extended the improvements to the Kanda site, late in April 2009. Because most of the challenges were already familiar from the Kaizen event in Yaesu, this time they needed only a little support from Philips in analyzing the data from NetForum.

Perseverance, backed up by convincing data, are the cornerstones of sustainable success. In Yaesu and Kanda, not only are patients happier about the reminders and shorter waiting times, but also the staff in Yaesu carries out around four extra examinations a day.

“20% of the success is down to the technical changes,” reflects Mr. Akane. “The rest is the result of managing the change process.” By partnering with the staff of the Medical Satellite Yaesu Clinic during the Kaizen event and afterwards, Philips Utilization Services played an important role in ensuring that success.
Excellent results after first Conversion to Achieva in Japan

Converting the old Intera magnet into a state-of-the-art Achieva 1.5T A-series saves cost and reduces rebuilding time

Keiyu-Kai Sapporo Hospital (Hokkaido, Japan) was the first to choose a smart way to get an Achieva by taking advantage of Philips’ attractive new Conversion to Achieva program that avoids magnet exchange.

The Conversion to Achieva program enables radiology departments to transform their current Philips Intera 1.5T or Gyroscan NT into an Achieva 1.5T A-Series without changing the magnet, and without the disruption and expense of completely reconstructing their MRI suite.

State-of-the-art technology to maintain the competitive edge

“We’re a relatively small hospital specializing in oncology – mainly esophageal and colon cancer – and we’ve been working with an Intera 1.5T system for around 6 years,” says Kuzuo Itoh, MD, director of the hospital’s radiology center.

“We wanted to be able to take full advantage of diffusion weighted imaging, which had some limitations on our previous system,” explains Kakuko Kanagae, MD, the center’s main radiologist for CT, PET and MRI. “Because we had been very satisfied with the quality of our Philips Intera MR system, we wanted to move to an Achieva 1.5T. However, our Intera was only 6 years old so we were reluctant to invest in a new scanner already.”

The perfect solution: no magnet exchange

Hospital administrators were also reluctant to undertake the major rebuilding project to completely replace the old system. “The estimated 6-week time span of a new install would have had severe financial and clinical consequences for the hospital. “The noise and inconvenience were of great concern. And having only one MRI system, the hospital would not be able to provide any MRI service during reinstallation,” recalls Dr. Itoh. “Because we already owned an Intera 1.5T, the Conversion to Achieva was the perfect solution for us. The conversion took only about 3 weeks.”

After the conversion we were quickly up and running again and immediately noticed the improved performance, especially in imaging of the abdomen.”
**Excellent whole body imaging and DWI**

The converted system has the same state-of-the-art imaging performance as a new Achieva 1.5T A-Series with 32-channel platform, including access to all Achieva 1.5T coils, software and hardware options. It also looks exactly like a new Achieva 1.5T.

“After the conversion we were quickly up and running again and immediately noticed the improved performance, especially in imaging of the abdomen,” says Dr. Kanagae. “The new 32-channel SENSE Torso/Cardiac coil gives us a much larger field of view than before, and we can now perform excellent whole body imaging. The clearly better image quality also greatly impressed our referring physicians, who now regularly refer their patients to our hospital for a body MRI exam. In addition, powerful tools such as DWIBS (whole body diffusion weighted imaging) and e-THRIVE (3D T1-weighted fast acquisition with fat suppression for dynamic imaging) are now much faster on our new Achieva 1.5T.”

“The improved abdominal imaging also allows us to more easily image organs such as the pancreas for which we tended to use other imaging modalities in the past,” recalls Dr. Itoh. “We’re also starting to use our new system for breast oncology patients, and looking into using it for prostate imaging.”

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**Before conversion**  
Dynamic liver imaging with 2D FFE 7 mm slices.

T1W with SPIR fat suppression; 5 mm slices.

3D MRCP with respiratory triggering in 3 minutes.

**After conversion**  
More detail and improved fat suppression in dynamic liver imaging with 3D e-THRIVE 2 mm slices.

More homogenous fat suppression with SPAIR. Improved detail with 2 mm slices.

3D MRCP with navigator technique in 2:20 minutes.
3D contrast studies provide higher spatial and temporal resolution

“The most impressive leap forward is seen in 3D contrast-enhanced series,” says Dr. Kanagae. “The images are a lot clearer and we are able to obtain much better temporal resolution as well. Previously when using 3D, temporal resolution tended to be less than in 2D imaging. After the conversion, it is also possible to perform dynamic 3D scanning with thinner slices. Image contrast is better too, which is very helpful in image interpretation.”

Increased efficiency

MRI radiographer Mr. Ogawa works with the new Achieva system on a daily basis. “The new system has expanded the range of examinations we can perform, and the speed has increased,” he says. “Having more possibilities, we’ve become more ambitious and added new sequences to our examinations. Still, our patient throughput has increased significantly.”

“Since the conversion we’ve started using ExamCards, which make planning of scans much easier and greatly smooth workflow. And no matter who performs the scan, we don’t have to worry about possible mistakes as could occur previously when using a scan list.”

The best of all worlds

According to Dr. Itoh, this conversion was their best choice for the future. “From the financial standpoint, I found the conversion far more attractive than buying a completely new system. And the performance is exactly as if we had bought a new Achieva 1.5T A-series. What’s more, after the conversion, our magnet has another full 10 years’ warranty. So taking all things together, I can definitely say that the Conversion to Achieva has given our hospital the best of all worlds.”
Most popular MRI NetForum contributions in third quarter of 2010

1. Examcard 3.0T Plaque imaging, compatible with MRI-PlaqueView
2. Examcard 1.5T Comprehensive abdomen including MRCP and dynamic liver
3. Examcard 1.5T R12 Dynamic Liver – University of Nebraska Medical Center
4. Examcard 1.5T Oncology Staging
5. Web Seminar MultiTransmit experiences at University of Vermont

Don’t miss this:
Check out the latest MultiTransmit ExamCards and login to get access to a wealth of new training modules. Also look forward to new Ingenia content and redesigned navigation on NetForum.

Visit the NetForum User Community for downloading ExamCards and viewing application tips, clinical cases, extended versions of FieldStrength articles and more.
dStream architecture brings paradigm shift in MR imaging

Digital revolution with better image quality, faster imaging and processing, and higher patient throughput

Philips’ Ingenia® with dStream architecture with DirectDigital RF provides high purity MR signal, by digitizing the signal directly in the coil on the patient. By digitizing the MR signal directly in the receive coil it can be transported across broadband fiber optic cable to increase SNR by avoiding analog signal loss and noise pickup. Also, by digitization in the coil the system becomes channel independent, so RF channel upgrades are a thing of the past.
Increased consistency and image quality
With digital broadband, more data can be transferred with less interference resulting in higher SNR – this is also applied in modern telephony and high-speed internet infrastructure. DirectDigital RF digitizes the MR signal in the coil on the patient. Transporting the digital signal by broadband fiber optic cable from the coil to the acquisition electronics in the scanner’s cabinets eliminates signal losses and noise pickup that typically occur in conventional cables of this length. In other words, the signal clarity is preserved.

In the revolutionary Ingenia system, dStream coils are designed both for fast imaging and high SNR in all images. Better than ever before the coil elements layout is optimized for large coverage and parallel imaging with high acceleration factors. Digitization in the coils, together with broadband signal transport, is essential for obtaining the gain in SNR.

The overall result of the dStream architecture and these sophisticated coil designs is an increase of SNR throughout the whole imaging volume, of up to 40% with respect to conventional MR systems.

Simplified workflow and improved throughput with dStream
In the Ingenia system, dStream architecture provides a complete set of dStream coils for head-to-toe solutions. The FlexCoverage posterior coil is integrated right underneath the tabletop with neck-to-toe coverage to eliminate coil handling and positioning in about 60% of all cases. The FlexCoverage anterior coil is lightweight and flexible for easy handling and patient comfort, and has outstanding performance with 60 cm coverage. FlexConnect enables single-handed coil connections as well as auto-eject for easy table undocking.

To further simplify workflow during the examination, the system automatically uses coils and elements to maximize SNR. This reduces examination time and increases the reproducibility and consistency among scans. Because of dStream’s excellent image quality, patient throughput improves by as much as 30%.

Channel independence avoids upgrade complexity
Since the signal of all coil elements is digitized directly in the coil, the system receives all signal through one broadband fiber optic cable, no matter how many elements the coil has. This means that the system can handle coils with many elements as easily as coils with few elements. In other words, the system is indifferent to the number of coil elements.

In traditional MR technology, an 8-channel system can only handle receive coils up to 8 channels; in order to support a 16-channel RF coil, an upgrade to a 16-channel platform is required. But with digitization moved to the coil, a truly channel-independent system is created; the number of channels is not a system specification anymore.

Future-proof architecture
The increased efficiency and throughput with excellent image quality, make dStream architecture the future of next-generation MRI systems.

With dStream there is no need for upgrading system RF receive channels to keep up with advances in coil technology. This enables easy expandability of clinical capabilities without major system overhauls, resulting in lower lifecycle costs and improved economic value.

* Pending 510(k), not available for sale in the U.S.A.
Fast and easy acute brain imaging on Ingenia system

The Ingenia® MR scanner is designed for image clarity and simplified, fast workflow – just what is needed in acute brain exams. When patients can’t lie still for long and results are urgently needed, patient comfort should be optimized, scans should be fast and robust, and image quality needs to be consistent and reliable.

Very easy patient preparation with dS HeadNeckSpine coil solution

Use the new dS HeadNeckSpine coil solution. It offers a more comfortable, open experience for patients, often important in acute brain scans, as many of these patients are restless and anxious and sometimes very confused.

Connect the dS HeadNeckSpine coil solution on the table. Only one hand is needed for this as the connector is small and lightweight, since it only contains one digitizer supply cable and a fiber optic cable for fast and undisturbed data transfer. The FlexCoverage posterior coil is integrated under the table and does not need manipulation.

The flexible, open coil design enhances patient comfort with a visual field and extra space, so the nose doesn’t touch the coil. The coil’s anterior flap can be raised or lowered to increase comfort and proximity of elements to the patient leading to clearly better SNR in the area underneath of the neck.

If a FlexTrak patient transport system is used, the technologist can easier focus on the patient, as the auto-eject functionality does not require a manual unplugging of coil connectors when lowering the tabletop using FlexTrak.
Trade higher SNR to speed up

Ingenia features dStream RF architecture and dStream coils. The direct digital sampling in the coil provides higher SNR and signal fidelity. In acute brain exams, this gain in SNR can be traded in for higher scan speed. A scan time of less than eight minutes can be achieved by reducing NSA and using SENSE. With current parallel imaging techniques noise breakthrough can be seen with high factors. Now with Ingenia, the new dS-SENSE allows high factors with excellent results.

SmartSelect automatic coil element selection

Coil selection is no longer necessary during scan setup. When the FOV is planned, the system automatically selects the coil elements in the dS HeadNeckSpine coil solution delivering the best possible SNR for the scans.

Setting up the ExamCard

In an ExamCard for an acute brain, scan time should be reduced as much as possible without sacrificing image quality. The increased SNR realized by Ingenia allows the use of higher parallel imaging factors due to the new dS-SENSE algorithm. The Ingenia fast brain ExamCard makes use of higher parallel imaging factors to minimize scan time while maintaining good image quality. It includes:

<table>
<thead>
<tr>
<th>3.0T scans</th>
<th>SENSE factor</th>
<th>Scan time [min]</th>
<th>Voxels [mm³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>2.0</td>
<td>1.39</td>
<td>0.4 x 0.9 x 0.8 to visualize abnormalities in the Circle of Willis</td>
</tr>
<tr>
<td>FLAIR</td>
<td>2.5</td>
<td>1.19</td>
<td>1.5 x 2.2 x 5.0 to visualize areas with abnormal diffusion</td>
</tr>
<tr>
<td>MR Angiography</td>
<td>2.3</td>
<td>1.6 sec/dyn, 40 dyn</td>
<td>2.3 x 2.3 x 4.0 to visualize lesions</td>
</tr>
<tr>
<td>Dynamic</td>
<td>2.3</td>
<td>1.6 sec/dyn, 40 dyn</td>
<td>2.3 x 2.3 x 4.0 to visualize lesions</td>
</tr>
</tbody>
</table>

Optional:

| 3D BrainView FLAIR | 5   | 5   | 1.1 x 1.1 x 1.1 to visualize anatomy and, for instance, demyelination and small white matter spots |

FieldStrength 39
Higher SENSE factors can be used

Use of a dS-SENSE factor will accelerate a scan by that factor. If SENSE factors are too high, noise will become too high. Ingenia with dStream allows for use of higher factors while still preserving SNR. These multislice T2 TSE images with increasing SENSE factors from 1 to 3 illustrate this.

3D BrainView

The 3D BrainView high resolution acquisition enables reformatting of any other orientations after the scan. The scan has no slice gap, so a FLAIR series is ideal to visualize, for instance, small white matter lesions in any desired plane.

The image example at the bottom shows a comparison between multislice FLAIR and 3D BrainView FLAIR.
Quick and easy whole body scanning with Ingenia

Philips’ digital broadband MR system Ingenia® facilitates outstanding whole body imaging. The Xtend imaging space delivers outstanding homogeneity on a 70 cm bore. The dStream architecture and coils enable high image quality, faster scanning and improved workflow.

**TIP 1**

**Patient positioning and coil choice**

Patient positioning has become faster and easier with dStream’s FlexCoverage posterior coil covering from “neck to toe” for feet-first or head-first imaging without any coil manipulation. By adding the dS HeadNeck coil solution and a single FlexCoverage anterior coil “eyes to thighs” oncology coverage is achieved. To obtain total body “head to toe” coverage just add one additional FlexCoverage anterior coil.

Positioning the wireless VCG/respiratory belt does not require connector and cable handling. No tabletop extender is needed, so whole body scanning can be performed faster and can easily be added to an exam. The table stroke is over 2 meters (6.6 feet).

The FlexCoverage anterior coils are easy to handle as they are lightweight and very flexible thanks to the use of fiber optic cables. The dStream coils enable easy one-hand connector plug-in. The coil is designed for strap-free use. However, strapping may be done to prevent unwanted coil movement.

* Pending 510(k), not available for sale in the U.S.A.
Planning a full whole body exam in only 5 stations

ExamCards already ensured a smooth workflow, but this is now further optimized since reference scans and coil survey scans are automatically performed by the system.

The large FOV in FH direction enabled by Ingenia allows acquisition of a full high quality whole body scan in only 5 stations. Compared to the 7 or 8 stations that were usually required on older systems, this considerably reduces exam time because it involves fewer table movements and thus decreased scan times.

SmartSelect automatic coil element selection for best SNR

Manual coil selection is not needed. Ingenia’s SmartSelect automatically selects the coils and coil elements which contribute to the highest SNR. So, no matter what coils are connected or what size the patient is, the system determines per station what the best coil elements are.

This is designed for enhanced ease of use and improved reproducibility and consistency between scans.

Use higher parallel imaging factors to optimize resolution per station

The use of digital RF coils – with signal digitization in the coil – improves SNR and thus enables parallel imaging with higher dS-SENSE factors. This speeds up whole body scans and helps to sharpen images. For instance, a SENSE factor of 4 in LR direction is now achieved.

In addition, it is possible to tailor the spatial resolution per station in whole body imaging. The dStream architecture makes use of higher parallel imaging factors practical, enabling flexible optimization of the resolution per station to obtain improved diagnostic image quality in all stations.
A 15-minute Ingenia 1.5T whole body exam

This example shows a high resolution whole body exam including single shot T2-weighted TSE and free breathing whole body DWI (DWIBS). Reconstructed voxel sizes are $1 \times 1 \times 6 \text{ mm}$ in the whole body scan. In DWIBS voxels are $5 \times 5 \times 6 \text{ mm}$. The total exam time is 15 minutes.
Meeting focuses on user experience

Workshop brings Philips customers to Eindhoven

With global trends putting more pressure on healthcare providers to deliver more for less, radiology is expected to increase both diagnostic quality and service efficiency. To that end, Philips users from India, Turkey, Sweden, Switzerland, the U.K., Canada and the U.S. were invited by Philips to discuss ways of improving usability, quality and efficiency on July 1-3, 2010.

The program was designed around collaboration, with a focus on user participation. Participants looked at how “a day in the life of MRI” is experienced by radiologists, technologists, patients and others involved. Philips moderators set the stage for selected topics, which were interactively discussed, including user challenges and how they are overcome today, and how users would like to overcome challenges in the future.

“I was very impressed that there are people from a big vendor like Philips who are so dedicated and really interested in my opinion, my thoughts, and open to discussion,” commented Mihael Abramovic, radiographer, Paraplegiker-Zentrum, Nottwil, Switzerland.

As Philips will drive user experience in upcoming years, close collaboration with users continues to be an important source of valuable feedback and suggestions.
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Notice
FieldStrength is published three times per year for users of Philips MRI systems. FieldStrength is a professional magazine for users of Philips medical equipment. It provides the healthcare community with results of scientific studies performed by colleagues. Some articles in this magazine may describe research conducted outside the USA on equipment not yet available for commercial distribution in the USA. Some products referenced may not be licensed for sale in Canada.
Education calendar 2011

Breast MR

Advanced Breast MRI
Cleveland, OH, USA
Dates: April 5-7* and October 4-6*
*Dates are subject to change
2.5-day course for radiologists and technologists with basic understanding of breast imaging. Course includes didactic, hands-on and clinical reviews. Breast biopsy and post processing packages will also be covered.
Info: kara.grey@philips.com

Soc. of Breast Imaging Course
San Antonio, Texas, USA
Date: May 18-21
Info: www.sbi-online.org

Erasmus course: Breast and female imaging
Chios, Greece
Date: September 7-10
Info: www.emricourse.org

Cardiac MR

Cardiac MR courses at CMR Academy
German Heart Institute, Berlin
All courses are for cardiologists and radiologists. Some parts will be offered in separate groups.
Info: www.cmr.academy.com,
info@cmr.academy.com
Tel. +49-30-4502 6280

Complete course
Dates: Feb. 7 - Mar. 18 or Oct. 24 - Dec. 2
Intensive course including hands-on training at the German Heart Institute, and reading and partially quantifying over 250 cases.

Compact course
Dates: Feb. 7-11; Sep. 5-9; Oct. 24-28
CMR diagnostics in theory and practice, including performing examinations and case interpretation.

International Cardiac MR course
Leeds, England
Dates: t.b.a.
Theoretical principles and practical applications of Cardiac MRI. Daily practical scanning and post-processing sessions in small groups.
Info: www.cmr.leeds.ac.uk,
M.O.Parker@leeds.ac.uk

Erasmus course: Cardiovascular MR with CT correlation
Bologna, Italy
Date: April 18-19
Info: www.emricourse.org
chiara.cilione@iec-srl.it
Tel. +39 51 614 4004

Physician Fellowship in CMR
St. Louis, MO, USA.
Dates: January through March - 3 month fellowship.
For cardiologists, radiologists, or other physicians.
Info: http://ctrain.wustl.edu,
scaruthers@cmrl.wustl.edu

Neuro MR

Clinical fMRI and DTI
Leuven, Belgium
Dates: March 24-27
This course aims to convey in-depth knowledge about functional MRI (fMRI) and diffusion tensor imaging (DTI). Organized by Prof. Sunaert, University Hospitals Leuven.
Info: www.esmrmb.org

MR Spectroscopy

MR Spectroscopy course
Zurich, Switzerland
Date: Summer (June) 2011
Theory sessions and daily practical scanning and post-processing sessions in small groups.
Info: www.biomed.ee.ethz.ch/education/
education-centre/spectroscopy-course,
dmeier@ethz.ch

Advanced MR Spectroscopy
Cleveland, OH, USA
Dates: t.b.a.
MR engineers, research technologists, physicians, and physicists of Philips MR sites, interested in MR spectroscopy. Participants require basic MR scanning experience. Note that class size for this course is limited
Info: vicki.milligan@philips.com

Musculoskeletal MR

Erasmus course on MRI: Musculoskeletal I
Leiden, The Netherlands
Date: January 24-28,
Info: www.emricourse.org,
PM.N.Kort@lumc.nl

Erasmus course on MRI: Musculoskeletal II
Izmir, Turkey
Date: September 12-16,
Info: www.emricourse.org,
synem@dekon.com.tr

Current issues of MRI in orthopaedics and sports medicine
San Francisco, CA, USA
Date: August 28-31
Info: www.stollerscourse.com

NetForum
www.philips.com/netforum

Register on NetForum to have free access to online training modules on use of Philips MR scanners and packages, use of coils, use of EWS, MR safety.
General MR

Essential Guide to Philips in MRI
Different locations, UK
Dates: t.b.a.
Designed for Philips users. Includes 2 days on basics of MR physics and 2 days on advanced concepts. The course can be attended for 2-4 days.
Info: philips.mr.training.education@philips.com

North American off-site training courses
Dates: upon request
Info: kara.grey@philips.com
Tel. +1-440-483-5355
Fax: +1-440-483-7946

Regional Registry Review
Cleveland, OH, USA or facilities across U.S.
Two day didactic course covering MR physics and cross sectional anatomy. This course is designed as an overview course to assist MR technologists in taking the ARRT MR registry exam.

MR Basics
Cleveland, OH, USA
Designed for the novice technologists with little or no previous MR experience. Lectures cover the basic concepts and theory of MRI. This program is entirely didactic and theory based.

MR Essentials
Cleveland, OH, USA
This comprehensive course for technologists covers all basic scanning and system functionality. Lectures cover MRI safety, scan parameters, and pulse sequences.

MR Advanced
Cleveland, OH, USA
Didactic and hands-on course covering advanced applications including advanced scan parameters, pulse sequences, advanced neuro, ortho, body and breast imaging techniques.

Cardiac imaging
Cleveland, OH, USA
Didactic and hand-on course covering all cardiac views, heart valves, Q-flow, coronary arteries and the postprocessing packages on the EWS.

1H Basic spectroscopy imaging
Cleveland, OH, USA
Didactic and hand-on course covering Basic 1H Spectroscopy for the brain, prostate, and breast. This course also covers postprocessing packages on the system.

Events calendar 2011

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>More information</th>
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<tbody>
<tr>
<td>Jan 16-19</td>
<td>Intraoperative Imaging Society – IOIS</td>
<td>Zurich, Switzerland</td>
<td><a href="http://www.intraopimaging.org">www.intraopimaging.org</a></td>
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<tr>
<td>Jan 22-23</td>
<td>The American Society of Neuro Imaging – ASN</td>
<td>Fort Meyers, FL, USA</td>
<td><a href="http://www.asnweb.org">www.asnweb.org</a></td>
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<tr>
<td>Jan 24-27</td>
<td>Arab Health</td>
<td>Dubai, United Arab Emirates</td>
<td><a href="http://www.arabhealthonline.com">www.arabhealthonline.com</a></td>
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<tr>
<td>Jan 28-31</td>
<td>Indian Radiological &amp; Imaging Association</td>
<td>New Delhi, India</td>
<td><a href="http://www.irisdelhi2011.com">www.irisdelhi2011.com</a></td>
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<tr>
<td>Feb 23-26</td>
<td>American Society of Spine Radiology – ASSR</td>
<td>Honolulu, HI, USA</td>
<td><a href="http://theassr.org">theassr.org</a></td>
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<tr>
<td>Mar 2-4</td>
<td>American Society of Functional Neuroradiology – ASFNR</td>
<td>Phoenix, AZ, USA</td>
<td><a href="http://www.asfnr.org">www.asfnr.org</a></td>
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<tr>
<td>Mar 3-7</td>
<td>European Congress of Radiology – ECR</td>
<td>Vienna, Austria</td>
<td><a href="http://www.myesr.org">www.myesr.org</a></td>
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<td>Mar 26-31</td>
<td>Society of Interventional Radiology – SIR</td>
<td>Chicago, IL, USA</td>
<td><a href="http://www.sirmeeting.org">www.sirmeeting.org</a></td>
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<tr>
<td>Apr 2-5</td>
<td>American College of Cardiology – ACC</td>
<td>New Orleans, LA, USA</td>
<td><a href="http://www.accscientificsession.org">www.accscientificsession.org</a></td>
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<tr>
<td>Apr 7-10</td>
<td>Japan Radiology Congress – JRC</td>
<td>Yokohama, Japan</td>
<td><a href="http://www.j-rc.org">www.j-rc.org</a></td>
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<tr>
<td>Apr 9-12</td>
<td>Charing Cross Symposium</td>
<td>London, UK</td>
<td><a href="http://www.cxsymposium.com">www.cxsymposium.com</a></td>
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<tr>
<td>Apr 9-13</td>
<td>American Association of Neurological Surgeons – AANS</td>
<td>Denver, CO, USA</td>
<td><a href="http://www.aans.org">www.aans.org</a></td>
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<tr>
<td>Apr 27 - May 1</td>
<td>Arab Radiology Congress</td>
<td>Beirut, Lebanon</td>
<td><a href="http://www.pansrs.org/arc4.htm">www.pansrs.org/arc4.htm</a></td>
</tr>
<tr>
<td>May 7-13</td>
<td>International Society for Magnetic Resonance in Medicine – ISMRM</td>
<td>Montreal, Canada</td>
<td><a href="http://www.ismrm.org/11">www.ismrm.org/11</a></td>
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