Heartbeat

Answers for life in Sustainable Cardiovascular Care

September 2013

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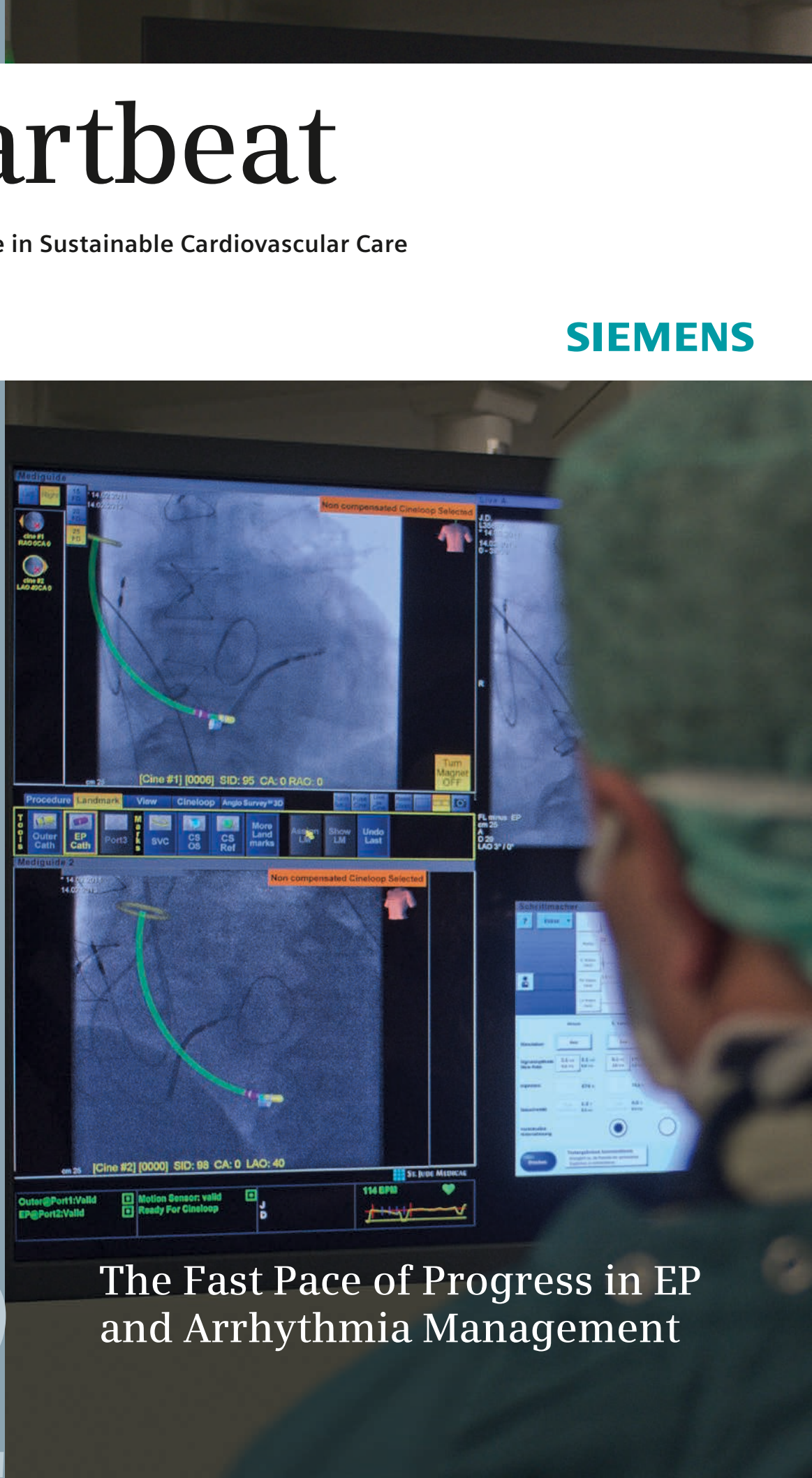

The Fast Pace of Progress in EP and Arrhythmia Management

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Answers for life.

Okan Ekinci, MD, MBA
Global Director, Cardiology
Siemens Healthcare

Dear Reader,

According to a recent study published in the European Heart Journal, the number of adults with atrial fibrillation will double within the next 50 years. Similar trends have been published for the USA (approximately 2.5-fold) and China (approximately 2-fold) and share the same underlying cause: demographic change.

The overall increase in the prevalence of atrial fibrillation, ventricular tachycardia and heart failure, combined with improved procedural outcomes and changing healthcare policies, has led to an increasing demand for electrophysiology (EP) procedures. From the catheter ablation of arrhythmias to implantable cardioverter-defibrillators (ICD) and cardiac resynchronization therapy (CRT), this sub-discipline of cardiology offers a wide array of therapeutic options. These therapies have dramatically changed the way we treat patients with the aforementioned diseases or prevent sudden cardiac death.

While their clinical value is unquestionable, millions of patients who would need an ICD or CRT remain undetected or untreated. In many regions it is often the missing infrastructure and the lack of qualified EP professionals that prevents patients from getting state-of-the-art therapy. Even in mature health systems, better patient selection criteria are necessary that identify more eligible patients and do this with higher specificity, considering, for instance, the moderate responder rate achieved in CRT patients.

For the latter, imaging markers and (in research) biomarkers play an increasing role. With the integration of advanced cardiac imaging, EP labs have become drivers of technological convergence; cardiovascular computed tomography (CCT), cardiovascular magnetic resonance (CMR) imaging and advanced 3D echocardiography features can be used for better patient selection, as well as to improve procedural success and outcome.

We have dedicated the cover story of our second issue of Heartbeat to EP. We spoke to Prof. Angelo Auricchio, the outgoing President of the European Heart Rhythm Association (EHRA), regarding the medical society he co-founded, the growth in EP, and the treatment of arrhythmic patients in Europe. We also visited Leipzig Heart Center and talked to Prof. Gerhard Hindricks about his experience with MediGuide™ Technology-supported CRT implantation, resulting in significantly lower radiation exposure for both patients and examiners. In another article, Dr. Gaspar from Leipzig describes the use of this technology in pulmonary vein isolation. Finally, we met with Dr. Per-Erik Gustafsson, chief cardiologist at Gävle Hospital in Sweden, to explore how the integration of remote monitoring of pacemaker patients using the Siemens' Soarian® Clinicals hospital information system has improved care delivery.

Besides EP, there is much more to explore in this issue of Heartbeat, including:

How, Dr. Christoph Tillmanns, Head of Cardiology at Diagnostikum Berlin, was able to set up a routine 3T CMR service with MAGNETOM® Skyra and Cardiac Dot Engine in a private practice.

How the emergency department (ED) of Mercy Medical Center could accommodate significant ED volume increases by introducing point-of-care high-sensitive Troponin-I testing with Stratus® CS Acute Care™ Diagnostic Systems.

Finally, if you are under the impression that there is an increasing number of cancer survivors with heart disease, do not miss our article on cardioncology – a new collaborative discipline at the intersection of cardiology and oncology.

Enjoy this issue of Heartbeat!

Yours sincerely,

Content

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A Heart Center in Chelyabinsk, Russia

The Fast Pace of Progress in EP and Arrhythmia Management

Cover Photo: Andréas Lang

The Fast Pace of and Arrhythmia

Progress in EP Management

A Voice for Europe's Arrhythmia Patients

In 2013, the European Heart Rhythm Association (EHRA) celebrates its 10th anniversary with one of its founding members as President, Professor Angelo Auricchio, MD, PhD. Italian-born, Auricchio is director of the clinical electrophysiology (EP) unit at the Fondazione Cardiocentro Ticino, in Lugano, Switzerland. His interest in EP stems from his university studies and led to his election as President of EHRA. Heartbeat spoke to him in Lugano to discuss EHRA, EP, and the treatment of arrhythmic patients in Europe.

By Claudia Flisi
Photos: Claudio Bader

Since 2013 marks the EHRA's 10th anniversary, please tell us something about this organization and your involvement in it.

The EHRA started with the merger of two European Society of Cardiology (ESC) working groups: one focused on arrhythmia, the other on cardiac pacing, in which I was involved at the time. The two groups came together in 2003, creating a single, strong scientific entity advocating the best treatment of arrhythmia patients in Europe and advancing the fight against sudden cardiac death (SCD). Since then, the EHRA has been a great success story. Its undisputed leading role at European and international level is demonstrated by the steady growth of membership, by the high quality of much diversified educational portfolio, and last but not least, by its increasing ability to lobby national governments and EU institutions to tackle inequalities in access to proven, life-saving, and affordable therapies.

My personal involvement in the EHRA goes back to 2005, when I have been asked to chair the Scientific Initiatives Committee; subsequently, I have been requested to chair the Scientific Documents Committee, and finally in 2009 I joined the EHRA Executive Board as President-Elect. Since 2011 I have the honor and privilege of serving as President of the Association. My mandate runs out in June 2013 during the EHRA 2013 congress; however, I will continue to support the EHRA Executive Board in my capacity as Past-President until June 2015.

When did you start working in EP?

My interest in electrophysiology began in 1985, as I was finishing my university studies in Italy and becoming ever more interested in EP. Pacemaker implantations were already available, but most treatment of arrhythmias was based on pharmacology. Only a few centers were working on catheter ablation; one of the largest of these was in Hannover, Germany. I went there, not speaking a word

Professor Angelo Auricchio's presidency overlaps with the 10th anniversary of EHRA.

of German, and spent around three-and-a-half years working on this treatment. Around 1989 and 1990, I was involved in a project concerning the hemodynamic effect of arrhythmic conditions and pacemaker therapies. The outcome of this project represented the physiopathological basis for a breakthrough therapy – cardiac resynchronization therapy – for patients with advanced heart failure and ventricular dyssynchrony. At that point, I was viewed as one of the European fathers of such therapy. Since then, most of my pre-clinical and clinical research activity has been devoted to the investigation of the effect of cardiac resynchronization therapy (CRT) and in establishing CRT as standard therapy for heart failure patients. More recently, I have been completing the pre-clinical and clinical experience by using computer modeling and simulation to understand patient-specific substrate and to improve outcome.

What is the role of EP within clinical cardiology? Why is it such a rapidly growing field?

Electrophysiology is playing a progressively greater role in clinical cardiology. Its growth is the result of a combination of factors: First, as the population is getting older and the number of people over 65 years of age is increasing, atrial fibrillation, heart failure and ventricular arrhythmias are becoming more frequent. All of these diseases can be very effectively treated by electrophysiologists.

The inability of antiarrhythmic drugs to satisfactorily control patient symptoms and the frequency of arrhythmia recurrence created the need to look for alternative non-pharmacological treatments. A breakthrough came in the early 1990s with the ability to cure some arrhythmias, such as Wolff-Parkinson-White, atrioventricular node reentrant tachycardia, and cavo-tricuspidal isthmus-dependent atrial flutter, using radiofrequency catheter ablation. Since then, catheter ablation has been applied to treat nearly all known cardiac arrhythmias.

A further breakthrough came in the late 1990s: the ability to treat heart failure in a way, and with an effectiveness, that had previously not been possible with drugs alone. With resynchronization therapy, a device implanted by electrophysiologists, heart failure patients were able to leave the hospital and enjoy life again after implantation.
Last but not least is the implantable cardioverter defibrillator (ICD). In the mid-1990s, several large, randomized controlled trials definitely proved that ICD was the most effective treatment for those patients who are at high risk of dying suddenly.

One major undertaking of the EHRA is its annual publication of the White Book, describing the current status of major treatments of heart rhythm disorders in ESC member countries. This covers treatments such as Implantable Pulse Generators (IPGs), Implantable Cardioverter-Defibrillators (ICDs), Cardiac Resynchronization Therapy (CRT), and Catheter Ablation Procedures. What made you decide to undertake such a huge project?
The White Book project began in 2008, thanks to Professor Panos Vardas, the current President of the ESC. At that time, he was President of the EHRA. He wanted to have an understanding of what was being done in the electrical treatment of arrhythmias in Europe. His starting point was sending a series of questionnaires to working groups at the national level. These included questions on EP procedures, infrastructure, guidelines, and training. They were also a means of identifying gaps between countries. The EHRA then compiled this information into a monograph. Today, this annual effort is supported by the healthcare industry. One of the things I asked myself when I began my term as President was, "Can we use this data to look at trends?" This prompted us to generate a document, supported by Siemens and Biotronik, that examines the use of cardiac implantable electronic devices and availability of EP infrastructure in the ESC member countries. It is a snapshot of data, but also a trend analysis and identification of treatment gaps. This is the very first time we have something like this at the EU level. Both the WHO and the European Union are now using our report. When I visited Siemens headquarters in July 2011, in my capacity as EHRA President, I presented our educational program, our activities, and also our White Book. Tom Miller, then CEO of the Customer Solutions Division at Siemens Healthcare, was very impressed by all of them.

> "We want to offer the best education to European physicians."

Could you elaborate on the importance of your educational and training programs?
Education is one of our key activities. We want to offer the best education to European physicians and we want to offer a diversified portfolio, which covers the needs of general practitioners with interest in arrhythmias, cardiologists, young electrophysiologists, experienced operators, and allied professionals.
The EHRA wants to provide its youngest colleagues, the next generation of electrophysiologists, with class-leading educational courses and theoretical knowledge as well as training opportunities throughout the EHRA Fellowship Training Program. The EHRA selects, on a very competitive basis, the fellows who most merit, and choose the centers where they will work. They receive one- or two-year educational grants. In addition to help from the industry, Siemens also provided generous support. This year was a record, with 80 fellows applying for the grants. However, we could only accept about one quarter of them. The majority of applicants came from countries in Eastern Europe.

Where else do you offer general education programs?
We offer a variety of educational programs in a range of locations. These include the European Heart House, in Southern France (ESC headquarters); Vienna, which offers the easiest access for applicants from Eastern Europe; as well as Alexandria, Egypt, for North African physicians. This year, 2013 is the first year in which we are also offering programs in Russian, held in Vienna. We know that many doctors face a language barrier, so we organized this two-day course and are promoting it with a website, also in Russian.
Since 2010, the EHRA made a strategic decision to move closer to doctors in their own locations, not just offering courses but also significantly increasing its remote learning educational platform by launching the EHRA/ESC eLearning (ESCeL) platform and webinars. Both of these educational products have been a great success, demonstrated by the several hundred participants attending each of our webinars, and by the large number of visits to the EHRA/ESCeL platform.

What is the Eastern Countries Initiative?
Our research tells us that electrophysiological procedures including device implant rates vary significantly across Europe. It is an issue that cannot be addressed in the same way in every country. In Eastern-European countries, lack of infrastructure and appropriate training is one problem; and lack of awareness about therapies for arrhythmic disorders is another. Let me give you some examples. In Bosnia and Armenia, there is a huge lack of state-of-the-art diagnostic equipment and modern treatment capabilities. The situation is slightly better in Belarus and Ukraine; although in these countries the gap between its healthcare infrastructure and that of the EU is large. In these countries there is the additional need of better trained electropyhsiologists and allied professionals, but more importantly the need of a better reimbursement for

eletrophysiological procedures. Finally, nearly all of these countries lack a more effective patient referral and awareness about non-pharmacological therapies of arrhythmic disorders and the effectiveness of these therapies compared to traditional drug therapy. This is where we can step in. As the EHRA, we can talk to health ministers and local authorities alike. We attempt to raise their awareness of the problems, and to offer solutions. We try to advise them of the importance to allocate proper budget to building infrastructure, to quantify the need of human resource allocation, to set sufficient budget for education and training of professionals, and to consider public awareness activities.

How are training and infrastructure related?

The lack of proper infrastructure is a key obstacle to accessing healthcare. The efficient use of that infrastructure is a further consideration. Indeed, it does not matter how many Ferraris you have in your garage, you have to know how to drive them. In the case of EP, it is not only the number of centers that is important, it is also the training of the doctors, nurses, and technicians who work in them. You also need high-tech equipment that can help you accomplish what you need to do. Indeed, a regular driver's license is not enough to drive a Formula One Ferrari. You also need to gain the appropriate racing license. Today, EP is very high tech. It requires EP labs with advanced cardiac imaging, interventional angiography, but also magnetic resonance and computed tomography imaging, and a high level of image and system integration, as well as trained staff to operate the equipment and infrastructure. Our fellowship program and providing training in different locations are some responses to these challenges.

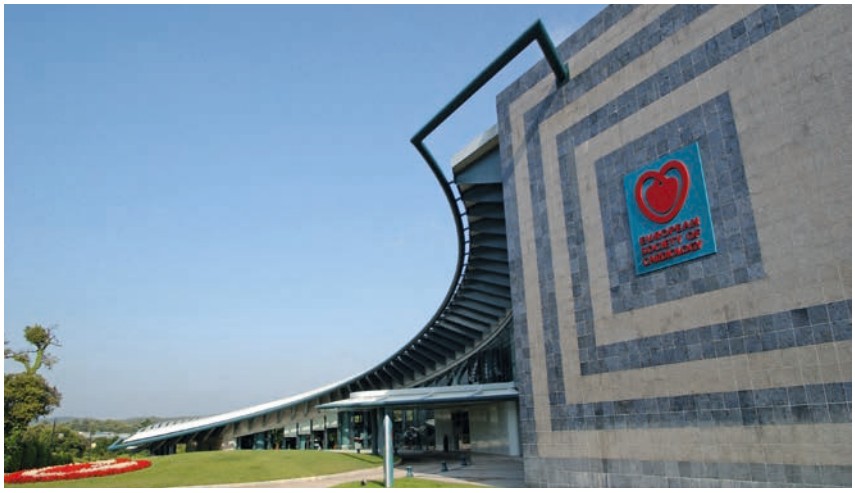
What are the greatest challenges for EHRA?

In the current economic climate, affordability, and sustainability of arrhythmia treatments are key. While we see growth in the technologies that support our work and significant innovations in medical devices, the economic situation in Europe means that the already underfunded electrophysiological activities will be in more jeopardy in the near future. Access to healthcare and proven therapies will certainly worsen. The use of cardiac ablation therapy or implantable electronic devices indeed has significant upfront costs; however, the benefits of such treatments would become clearly apparent after several years. Here, we have a disconnection between the medium-to-long-term healthcare benefit and the view of decision-makers or healthcare managers, whose time horizons are on the short term. This is our greatest challenge to overcome. This is where the EHRA is working its hardest, continuing our fight against the general misperception about high treatment cost of arrhythmias. The EHRA will continue to promote the use of proven, cost-effective life-saving therapies or treatments, which improve the quality of life of arrhythmic patients, and discourage the inappropriate use of therapies.

Another great challenge is the large diversity of healthcare systems in Europe. The EHRA will work in reducing inequality to access to healthcare and in defining the minimum standard in the treatment of arrhythmias in European countries. These are very ambitious goals, which may need a length of time and hard work.

What is important for the EP lab of the future? How will it look?

We need better imaging and medical technologies that improve procedural planning, enable us to deliver patient- and substrate-specific treatment, provide better outcome and larger outcome consistency across population, allow significantly reduce procedural time, and show greater consistency in investigational time independently of operator experience without adding significant cost to the procedure. In this ideal scenario, computer modeling and patient-specific computer simulation may play a major future role in the understanding of the mechanism involved in the to-be-treated arrhythmic disorder and in virtually testing different treatments. Along this line, the use of the EP equivalent of a flight simulator may be a very welcomed innovation.



The European Heart House is the administrative headquarters of the European Society of Cardiology. It is located in Sophia Antipolis near Nice, France.

Author: *Based in Italy, Claudia Flisi writes about science, technology, business, and culture for the International Herald Tribune, various airline magazines, and many publications in English, Italian, and French.*

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CRT Implantation Without Lead Apron

Given the duration of less than six minutes, the average fluoroscopy time for a complete Mediguide Technology-controlled CRT implantation is far lower than conventional exposure.

By Hildegard Kaulen
Photos: Andréas Lang

Hindricks likes to chart new territories. He is considered one of the pioneers of cardiac catheter ablation and manages one of the worldwide leading centers for rhythmology. Each year, his department performs 1,200 atrial fibrillation catheter ablations and around 500 CRT implantations. Recently, Hindricks started to break new ground. About nine months ago, he began implanting biventricular pacemakers using MediGuide™ Technology integrated into his Artis® zee system – and, thus far, the Heart Center in Leipzig, Germany, is the only clinic in the world doing it.

Hindricks is aiming to significantly reduce radiation exposure for patients and interventionalists, and seeks to further improve the quality of interventions. If the electrodes of the biventricular pacemaker are optimally positioned, cardiac status can improve and morbidity and mortality decrease almost without side effects – in fact for many years.

To date, Hindricks and his team have completed fifty MediGuide Technology-supported CRT implantations. They would have completed more but the supply of necessary equipment like sheaths and guidewires for non-fluoroscopic catheter navigation wasn't in full swing until recently. "Cardiac resynchronization therapy is the most important innovation in heart failure treatment in the past 10 years," Hindricks explains. "All clinical studies proved that patients live longer and better with it, since the technique leads to an improvement in cardiac function. And, there is a clear medical need for more CRT implantations." In Germany, 202 treatments per million inhabitants occur each year, which ranks as number two in the European care statistics. The majority of eligible patients, however, do

Cardiac Resynchronization Therapy (CRT)

CRT is indicated and effective for:
- Advanced drug-refractory heart failure
- Severe LV systolic dysfunction
- Ventricular dyssynchrony

CRT improves:
- Symptoms of heart failure
- Exercise capacity
- Ventricular function and structure
- Heart failure-related hospitalizations
- Mortality risk


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not necessarily receive this treatment. According to Hindricks, this is due to a lack of awareness among referring physicians. In many countries, the technique is not covered by insurers, and electrophysiological (EP) centers, as well as appropriately trained physicians, are not available. "We must overcome existing roadblocks and develop better screening programs," he comments. "The left ventricular electrode must be placed in a safe and suitable position. If complications arise, they normally are related to the intervention and include dislocations or infections," he adds.

How Does the MediGuide Technology Work?

MediGuide Technology is not a new mapping system but a cardiovascular treatment platform for fluoroscopy-free navigation. It can be used whenever devices are navigated under fluoroscopic control inside the body. The position of the device is determined by magnetic tracking, and projected in real-time to a pre-recorded cine loop. "The characteristics of MediGuide Technology are its built-in compensation algorithms," Hindricks explains. "The devices are depicted independent from primary and secondary organ movements. This provides high precision over time, resulting in 4D catheter tracking. Moreover, the fluoroscopy system and the electromagnetic sensor field do not work independently, but are fully registered." Compensation of respiratory and cardiac movement is enabled by a reference sensor in the patient's sternum. This sensor acts as a reference point for the calculation of the catheter position. The electromagnetic field transmitter is mounted inside the fluoroscopy detector. Conventional CRT implantations are associated with considerable radiation exposure. This is caused by the anatomically and technically challenging implantation of the left ventricular electrode, a process that usually requires continuous fluoroscopy. During this procedure, the interventionalist stands near the left shoulder of the patient and probes the coronary sinus by means of left anterior oblique (LAO) projections, thus being exposed to considerable scattered radiation. So, they would also benefit from a reduction in the duration of fluoroscopy procedures. Moreover, the C-arm would not interfere with the interventionist's work, as the patient is no longer exposed to fluoroscopy during the intervention. Consequently, the implanter is able to navigate in an LAO projection without a C-arm occupying this position. "The catheter can be visualized on pre-recorded cine loops even during prolonged periods of examination. We can, therefore, have fluoroscopy performed only at the beginning and at the end of a CRT implantation," Hindricks says. "I dream of an electrophysiological laboratory that doesn't use lead aprons. I think that we will be able to implement this vision in the very near future."

Study Proves Decrease of Radiation Exposure

There is substanstive data to back-up Hindricks' vision. During the 50 MediGuide Technology-supported CRT implantations completed, radiation exposure could be reduced significantly compared to the conventional procedure. The average fluoroscopy period for LV electrode positioning was less than three minutes, and for the entire implantation less than six minutes, without any increase in the rate of complications. "I am absolutely convinced that we can reduce the fluoroscopy duration even further," the electrophysiologist says. "We still are in an early stage and use fluoroscopy during the intervention for safety-related reasons. In case of an uncomplicated anatomy, already today a catheter can be navigated safe and reliably without fluoroscopy. In case of stenoses and anomalies of the coronary sinus, we still need it as a safety precaution. As soon as improved algorithms of navigation are available, this will no longer be necessary."
So which MediGuide Technology-supported devices are already available for Hindricks? During CRT implantation, he uses a CS sheath and a subselector, both equipped with a MediGuide Technology sensor. The electrophysiologist reaches the target coronary vein by means of a guidewire of 0.14 mm diameter with the MediGuide Technology sensor, which is used to place the electrode in a suitable tributary of the main cardiac vein. The electrode itself is not equipped with a sensor. "This will not be changed in the near future," he says.

"I dream of an electrophysiological laboratory without lead apron. I think that we will be able to implement this vision in the very near future."

Professor Gerhard Hindricks, MD
Heart Center of Leipzig University, Leipzig, Germany

"The electrode shall retain its proven design." Additionally, sensor-equipped diagnostic EP catheters are available as needed.

While the radiation exposure of MediGuide Technology-supported CRT implantations is considerably lower than in conventional procedures, the time expenditure is actually higher. Hindricks and his team need about 20 additional minutes (140 minutes compared to the average CRT implantation time of 120 minutes). "The increased time still reflects our study situation," he comments. "We enter new territories and are the first and only clinic in the world utilizing this procedure in CRT. With this in mind, the additional time expenditure is remarkably low. Nevertheless, intervention times are crucial for the hospitals. They should at least be comparable, if not even better than for the conventional procedure. I know that we have to improve, and I am convinced we will succeed."

Short Training Curve

Will other interventionalists adapt to MediGuide Technology? "The system offers one of the shortest learning curves you can imagine," Hindricks says. "We had colleagues who were familiar with it already after 10 minutes time, which was not only due to the fact that they were excellent electrophysiologists. Due to the projection of the catheter onto a conventional fluoroscopic image, we stay within an environment that is well-known to all users. They obtain additional imaging quality, but no basically new views. This helps them to quickly become accustomed to the MediGuide Technology system."

While CRT facilitates a longer and better life for most patients, one quarter of the patients equipped with such a device are non-responders. Hence, Hindricks also uses the MediGuide Technology to understand the reasons for treatment failure. "Non-responders presumably require an individualized therapy," the electrophysiologist says, "not standard therapy." Therefore, he measures the phase shift between the electrically and mechanically activated myocardial areas. This shift reduces the heart's pumping efficiency. Since MediGuide Technology depicts this time delay at high temporal resolution, Hindricks and his team are able to measure the late points and use them to determine the position of the left ventricular electrode in an appropriate coronary vein, which is optimal for the patient. For this approach, they are currently collecting data. First results are promising.

Author: *Hildegard Kaulen, PhD, is a molecular biologist. Following positions at Rockefeller University in New York and Harvard Medical School in Boston, she has worked as a freelance scientific journalist for notable daily newspapers and scientific magazines since the mid-nineties.*

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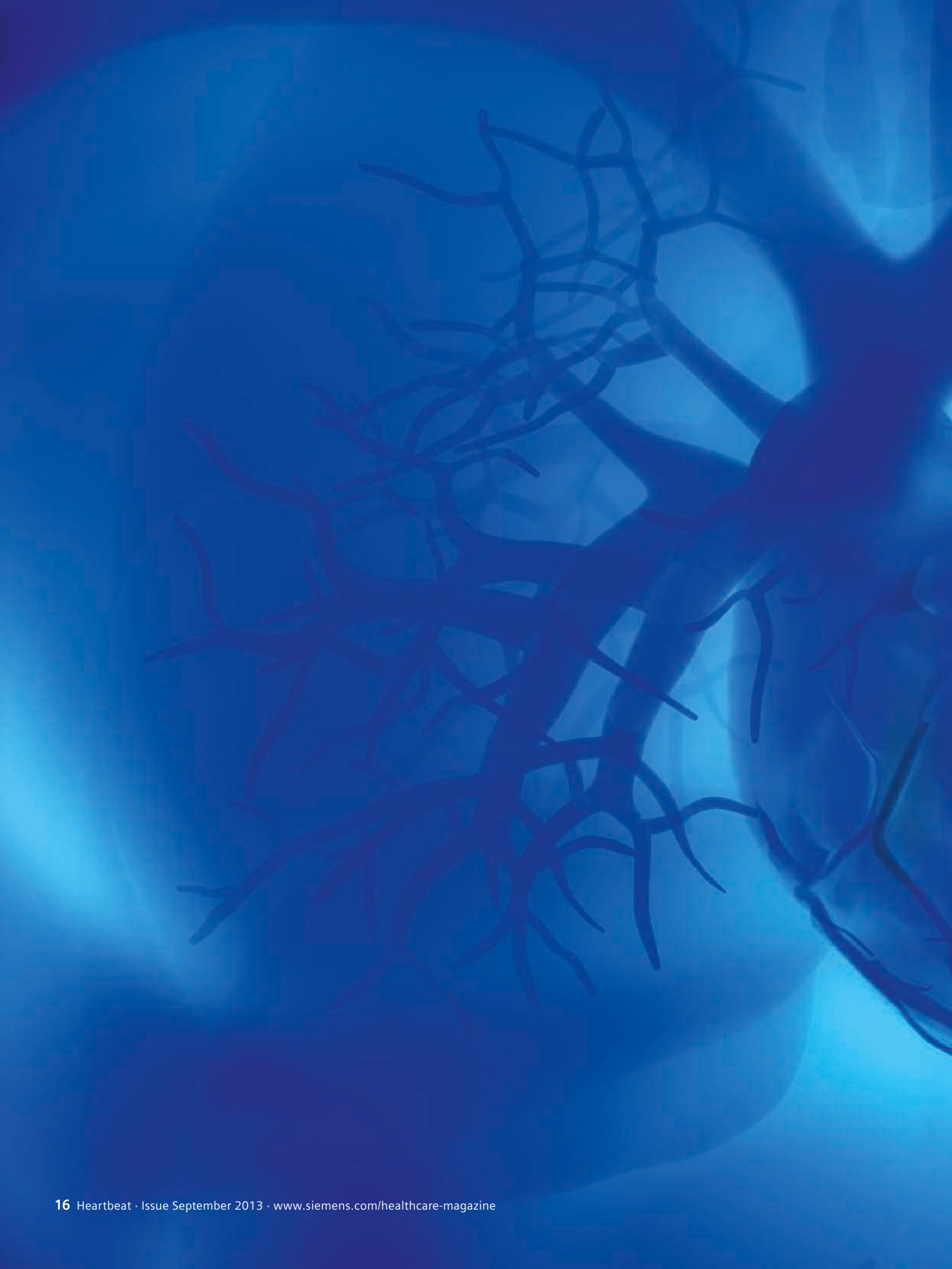

Cardiovascular Trends

Six-year-old Kirill recently underwent surgery to close a ventricular septal defect.

Oleg Pawlowitsch Lukin, MD, and his colleagues have their hands full: the facility's 167 beds are always fully occupied.

Matters of the Heart in the Ural Mountains

South of the Ural Mountains, in Chelyabinsk, Russia, a dedicated cardiovascular center opened its doors in early 2011. More than 5,000 surgeries will be performed at the hospital this year. All treatment is free of charge to the patients, who travel great distances – sometimes more than 500 kilometers – to have surgery in Chelyabinsk.

By Diana Laarz
Photos: Jan Lieske

Last year, doctors at the Chelyabinsk facility performed heart surgeries on about 80 infants and are willing to handle even more cases if the neonatal intensive care unit is expanded.

Mikhail Affanassyevitch Pavlov's 71-year-old heart is about to fail. The coronary arteries that supply the heart muscle with blood are severely stenosed. A computer screen on the desk shows a black-and-white image of Pavlov's heart; the blood vessels look like a river delta. "Here," says the cardiologist, Andrei Selivyorstov, MD, pointing to a spot where the blood flow is reduced to a minimum. "Here, too. And here." Pavlov needs three bypasses – at least. Selivyorstov explains to him how his ribcage will be opened and his ribs will be bowed apart. Cardiac surgeons will then place bypasses. Pavlov's arms lie calmly on his chair's armrests and his wrinkled, grandfatherly face stays completely motionless. When the doctor finishes his 20-minute explanation, Pavlov says just one sentence, "Well, then, let's get started."

Pavlov is a lucky man, and he knows it. "With his heart in this condition, he would have been in bad shape just a year-and-a-half ago – when patients in Pavlov's home city of Chelyabinsk still had to wait a year or more for a bypass operation. Some of them did not survive the waiting time," says Selivyorstov. But now, Pavlov sits in a treatment room in the newly constructed Clinical Center for Cardiovascular Diseases. "When should I come back?" Pavlov asks. "We'll start in a week," Selivyorstov answers.

A Modern-Day Oasis

Chelyabinsk, south of the Ural Mountains, straddles the boundary between Europe and Asia. The city has a population of just over a million and boasts few tourist attractions, teeming instead with the smoking chimneys of its sprawling industrial areas. Viewed from the air, the landscape of Chelyabinsk is made up of housing complexes in varying shades of gray. But on the western outskirts of the city, behind a grove of birch trees and right on Heroes' Prospect, a major traffic artery, lie the blocky beige buildings of the Chelyabinsk Cardiac Center, like dice thrown down on a green field. It looks like a modern-day oasis.

As part of its National Priority Health Project, the Russian government has installed eleven specialty clinics in recent years in regions of the country that lie far from its major centers of Moscow and Saint Petersburg, one of them in Chelyabinsk. Construction got under way in 2007, and the first cardiac surgery was performed in late January 2011. This year, doctors estimate that they will perform more than 5,000 operations at the center. Its 167 beds are always fully occupied. Treatment at these regional specialty clinics is free – the government in Moscow transfers more than 30 million euros to Chelyabinsk alone each year to ensure it. "Up until a few years ago, we could only dream of having a clinic like this," says Oleg Pavlovich Lukin, MD, the facility's Medical Director, as he sits at his office desk. A carved wooden icon hangs on the wall in the corner, and the computer screen on his desk shows a live close-up from one of the three operating rooms. Lukin is in constant radio contact with the doctors performing the surgery.

Born and raised in Chelyabinsk, Lukin is a man of measured movements with a soothing storyteller's voice. Before being

64-year-old Alexandra Braskina (left) had a bypass surgery six weeks ago and is now planning her future. Technology from Siemens (right) helped the surgeons to plan the procedure.

offered his current position at the new center, he worked at the district hospital. He is too polite to speak poorly of the conditions at his old job, but his words make one thing very clear: The cardiac center, equipped with state-of-the-art technology, has catapulted the doctors in Chelyabinsk into a new era in medical care. Patients are traveling to the center from the surrounding regions of Siberia, going distances of more than 500 kilometers to receive treatment in Chelyabinsk. "Just a few years ago, many Russian men didn't live to see their 60th birthday," Lukin says. "Now, we are seeing more and more patients who are 70 or older."

Relatively Low Life Expectancy

Demographic change is a fact of life in Russia. The population of about 140 million is shrinking. Researchers expect the figure to decline from the current 141.9 million to fewer than 130 million by the year 2025. Two main factors have contributed to this development. First, after the upheaval of the 1990s, Russian women are having fewer children. Second, life

The National Priority Health Project

Russian President Vladimir Putin initiated the National Priority Health Project in early 2006. The goal of the project is to improve medical care in Russia. Alongside pay raises for doctors and nurses and continuing professional education opportunities for healthcare workers, the project's main area of focus is building state-of-the-art specialty clinics in 15 regions across Russia. The new clinics specialize in cardiac surgery, trauma, orthopedics, or neurosurgery. The first of them was built in Khabarovsk, in the Russian Far East, near the Chinese border. Ten other healthcare centers have been built in the meantime, including the one in Chelyabinsk. The government hopes the cardiac clinics will help reduce mortality due to cardiovascular disease in Russia from 325 cases per 100,000 people to 250. The Russian government has invested more than ten billion euros in the health project to date.

expectancy in Russia is still relatively low, especially among men. At the end of the last millennium, life expectancy was 58.9 years. Now, Russian men live, on average, 64.3 years.
In fact, specialty clinics like the one in Chelyabinsk are designed to improve healthcare and thereby increase life expectancy. Nearly 57 percent of people in Russia die of heart attacks or other cardiovascular diseases, which makes state-of-the-art medical care especially important in remote areas and in industrial cities like Chelyabinsk. The Urals are widely considered an idyllic natural landscape, but in Chelyabinsk itself, factories constantly belch exhaust into the air. The city's metal combines are among the largest in Europe, producing iron alloys, stainless steel, pipes, cranes, tractors, and crawler tractors. The city leaves a gritty coat on the skin, tongue, and eyes in just a short time.

Neonatal Intensive Care Unit

When Lukin strides down the hallways in his hospital, he stops about every five meters to pat a doctor on the shoulder, shake hands with a nurse, and share a few friendly words. Most of the clinic's 700 employees had previously worked at the district hospital, so they have known each other for a long time. They all received extensive cardiology training. The district hospital is now staffed with new employees. Later, Lukin stops in the room leading to the magnetic resonance imaging (MRI) unit to discuss with three other colleagues cardiac MR images of a six-month-old child the clinic has received from a hospital in Orenburg, about 500 kilometers to the southwest. The cardiologists can see from the images that the right ventricle is two to three times larger than the left. But they can't tell the cause from the images sent by the referring institution. The infant has an appointment in Chelyabinsk the next day. The doctors hope that the Siemens MRI unit in the next room will provide more detailed pictures. "The child is near death, and we are the parents' last hope for help," Lukin says. Previously, 90 percent of newborns who had severe congenital heart disease and were too weak to travel to Moscow, died. Last year, though, the Chelyabinsk facility successfully performed cardiac surgery in about 80 infants. Lukin hopes to expand the neonatal intensive care unit to handle more cases in the future.

Future Plans: Heart Transplants

As with its neonatal treatment activities, the clinic's other successes are obvious, even just a year-and-a-half after opening. In Chelyabinsk and the surrounding area now, no one has to suffer months of chest pain waiting for a bypass operation or for interventional coronary therapies. The waiting list for cardiac pacemakers is getting shorter, and Lukin believes it will only take another year to get through this massive workload. In a couple of years, he hopes his clinic will also be able to handle heart transplants. "And in as little as one or two years," he says confidently, "the results of our work will be evident in the population statistics for the Ural area." By then, more infants will survive the difficult first few weeks, and people

"Patients had to wait a year or more for a bypass operation. Some of them did not survive the waiting time."

Andrei Selivyorstov, MD
Clinical Center for Cardiovascular Diseases, Chelyabinsk, Russia

The Urals are widely considered an idyllic natural landscape, but in the city of Chelyabinsk factories constantly belch exhaust into the air.

will get older thanks to a bypass, stent, or pacemaker from Chelyabinsk.

No patient ever looks forward to going to the hospital. But the people in the hallways of the cardiac clinic here on the outskirts of Chelyabinsk truly value this center, especially because it is so different from many public clinics in Russia. The corridors are painted bright, cheerful shades of yellow, there are comfortable sofas in waiting areas, and the overall mood is calm, focused, and yet also relaxed.

Take, for example, 64-year-old Alexandra Braskina, who sits on the bed in her room, six weeks after her bypass surgery, cheeks rouged, and smiles as she talks about her plans to grow tomatoes in her garden again soon. Or six-year-old Kirill, who underwent surgery to close a tiny hole in the wall of his heart. When his doctor comes to the door, he shouts happily and flings himself at her with open arms. Vladimir Feoktistov, 61 and also a bypass patient, waits for the car that is coming to pick him up and drive him home. His grandchildren are waiting for him, and Feoktistov wants to play with them again. Every one of these patients has already benefited from the cardiac center in Chelyabinsk. For Mikhail Affanassyevitch Pavlov, who just learned today that he will have surgery soon, the hardest part still lies ahead. But from the way he leans casually against the reception counter, waiting for his papers, he doesn't look overcome by fear. "No point," he says. "I just have to get through this, and then everything will be fine."

It is already evening when Lukin hears of the arrival of two new patients. Both are slightly over 50. Both are right on the verge of a heart attack. Should they wait until the next day? A brief word with the head of the radiology unit and Lukin has made his decision. The catheter labs are prepared again. That night, the doctors at the cardiac center in Chelyabinsk work until three o'clock in the morning.

Diana Laarz *is a correspondent in Moscow. She has been a journalist since 2006, writing reports for various German-language magazines and journals.*

Further Information
www.siemens.com/cardiology

One-Stop Evaluation

Cardiac MRI has evolved from a complex research methodology to an easy-to-use diagnostic tool that is indispensable to modern cardiology. Besides helping to assess a patient's indication for cardiac intervention, it gives the most detailed anatomical, morphological, and functional information possible. Although there are still issues with reimbursement in many countries, Diagnostikum Berlin demonstrates that cardiologists and radiologists in private practice can successfully offer cardiac MRI on 3T as part of their daily routine.

By Philipp Grätzel von Grätz
Photos: Werner Baumgärtner

Berlin has always been a good location for cardiac MRI. Back in the late 1990s, Charité Medical School, with its various hospitals, was among Germany's earliest adopters of this technology. Many landmark clinical studies – such as those on myocarditis, and obstructive cardiomyopathies – originated here. In 2013, Berlin's affection for cardiac MRI is still thriving.

Towards the end of Kurfürstendamm, formerly the 5th Avenue equivalent for West Berlin, an unassuming office building is home to one of the largest diagnostic outpatient clinics in Germany. At Diagnostikum Berlin, 18 radiologists, one cardiologist and one general practitioner perform well over 100,000 examination a year; among these, more than 25,000 MRI examinations, and around 17,000 CT scans. "The idea of radiologists and cardiologists offering joint cardiac diagnostics goes back to 2001," explains Dr. Christoph Tillmanns. Today, the cardiology team at Diagnostikum Berlin comprises one radiologist, Tillmanns as the cardiologist, plus several technical assistants: "We are responsible for around 3,000 cardiac MRIs, and an additional 1,000 cardiac CT examinations each year," Tillmanns explains. He sees the interdisciplinary approach to cardiac MRI as the way to go. "The questions we try to

"Cardiac MRI has become the gold standard in describing cardiac function. It is therefore heavily used for the initial diagnosis and follow-up of patients with cardiomyopathies."

Dr. Christoph Tillmanns
Head of Cardiology, Diagnostikum Berlin

Tillmanns: "The MAGNETOM Skyra is a highly efficient 3T MRI system for cardiac examinations."

answer with cardiac MRI can be highly complex, and often require cardiology know-how. On the other hand, radiologists have a far better understanding of the technology, the MRI protocols and the pitfalls of MR imaging."

Cardiomyopathies: All Information in One Go

Demand for cardiac MRI has risen sharply in recent years, according to Tillmanns. "In the Berlin region alone, there are now more than 400 doctors in private practice who refer patients to cardiac MRI regularly, 100 of these are cardiologists." In 2012, the German Societies for Radiology, Cardiology and Pediatric Cardiology issued a consensus paper, stating that modern diagnostics in cardiology had become unthinkable without cardiac MRI. The list of indications is long. It ranges from congenital heart diseases to pathologies of the heart valves, as well as rheumatic or inflammatory diseases of the myocardium, and cardiac tumors. But two groups of diagnoses dominate daily routine: cardiomyopathies and ischemic heart disease. "Cardiac MRI has become the gold standard in describing cardiac function. It is therefore heavily used for the initial diagnosis and follow-up of patients with cardiomyopathies," says Tillmanns. He sees several advantages over other imaging modalities in this context. Cardiac MRI is more accurate than other diagnostic modalities in quantifying left ventricular function and evaluating regional wall-motion abnormalities. "This is true for the left ventricle, but it is especially so for the right ventricle, which is extremely difficult to evaluate with echocardiography," the cardiologist explains. Consequently, patients with arrhythmogenic right ventricular cardiomyopathy (ARVC) are among the patients Tillmanns sees most often. Further cardiomyopathy patients commonly referred to cardiac MRI are those with hypertrophic left ventricular cardiomyopathy. "The advantage of MRI is that we don't have the problems with image quality that we encounter with many patients, when we use ultrasound-based imaging," says Tillmanns. "MRI is also better for patients who need frequent follow-up examinations, since it is less dependent on who performs the examination." A particular strength of cardiac MRI in the context of cardiomyopathies is its ability to not only describe and quantify cardiac function in detail, but also to exclude ischemic heart disease, the second most common cause of heart failure. "In cardiomyopathy patients, cardiac MRI is a diagnostic tool that allows a one-stop evaluation," Tillmanns explains. "Within half an hour, we can quantify the ejection fraction, describe wall motion abnormalities, identify perfusion deficits and localize myocardium that is no longer viable. No other modality can provide all this information in one go."

The Most Detailed Myocardial Ischemia Evaluation Available

Patients with cardiomyopathies are an important group in Tillmanns' daily routine. But even more often he has to deal with patients suffering from coronary artery disease (CAD). Six out of ten patients coming to Diagnostikum Berlin for cardiac MRI either have known cases of CAD, or are patients with suspected-but-not-yet-diagnosed CAD. In patients with known

CAD, cardiac MRI can answer various specific questions that can be highly relevant in deciding whether a percutaneous coronary intervention (PCI) makes sense, and where it would be most effective. Standard cardiac MRI protocols and stress MRI protocols allow Tillmanns to answer questions, such as: Is a known coronary artery stenosis hemodynamically relevant for the myocardium? Is there a restenosis in a recently implanted stent? Is there enough viable myocardium in the region of an older myocardial infarction that could justify a PCI? "In the old days, the morphology of the coronary arteries was the main criterion in deciding when to perform PCI," says Tillmanns. "With cardiac MRI, we can now get functional information that helps us reach far more informed decisions in our CAD-patients." Certainly, there are alternative methods. The traditional approach in clarifying whether relevant ischemia is present in the myocardium is to perform an exercise ECG test, if necessary, supplemented with a myocardial scintigraphy. Tillmanns certainly doesn't disapprove of such methodologies; however, he points out that several clinical trials, such as the MR Impact Study and the CE-MARC Study, have demonstrated the superiority of cardiac MRI over scintigraphy in proving ischemia, and also in answering other CAD-related questions. For those patients still awaiting a firm diagnosis of suspected CAD, the situation is a little different. In such patients, another methodology can be very helpful: cardiac CT. "We use both cardiac MRI and cardiac CT in these patients, and we think they supplement each other," Tillmanns says. Cardiac CT examinations are better for imaging coronary arteries directly. On the other hand, cardiac MRI is free of radiation, and, with the help of perfusion imaging and functional diagnostics, it can exclude relevant CAD, without the need for displaying coronary arteries in detail. "We usually advise a CT when the examination primarily aims to exclude CAD," the cardiologist explains. "The more likely CAD is, the more useful cardiac MRI becomes. This is because of all the additional information it provides concerning wall motion, viability and perfusion deficits."

Claustrophobia Prevalence Decreased by Half

Using modern equipment is a matter of course for Tillmanns and his colleagues. Having worked for years with 1.5T MRI MAGNETOM Avanto, Diagnostikum Berlin acquired 3T MAGNETOM Skyra in 2012, thereby becoming an International Reference Center for Siemens in the field of 3T cardiac MRI. "Being a reference center allows us to keep up-to-date with the latest innovative developments. We also think that it is important for MRI system providers to not only receive feedback from experts in big research centers, but also from users like us, working in routine care," Tillmanns says. MAGNETOM Skyra has now become Diagnostikum's workhorse for cardiac MRI. For CT examinations, the group uses SOMATOM Definition Flash, a Dual Source CT system. Tillmanns believes that switching to 3T MRI was the right decision. "The image quality is significantly superior. It allows us, for example, to depict myocardial perfusion at an even higher spatial and temporal resolution," he enthuses. The cardiologist also sees the wider core of the MAGNETOM Skyra as a further leap forward. "With the 70 cm open bore system, the prevalence of claustrophobia decreased by 50 percent." According to Tillmanns, on average only one patient a day now feels uncomfortable during the examination. A further help has been the architectural decision to have a window in the MRI room, letting in some daylight. In addition, MAGNETOM Skyra's MoodLight technology makes the atmosphere even more comfortable: "Some patients honestly say that they like their examinations."

Helpful Tools for Daily Routine

In spite of this, Tillmanns admits that he and his colleagues took a long time deliberating over whether to switch to the 3T system. "We were worried whether we would be as efficient with 3T as we were with 1.5T," he explains. But it turned out that these worries were unfounded. "Within two weeks, we were achieving the same number of examinations in the same amount of time as we were previously. MAGNETOM Skyra is a highly efficient 3T MRI system for cardiac examinations."
At Diagnostikum Berlin, a normal cardiac MRI, including a stress test with adenosine, takes just under half an hour. Cutting this time any further would be difficult, Tillmanns says. Nevertheless, even with examinations lasting half-an-hour, it is possible to do 15 cardiac MRI examinations daily, and still have time for non-cardiac patients.
Various MAGNETOM Skyra features improve efficiency during the daily routines of Tillmanns and his colleagues.

The Cardiac Dot Engine with AutoAlign Heart, for example, allows fully automatic planning of the 2-, 3- and 4-chamber views. The Cardiac Dot Engine can be very helpful, particularly for less-experienced radiographers. They find the correct axes faster, without having to know the entire anatomy by heart," says Tillmanns.

The post-processing stage is no less crucial. According to Tillmanns, the clinic's goal is to tell the patient immediately about any pathologies; additionally, calling the referring physicians with an update, directly following the examination. "This is only possible if post-processing workflows are intuitive and fast," he says. "MAGNETOM Skyra very much supports the immediate completion of reports, and thus helps us provide the standard of service that we want."

Struggling With Reimbursement Issues

The single aspect of cardiac MRI that is currently not to Tillmanns' satisfaction has nothing to do with technology, it is reimbursement. Similar to some other countries, the German public healthcare system currently doesn't routinely reimburse cardiac MRI. "This will have to change sooner or later. We definitely need a reimbursement agreement between the representative bodies for doctors, and the health insurance companies," Tillmanns stresses. At Diagnostikum Berlin, every patient requiring a cardiac MRI will get one. "But without proper reimbursement agreements, most patients have to individually negotiate with their insurance companies. This works for the patient, and it works for us, but obviously, it is far from ideal," he adds.

But there is some light at the end of the tunnel. An increasing number of health insurance companies are ready to sign contracts with Diagnostikum Berlin, in order to avoid the flood of paperwork that is generated as a result of individual reimbursement decisions. Summarizing this development, Tillmanns says, "They are increasingly aware that cardiac MRI is extremely useful. It is convenient for the patients. There is good data out there, and it is mentioned in all relevant guidelines. There is really no reason not to reimburse it."

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The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results.

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According to Dr. Tillmanns, the demand for cardiac MRI has risen sharply in recent years.

Three Stratus CS Acute Care Diagnostic Systems analyze Troponin-I for approximately 1,800 patients per month.

Hospital Pioneers Groundbreaking Care

Mercy Medical Center in Canton, Ohio, consistently ranks among top-performing hospitals in the U.S. for overall cardiac care, cardiology services, and coronary interventional procedures. For almost 15 years, the hospital has pioneered rapid, proven pain triage – adopting protocols and selecting equipment years before they became universal methods of choice. By Diana Smith

Recognized among the top 50 heart hospitals in the country for five years in a row by Thomson Reuters, Mercy has initiated a number of groundbreaking, life-saving protocols in coronary interventional procedures. Not only does Mercy boast the first accredited Chest Pain Center in the U.S., the hospital installed the nation's first and only fixed cardiac catheterization lab in an emergency room. Additionally, the hospital operates three Siemens Stratus® CS Acute Care™ Diagnostic Systems in the busy ER, which deliver high-sensitivity Troponin-I results, typically in only 14 minutes. When timing is critical for patients with suspected myocardial infarction (MI), Mercy's innovative Emergency Chest Pain Center allows for rapid diagnosis, improves overall outcomes and shortens hospital stays.

Fastest Response

At Mercy, the catheterization lab is literally steps away from the ER entrance, next to the ambulance bay. That proximity allows the hospital to significantly shorten the time between myocardial infarction and life-saving percutaneous angioplasty (PTCA). According to Frank Kaeberlein, MD, Medical Director of the Mercy Emergency Department and Co-Director of Mercy's Emergency Chest Pain Center, many patients receive catheterization within 15 minutes, making Mercy one of the nation's fastest angioplasty responders. In fact, the hospital reportedly holds the world's record for the shortest door-to-balloon time, a blazing seven minutes. The American College of Cardiology and the American Heart Association guidelines suggest the use of a high-sensitive (HS) Troponin-I that meets the 99th percentile and is less than or equal to a 10 percent coefficient of variation (CV). Earlier detection results in faster, life-saving treatment. Thanks to the dedicated ED cath lab and Mercy's heart center team which works in close collaboration with area EMS, more than 90 percent of Mercy's patients receive catheterization in less than 90 minutes, with nearly ten percent in 15 minutes or less.

Frank J. Kaeberlein, MD, Medical Director, Emergency Department at the Mercy Medical Center

Point-of-care Troponin-I Testing

Yet, the majority of MI patients at Mercy do not present with classic textbook symptoms. For those patients, time is just as critical as it is for those that have an established heart attack confirmed via electrocardiogram. To enhance clinical decision-making in these non-STEMI cases, standard protocol calls for cardiac biochemical marker testing, which requires that blood be drawn and evaluated for chemical indicators that show if a heart attack has occurred. When Mercy opened the hospital's Chest Pain Center, they adopted Troponin-I as the biomarker of choice. Remarkably, they did it in 1998, years before Troponin-I was recognized as the preferred biomarker in acute MI. "When we started the Emergency Chest Pain Center, we looked at the data and the research and decided on Troponin-I," says Dr. Kaeberlein. "We also decided on point-of-care testing." Today, Troponin-I is the preferred biomarker according to internationally accepted guidelines (ESC/ACC/AHA/NACB/IFCC). At Mercy, the 32-bed Emergency Department uses three Siemens Stratus CS Acute Care Diagnostic Systems to analyze Troponin-I for approximately 1,800 patients per month.

"Having the Stratus analyzers in the ED cuts down the time factor for results significantly," says Mary Ann Burich-Boccia, MBA, MT (ASCP)SBB, Administrative Director, Pathology and Laboratory Medicine at Mercy Medical Center. "A trained phlebotomist or nurse can draw the blood for testing, label the sample, walk over and put it on the instrument all in the ED." Results are usually back in 14 to 17 minutes, saving precious time for patients.

Team Effort Saves Lives

Located in Canton, Ohio, a city of about 75,000 residents, Mercy Medical Center serves a five-county area and is operated by the Sisters of Charity Health System. Over the last two decades, the 476-bed hospital has seen a significant increase in ED volume over the last two decades. "Twenty years ago, our Emergency Department was seeing 35,000 patients a year," reports Dr. Kaeberlein. "This past year, we saw 65,000, so that number has almost doubled. In addition to the volume increase, patients are older, sicker and have multiple problems and multiple medications. We are seeing many more complex patients."

As the hospital contemplated completion of its Emergency Chest Pain Center, co-founders Kaeberlein and Ahmed Sabe, MD, determined that it was imperative to design a center that would provide the fastest, safest, and therefore, most cost-effective care. That led them to innovative point-of-care testing with Siemens Stratus CS Acute Care Diagnostic Systems and a groundbreaking dedicated ER catheterization lab. Thanks to these innovations, Mercy Medical Center is widely recognized as a leader in cardiac care.

Source: *HealthGrades, an independent health care ratings organization*

Diana Smith *is a freelance writer based in Liberty Hill, TX, USA.*

The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results.

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IQ•SPECT Boosts Throughput and Improves Accuracy of Cardiac Imaging at Halifax

When planning a new ten-story, 944-bed inpatient facility in Daytona Beach, Florida, USA, Halifax Health Medical Center included Siemens Symbia T2 SPECT•CTs among the state-of-art radiology equipment to install. That decision is now paying big dividends. Outfitted with IQ•SPECT-Siemens technology for improving throughput and lowering dose for myocardial perfusion SPECT – the new scanners have exceeded staff expectations with the high accuracy of scans and shorter wait times for patients.

By Suzanne Stone

High demand and outdated equipment led to a two-week backlog for nuclear cardiac scans at Halifax Health, according to Andrea Huffman, Nuclear Medicine Coordinator. Slow scan time limited them to no more than eight cardiac scans a day. "Now we do up to 15," she said. The use of Symbia™ SPECT•CT scanners with IQ•SPECT has cut the time for a cardiac scan from 20 minutes to just five – four minutes to gather and process the counts for a cardiac study and one minute to perform CT-based attenuation correction and calcium scoring. "Our five-minute cardiac scans are better than the ones that used to take 20 minutes," says Thomas Yuschok, MD, a nuclear medicine physician.

IQ•SPECT's SMARTZOOM collimators and a cardio-centric orbit maximize counts from the heart. The versatility of the two Symbia T2 systems installed at Halifax Health allows the nuclear medicine department to adapt to the changing needs from the inpatients and the emergency room they serve. "Being an important facility, most of our scans are not scheduled, so we never know what tests will be needed on a given day," says Yuschok.

The facility uses the Symbia T2 scanners for cardiac scans, as well as bone, tumor, lymph node, and other types of scans. "On an average day, about 60 percent of our scans are cardiac," says Huffman.

Attenuation Correction Provides High Accuracy, Specificity

Hospital administrators chose Siemens SPECT•CT primarily for its exceptional ability to correct for attenuation during cardiac studies and other nuclear medicine studies, such as parathyroid localization and oncology studies of the prostate, according to Yuschok. Although attenuation correction for SPECT has been available for more than a decade, this feature was subpar on many of the other systems Halifax considered. Before Symbia T2 arrived with IQ•SPECT, cardiologists often complained about false positives due to attenuation of artifacts that were misinterpreted as a lack of blood flow to segments of the heart wall. Many were actually caused by breast and diaphragmatic attenuation, according to Yuschok.

IQ•SPECT´s advanced reconstruction algorithm corrects not only for attenuation, but also for scatter and patient motion. "The attenuation correction feature is particularly helpful for heart scans," says Yuschok. "It allows us to compensate for varying patient body size. It also helps correct for attenuation caused by the diaphragm, breasts, and pectoral muscles." The staff helps ensure quality by reviewing images from each scan with and without attenuation correction, he says. If the images of the diaphragm from the CT nuclear acquisitions are not aligned, the images corrected for attenuation may be misleading. Accurate attenuation correction on Symbia T2 helps evaluate cases of false positives, he says.

Improved Speed, Quality, and Patient Comfort

Symbia T2 is also fast. Speed means better image quality due to less patient motion. It also translates into increased throughput and improved patient comfort, a benefit

that patients previously scanned on the old equipment at Halifax have commented upon.

Underlying this increase in speed are Siemens SMARTZOOM collimators that gather the maximum number of counts from the heart. Flexible gantry motions keep the collimators with their 48,000 holes focused on the heart throughout a cardio-centric orbit. This is achieved by individualizing the protocol to the patient. Prior to the scan, the location of the heart is identified on a patient positioning monitor. IQ•SPECT calculates and executes an orbit that optimizes the counts coming from the heart. This contrasts with a conventional acquisition, which positions the detectors as close to the patient as possible, an approach that some patients find uncomfortable.

Following a cardio-centric orbit, Symbia T2 detectors remain a constant distance from the center of the heart.

"We are able to schedule more claustrophobic patients, because the cardiocentric rotation means the camera isn't as close to the patient. However, the scan time is the best thing," says Huffman. "It has given us better image quality, of course, because there is less motion. The turnaround time is so much greater with IQ•SPECT."

IQ•SPECT´s superb image quality is attained through an advanced reconstruction algorithm that takes into account the geometry of the SMARTZOOM collimators, reduces noise and corrects for effects from attenuation, scatter and patient motion. "The quality of the scans means there is less need for rescanning," says Huffman.

Adding to the speedy performance of Symbia T2 are high-definition detectors and an ultrafast multislice CT, as well as Siemens Automated Quality Control (AQC), an Automated Collimator Changer (ACC) and an intuitive automated user interface.

Halifax Health campus, Daytona Beach, Florida, USA

Up and Running Quickly with Siemens Training and Support

Huffman describes the transition to the new scanners as "very smooth." Siemens training staff met with her and the chief technologist two weeks before the new scanners began operating to work out an optimized workflow. "When we went live, Siemens application specialists worked side-by-side with us – and Siemens staff remained on-site for two weeks after start-up," she said.

"They actually provided follow-up training, so after we used the systems for about eight weeks, they sent an application specialist in to work with us for a week to make sure we didn't have any problems and to see if anything needed to be adjusted from the initial setup.

There was plenty of follow-up with them, and they are available anytime we need help, but our technologists caught on well, and they like the systems," says Huffman. Yuschok says physicians needed no additional training to interpret images produced with the new systems. "We have 22 radiologists, and they were all comfortable with the image display right away," says Yuschok.

Successful Integration with Existing PACS System

Halifax Health has been using a freestanding PACS since 2004. "One of the must-haves for a new imaging system was that we had to be able to integrate the SPECT•CT images with our PACS," says Yuschok. "Our vision was to use the PACS for everything in our department and that vision has been realized."

Symbia studies are interpreted on a conventional PACS workstation. Referring physicians can access radiology reports and nuclear medicine images from their offices using the PACS.

Huffman notes that when representatives from other hospitals visit Halifax to see Symbia T2 in action, they are impressed with the ability to read its images on the PACS. "This demonstrates how well Siemens coordinated with us on workflows and protocols," she adds. Both Yuschok and Huffman are pleased with the Symbia T2 scanners and Siemens support.

Suzanne Stone *is a freelance health and medical writer with nearly 20 years of experience. She is located in Carmichael, California, USA.*


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Management & IT

Per-Erik Gustafsson, the chief cardiologist at Gavle Hospital, knows that the accessibility of information can be vital.

“More Time to Focus on the Patient”

Soarian Clinicals, a Hospital Information System from Siemens, has helped medical staff at Gävle Hospital in Sweden to improve the management of patients with implantable cardiac devices. This means that they have more time to focus on the most important part of their work: diagnosing and treating the patient.

By Nils Lindstrand
Photos: Tim Meier

"I think Soarian® is fantastic in helping us to achieve greater efficiency and better patient safety," says Per-Erik Gustafsson, MD, the chief cardiologist at Gävle Hospital. "With all of the data feeding into Soarian and becoming more accessible, all authorized personnel can get instant access to the data they need about pacemaker function, thereby improving patient safety. We are also reducing the time spent looking up records, scanning documents to prevent them from becoming unreadable, and so on. This gives us more time to work on actual medical issues."

Increased Patient Safety At Home

Gävle Hospital has been using Siemens Soarian Clinicals since 2008. The hospital's use of remote monitoring for pacemakers has increased in recent years and today almost 400 patients in the county of Gävleborg have pacemakers equipped with remote monitoring, and automatic presentation of the results in Soarian. Gävle hospital is the first in Sweden to have introduced this combination of remote control and Siemens Soarian. The remote control system helps patients feel safer while they are in their own homes; its combination with Soarian makes them feel more secure in all manner of situations, no matter where they are. Thanks to the readings and data collected by the Siemens Hospital Information System (HIS), information about the pacemaker and the patient's condition is accessible to authorized medical staff anywhere.

"The accessibility of information can be vital in a number of situations," says Dr. Gustafsson. "The patient may need to seek help at another hospital, or at his local health centre. With Soarian, it is easy to access, for instance, data on how the pacemaker is set and how it has been working. This can also be important in other situations, such as when the physiology team at the hospital wants to determine the patient's physical status. You don't want to subject a pacemaker patient to more physical strain than he or she can deal with."

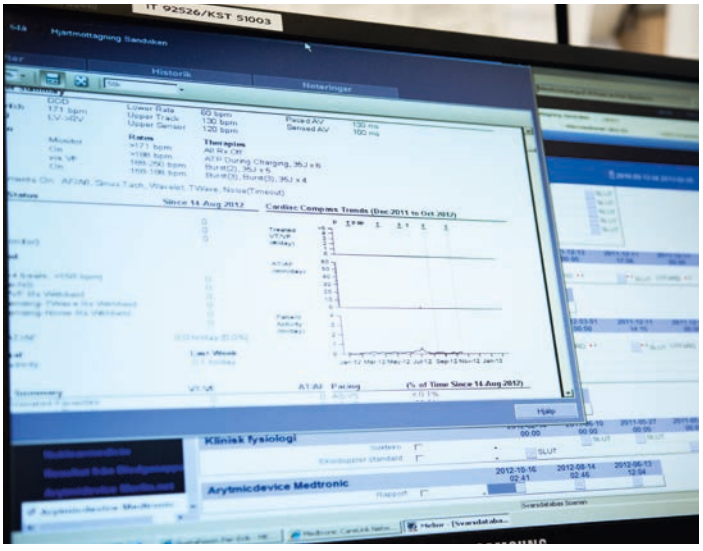
Positive Experiences for the Last Five Years

Patient safety and wellbeing are obvious considerations when choosing to work with HIS, like Soarian and remote monitoring technology. However, there are also other important aspects of healthcare where Soarian may contribute to efficient solutions.

Gävle Hospital has a queue of patients with heart problems and due to an aging population in its catchment region, this pressure is unlikely to decrease in years to come. Time efficiency is essential. Remote monitoring and Soarian help with this in at least two ways: fewer routine examinations at the hospital are necessary and less paperwork which equates to less time spent on paperwork and more time for the patient!

"We used to have patient records on paper, and in a number of binders," says Gustafsson. "This often meant that it was time-consuming work collecting all the necessary data. The printer paper and ink used were often of a quality that would not remain readable for very long. That meant we had to copy printouts to ensure that we could still read them over time. And such printouts were both expensive and environmentally questionable."

Thanks to its use of technology, the hospital saves both time and money; patients are happy with the remote monitoring as they can spend more time out of the hospital. In general terms, all this sounds very positive; however, economic calculations are seldom straightforward. "Remote sensor versions of pacemakers are a bit more expensive to buy, so the economic constraints within the healthcare sector can present problems at the investment



stage," says Dr Gustafsson. "Investing in remote monitoring is sound economics in the long-term; the challenge lies in getting past budget considerations that only look ahead to the next fiscal year."

Safer Patients Spending Less Time in the Hospital

Remote monitoring systems for pacemakers are easy for patients to use and – combined with Soarian Clinicals allow medical staff to easily take advantage of them. At the patient's end, a sensor inside the pacemaker or an implanted cardiac defibrillator (ICD) wirelessly transmits information every weekend to a device in the patient's home. This device is similar in size to a modern alarm clock or a small tablet PC. The information received is then processed and analyzed automatically. If this analysis concludes in a conclusion that anything out of the ordinary has occurred, a report is sent to the supplier's server. This will generate a PDF document from the data, which is forwarded to the electronic patient record inside Soarian. Once inside Soarian, this information is available for everyone with a clearance to read it, allowing – emergency room doctors or physiotherapists, for example – quick access to vital information about how a pacemaker is set and how it has been working for the patient. The doctor will receive an additional notification that the information is available for review in a website belonging to the monitor supplier – in this case, Merlin.net®.

"I start every workday by checking my list of irregularity reports," says Dr. Gustafsson. "Then I go through it and take whatever actions are necessary; calling patients, scheduling hospital visits and so on."

The remote monitoring system, combined with Soarian, presents an advantage for the patient, and at the same time, fewer routine visits to the hospital: "The remote monitoring system often proves to be more sensitive than the patients," says Dr. Gustafsson. "We often get reports that the pacemaker needs adjusting, or that the patient may need some treatment or other, before the patient has experienced any inconvenience." It also provides an opportunity to detect health problems early on thereby avoiding future problems. "Disturbances in the heart are often associated with other health problems, such as a potential stroke," he points out. "Remote monitoring therefore means a better chance for early intervention to prevent a stroke or some other severe health problem from occurring. This is a major advantage both from a patient perspective and in terms of providing efficient healthcare."

Further Steps Lie Ahead

The cardiologist is pleased with the results so far both from using remote monitoring and from using Soarian Clinicals. But the innovative doctor and his colleagues are preparing for the next steps in this evolution: "We were the first hospital in Sweden to use remote monitoring and followed by presentation in the electronic patient record. This combination has been very successful, but it will deliver further gains when we involve more staff," he says. "Nurses are responsible for much of the planning, such as booking patients for hospital examinations. When we get them to harness all the possibilities offered by remote monitoring and Soarian, we will probably become even more efficient."

The cardiology department at Gävle hospital is also working together with the hospital IT department, Siemens and other suppliers to establish a data link for pacemaker readings from hospital check-ups or adjustments with presentations into Soarian. This work is progressing very well, and the project representatives are positive that this transfer of information into Soarian will soon be a reality. A complete transition to using pacemakers with remote monitoring still lies in the future and it is vital to have

Jan Renströms has been living with an ICD with remote monitoring for the last two years.

data for all pacemaker patients immediately available via Soarian Clinicals as soon as possible. "This will be a major step for us to become more efficient," says Dr. Gustafsson. "We will also extend the monitoring alternatives by cooperating with healthcare centres and other nodes in the healthcare system thereby, allowing more patients to get advanced treatment at the hospital."
The innovative spirit within the cardiology department at Gävle Hospital has not gone unnoticed. Recently they received awards from the IT media in Sweden, and also from Siemens, for their ambition and initiative in improving IT-efficiency within the healthcare sector.

Author: *Nils Lindstrand is a freelance science, business and technology writer based in Stockholm, Sweden. His academic background is in chemistry and biology, and he has been working as a science writer and journalist for over 25 years.*

The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results. Soarian Clinicals is not intended for clinical monitoring, diagnostic, and/or therapeutic purposes.

The Patient: "Remote Monitoring Makes Me Safer."

Jan Renströms is 60 years old. He is a former industrial fitter, who lives in Hofors, a small town which is a 45-minute drive from the hospital in Gävle. He was fitted with an ICD with remote monitoring two years ago, and is very content with this system. It means he doesn't have to go into Gävle for routine check-ups. Instead he can stay at home, taking care of his three-year-old granddaughter, Liv, or working on his car: "Twice in the last two years, I have been called to the hospital because the remote monitoring system reported problems with my heart rhythm. I later came to understand that these irregularities could have given me major problems later on, but I never felt any indications myself. So the system is obviously very sensitive and efficient," he says.

Renström considers the remote monitoring technology very easy to use: "I don't really have to do anything. Dr. Gustafsson created the settings on the home unit when we began the monitoring. Now, I just have to plug it into the electrical socket and have the device pointing towards my bed. Apparently, it reads the pacemaker every night while I sleep, but I never notice anything."

Innovations & Research

Cardioncology – A new clinical segment creates a sense of urgency

Cardiovascular diseases and cancer are two of the most threatening diseases worldwide. The number of patients with oncological and cardiological comorbidities is constantly increasing. More than 20 million cancer survivors treated by radiation or chemotherapy suffer from potential long-term cardiovascular toxicity. At least 50% of all patients exposed to chemotherapy will show some degree of cardiac dysfunction within 10 to 20 years after treatment; 5 to 10% will develop overt heart failure and 40% will experience arrhythmias. This population presents an eightfold higher cardiovascular mortality than compared to the general population.

Cardiac events may occur during or shortly after treatment, within days or weeks, or may not be apparent for months and sometimes years after completion of chemotherapy and radiotherapy.

The need for interdisciplinary expertise to manage these patients led to the creation of Cardioncology, a medical subspecialty focusing on the diagnosis and treatment of heart disease in cancer patients. These efforts aim to improve clinical outcomes by integrating new imaging and biomarkers and to promote the development of new anticancer therapies. With the enhanced efficiency of cancer therapy and an increasing number of potential survivors, the "cardio-oncologist" aims to ensure that patients will have healthy hearts to enjoy their new lives.

Trends in Cardioncology: The 2012 ICOS Annual Meeting

The sixth annual meeting of the International Cardioncology Society (ICOS) brought together more than 130 participants from 23 countries. In line with the educational goals of the society, key topics discussed at the annual meeting in Milan, Italy included the cardiovascular implications of oncological treatments and the elimination of cardiac diseases as a barrier to optimal cancer therapy.

By Carlo M. Cipolla, MD and Daniel J. Lenihan, MD, ICOS

Cardioncology is a new interdisciplinary field aimed at:

- Preventing treatment-related heart problems in cancer patients
- Providing care for cancer patients with a history of cardiovascular disease
- Providing care for those who develop cardiac complications during cancer treatment
- Early diagnosis and prognostic evaluation
- Treatment of patients undergoing chemotherapy for effective myocardial protection
- Including appropriate protocols/biomarkers in new drug developments in order to reduce the risk of chemotherapy-induced cardiomyopathy.

Dr. Carlo Cipolla, President, International Cardioncology Society Europe

ICOS is a non-profit professional society founded in 2009 by Dr. Carlo Cipolla of the European Institute of Oncology, Milan, Italy, and Dr. Daniel Lenihan, who worked at the MD Anderson Cancer Center, Houston, Texas, during that period. Its purpose is to promote training, research and study in the fields of cardiology and oncology as associated comorbidities, to understand the cardiovasuclar implications of oncology treatments, and to eliminate cardiac diseases as a barrier to optimal cancer therapy. Previously thought to be a relatively rare phenomenon, studies conducted by Dr. Cipolla, Dr. Lenihan and others from ICOS, suggest that as many as 20%–30% of patients receiving certain classes of anticancer therapy may have some level of cardiac side effects. Cancer therapeutics, both radiation therapy and chemotherapy, are known to have important effects on the cardiovascular system. Many of these long-term consequences did not become clinically evident until overall cancer survival sufficiently improved for the effects to be realized. ICOS was founded with a goal of eliminating cardiac diseases as a barrier to optimal cancer therapy.

Managing Cardiac Disease During Aggressive Treatment

The research opportunities that arise from looking at cardiology in approximation with oncology are manifold. [1]**Giuseppe Curigliano's MD, PhD** presentation focused on the latest cardiac-related results from international trials of trastuzumab, that point toward a stable rate of cardiotoxicity over many years after initial detection. The data emphasize that the rate did not rise progressively over years, and suggests that the issue may be well managed, given today's increased awareness of cardiotoxicity with trastuzumab combinations. [2]**Dr. Curigliano** detailed his contributions to a European Society of Medical Oncologists (ESMO) guideline on the management of cardiotoxicity during chemotherapy. [3]**Giorgio Minotti, MD** described data about the precise mechanism of anthracycline-related cardiac toxicity, and suggested a strategy for reducing these effects. [4-5]**Douglas Sawyer's MD, PhD** presentation showed that the biology of the HER receptor family in the myocardial cell is unique. Current anti-HER2 therapy, such as trastuzumab, appears to be responsible for some occurrences of cardiotoxicity.

Dr. Daniel J. Lenihan, President, International Cardioncology Society USA

According to the expert, this receptor mechanism provides important insight into the survival and repair mechanisms within cardiac cells. This has led to the development of potentially useful therapy for cardiac dysfunction by enhancing cardiac repair. [6-7]**Daniela Cardinale, MD, PhD** presented her group's data on the detection and treatment of "late" cardiotoxicity as well as the expected outcomes. [8]**Marco Giorgio, MD, PhD** demonstrated data concerning the use of mitochondria-based biomarkers to detect cardiotoxicity. The real injury occurring in many situations, he explained, is based on damage to the mitochondria. A new marker is being developed by the speaker's group that may prove to be useful in the clinical detection and management of cardiotoxicity.

The collaboration between cardiologists and oncologists was pivotal in the lecture of Fabio Ciceri, MD. Common cardiovascular issues may be encountered during high-dose chemotherapy and stem cell transplantation, including heart failure, electrocardiographic changes, and biomarker abnormalities. Typical cardiac safety signals can develop during aggressive treatment, and careful and close collaboration is crucial.

Daniel Lenihan, MD presented data from a multi-center observational trial employing cardiac biomarkers and echocardiography to detect cardiac toxicity in a manner suitable for routine-use. Dr. Lenihan showed highly defined cardiac data and biomarkers in patients undergoing anthracycline-based chemotherapy, suggesting a prominent presence of undetected cardiac disease in this population. Strategies to optimize the management of cardiac disease during aggressive treatment are a major goal; how can cardiac safety be maximized without unduly impairing the ability to conduct an oncology trial? **Dr. Lenihan and Dr. Cipolla** revealed an online provider-based survey that indicates how important cardiac disease may be in oncology patients and how traditionally held beliefs about cardiotoxicity are based on minimal data. Provider feedback documented by the survey highlights the need to continue developing good research information that can be effectively applied improving patient care. The closing discussion session made it obvious that cardiac side effects, such as heart failure, can prevent patients from continuing to receive optimal cancer treatments and that they can impact long-term survival. "Many cardiac side effects can be more effectively managed, and in some cases prevented, with currently available technologies and therapies," said Dr. Lenihan. "Much more

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investigation is needed, but it is critical that we raise awareness among oncologists and cardiologists to ensure optimal management of these patients."
More evidence is required to understand the value-add and role of advanced imaging such as cardiac MRI or cardiac CT.

"A Bright Future for Cardioncology"

Enthusiasm for the field was evident at the conference, which had been opened by ICOS co-founder Dr. Carlo Cipolla. The development of a broadly represented consensus document providing careful recommendations for investigators and practitioners is underway. The 2013 annual meeting will be held in conjunction with the Cardiac Safety Research Consortium (CSRC) meeting in Washington D.C. on December 12–14. This year, the organizers' goal for the meeting is to develop a consensus document on the prevention, detection, and treatments of the cardiotoxicity of cancer treatment based on a careful data/literature review. Plans are to conclude with a summary recommendation regarding the evaluation of cardiac safety during drug development (in particular, cancer therapy), the identification and optimal management of cardiac diseases in cancer patients, and the best methods for surveillance and prevention of cardiac diseases in cancer survivors. A concise document will be prepared in the months preceding the meeting and controversial or uncertain areas will be presented at the meeting for discussion. A summary document will be finalized at the meeting and subsequently submitted for publication.

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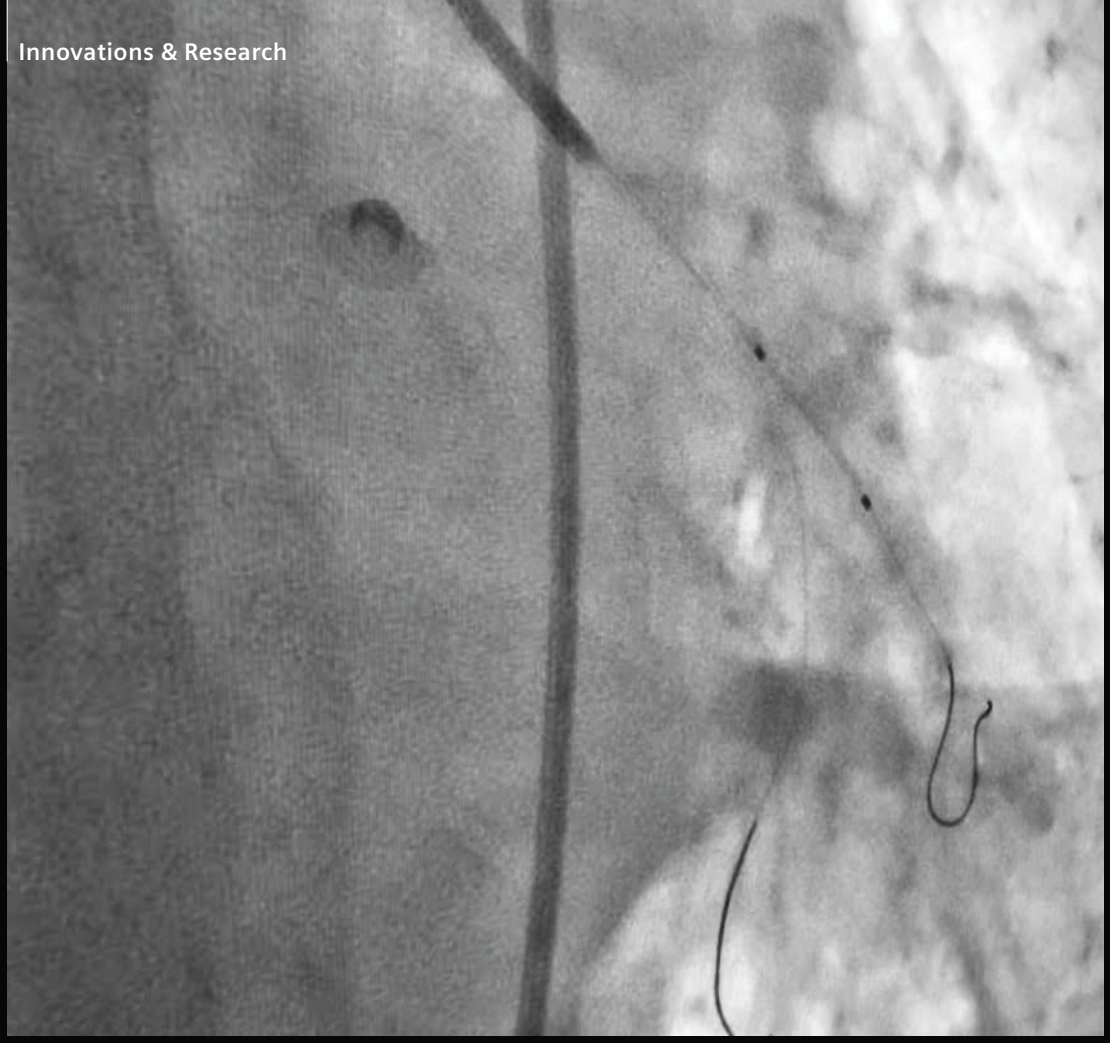
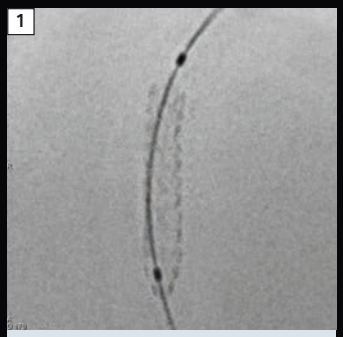
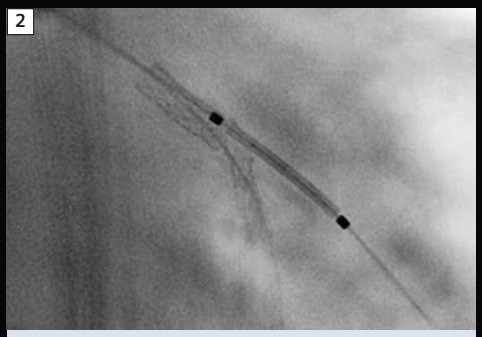




1 CLEARstent used for stent deployment assessment showing insufficient expansion of distal stent end requiring post-dilatation.



2 CLEARstent Live real-time stent enhancement used for precise stent positioning in LAD bifurcation prior to deployment of third stent.

Images courtesy of Kristoff Cornelis, MD, AZ, Maria Middelares Ghent, Belgium.

Watch the video!

Get the full picture at www.siemens.com/clearstentlive

Scan Code with Smartphone

CLEARstent Live: Stent Enhancement in Real-Time

Real-time stent enhancement with motion-freeze allows precise positioning of stents in relation to previously deployed stents or cardiac anatomy. This facilitates complex procedures such as bifurcational stenting.

During complex coronary interventions (PCI), physicians often need to place stents next to each other without overlap and at the same time with as little gap in between as possible. Stent gaps have been associated with in-stent restenosis, an excessive growth of tissue inside the stent that reobstructs the coronary vessel.
On the other hand, overlapping stents may result in stent fracture, which has also been associated with in-stent restenosis and successive stent thrombosis, recurrent angina or myocardial infarction.
To assess the correct deployment of stents, either stent enhancement like CLEARstent or intra-vascular ultrasound (IVUS) can be used. IVUS allows for a cross-sectional image of the coronary vessel, which allows the expansion of the stent to be seen in relation to the vessel wall.
CLEARstent allows the evaluation of a stent before the implantation, yet it has been designed to deliver highest image quality for assessment of an implanted stent. To achieve this, it takes a couple of seconds to calculate and will not allow manipulation of the catheter while the image is being enhanced.
CLEARstent Live can help as fast as it takes to step on the pedal. It is activated during a low dose acquisition protocol, CLEARstent Live makes the image enhancement happen in real time. This allows for catheter manipulation while getting a clear visualization of previously deployed stents or cardiac anatomy in relation to the currently positioned stent.

Technical Aspects

CLEARstent Live is based on the same principle as CLEARstent, identifying the golden balloon markers and enhancing the stent by rotating and manipulating the images to position the markers on top of each other. Differently to CLEARstent though, this processing is ongoing and displays the live result in real time. The enhanced image is displayed on the Artis Assist monitor while the regular acquisition is shown on the Artis Live monitor. CLEARstent Live can enhance any frame rate up to 15 f/s and similar to CLEARstent, CLEARstent Live runs on the Artis system and does not require an additional workstation. It offers full PACS compatibility by saving the resulting scenes as DICOM files, which can be exported and reviewed with any DICOM viewer.

Main Benefits

- Simultaneous display of live and stabilized images with up to 15 f/s
- Facilitation of complex procedures
- PACS compatibility for review of scenes using any DICOM viewer

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How I do it

Real-Time Assessment of the Revascularization of Peripheral Vascular Disease

Supported by *syngo* iFlow

Courtesy of Jianping Gu, MD, and Wensheng Lou, MD
Department of Interventional Radiology, Nanjing, No.1 Hospital, Shanghai, China

Patient History

A 75-year-old male patient with an 8-year history of hypertension suffered from lower extremity arterial occlusive disease. He was treated with the implantation of a stent three years ago. After two years, the symptoms of intermittent claudication emerged and gradually progressed. Half a month ago, the patient revisited the hospital, presenting with severe pain and numbness in his right lower limb, causing his maximum walking distance to fall below 20–30 meters.

Diagnosis

The middle and upper segments of the right superficial femoral artery were occluded, while the lower segment still showed sufficient perfusion due to collateral flow. The popliteal, peroneal, anterior tibial, and posterior tibial arteries were not obstructed but presented with localized plaque formations.
A severe stenosis existed at the bifurcation of the posterior tibial artery.

Treatment

A balloon dilatation (5F, 4x120 mm, Admiral, Invatec, Italy) and a following thrombolysis therapy were performed at the upper segment of the right superficial femoral artery. The DSA examination performed after nine days showed a minor improvement of circulation, but the occlusion still existed. In the next few days, two stents (6x150 mm, Protege, EV3) were implanted into the right superficial femoral artery to reopen the vessel. However, the post-DSA showed a new occlusion at the bifurcation of the popliteal artery, presumably due to an embolus from the superficial femoral artery. A careful analysis of pre- and post-*syngo* iFlow measurements, which can be seen in figures 1–2, indicated that the perfusion and circulation around the distal arteries were sufficient. After a risk-benefit analysis, the physician decided that no further treatment would be needed. After the procedure, the patient was asymptomatic.

Comments

In most cases *syngo* iFlow was used as an offline tool to post-process the DSA images and to help the physician for diagnosis or assessment. This case demonstrated the capabilities of *syngo* iFlow to evaluate the perfusion and circulation in and around distal arteries during the interventional procedure. The functional information was very valuable for choosing the right treatment strategy for the next step.
syngo iFlow images were able to achieve precise measurements concerning time-to-peak of contrast medium flow in distal arteries.
The case demonstrates that *syngo* iFlow provides essential hemodynamic and perfusion information to support the decision making for the management of intra-procedural complications during a peripheral vascular intervention.

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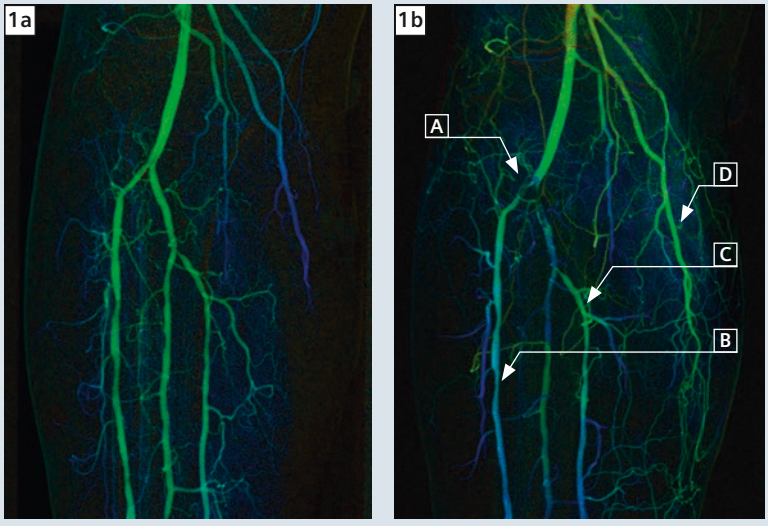
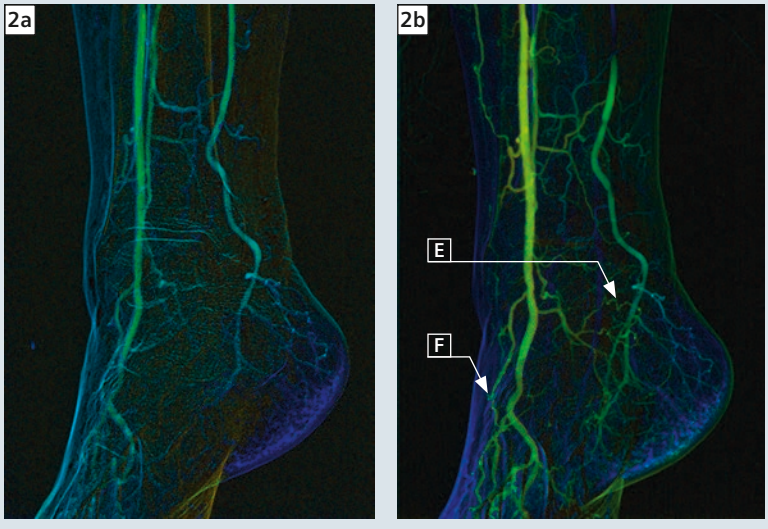
"If we can standardize the DSA acquisition and evaluation method, *syngo* iFlow is a powerful imaging tool for peripheral intervention procedures, not only for the assessment of the outcome, but also for intra-procedural decision making."

Jianping Gu, MD
Department of Interventional Radiology, Nanjing, No.1 Hospital, Shanghai, China



1 [a] *syngo* iFlow image before treatment of the stenosed superficial femoral artery.
[b] During stenting of the superficial femoral artery an occlusion of the popliteal bifurcation was caused by an embolus (A).
syngo iFlow shows the hemodynamic changes in the distal vessels. Time-to-peak (TTP) analysis based on the *syngo* iFlow images showed an increased flow in a collateral branch (D). At the same time blood flow within the anterior (B) and posterior tibial arteries (C) slowed down.

A: Bifurcation of popliteal artery
B: Anterior tibial artery TTP ↑ 2.5 s
C: Posterior tibial artery TTP ↑ 1.5 s
D: Collateral branch artery TTP ↓ 2.5 s



2 *syngo* iFlow measurement shows improved distal blood flow after intervention despite the embolus.
[a] *syngo* iFlow image before treatment
[b] *syngo* iFlow image after treatment

TTP shows that (E) the blood flow in the malleloar artery was almost the same as before (TTP ↑ 0.5 s) and that (F) the blood flow in the dorsalis pedis artery was improved (TTP ↓ 3.5 s).

Pulmonary Vein Isolation without Fluoroscopy During Left Atrial Procedure:

Impact of a New Sensor-Guided Navigation-System – The MediGuide Technology

Courtesy of Thomas Gaspar, MD
Department of Electrophysiology and Rhythmology, Heart Center Leipzig, Leipzig, Germany

Patient History

A 62-year-old female patient with lone atrial fibrillation. Treatment including a beta-blocker and specific antiarrhythmic drugs (flecainide) did fail in controlling recurrences of the arrhythmia. Stress electrocardiogram and transthoracic echocardiography has not shown relevant structural heart disease. The left ventricular ejection fraction was normal with 60 %, the left atrium was slightly enlarged (42 mm in the parasternal long axis).

Diagnosis

Highly symptomatic, drug-refractory paroxysmal atrial fibrillation indicates catheter-interventional treatment with the aim of circumferential isolation of the pulmonary veins.

Treatment

The procedure was performed under the guidance of a 3D electro-anatomic mapping system (NavX-EnSite Velocity™) supplemented by a novel sensor-based electromagnetic tracking system (MediGuide™ Technology; MG) installed within the fluoroscopy detector of a flat panel X-ray imaging system (Artis zee). Special sensor-equipped catheters can be localized in 3D and in real-time resulting in 4D visualization within a moving organ image, such as pre-acquired X-ray cine loops.

Before catheter insertion two cine loops in a 20° RAO and 50° LAO were recorded for 5 sec. and a dosage of 453 µGym², each. Based on these cine loops, the MG sensor-enabled electrophysiology catheters were advanced non-fluoroscopically and positioned in the coronary sinus and the apex of the right ventricle. Consecutively, LA angiograms were acquired for serving as dynamic cine loops during the LA procedure. For that, 50 cc of non-ionic iodinated contrast material was injected through a pigtail catheter into the common pulmonary artery trunk. The fluoroscopic acquisition started after 4 sec. of lung passage time and takes 4 sec. in a 20° RAO and 6 sec. in a 50° LAO projection, respectively. The cumulative fluoroscopy dosage after these steps was 1356 µGym².

Hereafter a single transseptal (TSP) puncture was made. For safety reasons and due to the fact that neither a TSP sheath nor a TSP needle equipped with the MG sensor is available, this was performed under fluoroscopic guidance with a steerable sheath. This resulted in a cumulative fluoroscopy time and dosage of 2.6 min. and a dosage of 1985 µGym². Hence, no fluoroscopy was necessary up to the end of the procedure.

The four PVs were reconstructed as individual NavX-EnSite anatomies with an MG sensor-equipped irrigated tip ablation catheter and subsequently served as the anchor structures to register the 3D CT image. LA mapping and ablation were performed using a specific MG sensor-equipped irrigated tip ablation catheter. That catheter could be tracked within the LA angiogram in real-time (fig. 1, 2). Circumferential ablation around both ipisilateral PVs was performed at the atrial side of the PV antrum (fig. 3). Bidirectional conduction block was the end point of the procedure, and was confirmed by the circular mapping catheter. Successful pulmonary vein isolation was performed within 159 min. with a total fluoroscopy time of 2.6 min. and a fluoroscopy dosage of 1985 µGym².

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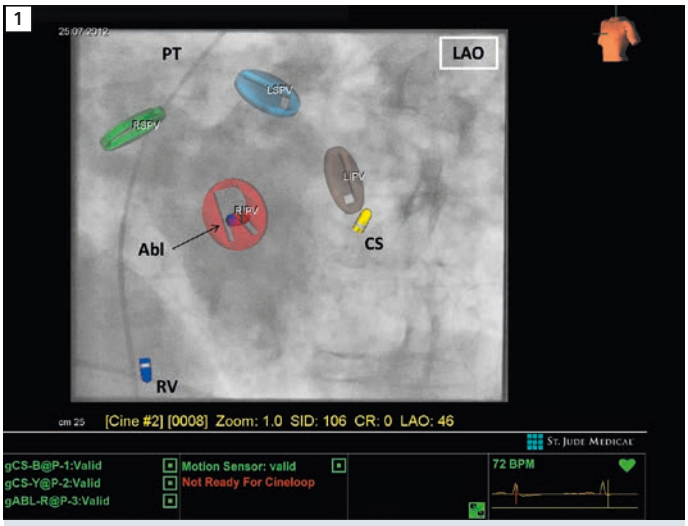
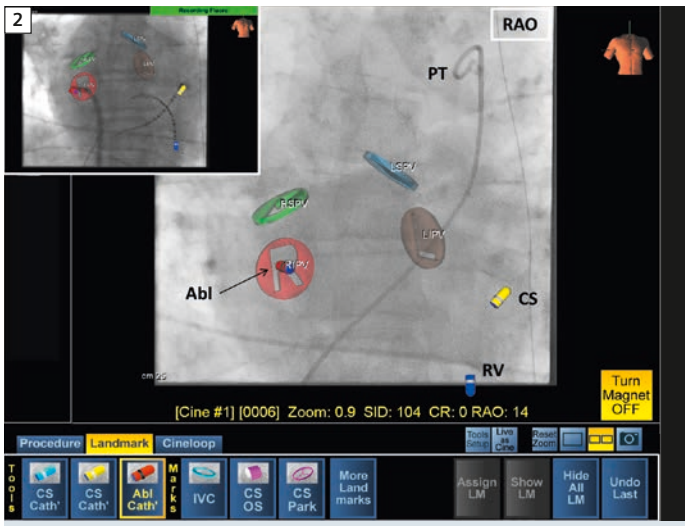


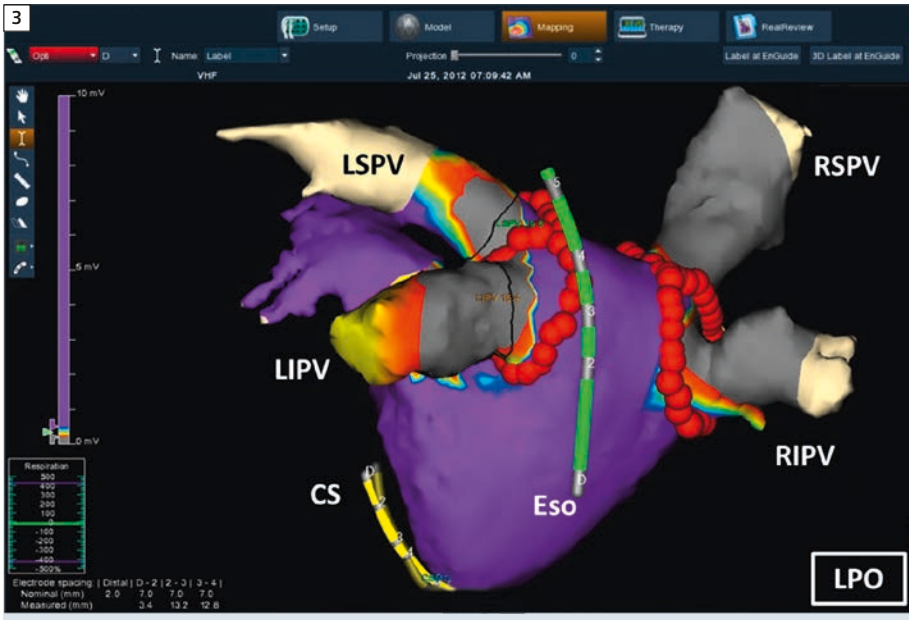
1 Screen shot of the MediGuide Technology user-interface during a pulmonary vein isolation procedure in a left anterior oblique projection (LAO). Three MediGuide Technology sensor-enabled catheters are tracked real time and non-fluoroscopically by the electromagnetic sensor field and projected as an icon on their intracardiac position within prerecorded left atrium angiographies. One catheter is placed in the coronary sinus (CS - yellow icon), one in the apex of the right ventricle (RV – blue icon) and the sensor-enabled ablation catheter is on the ostium of the right inferior pulmonary vein (Abl – red icon). During mapping of the pulmonary veins their ostia are marked by chips of different color (right superior pulmonary vein – RSPV, green chip; right inferior pulmonary vein – RIPV, red chip; left superior pulmonary vein – LSPV, blue chip; left inferior pulmonary vein – LIPV; grey chip).



2 Screen shot of the MediGuide Technology user-interface during a pulmonary vein isolation procedure in a right anterior oblique projection (RAO) combined with the validation of displayed catheter position on fluoroscopy (small image on left upper side). Similar to fig. 1, three MediGuide Technology sensor-enabled catheters are tracked in real time and non-fluoroscopically by the electromagnetic sensor field and projected as an icon on their intracardiac position within prerecorded left atrium angiographies. For validation catheter positions are now visualized simultaneously on live fluoroscopy and non-fluoroscopically within the MediGuide Technology surface. The overlay of the fluoroscopic catheter image and the non-fluoroscopic catheter icons indicates the accuracy of the system for catheter localization.

"The application of this promising new catheter tracking technology integrated into Artis zee offers nearly fluoroscopy-free operations even in complex ablation procedures."

Thomas Gaspar, MD
Electrophysiology and Rhythmology,
Heart Center Leipzig, Leipzig, Germany



3 Visualization of the 3D model of the left atrium at the end of the procedure within the electroanatomic mapping system.

Single Vessel Coronary Artery Disease Evaluation Using IQ•SPECT – an Ultrafast Cardiac Imaging Solution

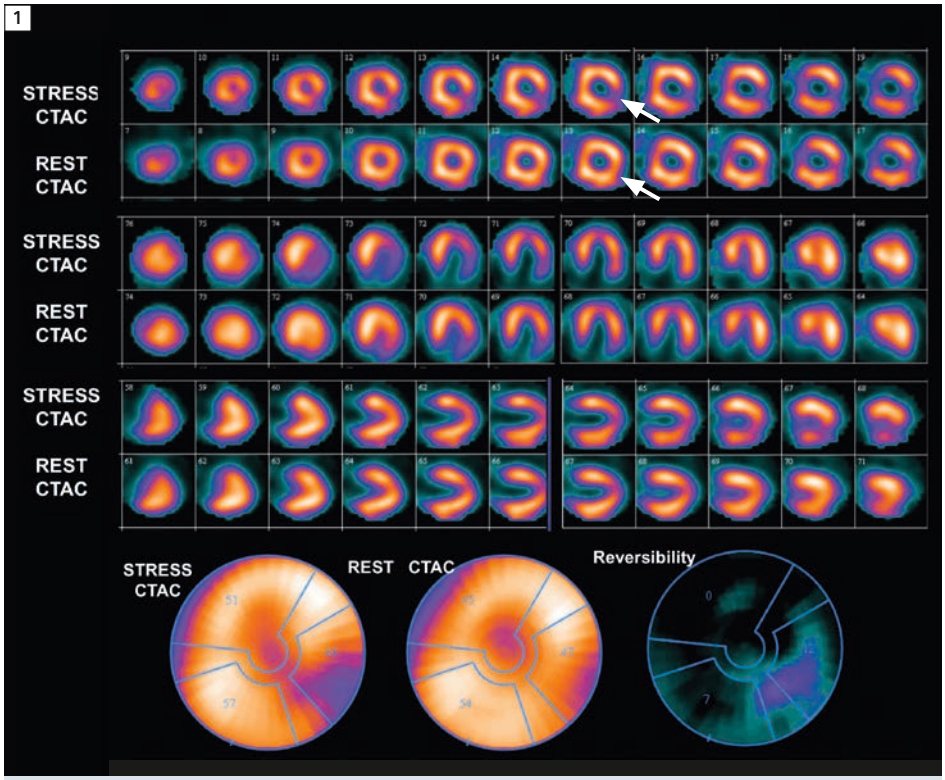
By Guillame Bouchard, MD
Case study data provided by Hôpital de la Cité-de-la-Santé de Laval, Canada

Patient History

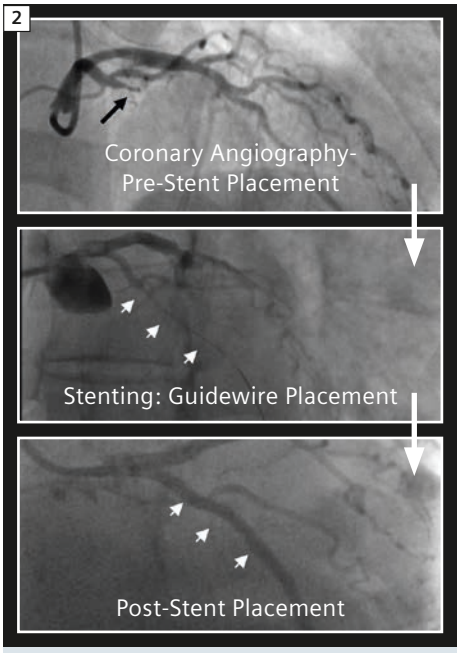
A 65-year-old female with progressive history of chest pain on exertion and hypertension was referred for a stress/rest myocardial perfusion study to evaluate for inducible ischemia. A technetium-99 (99mTc) sestamibi (MIBI) ultrafast myocardial perfusion study was performed using IQ•SPECT at rest and with pharmacological stress. Total acquisition time for each study, stress and rest, was only 4 minutes.

Diagnosis

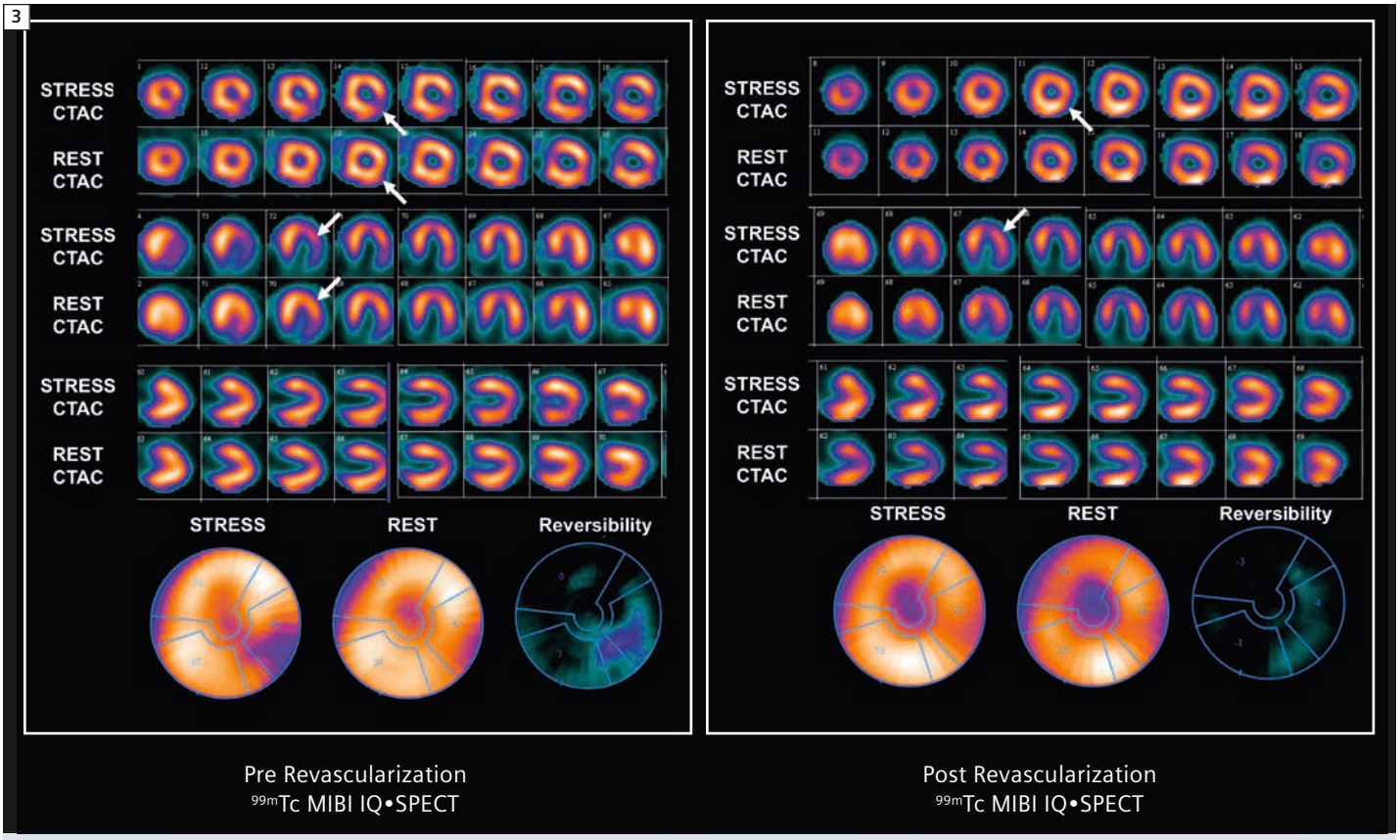
The IQ•SPECT study (Figure 1) shows reversible ischemia in the inferolateral wall (white arrow) suggestive of ischemia in the left circumflex artery territory. The rest of the left ventricular (LV) myocardium showed normal perfusion. LV cavity size in the stress study is slightly larger as compared to the rest study, although the dilatation is not clinically significant (TID: 1.07).



1 IQ•SPECT study shows reversible ischemia in the inferolateral wall (white arrow) suggestive of ischemia in the left circumflex artery territory.



2 Coronary angiography demostrates single 95% stenosis of the mid-left circumflex artery (black arrow), which correlates well with IQ•SPECT findings. Coronary flow was completely restored after the successful placement of two stents (white arrows).



3 A follow-up MPI study was performed for atypical chest pain after revascularization, which shows normalization of the reversible defect of the inferolateral wall (white arrows).

The patient subsequently underwent coronary angiography.

Coronary angiograms (Figure 2) for the same patient show single 95% stenosis of the mid-left circumflex artery (black arrow), which correlates well with IQ•SPECT findings. The patient underwent stenting of the lesion. Coronary flow was completely restored after the successful placement of two stents (small white arrows).

A follow-up IQ•SPECT myocardial perfusion study was performed for atypical chest pain after revascularization, which shows normalization of the reversible defect of the inferolateral wall (Figure 3). Attenuation corrected pre- and post-stenting studies (6-month interval between MPI studies) shows significant improvement in the inferolateral defect with normal perfusion throughout the rest of the LV myocardium. Note the prominent apical thinning in the post-stent study, which is a common post-attenuation correction finding in IQ•SPECT studies.

Comments

IQ•SPECT provides high-quality myocardial perfusion SPECT acquisition at high acquisition speed. In this case example, the IQ•SPECT 4-minute scan provided the same image quality as more conventional imaging methods, which require longer acquisition times. The inferolateral perfusion defect seen on stress and clear evidence of reversibility seen in the rest images was conclusive enough for the prediction of a predominantly left circumflex artery territory ischemia. LV cavity size delineation was visually appropriate for appreciation of mild post-stress dilation, which did not appear to be clinically significant. The angiographic correlation of a single vessel disease involving the left circumflex artery correlated well with the IQ•SPECT evaluation. CT attenuation correction using an integrated diagnostic CT on the Symbia T system along with IQ•SPECT, provided improved sensitivity through attenuation correction combined with fast cardiac SPECT acquisition.

The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results.

Examination Protocol

Scanner	*Symbia T*
Dose	*25 mCi 99mTc MIBI*
Parameters	*17 frames, 9 sec/ frame, 4 min total*
Scan Mode	*IQ•SPECT*
CT	*130 kV, 25 mAs, 5 mm slice*

Reference Sites

Improving Therapeutic Efficacy in Cardiology

The close collaboration of interventional and non-invasive cardiology helped to improve quality of care in a German hospital.

By Eric Johnson

In Essen, Oliver Bruder, MD (left), head of non-invasive, and Christoph Naber, MD, head of invasive cardiology, work together to tailor treatment to a simple standard: not too much, not too little.

Which is better – a false negative or a false positive? Human nature surely favours the latter. "Better safe than sorry", cried our caveman ancestor, as he fled a jungle rustling that turned out to be not a tiger but the wind. More scientific minds might vote for the former, citing the "year 2000 bug" fiasco or the risk and expense of needless medical interventions.
Then there is a middle view: both kinds of false indications are highly unwanted and should be strenuously avoided. At Elisabeth-Hospital in the German city of Essen, the Contilia Heart and Vascular Center is guided by this philosophy. For every heart patient, the hospital tries to tailor treatment to a simple standard: not too much, not too little, but just the right amount. Personalized medicine, this is, recognizing that each heart marches to its own distinct beat.
At the core of this approach lies a constellation rarely seen in European hospitals. Instead of working in their own silos, interventional and non-invasive cardiology are joined at the hip, working side-by-side under one management team. "Rather than our patients adapting to suit our hospital's organization," says the head of non-invasive cardiology, Oliver Bruder, MD, "we've adapted our organization to suit the patients."

Clinical Workflow Algorithms

The close collaboration means that heart patients receive diagnosis and treatment seamlessly integrated in one single system, even if they need to be transferred between the units. Says Bruder's opposite number, head of invasive cardiology, Christoph Naber, MD: "If patients from my cath lab need to undergo an MRI [magnetic resonance imaging – Bruder's domain], I send them over there immediately."
In many other hospitals, such a transfer can take days or even weeks. "They send letters back and forth to do it," Naber notes. "The invasive and non-invasive units might be excellent within their own specialties, but they wouldn't talk to each other."

Setting the standard

As of 2011, Elisabeth-Hospital's Contilia Heart and Vascular Center joined Monaco's Cardio-Thoracic Center as Siemens' second European Reference Center Cardiology. "Siemens supplies our big systems," says Oliver Bruder, MD. "We all know there are three main suppliers in this area; Siemens sets the standard across the board for high-quality products."
Particularly praiseworthy is the user-friendliness of Siemens' systems. "We don't just work with this equipment, we live with it," comments Michael Jacobs, head of the cardiac cath lab. "It makes a tremendous difference when we can feel good not only about the results they deliver, but the way we use them."

At Elisabeth-Hospital, interventional and non-invasive cardiology work side-by-side under one management team. Heart patients receive diagnosis and treatment seamlessly integrated in one single system.

Oliver Bruder, MD, head of non-invasive cardiology at Elisabeth-Hospital in Essen, Germany: "Speaking to patients, getting their detailed medical history, is key to our algorithm."

Christoph Naber, MD, head of invasive cardiology, says: "If patients from my cath lab need to undergo an MRI, I send them over there immediately."

Matter of the heart

With 140 beds, 50 physicians and 17,000 patients a year, the 29-year-old Contilia Heart and Vascular Center is one of Germany's largest heart centers. The clinic sits near to the city center, amidst the rambling campus of the 600-bed Elisabeth-Hospital, Essen's first, which was founded in 1843 under the auspices of the St. Elisabeth Foundation.

Talking is where treatment at Elisabeth-Hospital's cardiology department starts. "Speaking to patients, getting their detailed medical history, is key to our algorithm," says Bruder. "We will never automate that out of our medical workflow." In initial interviews, the objective is to classify risk (using tools such as the Framingham Score), thereby identifying the right pathway among several, for subsequent diagnosis or therapy. Typical chest pain in a 60-year-old hypertensive diabetic with a family record of heart disease demands immediate invasive diagnostics – straight to the cath lab. Someone half that age with atypical symptoms and no family history will rather head to a stress test such as adenosine perfusion MRI.
Between those extremes – among the intermediate risks – is where recent progress has been greatest, thanks to the growing diagnostic accuracy of non-invasive investigations. For example, a patient with atypical chest pain classified by interview as being at intermediate risk can be sent to CT calcium scoring to examine the degree of calcification in the coronary arteries. If the calcium score is in the 75th percentile of the same age group or above, the patient's corrected status is "high-risk", making it more likely to perform a diagnostic catheterization or initiate more aggressive treatment strategies. However, if in fact the calcium score is rather low, the "real" status of the patient can be considered as "low-risk", which may result in preventive measures such as recommending lifestyle and dietary changes.
The ironclad gatekeeper for invasive handling is the presence of not just symptoms, but also significant myocardial ischemia. As the landmark COURAGE study[1] revealed, "As an initial management strategy in patients with stable coronary artery disease, PCI [percutaneous coronary interven-

As of 2011, the Contilia Heart and Vascular Center Essen joined Monaco's Cardio-Thoracic Center as Siemens' second European Reference Center Cardiology.

tion] does not reduce the risk of death, myocardial infarction, or other major cardiovascular events when added to optimal medical therapy." Naber summarizes the finding far more bluntly: "I believe, there are way too many PCIs performed in this type of patients."

Non-invasive Imaging on the Rise

In the past decade, the invasive/non-invasive double-team has led the cardiology clinic into doing more interventions yet fewer invasive diagnostics. Ironic, of course, but also more efficient. "We're getting steadily better at screening," says Bruder. "More people, especially those in the lower risk groups, are getting no more and no less treatment than they need." Targeted therapy, he adds, reduces side-effects and saves cost.

These same efficiency and cost factors have prompted Elisabeth-Hospital to launch a prevention center, aimed at corporate managers in the Essen region. BodyGuard!, headed by a five-member team including Bruder, identifies higher risks (not only in cardiology) from the general population – people who don't realize they have an illness or are at very high risk for it. The program is very dependent on testing by non-invasive means, which cause minimum fuss and risk for participants. "You couldn't expect busy managers with no symptoms to agree to invasive tests," Bruder points out, "but most are willing to try a non-invasive check-up." This, say Bruder and Naber, is the future of cardiology. More non-invasive diagnostics for intermediate-risk patients. Low dose is particularly important in this population, which is why the use of modalities such as cardiac MRI (free of ionizing radiation) is on the rise. To appropriately offer these advanced modalities in clinical routine a seamless integration of both invasive and non-invasive cardiology appears to be the foundation. Hospitals have to keep pace, they claim, "The hospitals that can do both in an integrated way," says Naber, "will be the ones to survive and grow."

***Eric Johnson** writes about medical technology, business, and the environment from Zurich, Switzerland. Formerly he headed what is now a Thompson-Reuters bureau and corresponded for McGraw-Hill World News.*

[1]Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE). Boden, W.E. et al. Optimal medical therapy with or without PCI for stable coronary disease (2007) New England Journal of Medicine, 356 (15), pp. 1503-1516

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Cardiology Education

Continuing education is a major pillar of Siemens' dedication to ever better healthcare. The wide spectrum of cardiology offerings includes clinical fellowships, clinical workshops with leading experts in their fields, e-learning and application trainings from basic to advanced level, empowering users to tap the full potential of their systems and to improve their clinical and financial outcomes.

Cardiovascular MR

Fellowship Title	Target Groups	Date/Duration	Place	Language	Registration
Cardiac MR and MR Angiography	Cardiologists, Radiologists, Radiographers (Rag.), Physicists	2, 3, 5 or 10 days	Berlin, Germany/ Lugano, Switzerland	English, German, Italian	Siemens representative
Multimodality non-invasive and invasive cardiology	Cardiologists, Radiologists, Rag., Physicists	2, 3, 5 or 10 days	Monte Carlo, Monaco	English, French, Italian	Siemens representative
Pediatric Cardiology and Congenital Heart Defects	Cardiologists, Radiologists, Rag., Physicists	2, 3, 5 or 10 days	Munich, Germany	English, German, Italian	Siemens representative
Pediatric Cardiology and Congenital Heart Defects	Cardiologists, Radiologists, Rag., Physicists	2, 3, 5 or 10 days	Essen, Germany	English, German	Siemens representative

Cardiovascular Lab Diagnostics

Workshop Title	Target Groups	Date/Duration	Place	Language	Registration
Cardiac Biomarkers in Heart Failure and Acute Coronary Syndrome	Laboratorians, Clinicians	On request	Worldwide	English	Siemens representative
Natriuretic Peptides in Heart Failure and Acute Coronary Syndrom	Laboratorians, Clinicians	On request	Worldwide	English	Siemens representative
Clinical Utility of Cardiac Troponin	Laboratorians, Clinicians	On request	Worldwide	English	Siemens representative
Online Webinar: A Woman's Heart – Unique Features of Cardiovascular Health and Disease in Women	Laboratorians, Clinicians	On request	Online	English	www.meetme.net/her-heart
Online Webinar: Cardiac Case Studies: The Benefits of Using Sensitive Troponin Assays	Laboratorians, Clinicians	On request	Online	English	www.meetme.net/CVD-Case-Studies

Interventional Cardiology

Workshop Title	Target Groups	Date/Duration	Place	Language	Registration
Introductory Course in Interventional Cardiology	Cardiologists	April 2014/ 2 days	Singapore	English	kellie.koh@ siemens.com
System Application Trainings: Artis zee, AXIOM Sensis, Dose Management Understanding, EP	Physicians, Radiographers	E-Learning	Web-based	English	Siemens representative

Fellowship Title	Target Groups	Date/Duration	Place	Language	Registration
Interventional Cardiology	Cardiologists, Cardiac surgeons, Radiographers, Technicans	3–5 days	See four sites below	German English	Siemens representative

Leopoldina Hospital Schweinfurt, Germany

The Leopoldina Hospital Schweinfurt which uses an AXIOM Artis dBC with AXIOM Sensis XP & Artis zee floor, offers their patients state-of-the-art cardiovascular diagnostics and therapy.

Hospital Darmstadt, Germany

Hospital Darmstadt uses an Artis zee biplane with AXIOM Sensis XP. The spectrum of care covers the diagnosis and treatment of cardiovascular diseases using all currently standard, non-invasive and invasive methods as well as innovative new treatments.

University Hospital Erlangen, Germany

The University Hospital Erlangen is one of the main centers for pediatric care in Germany. They offer the full range pediatric cardiology diagnostics and therapy for congential heart disease as well as pre and post treatment for the complete spectrum of congenital heart surgery. The pediatric cardiology team of Prof. Dittrich performs more than 300 procedures per year in his lab. The site has a lot of experience in advanced 3D imaging.

Center for Cardiovascular Diseases Rotenburg a.d. Fulda, Germany

The Center for Cardiovascular Diseases was set up 1974 for diagnosis, therapy and rehabilitation of patients with cardiovascular diseases. In 1989 it was extended by the Center for Cardiac and Vascular Surgery in which a hybrid OR was set up in 2010. It is equipped with the Artis zeego system, with the Artis OR table, *syngo* DynaCT, *syngo* Aortic ValveGuide, AXIOM Sensis XP, two large displays and a cockpit. In the hybrid OR close to 100 TAVIs are performed per year by both cardiac surgeons and cardiologists. In addition, mitral valve replacement and vascular surgery is being performed in the hybrid OR.

Cardiovascular CT

Workshop Title	Target Groups	Date/Duration	Place	Language	Registration
Advanced Cardiac CT	Cardiologists, Radiologists	Sep 17–20, 2013	Frimley, United Kingdom	English	www.imperial.ac.uk/nhli/training/short-courses/acct
SCCT CTA Academy 2014	Cardiologists, Radiologists	Jan 11–12, 2014	Hawaii, USA	English	www.scct.org/training/cta
Clinical Workshop on Cardiac CT	Cardiologists	Sep 23–25 / Dec 11–13, 2013	Munich, Germany	English	www.siemens.com/SOMATOM-Educate
CTA Interpretation Course	Cardiologists, Radiologists	Nov 7–8, 2013	Erlangen, Germany	English	www.siemens.com/SOMATOM-Educate

Siemens Multi-Modality Reference Sites Cardiology

Mutimodality Clinical Reference Centers represent the impact of disease-focused solutions from Siemens Healthcare and exceptional clinical expertise on the quality and efficiency of cardiovascular care. They conduct fellowships and trainings for cardiologists, cardiac surgeons, cardiovascular nurses, and other medical professionals several times throughout the year.
Fees and further information: julie.a.clark@siemens.com

Centre Cardio Thoracique de Monaco
- Non-invasive cardiovascular imaging and advanced image post-processing
- Peri-interventional imaging in the Hybrid OR
- Comprehensive assessment of acute and chronic myocardial ischemia
- Comparative evaluation of cardiovascular imaging modalities
- Dedicated Cardiac CT and Cardiac MRI trainings and fellowships

Language: English, French, Italian

Cooperation

European Reference Center Cardiology

CENTRE CARDIO THORACIQUE DE MONACO

Contilia Heart and Vascular Center Essen, Germany
- Improving the structure of a cardiac catheter lab and interventional suite for optimal workflows in invasive cardiology
- Structured lectures and case studies covering the use of cardiac MRI and CT in noninvasive cardiology
- State-of-the-art approaches to electrophysiological evaluation and treatment
- An academic program for nurses and assistants

Language: English, German

Cooperation

European Reference Center Cardiology

Contilia Heart and Vascular Center

Heart Center at Cheng Hsin General Hospital Taipei, Taiwan ■
- Cardiovascular CT and cardiovascular MR imaging
- Peri-interventional imaging in the hybrid OR
- Comprehensive multimodality assessment of acute and chronic myocardial ischemia
- Advanced interventions and ablation procedures in the cath lab and EP lab
- Cardiac surgery procedures and hybrid approaches

Language: English, Chinese

Cooperation

International Reference Center Cardiology

振興醫療財團法人 振興醫院 心臟醫學中心 CHENG HSIN GENERAL HOSPITAL HEART CENTER

ESC Congress 2013

This year's ESC congress is going to be held in Amsterdam, Netherlands from August 31 to September 04, 2013. Don't miss Siemens' Hands-on Tutorial Training Sessions during the conference. You will find more information on the program by following the link below.

Hands-on Tutorial Training Sessions

Cardiac imaging is rapidly developing, driven by the introduction of new imaging approaches like tomographic imaging in the interventional lab or real-time 3D echocardiography. In order to keep you updated in the field of state-of-the-art cardiovascular imaging, Siemens Healthcare is providing a comprehensive set of Hands-on Tutorial (HOT) sessions during this year's ESC congress in Amsterdam - Netherlands (31 August – 04 September 2013).

You will have the opportunity to learn from known clinical experts how to perform and analyze 3D imaging in the cath lab, real-time 3D echocardiography, comprehensive studies with cardiac CT and MRI. Besides that, Siemens also offers case-based learning sessions with detailed discussions on the role of imaging in CV care.

Contact
carsten.lauer@siemens.com

ESC 2013:
Scan Code
with Smartphone

You will find the detailed program on our website:
www.siemens.com/esc

A Clever Combination

Dr. Vasco Gama, Head of the Cardiology Department at Centro Hopitalar Vila Nova de Gaia in Portugal talked with Siemens about his clinical experience when combining *syngo* Dynamics with *syngo*.via[1].

According to Dr. Gama, the combination of the Cardiovascular Imaging and Information System (CVIS) with the advanced image reading software enables him and his team a streamlined workflow – from multimodality image review to enterprise-wide access to data, including the use of remote technologies. Automated data flow between *syngo* Dynamics and *syngo*.via helps provide fast and reliable results in reporting. This supports sound clinical decisions from examination to diagnosis, treatment, and follow-up plans. At the same time, crucial information from CT and MRI, for example, is available in one workplace, instead of separate disconnected systems, as in the past. Having all the data available in one workplace, the staff can comfortably and efficiently discuss each patient case without changing systems or locations.

[1] *syngo*.via can be used as a standalone device or together with a variety of *syngo*.via-based software options, which are medical devices in their own right.

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Siemens Cardiovascular Imaging and Information System provides personalization of the healthcare providers' workspace by bringing together the power of *syngo*® Dynamics for multimodality cardiovascular imaging. Siemens Cardiovascular IT offers a patient-centric view of the cardiovascular record and enables exam review, reporting, and distribution through a single point of control. The *syngo*.via 3D routine and advanced reading solution helps to accelerate workflows across all modalities, and is suitable for both day-to-day and more challenging cases.

Watch the video!

To learn more about the benefits Dr. Gama and his colleagues are experiencing, listen to his story available online under www.siemens.com/*syngo*-dynamics

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Insights into Workflow Automation and Quantification Using Real-Time 3D Echocardiography

Accurate quantification, high image quality and exam speed as well as reduced user variability of results are key requirements in echocardiography. The ACUSON SC2000™ volume imaging ultrasound system features comprehensive workflow automation tools that enable reproducible quantifications in echocardiography. Watch what renowned experts have to say about workflow automation and quantification including tools such as eSie PISA™ volume analysis and eSie LVA™ volume LV analysis.

Follow their discussion

Dr. Dinesh Thavendiranathan
Toronto General Hospital, University Health Network, Peter Munk Cardiac Center, Toronto, Canada

Dr. Mani Vannan
Chief, CV Imaging Department, Piedmont Heart Institute, Director, Echocardiography, Fuqua Heart Center, Piedmont Atlanta Hospital, Atlanta, Georgia

Professor Jose L. Zamorano
Director, Cardiovascular Institute, University Clinic San Carlos, Madrid, Spain

Dr. Michael Brook
Professor of Pediatrics and Surgery, Director, Pediatric Echocardiography, UCSF Medical Center, San Francisco, CA

Watch the video. Scan Code with Smartphone

First Clinical Use of ACUSON AcuNav V Ultrasound Catheter: 3D Ultrasound Guidance During Complex Cardiovascular Interventions

In complex cardiovascular interventions such as the closure of atrial septal defect (ASD), the occlusion of left atrial appendage (LAA) or transcatheter aortic valve implantation (TAVI), echocardiography, especially transoesophageal echocardiography (TEE), plays an important role guiding these procedures.
Siemens Healthcare introduced intracardiac echocardiography (ICE) years ago, and is now ushering a new era in echocardiography by enabling 3D intracardiac volume imaging with the new ACUSON AcuNav™ ultrasound catheter. Using ICE imaging improves patient care and clinical workflow by allowing complex procedures to be performed under conscious sedation as opposed to general anesthesia which is required when using conventional TEE image guidance.
The June 2013 edition of the European Heart Journal – Cardiovascular Imaging, features the first clinical use of the ACUSON AcuNav V ultrasound catheter guiding the closure of an ASD[1] at the Gaia Hospital Center, Vila Nova e Gaia, Portugal.

[1]Ricardo Fontes-Carvalho, Francisco Sampaio, José Ribeiro, and Vasco Gama Ribeiro: Three-dimensional intracardiac echocardiography: a new promising imaging modality to potentially guide cardiovascular interventions.
Eur Heart J Cardiovasc Imaging (2013) doi: 10.1093/ehjci/jet047

Link to report. Scan Code with Smartphone

Heartbeat – IMPRINT

Publisher:
Siemens AG
Healthcare Sector
Customer Solutions Division
Henkestrasse 127, 91052 Erlangen, Germany

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Includes text and photographic contributions from Primafila AG, CH-Zurich / independent Medien-Design, D-Munich

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Printer: G. Peschke Druckerei GmbH, Schatzbogen 35,
81829 Munich, Germany

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We remind our readers that when printed, X-ray films never disclose all the information content of the original. Artifacts in CT, MR, ultrasound, and DSA images are recognizable by their typical features and are generally distinguishable from existing pathology. As referenced below, healthcare practitioners are expected to utilize their own learning, training, and expertise in evaluating images.

Find more about sustainable cardiovascular care under:
www.siemens.com/cardiology

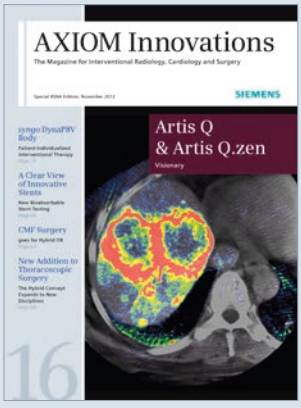
The entire editorial staff here at Siemens Healthcare extends their appreciation to all the experts, radiologists, scholars, physicians and technicians, who donated their time and energy – without payment – in order to share their expertise with the readers of Heartbeat.

Siemens Healthcare Publications

Our publications offer the latest information and background for every healthcare field. From the hospital director to the radiological assistant – here, you can quickly find information relevant to your needs.

Heartbeat
Everything from the world of sustainable cardiovascular care.

Medical Solutions
Innovations and trends in healthcare. The magazine is designed especially for members of hospital management, administration personnel, and heads of medical departments.



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A91CC-0003-11M1-7600 | Printed in Germany
CC CRM 1550 081310. |

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