And the focus is heart failure

Given the exponential increase in the patients presenting with heart failure in recent years, a total of 53 sessions have been dedicated to this topic. The sessions include clinical updates and state-of-the-art lectures, but also the newest on diagnosis and therapy will be presented. In their welcoming address, Kim Fox and Jeroen Bax highlight some of the lures of this important and notable event for cardiologists worldwide.

Three Hotlines - Two Clinical Trial Updates

Late-breaking trials and the most recent updates on published trials will be presented. These sessions frequently include large, randomised clinical trials that have major impact on patient management.

Basic Science

The Council for Basic Cardiovascular Science will present sessions in a bench-to-bedside format, focusing on the translational aspect of basic science, but also highly specific basic science research will be presented.

Abstracts and posters

Submitted abstracts: almost 10,000. Reviewers to grade abstracts: Acceptance rate: 37%.

Late-breaking trials and the most recent updates on published trials will be presented. These sessions frequently include large, randomised clinical trials that have major impact on patient management.

The safety of drug-eluting stents will be another hotly debated subject, as will the uptake of the iron markers. Based on the number and distribution of the markers status of the inflammation, because the higher the inflammation activity the better the markers can make vulnerable plaque visible in MRI. Even more: we can determine the vulnerability of the plaque.

Siemens and here at the Charité in Berlin, we work with ultra small iron particles, so called nano particles. In the Nano for Life Working Group, a research co-operation between University Hospital Charité Berlin and Siemens, we are working on new imaging modalities, that can make vulnerable plaque visible in MRI.

At this point we do not have a method do distinguish vulnerable from stable plaque. Stable and vulnerable plaque is very important for us. Vulnerable - that is inflamed - plaque can rupture at any moment and cause thromboses, which are often fatal. At this point we do not have a method do distinguish vulnerable from stable plaque. The best we can do basic research, so to speak. Research into the visualisation and differentiation of stable and vulnerable plaque is very important for us. Vulnerable - that is inflamed - plaque can rupture at any moment and cause thromboses, which are often fatal. At this point we do not have a method do distinguish vulnerable from stable plaque. The best we can do basic research, so to speak. Research into the visualisation and differentiation of stable and vulnerable plaque is very important for us. Vulnerable - that is inflamed - plaque can rupture at any moment and cause thromboses, which are often fatal. At this point we do not have a method do distinguish vulnerable from stable plaque. The best we can do basic research, so to speak. Research into the visualisation and differentiation of stable and vulnerable plaque is very important for us.

Joint sessions

The American Heart Association and the American College of Cardiology, as well as societies representing subspecialties such as hypertension, atherosclerosis and diabetes, etc. will present joint sessions.

12 main sessions

These will be packed with important clinical topics, e.g. the relation between anaemia and heart failure, or the role of BNP in heart failure.

The safety of drug-eluting stents will be another hotly debated subject, as will the increasing role of non-invasive imaging using different modalities, and the development of percutaneous valve therapy.

New ESC guidelines

Five new ESC guidelines are to be released on acute coronary syndromes without ST elevation, valve disease, cardiac pacing, hypertension and prevention of cardiovascular disease. In addition, the new Universal Definition of Myocardial Infarction (endorsed by the AHA, ACC and ESC) will be presented.

The EHSP

Lessons from the Euro Heart Survey Programme – an extensive questionnaire involving many hospitals in ESC countries across Europe – will be the focus of four sessions.

Annual meetings

The five ESC Associations will report on their annual meetings or present their news in 90-minute sessions organised in the Association Corner. The five include subspecialisations – echocardiography, heart rhythm, prevention, percutaneous coronary intervention, and heart failure.

Working lunch

Participants can also fill their lunch periods with attendance at nine practical sessions under the banners Meet the Expert; Read with the Expert, and How to.

It’s ESC time again!

This special cardiology supplement is a EUROPEAN HOSPITAL publication

www.european-hospital.com
A next-generation diagnostic tool for cardiovascular disease, using a nanoscale iron particle, is now under development at a unique industry-government-university named Nano AG. A report from Siemens describes the research and progress at the centre.

For and against Absorbable metal stents

Absorbable metal stents (from Biotronik) after expansion (left panel) and in electron microscopy magnification (right panel).

Cardiology can achieve an immediate result similar to the result of other metal stents and be safely degraded after four months. Nevertheless, the restenosis rate remains high and modifications of the stent characteristics, i.e. prolonged degradation and/or drug elution are objects of further development addressing the problems of excessive recall and proliferation. Due to reduced radiofuctivity of the used magnesium alloy, the AMS-stent cannot be visualized by X-ray and induces no metallic artifacts during assessment with computed topography and magnetic resonance. This characteristic allows the non-invasive assessment, even of the stent segment, after implantation of an AMS-stent and gives new opportunities in the follow-up examinations after coronary artery interventions.

Contact for references and further details: Dr. Boese. +49-201-7234888 e-mail: dirk.boese@uk-essen.de

A new blood pressure (BP) measuring device that provides, along with all the conventional cardiovascular parameters, the cardiac stroke volume, peripheral resistance and arterial augmentation, has been developed at the Austrian Research Centre (ARC), Vienna-Seibersdorf, has been working to develop a new, more powerful method to measure blood pressure. The result of seven years’ work by researchers, the device, named CardioMon, is now ready for sale.

The ARC refers to one study in particular to underline the need for their advanced measuring system. Conducted during a Vienna Cardiovascular Events programme in 2005, within one week the blood pressure of 7,018 patients was measured. Of these, 1,109 people were receiving treatments. However, only 175 were being correctly regulated, mainly because conventional blood pressure measuring methods could only indicate symptoms, but not the cause of problems. For these, invasive methods, such as catheterisation, have been necessary. The ARC reports that its CardioMon will make such a difference to this, that it will have supplant all conventional blood pressure measuring tools in just a few years.

Cardiac stroke volume, peripheral resistance and arterial augmentation have been measured using a new device named CardioMon.
Cardiac resynchronisation therapy

Worldwide clinical trial gets underway


The trial is sponsored by Biotronik, which manufactures the implanted devices but, Dr Ruschitzka pointed out, ‘EchoCRT is an independent, investigator led trial overseen by an international executive committee.’

‘Many cardiologists feel, as I do, that we are not treating many HF patients who would benefit from CRT simply because there are no scientifically evidence-based guidelines telling us to. I have used CRT successfully in patients with narrow QRS, and so have many others. The medical literature supporting this belief is increasing with observational studies and anecdotal cases of success in several thousands of these patients.’

‘The ESC recently conducted a poll asking its members if they thought patients with a narrow QRS would benefit from CRT. The time is now right for a large-scale, international trial to provide the definitive answer. Recruiting will begin in the first quarter of 2008 and will probably last for up to two years. The trial itself will probably run for a further two or three years after recruiting is complete depending on when we reach the numbers required statistically of primary end-point. It would be stopped immediately if it became obvious that the benefits of CRT therapy were statistically superior. The results are due in 2011. ‘I’m very confident that CRT is the way to go with HF patients with narrow QRS. These are very sick patients with a high morbidity and mortality. I am convinced that it is unwise to withhold CRT from this population and that EchoCRT will provide the necessary evidence to support this treatment change.’

Proven Outcomes

Helping cardiologists make 24 hours work like 48.

We see a way to reduce retake examinations by up to 75%
Progenitor cell transfer to repair the damaged heart has emerged as an active and promising recent development in cardiovascular medicine. Since the first reports that adult bone marrow-derived stem cells were capable of transdifferentiating into a cardiomyocyte phenotype, research in regenerative medicine has advanced in an explosive manner. A variety of progenitor cell types that reside in bone marrow, or circulate in the blood, are capable of replacing the function of the injured heart in pre-clinical models, but underlying mechanisms are incompletely understood. Consequently, the traditional view of the heart as a terminally differentiated organ has been challenged by several groups, who have reported the isolation of cardiac stem or progenitor cells - characterised by the absence of traditional cardiomyocyte, endothelial, or smooth muscle markers, and that have a slow turn-over rate, and might constitute an endogenous reservoir for cell-based repair. However, massive cell loss of cardiomyocytes and these progenitors alike, such as after acute myocardial infarction, precludes sufficient repair capacity of these endogenous progenitors in the infarcted territory. Therefore, cell-based repair requires inventive strategies to mobilise or deliver significant numbers of progenitor cells to sites of injury and secure their survival, or to stimulate neighbouring cardiac precursor cells to multiply, integrate, and couple with spared myocardium and enhance myocardial function. While those strategies are very appealing, a major question is whether we have the knowledge and tools to implement them at this stage in clinical practice, at an equitable cost-benefit?

Cardiac infarction is characterised by tissue ischemia with loss of contractile heart muscle. The consequence is cardiac insufficiency and disturbance to cardiac rhythm. About two thirds of all patients have no symptoms before an infarction; about two thirds of all patients do not survive their cardiac infarction. About a third of surviving infarction patients experience increasingly worsening heart function in the first year after the infarction (remodelling). The aim of therapy is to re-open the infarcted vessel using acute procedures (balloon dilatation and stent implantation), though this is merely the tip of the iceberg, and the destroyed heart muscle usually remains useless. This is where treatment with stem cells comes in as causal therapy, striving to regenerate heart muscle by injecting stem cells into it.

Maintained improvement can be seen in patients who received stem cell treatment (TX).

Fig. 3: Ejection fraction over a period up to three years after stem cell transplantation. The latter was associated with a favourable effect on myocardial perfusion (evaluated as coronary flow reserve), infarct remodelling with a greater reduction in infarct size and greater recovery of regional LV function. Although we are still in a preliminary phase of clinical development, meta-analysis of published randomised controlled trials and cohort studies of bone marrow cell transfer (including}

by Professor Bodo-Eckehard Strauer MD, Head of the Department of Cardiology, Pneumology and Angiology at Dusseldorf University Hospital

The therapeutic potential of adult stem cells in CVDs

The potential of adult stem cells in cardiovascular disease (CVD) has emerged as a new area of research in cardiology. Adult stem cells, such as bone marrow-derived stem cells, have the capacity to differentiate into various cell types, including cardiomyocytes and endothelial cells. This allows for regenerative strategies to be developed for the treatment of cardiovascular diseases.

**Cell Transfer for Cardiac Repair**

Progenitor cell transfer for cardiac repair after myocardial infarction

By Stefan P Janssens, Professor of Medicine at the Cardiology Department, Gasthuisberg University Hospital, KU Leuven, Belgium.

While those strategies are very innovative and promising, massive cell loss of cardiomyocytes and these progenitors alike, such as after acute myocardial infarction, precludes sufficient repair capacity of these endogenous progenitors in the infarcted territory. Therefore, cell-based repair requires inventive strategies to mobilise or deliver significant numbers of progenitor cells to sites of injury and secure their survival, or to stimulate neighbouring cardiac precursor cells to multiply, integrate, and couple with spared myocardium and enhance myocardial function. While those strategies are very appealing, a major question is whether we have the knowledge and tools to implement them at this stage in clinical practice, at an equitable cost-benefit?

Cardiac infarction is characterised by tissue ischemia with loss of contractile heart muscle. The consequence is cardiac insufficiency and disturbance to cardiac rhythm. About two thirds of all patients have no symptoms before an infarction; about two thirds of all patients do not survive their cardiac infarction. About a third of surviving infarction patients experience increasingly worsening heart function in the first year after the infarction (remodelling). The aim of therapy is to re-open the infarcted vessel using acute procedures (balloon dilatation and stent implantation), though this is merely the tip of the iceberg, and the destroyed heart muscle usually remains useless. This is where treatment with stem cells comes in as causal therapy, striving to regenerate heart muscle by injecting stem cells into it.

Maintained improvement can be seen in patients who received stem cell treatment (TX).

Fig. 3: Ejection fraction over a period up to three years after stem cell transplantation. The latter was associated with a favourable effect on myocardial perfusion (evaluated as coronary flow reserve), infarct remodelling with a greater reduction in infarct size and greater recovery of regional LV function. Although we are still in a preliminary phase of clinical development, meta-analysis of published randomised controlled trials and cohort studies of bone marrow cell transfer (including
The body itself contains naturally occurring, adult autologous stem cells, e.g. in the bone marrow. They are an ethical resource of cells that is completely safe. The idea was therefore to regenerate heart muscle clinically, by transplanting naturally occurring bone marrow stem cells into the infarcted region. This process was developed in Dusseldorf.

Bone marrow was removed and the cells prepared, then, after re-opening the infarcted vessel by balloon dilatation, they were injected into it under low pressure, using a balloon technique. The vessel was kept open with a catheter (a procedure lasting about 30 minutes), during which time two to three ml of a suspension of stem cells were injected into the infarcted region, a process repeated with four to six insufflations. The intervention was carried out on conscious patients with local anaesthesia, and at most produced mild pain at the site of injection.

Follow-up controls for three years and longer after the infarction show that long-lasting improvement in cardiac function has been achieved, with an average increase in cardiac function of 50% and a reduction in the size of the infarct of about 20%. At the same time, blood supply to the cardiac muscle has been considerably improved, as has metabolism, and physical strength has increased. As yet, no side effects have been reported, so the procedure should be considered an ethically safe treatment of muscle loss after infarction, and causal therapy that is really beneficial to the patient.

The Dusseldorf results have since been confirmed worldwide. Work groups in Frankfurt, Hanover and Rostock have been able to show, even in larger studies, that regeneration of infarcted cardiac muscle can be achieved by transplanting autologous bone marrow stem cells. What is important is that this myocardal regeneration, which, depending on study design, is between 4–16%, is of an order of magnitude that is at least as great as the sum of all therapeutic improvements in ventricular function achieved with balloon dilatation or stent implantation for cardiac infarction. Consequently, added improvement in patients’ ventricular function can thus be achieved, on top of surgical intervention and drug treatment.

No complications from the stem cell treatment have been reported so far. There is no malignant degeneration as the cells used occur naturally in the body. No signs of inflammation have been observed, nor have disturbances to cardiac rhythm, angina pectoris or respiratory distress. Complications arising from the procedure itself are much the same as those that might occur in ordinary heart catheterisation procedures, and are insignificant.

It should be mentioned that a similar procedure is also effective in treating peripheral arterial disease. In this case, treatment involves intra-arterial and intramuscular injection of autologous bone marrow stem cells into the limbs affected, the therapy first practised by Bartisch et al. Ischaemic preconditioning, such as by compression induced with a cuff, or even ergometry, greatly promotes migration of stem cells into the muscles. After three months there was marked improvement in the length of stride, the ankle/arm indexes, oxygen saturation and even venous occlusion plethysmography parameters. Consequently, autologous stem cell therapy can also be classed as a successful procedure for peripheral arterial occlusive disease, where symptoms are refractory to treatment, and in advanced stages of vascular disease.

One exam. One visit. A new dimension in PET/CT brings it all together.

Introducing Discovery™ PET/CT with Dimension from GE Healthcare. One scanner, one console, one exam. A new view in hybrid imaging maximizing the clinical benefits of both PET and CT. Dynamic gated PET. Comprehensive diagnostic CT techniques. Breakthrough image quality with real-time reconstruction. All in a single exam, helping you provide quick and easy studies, more confident decision-making, and improved diagnostic accuracy. A new dimension in PET/CT, now a reality. PET/CT Re-imagined.

To learn more come visit us at ESC, Booth # B260, zone 3 or visit www.gehealthcare.com/re-imagine

Ready for action: The 17.5

The world’s first portable, plug-and-play system to provide hours of emergency cardiopulmonary support is now on sale in Europe.

EH correspondent Holger Zorn reports

In an earlier experimental study at the University of Cologne, cardiac surgery using the Lifebridge simulator was used in pigs. The animals’ blood gases were kept constant during the entire length of the study. The blood circulation remained constant even when the heart differed between the machine and heart was changed. Injection of up to 100ml of venous air also did not reduce blood flow, and even the most disadvantageous conditions did not result in an arterial embolism (source: Mehlhorn U et al., Ann Thorac Surg 2004; 77:122).

Gap in supply of technology for the treatment of cardiogenic shock can be filled

Annually, hundreds of thousands of Europeans suffer heart attacks,
kg heart-lung machine

caused by the occlusion of coronary vessels following coronary heart disease. To avoid death or lasting damage a patient ideally needs to receive treatment within ‘the golden hour’. However, according to data supplied by MTRRA, Germany’s heart attack register, in that country alone, the time lapse between heart attacks and start of treatment is on a continuous increase. Between 60,000 and 65,000 patients do not survive their heart attacks (source: Mark-B et al., Dts Aerzteblatt 2006; 103: A 1378). Cardiogenic shock kills around 20,000 people. ‘Up to 50% of those patients could survive if they received fast mechanical, extracorporeal circulation support,’ points out Prof Zerkowski of Basel University, Switzerland.

Ideally, artificial circulatory support should begin during transfer to a specialised hospital, because vital vessels and organs need sufficient blood supply to avoid irreversible damage caused by hypoperfusion. However, mobile emergency systems are not usually used during a transfer, because currently available equipment does not meet requirements for portability and quick, safe use. ‘Filling this gap in the supply is of utmost urgency,’ said Prof Ruediger Lange, director of the Cardiovascular Surgery Department, German Heart Centre, Munich, during a symposium held during a market launch for Lifebridge. In specialist centres, heart-lung machines used during cardiac surgery must be set up and run by trained perfusionists. Their size and weight make them unsuitable for mobile use. A patient in cardiogenic shock, according to Lange, needs support for cardiovascular function by a lightweight, fast, easy to use machine, which can be used anywhere.

The situation for hospital treatment is similar. Cardiogenic shock develops in 7 – 10% of all infarctions, and it is unpredictable. In such an emergency, currently, doctors mainly use intra-aortic balloon pump counterpulsation (IABP), left-ventricular assist systems along with conventional heart-lung machines (HLM). However, the former can only be used if the heart muscle has remaining functionality. In the case of acute, complete cardiac arrest, the immediate use of a heart-lung machine is necessary. Even ultra-modern, percutaneous heart-lung machines, which are connected to the patient’s circulation via the iliac vessels during external cardiopulmonary reanimation, can only be used after 15 – 20 minutes. In addition, because they depend on manual operation, user errors and air embolisms cannot be eliminated.

Therefore, a fully-integrated ‘click’n’run’ heart-lung support system is an urgent requirement, said Prof Zerkowski.

Lifebridge Medizintechnik AG (founded: 1999) has found a market niche with Lifebridge B2T. With 22 employees, the firm is supported by Bavarian financiers and an investment bank in the United Arab Emirates. It reports that there has already been strong demand from hospitals for this portable heart-lung device, and Manfred Salat, Chairman of the Board, predicts that, as from next year, the Lifebridge should be able to finance further growth internally.

ESC Vienna Booth B-255

prosourd

Pursuing More Sophisticated Diagnoses

ALOKA technology is the result of a tireless pursuit of quality in imaging, functionality, network management, and analysis. For over half a century, ALOKA has been developing and creating reliable imaging systems for cardiovascular experts, so they can have better insights into healthcare.

The complete ALOKA Prosound CV range is designed to offer high precision and easy to use diagnostic tools to the cardio-vascular specialists; such as ASMA(TM), 2D tracking(TM) for asynchrony studies, e-Tracking(TM) for early atherosclerosis quantification or WTM for heart/vessel coupling assessments.

ALOKA, the inventor of the first Color Doppler Ultrasound system in 1983, is proud to present its latest innovation at the ESC congress in Vienna: Vortex Flow Mapping VFM(TM), a new proprietary and revolutionizing flow mode opening a new century in the hemodynamic world.
A non-invasive measurement of arterial wall atherosclerosis

By Thaddeus Chodakauskas BS RDMS and Steve Feinstein MD FACC

Non-invasive ultrasound imaging techniques continue to provide a major role in diagnosis and management of patients with cardiovascular disease. The early presence of atherosclerosis predates major clinical events such as myocardial infarction and stroke. Over the last 17 years, the ultrasound-based measurement of carotid artery intima-media thickness (c-IMT) has become a standard for assessing atherosclerosis and is recommended by the American Heart Association for the non-invasive assessment of cardiovascular risk.

Carotid intima-media thickness is defined as the distance between the lumen-intima interface and the media-adventitia interface, which corresponds to the inner and outer echogenic lines seen on B-mode ultrasound image. (Fig.1). Measurement of c-IMT is traditionally performed with the image of the carotid artery in the longitudinal axis, revealing the common carotid artery, the carotid bifurcation, and the internal and external carotid arteries. Although these measurements have been performed for years, significant variability exists when measuring the near wall due to technical and acoustic difficulties encountered when imaging the c-IMT of the near wall.

Due to these technical limitations, clinical measurement of c-IMT using B-mode ultrasound is often applied to the far (posterior) wall of the common carotid artery. With the development of non-invasive imaging technologies, ultrasound methods can be used to reliably measure intima-media thickness (IMT). This measurement serves a non-invasive marker of arterial wall atherosclerotic disease. Studies have found that, on average, based on gender and age, the intima-media thickness will increase 0.01-0.03 mm per year. (See tables on historical clinical studies of c-IMT).

Imaging common carotid artery

• Maximise the depth selection and optimise the gain settings to visualise the posterior intima-media wall of the common carotid artery.
• Attempt to capture the common carotid artery with the jugular vein to improve visualisation of the anterior and posterior carotid walls.

Research Project in Telemedicine

PARTNERSHIP FOR HEART

In Germany, approximately 1.5 million people suffer from chronic cardiac insufficiency. Very often, the insidious symptoms are recognised too late, leading to complications and hospitalisation. ‘Partnership for the Heart’ is a joint project by science, industry and healthcare system led by Berlin Charité and aiming to develop a telemedical early warning system. The system monitors patients 724/1 at home and a mini-computer records all therapy-relevant vital parameters.

Body weight is an important risk indicator. A sudden increase in body weight can switch off the AED mode and decide the energy transmission of the values to the Robert Bosch Hospital in Stuttgart. Blood pressure and ECG are determined in a similar way.

FRED® easyport is a Life-Saver

Cardiac infarction and cardiovascular failure are two of today's most frequent emergencies. SCHILLER'S FRED® easyport pocket is the only pocket defibrillator in the world. It is so small (133 x 126 x 50 mm) and light (490 gr incl. battery) that for many doctors it is already standard equipment in their emergency bag. It is also suitable to accompany risk patients and their relatives around the clock.

This life-saver is always available to give doctors, paramedics and rescue technicians peace of mind in emergency situations.

For example during the World Cup 2006, paramedics on duty at the football stadiums carried out their duties with FRED easyport clipped to a belt around their waste. In Switzerland an entire police department has been equipped with this device to help fight against sudden cardiac death.

Patients at risk can easily carry this small defibrillator with them, after they and their families have been instructed by their doctor. This dramatically reduces the response time to treat ventricular fibrillation and tachycardias, giving the patient a much better chance of survival.

For cardiologists this defibrillator can now also be supplied with a manual shock option, i.e. the doctor can switch off the AED mode and decide the energy level and exact moment of defibrillation.
Finland - An increased TWA (T-wave alternans) is a significant indicator of all-cause and cardiovascular mortality, as well as of sudden cardiac death in patients with mostly normal ejection fraction, according to a recently published study by researchers led by Dr Tuomo Nieminen. Until now, this was only known as an indicator for those patients suffering severe heart diseases predisposing to life-threatening arrhythmias. In an interview with Meike Lerner, of European Hospital, Dr Nieminen explained the advantages of the TWA measurement, study results and the consequences these have for future research.

'The T-wave represents the electric repolarisation of the heart, Dr Nieminen explained. Thus, alternans in the T-wave is a marker of an alternating repolarisation process, which might indicate cellular disturbances during repolarisation. This is important, since pathological repolarisation phase predisposes to ventricular arrhythmias. In general, the TWA measurement could be used for arrhythmic risk stratification, but it is also one of the diagnostic criteria for long QT interval syndrome, another repolarisation abnormality.

TWA can be measured with a regular electrocardiogram; no extra examinations are necessary. The possibility to measure the T-wave alternans is a special feature within normal ECG software.

There are two methods for TWA assessment: time-domain modified moving average (MMA) and spectral methods. Both methods seem to measure the same phenomenon. For our study, we used the GE Healthcare software embedded with the MMA method, which can be applied in routine exercise test protocol without stabilising the heart rate to any specific level.'

Several studies have proved the effectiveness of measuring TWA for prognoses. What makes this study different?

'Essentially all previous studies included patients with an ejection fraction of less than 50 percent, which is called abnormal. But in our population this only refers to 13 percent of the patients.

In 2001, we launched the Finnish Cardiovascular Study (FINCAVAS), in which we enrol all volunteering patients performing a clinical exercise test at Tampere University Hospital. We use the standard protocols of the bicycle ergometer test, with an increasing load every minute. This TWA analysis aimed to test whether TWA predicts mortality in our study population. The results of the study show that the TWA measurement provides prognostic value also in patients with a normal ejection fraction.'

What consequences do these findings have for patients' treatment?

'Our results suggest that TWA identifies patients prone to sudden cardiac death at an earlier stage of cardiac disease than supposed before. It is the first but naturally important step to show that a certain marker is associated with mortality.

Another equally important step will be to test whether the patients with such a pathological marker will benefit from treatment options, such as anti-arrhythmicogenic pharmaceuticals, or an ICD implant. The results of our study did not answer that latter part, which is a big question for the future - studies are being planned and conducted to reach that goal.

We need to bear in mind that estimating the aggregate risk for sudden cardiac death should be based on several parameters. No single marker will suffice, but TWA seems to be a very good candidate to be involved!'
I t has only recently been discovered that very often it is not the size of the plaque in the coronary vessels but its inflammation status that determines the occurrence of a cardiac infarction. This knowledge triggered new research approaches for its early diagnosis and treatment in cardiology – for example the High-Risk Plaque Initiative jointly founded by Philips Medizin Systeme, AstraZeneca, Merck & Co, BG Medicine and Humana, which focuses on the possibilities that molecular medicine now offers. The researchers are searching for suitable biomarkers that allow the early diagnosis and targeted therapy in inflammation, so-called high-risk plaque.

In molecular medicine, the High-Risk Plaque Initiative is one of the most important projects of Philips Medizin Systeme, as Paul Smit, in charge of strategy and development in the Dutch company, explained: "Today, high-risk plaque is recognised as the major cause of cardiac infarction which kills about 50 percent of the patients. This means, in many cases, death is the first symptom of the disease. Furthermore, those patients who survive the event are chronically ill and require medical care for the rest of their lives. This disease is not only dangerous for the patients but also presents an immense financial burden on the healthcare system – a burden that will increase steadily over the next few years. In short, high-risk plaque is one of the most fatal and one of the most expensive diseases.' In addition, coronary plaque is a highly unpredictable condition because, depending on the degree of inflammation, the plaque can suddenly rupture and causes an embolism, which in turn leads to the development of a standard method that I believe will lead to saving operations. In addition, he pointed out that returning to a 2001. With the introduction of a ‘day return’ cardiac treatment service, patients receive no longer than a year - the study will take about one year. While the complete set of imaging data will be ready in more than a year - the study will take about four years.

A weapon to beat high-risk plaque

The Sensei Robotic Catheter System, a first generation robotic technology developed by Hansen Medical at the USA’s Heart Rhythm Society Scientific Sessions in May this year, is in use in Europe. St Mary’s Hospital, in Paddington, central London, became the world’s first centre of excellence for training in and development of the system, under the guidance of consultant cardiologist and electrophysiologist Wyn Davies MD FRCP FHR S. As of July, over 20 atrial fibrillation patients had been operated on at St Mary’s using this robotic surgical aid controlled by the surgeon at a nearby workstation.

The Sensei system and Artisan catheter aim to enable physicians to easily and accurately place mapping catheters in hard-to-reach anatomical locations within the heart with stability, during the diagnostic phase of complex cardiac arrhythmia treatment, Hansen reports. ’The new robotic system allows the operator to perform EP procedures in a more consistent fashion, which I believe will lead to the development of a standard approach for complex diseases,’ Wyn Davies observes.

Currently, the majority of clinicians manually guide catheters through the heart to detect and treat a variety of cardiac arrhythmias. This technique requires physicians to perform a series of complex manipulations at one end of the catheter without assurance that the tip of the catheter will respond as desired when inside a patient’s heart. Achieving stable contact at anatomic sites within the heart, which is essential for successful mapping procedures, can be difficult, Hansen points out. ’As a result, insufficient contact between the catheter tip and the inside of the heart wall can lead to highly variable and less than optimal procedure results for the patient. Hansen Medical believes its robotic platform overcomes these hurdles and will enable physicians to perform procedures that historically have been too difficult or time consuming to accomplish routinely with existing manual technique.’

The system

The Sensei system is compatible with fluoroscopy, ultrasound, 3D surface map and patient electrocardiogram data. The two main components that comprise the system are the Artisan control catheter and an ergonomically designed, remotely-placed workstation where the physician sits throughout the procedure. In addition to lessening operator fatigue, the remote workstation creates a virtual shield for physicians against harmful radiation, Hansen added. ’The open architecture provided by the Sensei system, which allows the use of preferred accessories from third-party manufacturers, requires a labelling addition from the FDA. The addition is intended to remind physicians that the safety and effectiveness of the system for use with cardiac ablation catheters in the treatment of cardiac arrhythmias, including atrial fibrillation, have not been established. The Sensei system has received CE mark approval in Europe, and the Artisan Control Catheter is currently pending CE mark approval.

For many patients, a catheter ablation is the most effective way of treating AF, however a short- age of clinicians able to perform these complex procedures contributes to thousands living with the condition and its associated risks. In the UK alone, over 50,000 people develop AF annually, yet fewer than 10% undergo catheter ablation.

St Mary’s NHS Trust, which was awarded £1 million in funding in the 2006 NHS performance ratings, has 3,600 staff that provides special care for women’s health, cardiology, children’s services, infection and immunity and robotic surgery. The Trust reports that it has one of the lowest mortality rates in the UK, and a ‘rich history of research development and teaching thriving today through the relationship with international research and teaching partner, Imperial College London.’

Dr Wyn Davies set up the electrophysiology department at St Mary’s and also has been praised by the British Medical Association for initiating a ‘day return’ cardiac treatment service in 2004. With this service, patients receive treatment during a day and return to their local hospital that evening. This has shortened waiting times for beds to become vacant for their potentially life-saving operations. In addition, he pointed out that returning to their local hospital means relatives and friends can visit more easily.

Atrial fibrillation – during a U K , according to the NICE guidance, indicate that, in July 2006, there were more than 1.4 million UK patients with AF (source: NICE impact report). This substantial part of healthcare financial budget.

The main goals of AF treatment are widely recognised – to renew normal cardiac rhythm, and to ensure that AF doesn’t occur again. Therapeutic modalities are diverse, apart from anti-arrhythmics, modern minimvasive methods are recently on the rise – cardivectorstimulators and cardivection and particularly catheter ablation.

In the Czech Republic, the first patient with an implanted cardidostimulator was seen at IKEM back in 1962, and the first digital cardidostimulator was implanted in 2005 at Prague’s Na Homolce Hospital. Catheter ablation as an AF treatment has been in use for quite some time.

With new medical technology achievements, three-dimensional imaging has arrived in this scene. New diagnostic approaches allow 3-D views inside the heart, so cardiologists can combine that imaging technique with a cardiac CT scan and navigate the catheter through the heart with a full sterteroscopic view.

One of the positions in the field of even more advanced medical techniques is London’s St Mary’s Hospital (see robot feature on this page).

Cardiologist meet to sum up progress

The first patients will be scanned in the autumn of 2007, and the complete bi-imaging study will take about one year. While the complete set of imaging data will be ready in more than a year – the study will take about four years.

Czech Republic – During a meeting of cardiologists in Prague earlier this year to exchange experiences with new methods and treatments to control atrial fibrillation, Dr Josef Kautzner, Head of Cardiology Department at IKEM (Institute of Clinical and Experimental Medicine) pointed out that numbers of patients with AF will more than double during the next 20 years. In the Czech Republic alone, there are about 130,000 people diagnosed with AF. All these patients have worsened quality of life, twice the mortality due to cardiac failure, and five times greater risk of cerebral vascular accident (CVA) when compared with the normal population of the same age. AF also causes about a fourth of all CVs, which means around five thousand people are afflicted by this disease.

The annual treatment of one patient is 40 thousand CZK, i.e. almost 5 million EUR. Figures for the
a cardiac infarction, or a stroke. This sudden rupture of inflamed plaque in a coronary artery explains why 70–75% of cardiac infarctions occur without prior symptoms. ‘High-risk’ physicians were unable to determine when the plaque has reached a dangerous stage. Today, molecular medicine offers the possibility to identify indicators of the inflammation. The first task of the High-Risk Plaque Initiative is to develop a broad patient screening concept, which we hope will show early indicators in patients with infarcts that are not present in the control group. If we know these early indicators, or biomarkers, which predict an inflammation, thanks to modern imaging methods we will be able to locate the high-risk plaque and determine its volume,’ Paul Smit pointed out.

The collected data can be combined with statistical values and thus provide valuable information on the patient’s current and future risk. Currently, Philips and the other members of the High-Risk Plaque Initiative are developing a test that will be applied to more than 6,000 patients in coming years. Early diagnosis of high-risk plaque is no doubt a major step forward. However, it has to lead to targeted therapies for the afflicted coronary vessels. Today, physicians are rather powerless when it comes to the treatment of plaque, since there are no validated tests to determine the effectiveness of drugs. However, it appears to be proven that regular monitoring and a healthy lifestyle often improve a patient’s condition.

Molecular medicine offers promising approaches for other diseases as well – cancer, for example. Currently, methods are being researched that use ultrasound to transport medication through the vessels right to the affected body region. The medication is docked onto micro-bubbles, or a contrast agent, and injected into the body. With the help of ultrasound signals the physician can trace the bubbles’ route to the target region. As soon as the bubbles reach the affected tissue a certain ultrasound frequency causes them to burst and the active ingredient is released. Because the medication is administered in a very targeted way, a much lower dose than in a systemic therapy is required – which increases the therapeutic success and significantly reduces side effects. The principle has already been tested in pre-clinical trials and is now being developed for clinical use in a joint effort with the pharmaceutical industry. The Philips research team has already gone one step further and is working on finding out whether this innovative method can be used for cardiac diseases.

‘We are still in the early stage of research into validated biomarkers and it will take about four more years before we will be able to identify high-risk plaque with the help of biomarkers,’ Paul Smit concluded optimistically. ‘These developments will open entirely new possibilities from which both the patients and the healthcare system will profit: Early diagnosis can significantly reduce treatment and follow-up costs of many diseases.’

Report: Meike Lerner

*‘enormous potential to help deliver difficult catheter ablation procedures’. Pointing to the shortage of expertise in the UK, which means there are too few centres where highly complex cases can be carried out, he added: ‘With further development that we are already embarking on, this robot will enable complex procedures to be carried out almost automatically, increasing the opportunities to treat more patients and ultimately reducing clinical risk. The robot allows accuracy and control of catheter movement which cannot currently be achieved without a skill level that usually takes considerable time to acquire. We are thrilled that St Mary’s cardiology unit has been able to pioneer this exciting advance. With the other surgical robotic programmes already established at the hospital, St Mary’s is a world leader in robotic medicine.’

Although capable of use in all forms of ablation procedures, Hansen reports that the robot will predominately be used for complex ablation procedures to treat atrial fibrillation.

**The Czech Republic and Germany**

Another chosen centre of excellence is the Cleveland Clinic Foundation in Ohio, where the system is being used under the guidance of Andrea Natale MD, who is director for the Centre for Atrial Fibrillation, director of the Electrophysiology Laboratories and head of the Section of Pacing and Electrophysiology there. She had used the Senses system during clinical evaluation on 25 patients in the Czech Republic and Germany. ‘The stability of the Artisan catheter allowed us to perform catheter mapping procedures more efficiently and effectively,’ Dr Natale said. ‘The incorporation of the Sensi system and catheter did not add time to the procedures, nor did it require increased radiation time, as hoped to normally be expected with new technology. As a result, I’d expect this new system to become the medical standard for performing complex EP procedures, which are currently limited to those individuals with the highest level of skill.’

Report: Brenda Marsh

---

**Proven performance meets state-of-the-art EMR connectivity**

Burdick Atria™ ECGs offer cutting-edge technology, combining the convenience of a traditional ECG with the flexibility of digital communications.

*The Atria product family truly offers the best of both worlds.*

- **Flexible connectivity options including wired Ethernet and wireless 802.11**
- **Advanced encryption tools ensure the highest level of data security**
- **Ideal for device for EMR integration.**
- **Transmit test results via XML, E-mail colleagues test results**
- **ECG reports attach to the patient’s EMR, keeping all data in one place**
- **E-mail colleagues diagnostic-quality test results**
- **FAA Compliant**

**For information contact your local representative**

---

**ELECTROCARDIOGRAPHS**

**Atria 6100 – Hospital grade performance at a physician’s office price point**

- Large, full color preview screen
- Continuous waveform viewing
- Interpretation based on five criteria

**Atria 3100 – Compact, simple to use**

- 3-, 4-, or 6-channel, 12-lead ECG tracings
- Easy-to-use keyboard, menu driven interface
- Most popular ECG in the physician’s office

---

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

**CARDIOLOGY**

---
39th World Forum for Medicine
International Trade Fair with Congress

www.medica.de

Düsseldorf, Germany
14–17 November 2007