cardiovascular imaging

Last year’s key focus was on heart failure. What will be this year’s hot topic? 
**KF** “This year we decided to go for cardiovascular imaging because any cardiovascular condition that will be discussed during our congress always involves imaging in some form. Imaging is the cornerstone not only for diagnosing a condition but also to assess progress and tailoring individual treatment, too. By imaging we are talking about procedures from the simplest form such as the electrocardiogram to the most complicated non-invasive imaging techniques – MRI, nuclear imaging, echocardiography and, more recently, cardiac CT scanning, and of course not forgetting to mention all the invasive techniques: cardio-angiography and cardiac catheterisation.”

Which of the current emerging modalities is making the strongest progress?

“The gold standard is multimodality imaging, because although a single tool may be sufficient, patient evaluation is often best when used in conjunction with other techniques. Every imaging technique has its individual strengths and weaknesses; they all give a different piece of information, so it depends on what you intend to measure.

Therefore one of the hot ESC topics will be to discuss which are the right imaging tools to use for a special problem. Of course we have considerable hopes in molecular imaging. It may be the tool to identify different forms of heart muscle diseases that may respond to different therapies and, in particular, may respond to stem cells. If it were to be shown that stem cells were to be beneficial, then to deliver the stem cells will require sophisticated imaging. The second hope we nourish in molecular imaging is to identify vulnerable plaques. We’ve just started to get some imaging information by using intravascular ultrasound of the coronary artery.

What form does work sharing take between cardiology and radiology imaging?

Nowadays the management of a patient is multidisciplinary, to achieve the best quality of healthcare. As a cardiologist I think that radiology is extremely important in particular cases where physics is involved – radiation in particular. Radiologists need to be involved in ensuring that proper safety is taken into account. However, when it comes to actually deciding which imaging tool should be used for a patient, the cardiologist must be the person to make the decision.

The most controversial issue here is: Who should execute the procedure? The demarcation lines for that are changing currently and they differ from country to country. In the UK, for example, the radiologist will lead on cardiac CT, most of the others by cardiologists but with special expertise in imaging. I assume that coronary CT will probably remain the area of radiologists just now.

What will be the biggest challenges for cardiology in the future?

‘Heart transplantation is a fantastic technique but we clearly need to think about some form of alternative technique, which may be stem cells or a form of artificial heart. Better still, of course, would be better implementation of prevention. We probably could deal with most of the cases of heart failure if prevention would be better, which brings me to obesity, which causes an increasing number of heart diseases. Last year, at the ESC opening ceremony, I emphasised my dislike of smoking. Now I see child obesity as a major issue to take care of. But it is much tougher to handle because you cannot legislate what people eat. The trouble is that fast food is much cheaper than a healthy diet. It will take huge educational programmes to accomplish a change of thinking.

Finally, it would be very helpful to identify the 20–30% of patients benefiting from treatment with drugs, because this would lead to enormous cost savings and allow access to medicinal treatment for people who truly need it. What we are doing now is treating the whole population with a drug or procedure from which only a few profit. But the most important thing to do in cardiology is prevent inchoate heart disease. We have to identify the people who show an aggravating risk to optimise our strategies of prevention and treatment based on the individual.”

**efHeart**

Aiming to personalise CVD diagnosis and treatment

Royal Philips Electronics is to lead ‘efHeart’, the new European Union (EU) funded research project that aims to improve CVD diagnosis, therapy planning and treatment. By targeting the diagnosis and treatment phases of the care cycles for heart conditions such as heart failure, coronary artery disease, heart rhythm disorders and congenital heart defects, the efHeart project complements the recently announced HeartCycle project (also led by Philips) which focuses on the long term management of chronic heart disease patients.

The newly created ‘efHeart’ consortium aims to improve the diagnosis, therapy planning and treatment of CVD by developing computer models that simulate the normal and disease-related behaviour of each individual patient’s heart and aorta.

Supplied with information about how specific CVDs affect heart function at molecular cellular, tissue and organ level, these computer models have the potential to allow doctors to continue on page 2
Hypertension worldwide

Social and cultural differences affect risk factors for cardiovascular diseases

Countries vary widely in their capacity to manage hypertension, but globally the majority of diagnosed hypertensions is inadequately controlled. Not treated it can cause cardiovascular disease (CVD), myocardial infarction and stroke. According to the WHO, hypertension is estimated to cause 4.5% of the current global disease burden and is as prevalent in many developing countries as in the developed world. Here, three experts from three continents comment on risk factors and hypertension management in their countries.

Dr Tomasz Zdrojewski, Dept. of Hypertension and Diabetology at the Medical University of Gdansk, Poland

Generally we can say that, with the political transformation that has taken place over the last 15 years, the risk factors for CVDs have dramatically changed, some of them significantly decreased (e.g. smoking, alcohol misuse, psychosocial factors). With regard to hypertension the consumption of too much salt is our main national problem. The average daily allowance is 7g but every Pole eats 10–15g, in poor families it is even 15–20g. The government began to take action last year with an information campaign on Polish TV and radio. Additionally, they are attempting to convince industry to replace sodium by potassium. Education is the crucial factor in prevention and control of arterial hypertension. One of the cornerstones is health promotion, to make primary physicians measure BP during every patient visit. The place of residence is also a major indicator for prevalence and a starting point for the control of hypertension. One can say that Poland, especially during the early and very rapid phase of political and economic transformation, has been separated into two sections: large cities and small cities (county boroughs) and villages. People in large cities have had much better access to the medical treatment, so we have many more cases of severe heart failure in the countryside, for example. Another problem is that rural CVD mortality rate of the rural population has been much higher in the last 15 years.

However, we have made significant progress in recent years, due to huge investments and the long-term and complex health policy project – National Cardiovascular Diseases Prevention and Treatment Programme. Since 2003, Poland now has a tight nationwide network of interventional cardiology and cardiac surgery centres. Access to these procedures dramatically improved and large inequalities significantly decreased. For example: in 2002, 2,300 patients were treated by PCI procedures. Now there are millions of procedures with the improvement of mortality in our country. This year we want to check this hypothesis and calculate the importance of each factor using the IMPACT model (myocardial ischaemia and post-stroke treatment). My most recent project is the 400 Cities Programme, that is a national problem. The recommended daily intake of sodium is 5-6g, yet 3,850 coronary angiographies and 2,185 PCI. I hope this improvement in access to best procedures, changes in population awareness, healthier diet and less smoking are the most important factors responsible for a 30% reduction in CVD prevalence and premature mortality in our country. This year we want to check this hypothesis and calculate the importance of each factor using the IMPACT model (myocardial ischaemia and post-stroke treatment). My most recent project is the 400 Cities Programme, that is a national problem. The recommended daily intake of sodium is 5-6g, yet 3,850 coronary angiographies and 2,185 PCI. I hope this improvement in access to best procedures, changes in population awareness, healthier diet and less smoking are the most important factors responsible for a 30% reduction in CVD prevalence and premature mortality in our country. This year we want to check this hypothesis and calculate the importance of each factor using the IMPACT model (myocardial ischaemia and post-stroke treatment). My most recent project is the 400 Cities Programme, that is a national problem. The recommended daily intake of sodium is 5-6g, yet 3,850 coronary angiographies and 2,185 PCI. I hope this improvement in access to best procedures, changes in population awareness, healthier diet and less smoking are the most important factors responsible for a 30% reduction in CVD prevalence and premature mortality in our country. This year we want to check this hypothesis and calculate the importance of each factor using the IMPACT model (myocardial ischaemia and post-stroke treatment). My most recent project is the 400 Cities Programme, that is a national problem. The recommended daily intake of sodium is 5-6g, yet 3,850 coronary angiographies and 2,185 PCI.

Dr Yackoob Kasim Seidat, Nelson R Mandela School of Medicine, Faculty of Health Sciences, University of KwaZulu-Natal, Durban, South Africa

Sub-Saharan Africa (SSA) contains a diversity of countries (54 in all) of vastly different socio-economic status. Data from many parts of sub-Saharan Africa are poorly explored because of resource constraints. South Africa is one of the few countries where data are reasonably accurate. Available data focusing on black groups indicate that hypertension seems more common with increasing acculturation, with a group of truly rural dwellers still being relatively protected. However, it is not known what proportion of CVDs in SSA are in truly rural conditions.wealthy and highly educated population groups, relatively immune to the advances of civilization versus those succumbing to urbanisation either rapidly or gradually. The primary medical problem in SSA is the lack of adequate financing for research. In order to build the research capacity of SSA, the WHO has collaborated with the International Society of Hypertension. The WHO funds the WHO Collaborating Centre for Hypertension and the WHO Collaborating Centre for Cardiovascular Disease Prevention. These centres bring together experts from across Africa. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society. The WHO has supported the establishment of the South African Hypertension Society.

Dr Fiona Turnbull, George Institute for International Health, University of Sydney, Australia

Blood pressure-related disease is a major global public health problem and is responsible for nearly eight million deaths annually. About half of all stroke and coronary heart disease is attributable to non-optimal blood pressure (BP). Furthermore, about 50% of these major cardiovascular events occur in people who are so-called ‘normotensive’. Therefore major health gains can be achieved by lowering BP, even in people who are not hypertensive according to traditional threshold values. Obviously obesity and nutritional factors, especially salt consumption, are important contributors to this, but far from being the only factors to blame. Although lifestyle factors are important, drug therapy remains the mainstay of blood pressure control and, given the millions of people inclined to forget to take their medicine, it is likely to be important even in modest differences in the benefit of different drug classes. A major component of my activities has been the leadership since 2002 of the Blood Pressure Little (BP4L) Collaboration (BP4LTC). This is an international collaboration of the principal investigators of major trials of blood-pressure-lowering regimens. The collaboration seeks to provide clinicians, patients and policy-makers with the most reliable information about BP drugs and their effects on major cardiovascular events, such as stroke and coronary heart disease, by conducting meta-analyses (pooled analyses) of these trials.

The work of the Collaboration is conducted at the George Institute for International Health in Sydney, Australia. This international initiative includes 12 principal investigators, more than 400 centres, and includes nearly 200,000 patients from the UK, Europe, US, China, Japan and Australasia. The collaboration brings together not only the data from the largest BP trials but also the expertise and experience of the principal investigators of these trials, who are leaders in their respective fields. To date, the Collaboration has provided important information about the effects of newer compared with older classes of BP-lowering drugs and about their effects on stroke, coronary heart disease in patients of different age, sex, and disease status. These major international trials have contributed to, as well as clinical practice. A major challenge to this research is to ensure continually that the research is translated into practice. Huge gaps exist between evidence and practice based on randomized controlled trials and the lack of implementation of the global population at risk of blood pressure-related disease con- continue to remain untreated. Part of the problem that doctors persist in is the fact that many patients are based on non-individ- ual risk factors rather than consideration of the patient’s ‘absolute risk’ of experiencing a major cardiovascular event.

As new drugs appear and new indications for treatment evolve, the work of the BP4LTC will continue to provide reliable information about the effects of these important drugs.

continued from page 1

investigate the effects of different therapy choices on a virtual model of the patient's heart and is responsible for nearly eight million deaths annually. About half of all stroke and coronary heart disease is attributable to non-optimal blood pressure (BP). Furthermore, about 50% of these major cardiovascular events occur in people who are so-called ‘normotensive’. Therefore major health gains can be achieved by lowering BP, even in people who are not hypertensive according to traditional threshold values. Obviously obesity and nutritional factors, especially salt consumption, are important contributors to this, but far from being the only factors to blame. Although lifestyle factors are important, drug therapy remains the mainstay of blood pressure control and, given the millions of people inclined to forget to take their medicine, it is likely to be important even in modest differences in the benefit of different drug classes. A major component of my activities has been the leadership since 2002 of the Blood Pressure Little (BP4L) Collaboration (BP4LTC). This is an international collaboration of the principal investigators of major trials of blood-pressure-lowering regimens. The collaboration seeks to provide clinicians, patients and policy-makers with the most reliable information about BP drugs and their effects on major cardiovascular events, such as stroke and coronary heart disease, by conducting meta-analyses (pooled analyses) of these trials.

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As new drugs appear and new indications for treatment evolve, the work of the BP4LTC will continue to provide reliable information about the effects of these important drugs.
Recent studies have shown that overweight and obesity during childhood and adolescence have a negative impact on the functioning of the internal walls of the arteries (vascular endothelium), paving the way to the development of an atherosclerotic disease from an increasingly early age. They also prove that, regardless of age, race and sex, child and adolescent obesity affects the vascular endothelial functions. ‘The evidence that the risk factors for cardiovascular diseases that reveal themselves in adulthood begin in childhood or adolescence makes it imperative that prevention strategies be planned from a very early age,’ said Dr Héctor Trunegilidi, President of the Paediatric Cardiology Committee of the Argentine Federation of Cardiology (FAC), speaking this May at the World congress of Cardiology, held in Buenos Aires. ‘These risk factors, such as overweight and obesity, as well as a sedentary lifestyle, nicotine addiction, dyslipidemias, hypertension and type 2 diabetes, share a common element that cannot be denied: the adoption of poor health-related habits characteristic of western societies.’

Released at the congress were the preliminary results of the Educanco (Educating) Plan, a project, developed by the Argentine Federation/Foundation of Cardiology, and launched in 2001. The plan aims to prevent cardiovascular disease from childhood, and is targeted at primary school teachers, to encourage healthier lifestyles by providing information about the disease and prevention. ‘A clear and didactic message can be easily communicated to children,’ explained Dr Rodolfo La Greca, co-director of the plan. Since the programme began in 2001, around 8,000 primary school teachers, in charge of about 100,000 children between four and five years old, have received training. ‘We will try to convey the Argentine experience because, due to its characteristics the Educanco plan is unique as regards the centralised and unified management of the plan, addressed to teachers and not directly to children, who sometimes do not receive the message properly,’ Dr La Greca pointed out, adding that teachers are the proper vectors to convey life quality concepts to children.

The World Heart Federation in Colombia also has a project to promote healthy life habits in childhood and adolescence. ‘Healthy Habits For Life’, presented through the television show Plaza Sesamo (Sesame Workshop), consists of the development of audiovisual materials that encourage preschool children (aged between three and six years) to take regular physical activity and eat a healthy, balanced diet, and to promote the importance of instilling healthy life habits in children among their carers. Along with this the project encourages multi-sector collaboration for the prevention of cardiovascular disease, said Dr Shakhyar Sheik, President of the World Heart Federation, who added that it also aims to ‘...identify those elements of the programme that are cost-effective in order to reproduce them; and to develop an association with Plaza Sesamo that can be spread to other countries.’ This project began in 2006, with the development in Colombia of audiovisual content that focuses on healthy life habits, designed to be used by health and education professionals and to enable the later evaluation of their impact on both children’s and parents’ activities. Six out of the 27 audiovisual materials initially planned have been broadcast in 2007 within the Plaza Sesamo show, which is broadcast virtually all over the American Continent through the cable TV channels Discovery Kids, TeleFutura and Televisa, and others. New episodes are being broadcast during 2008.

**CHILDHOOD OBESITY**

New strategies to prevent obesity and sedentary lifestyles

and the biophysical (structural and functional) personalisation of the models. The clinical relevance of the project will be ensured by additional application work-packages that will focus on specific model development for each of the clinical focus areas listed above – tailoring the model to specific diseases.

Funding

The euHeart consortium comprises public and private partners from 16 research, academic, industrial and medical organisations, from six European countries. Planned to run for four years the budget is around euros 19 million; 14 million of this provided by the EU as part of the EU 7th Framework Programme. The project forms part of the Virtual Physiological Human (VPH) initiative – a collaboration aiming to produce a computer model of the entire human body so that it can be investigated as a single complex system.
The growing HF population

The number of HF sufferers is expected to climb to epidemic proportions. Worldwide, HF affects nearly 23 million people. In the United States, HF affects approximately 4.7 million people with approximately 550,000 incidences of HF diagnosed annually. Estimates of the prevalence of symptomatic HF in the general European population are similar to those in the United States and range from 0.4 to 2% of the total population. Existing gold-standard pharmacological strategies are able to provide superior compensation of acute and early-stage HF patients, increasing their survival rates without ensuring a full recovery. This results in an increasing long-term shift of such patients into the advanced HF group.

With no new drug therapies addressing advanced HF and existing pharmacological strategies failing to compensate for a weakening heart, alternative, non-pharmacological solutions have to be found. In view of long waiting lists for heart transplants and the growing lack of donor hearts, significant numbers of patients die while waiting for a heart transplant. However, cardiac resynchronisation therapy, mechanical circulatory support devices and other alternative technologies have demonstrated promising results, and the continuing rapid technological developments in this area suggest we may only be a decade away from eliminating the reliance on heart transplants, according to a new report* by Datamonitor, an independent market analyst that provides online data, analyses and business forecast platforms (www.datamonitor.com).

Cardiac transplantation continues to be the gold standard for the treatment of end-stage HF. However, the number of potential transplants far exceeds the number of donors. In the US, about 2,500 heart transplants are carried out each year and research has suggested that up to 100,000 patients have advanced heart disease that would benefit from transplantation. This leads to 30% of patients on the waiting list dying annually.

Cardiac resynchronisation therapy (CRT) through multiple randomised clinical trials, has demonstrated promising results in terms of both safety and efficacy, improving left ventricular efficiency and, subsequently, improving functional class. However, one of the greatest limitations of this technology is the fact that existing CRT devices, similarly to pharmacological treatment, can only temporally improve symptoms and to some degree delay the progression of myocardial deterioration. Unfortunately, neither can prevent, stop nor reverse it. This unfortunate situation eventually brings advanced HF patients back to the heart transplant waiting lists, Dr Ishin points out.

Improving survival with alternative solutions

Although advances in surgical techniques and immunosuppressant therapy make it possible to perform successful heart transplantations even in the most critically ill patients, the rapidly growing end-stage HF population creates a tremendous gap in the number of patients waiting for new hearts and the number of organs that actually become available, Dr Ishin adds. ‘In view of this, in addition to avoiding the immunosuppression and rejection complications of transplantation, mechanical circulatory support devices work as the only promising option which can help resolve the issue of organ availability and save more patients.’

The idea of finding a mechanical alternative to donor transplants is not new, Datamonitor points out. Mechanical circulatory support devices and total artificial hearts have been under development since

The ProSound α7 is a diagnostic ultrasound system that contradicts the thought that high-performance systems are large. It inherits the proven technologies and functions of ALOKA’s high-end product, yet offers outstanding mobility thanks to being the smallest size in its class. The system is easily transported to deliver high performance throughout the hospital.

www.aloka-europe.com
Can technology diminish reliance on heart transplants?

In 2007 the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) reported device malfunction in 9% of all reported implantation cases. Factors that affect the probability of device malfunction are directly related the number of individual components and moving parts in the system. Hence, simplification of design and reduction in the number of components and moving parts should improve long-lasting performance and durability of devices.

In addition to device malfunction, device-related infections are one of the most frequent complications of ventricular assist device placement. Infections are reported to occur in no less than 13% of cases, Dr Ishin points out. ‘Although device-related infecions can involve any aspect of the device: the surgical site, the driveline, the device pocket, or the pump itself, and more than half of all device-related infections include multiple sites, the existence of external components, such as drivelines and batteries, leads to a significant increase in the chance of an infection, leading back to the problem of external power supply and longer lasting batteries.’

‘Although at present we can not completely eliminate the need for heart transplantation, rapid technological developments indicate that we are not that far away from sorting mechanical issues, coagulation control and device-related infections with serious breakthroughs expected within next five to 10 years,’ Dr Ishin concludes.

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Advances of vascular MRI at higher field strengths

Stefan G Ruehm, Kambiz Nael, Derek Lohan and Henrik J Michaely describe impressive images that benefit patient treatment

Contrast-enhanced MR angiography (CEMRA) has evolved as an increasingly competitive diagnostic modality challenging both catheter angiography and CT angiography (CTA) for imaging of nearly all vascular territories. Over the recent years, improvements in gradient technology, pulse sequences, and postprocessing algorithms, combined with dramatic improvements in radiofrequency (RF) technology, have enabled the current status of CEMRA applications at 1.5T. Lately, whole-body 3T MRI systems have been introduced, with the promise of greatly improved signal-to-noise ratio (SNR) compared to 1.5T. With 3T imaging it appears feasible to obtain almost double the available SNR compared to 1.5T. However, the move from 1.5T to 3T involves more than just increasing SNR. For some pulse sequences, many of which are now routine for imaging at 1.5T, there are substantial trade-offs at 3T such as so-called dielectric resonance effect, which can result in bands of signal called dielectric resonance effect, tial trade-offs at 3T such as so-

Clinical Applications

In many institutions 3-T CEMRA has found its role as the method of choice for the evaluation of the craniovascular vasculature. However, the move from 1.5T to 3T involves more than just increasing SNR. Some pulse sequences, many of which are now routine for imaging at 1.5T, there are substantial trade-offs at 3T such as so-called dielectric resonance effect, which can result in bands of signal called dielectric resonance effect, tial trade-offs at 3T such as so-

Table: Benefits of 3 Tesla CEMRA for improved therapeutic strategies

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<thead>
<tr>
<th>Technique</th>
<th>Problem</th>
<th>Solution</th>
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<tbody>
<tr>
<td>High-resolution MRA</td>
<td>Stenosis quantification</td>
<td>Improved accuracy for determination of significant stenoses</td>
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<tr>
<td>Fibromuscular dysplasia</td>
<td></td>
<td>Better detection of distal renal artery involvement by string-of-beads changes</td>
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<tr>
<td>Time-resolved MRA</td>
<td>Occlusion</td>
<td>Detection of collateral flow</td>
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<td>T1 morphologic imaging</td>
<td>High-grade stenosis</td>
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<td></td>
<td>Activity of vasculitis</td>
<td>Improved detection of subtle vessel wall enhancement</td>
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Fig. 3: Time-resolved MRA in a patient with left-sided foot ulcer and PAD. In the dynamic time-resolved echo-shared MRA at 3.0T (TREAT, 1.5 x 1.5 x 1.5 mm spatial resolution, 3s temporal resolution) after administration of first pass gadofosveset (Vasovist) a regular run-off of the right lower extremity can be appreciated while on the affected left side no patent arterial vessel can be seen. These are only small collateral branches excluding interventional recanalization.

Fig. 4 (a+b): Conventional renal angiography (a) and corresponding 3-D high-resolution contrast-enhanced MR angiographic oblique maximum intensity projection (MIP) (b) from a female patient with thoracic dysplasia of the right renal artery. This is evidenced by branching and irregularity of the distal third of this vessel on both imaging techniques. While of inferior spatial resolution to conventional radiographic techniques, CEMRA at 3 Tesla maintains high diagnostic accuracy, while precluding the requirement for arterial puncture and ionising radiation exposure.

Fig. 5 (a+b): High resolution 3-D contrast-enhanced MRA full-thickness of the left renal artery (a) and time-resolved contrast-enhanced MRA at 3 Tesla with injection of 12cc of Magnevist (gadopentetate) in a patient with Giant Cell Arteritis. An aberrant right subclavian and conventional left subclavian artery are occluded, with resultant arterial collateralization. Dynamic time-resolved images acquired with a TWIST sequence using a relatively diminutive dose of 5cc Magnevist, confirms delayed bilateral upper extremity perfusion due to the attenuated size of these collateral vessels.

ESC 6
The contraction of the atria and ventricles is differentially regulated, according to a study by Fischmeister and colleagues, at INSERM UMR-S 769 in Châtenay-Malabry. The contraction phase of the heart beat is controlled by several pathways, including one initiated by stimulation of beta-adrenergic receptors. At the molecular level, the flow of Ca2+ through protein channels known as L-type Ca2+ channels has a central role in the regulation of the contraction of the heart by beta-adrenergic receptors.

FMD represents the second most common cause of renal artery disease. It tends to affect younger patients. Patients benefit from early diagnosis since there is a good response to balloon angioplasty. PMD usually affects the mid and distal artery segments. These segments may be missed on conventional MRA at 1.5T due to limited spatial resolution. It is expected that CEMRA at 3T increases sensitivity and specificity for the early detection of FMD.

Similarly to single station MRA, multistation peripheral or whole-body imaging can be performed at 3T yielding high spatial-resolution data sets with isotropic submillimeter voxel size. With the combination of parallel imaging, an appropriate contrast-agent injection protocol, and flexible table movement, venous contamination can be minimised or avoided. The procedure is feasible and holds promise for screening applications.

In summary, a wide spectrum of vascular diseases may benefit from imaging at 3T. Our experience suggests that CEMRA at 3T is robust and besides providing spectacular images holds promise to improve patient care by improved diagnostic accuracy which may positively affect therapeutic strategies.

*Henrik J Michaely is a consultant to Bayer/BostonCave*
HIFU surgical ablation products gain CE Mark

St. Jude Medical, Inc. has received European CE Mark approval for Epicor Medical’s Focused Ultrasound Ablation (FDA) and its related Catheterisation system for its Epicor LP cardiac ablation system. The company adds. The company is continuing its pursuit of expanding the use of the HIFU surgical ablation technology, it said.

The Epicor LP system has a lower profile (smaller relative to the first generation technology) as well as other features designed to facilitate easier device introduction and placement around and on patients’ heads, the company said. The Epicor LP system is equally suited for use in both closed chest procedures performed through a single incision, and in open chest procedures.

In the December 2007 edition of The Annals of Thoracic Surgery, the results of an independent investigative group from Siemens were published, showing that AF is effectively treated using the Epicor Cardiac Ablation System when used concomitantly to corrective heart surgery. The investigators reported that more than 83% of all patients, followed for at least six months after surgery, were free from AF. In addition, 86% of the patients followed for at least 18 months remained free from AF. The investigators reported that there were no device or ablative procedure-related adverse events and specifically noted an absence of congenital, coronary artery or other adverse events.

The 2007 results confirmed the findings of an earlier European multi-centre trial published in the September 2005 Journal of Thoracic and Cardiovascular Surgery. The investigators in the European clinical trial reported an 85% freedom-from-AF rate at six months post-procedure - the study’s primary efficacy end point - in patients concomitantly treated with the Epicor cardiac ablation system. St. Jude Medical acquired Epicor Medical in 2004 and worked closely with Dr James Cox to develop the Epicor Medical HIFU ablation system and its related surgical procedure. Dr. Cox is the developer of the Cox’s surgical procedure for the treatment of AF and is acknowledged by his peers as a pioneer in the field. Since the acquisition, St. Jude Medical has been committed to improving the manufacturability and performance of the HIFU surgical ablation technology, the company adds. The company is continuing its pursuit to expand its clinical data, as well as additional tools to facilitate minimally invasive procedures, for the technology.

The first generation Epicor System gained regulatory approval for the treatment of AF in Europe in 2006. In the US, the first generation Epicor System and the Epicor System received clearance from the FDA for the surgical ablation of cardiac tissue but have not been indicated by the FDA specifically for the treatment of AF.

St. Jude Medical has over 12,500 employees worldwide and is headquartered in St Paul, Minnesota. The firm focuses on developing systems for cardiac rhythm management, cardiac ablation, an atrial fibrillation, cardiac surgery, cardiology and neurovascular.

Cardiologist, Dr. Melissa Wood, of the Massachusetts General Hospital, Boston, USA, has reported that the use of echocardiographic imaging technology, using GE Healthcare’s Vivid cardiac compact ultrasound system, has allowed the medical research team in Boston to identify healthy patterns of heart enlargement that can differentiate it from hypertrophic cardiomyopathy. Previously, it was believed that heart size is indicative of risk of sudden cardiac death (SCD). However, Dr. Wood’s research with the USA’s Weightlifting and US Men’s Rowing teams has shown that is it the health of the systolic or blood-pumping action - not the heart size - that is the distinguishing factor of risk for severe cardiovascular difficulties, he said in the process of developing a cardiac fitness index to be released later this year that will help trainers and coaches understand how cardiac conditions impact performance of high-endurance athletes, Dr. Wood explained.

The Acuson SC2000 system is designed to support advanced cardiovascular applications. The system has unparalleled capabilities in the areas of diagnostic imaging, color Doppler, and spectral Doppler. This breakthrough technology showcases Siemens acoustic mastery and delivers on the long-awaited promise of true volume imaging for every patient.

Better outcomes through workflow-driven examination sequences

The Acuson SC2000 system is designed to support advanced cardiovascular applications. The system’s workflow-driven examination sequences allow for a better understanding of anatomical patterns and landmarks, as well as to perform automatic measurements streamlining clinical workflow.

The system automatically derives reference plane images from the full-volume cardiac capstone to facilitate minimally invasive procedures, for the technology.

CVD specialists meet football

World’s first symposium on sudden death syndrome among European athletes

Spain – The world’s first symposium on the molecular analysis of sudden death syndrome (SDS) among athletes, which brings together European researchers and several top Spanish footballers. Sponsored by Applied Biosystems, and held in the Madrid’s Hospital Clinico San Carlos, the I Symposium de Prevención en el futbol aims to initiate the development of new tests to identify sports players at SDS risk.

This syndrome, most common in men under 40, generally causes immediate cardiac arrest, leading to unconsciousness. Reports of unexpected deaths of young men participating in marathons, cycling races and football matches are not unusual. Sudden death can be caused by a variety of factors, from myocardial infarction to arrhythmia. Genetic causes usually have no symptoms, so professional athletes at risk of the syndrome can appear to be in a perfect physical condition during routine medical and fitness checks. Currently available CVD tests are usually insufficient to detect an individual at risk of SDS – only a genetic test can provide the required accuracy.

A roundtable discussion ensued on methods to identify specific molecular or genetic changes in people at risk. Applied Biosystems points out that these biomarkers could be used to develop non-invasive tests for football players or other sportsmen to identify their risk of sudden death.

There are several known genetic causes of sudden adult death, including myocardial infarction, long QT syndrome, and sudden arrhythmic death syndrome. There is also a growing body of research on the role of genetic abnormalities in sudden cardiac death, including congenital QT syndrome and Brugada syndrome.

The Acuson SC2000 volume imaging ultrasound system – reported to be the first system in the world to acquire non-stitched real-time full-volume 3-D images of the heart in one single heart cycle – will be launched by Siemens Healthcare at the European Society of Cardiology (ESC) meeting in Munich. This is expected to be better that echo “in a heartbeat,” this new technology provides the greatest acquisition speed in sound since the introduction of 2-D imaging in the late 70s, Siemens explains. “Sudden, non-stitched in one image in 55 years after echocardiography pioneers Inge Edler and Helmuth Hertz acquired the world’s first cardiac ultrasound recording in 1953.”

Klaus Hambuechen, CEO of Ultrasound, Siemens Medical Solutions USA Inc. added: “The system has unparalleled capabilities in the areas of diagnostic imaging, color Doppler, and spectral Doppler. This breakthrough technology shows Siemens technological edge, and delivers on the long-awaited promise of true volume imaging for every patient.”

Rolling out ScanCath

USA – With the recent opening of its new headquarters in Newark, NJ, the company has also added new features and roll-out of the development of its first imaging catheterisation system, ScanCath cardiac catheterisation system.

Newly, which is a high-speed, X-ray imaging technology, enables the ScanCath cardiac catheterisation system to provide clinicians with advanced full-volume imaging capabilities coupled with reduced exposure in radiation.
Economic recession: a cause of later CVD?

Germany—Bad economic conditions, e.g. a recession, at the time of birth may lead to a higher risk of cardiovascular mortality much later in life, according to a recent study published by researchers at the Institute for the Study of Labour (IZA) in Bonn. The study showed that individuals born in a recession on average live 15 months less than those born under better conditions and that this difference can be mostly attributed to cardiovascular health risks. “What is surprising is that such effects may pop up 70 or 80 years after birth,” said Gerard van den Berg, Economics Professor at VU University Amsterdam and Programme Director at IZA, who co-authored the study with Gabriele Doblhammer-Reiter and Kaare Christensen. In the intervening years no extraordinary health events may occur, until suddenly the fatal cardiovascular problems arrive. The authors report that they do not find such long-run effects on cancer in general, although certain types of cancer have been linked to low birth weight, another marker of early-life conditions.

The team used data on individuals born around 1900, as well as that of twins in Denmark, whose mortality causes have been systematically gathered for many years. The latter made it possible to check whether a twin pair’s health outcomes are more similar later in life if they were born under adverse conditions than if they were born under good conditions. The finding was that they are more similar later in life if the starting position was bad. Conversely, if an individual is born under better conditions, then individual-specific factors dominate more.

Why might a recession, for example, cause later damage to the cardiovascular system? Dr Van den Berg said analyses carried out by the team for specific parts of Denmark suggest that long-run effects are particularly triggered by the combination of suboptimal nutrition and a suboptimal health infrastructure early in life. Low household income is less harmful for the baby’s future if the environment has good healthcare and hygiene facilities. In addition, stress is possibly a major factor. Parents who are economically stressed may produce offspring with features that make them more susceptible to CVDs at advanced ages.

One may wonder whether the results are of significance for present-day birth conditions. Of course, we need another 80 years to know for sure. But there are signs that long-run effects are as important as ever. For example, birth weight studies among recent cohorts show effects on health and adult height that are as strong as ever. And with the advent of the fast food society, nutritional habits among segments of society may not be as good as they used to be.

From this point of view, it may be worthwhile to screen young individuals born under adverse conditions for CV markers and predictors, and to expose those who have unfavourable test values to preventive interventions. Moreover, the results support investments in nutritional quality and health infrastructure in countries with a high degree of deprivation, as a means to reduce the cardiovascular mortality rate in future years.

As recession looms in various countries, so the effects of economic stress on families may be passed on to the children born during such times, causing a higher risk of them developing fatal cardiovascular diseases in later life.

HeartVue 6S seeks USA marketing

Pegasus/Heartview LLC has announced that clinical studies of its HeartVue 6S Heart Screening System—which obtained CE Mark Approval in Europe almost two years ago—have been completed according to FDA guidelines, as a pre-marketing condition for release in the USA. The HeartVue 6S Screening System, used as a screening tool, provides a quick, accurate assessment of patients with suspected coronary artery disease in 1–2 minutes. The clinical studies included testing 170 patients of various ages, genders, races, weights and health conditions. The results will now be analyzed, interpreted and presented to the FDA in the form of a 510K Filing.
The diagnostic work-up of syncope patients often raises the question of how much diagnosis is necessary and what examination methods are really needed. To save time, specialists recommend focusing on determining whether the syncope may be caused by a cardiac problem – a question answered quite easily in many cases. According to Professor Andreas Schuchert, a basic diagnostic work-up for every syncope case consists of three steps: the first is a thorough anamnesis, followed by a brief physical examination and an ECG. Further measures are only necessary either if no specific type of syncope can be determined or if there are indications of their being caused by a cardiac problem.

Orthostatic syncope – if loss of consciousness occurs directly after standing up from having been lying down or sitting, this indicates orthostatic syncope. The most important recommendation of Prof Schuchert is simply to stand up more slowly so that the cardiovascular system can adapt better to the body being upright. “Support hose, the sympathomimetic drug etilefrine or the mineral corticoidsteroid fludrocortisone can also be helpful.”

Situational syncope – usually occurring during micturition, defecation, coughing or vomiting. “Unlike the vasovagal attack, the trigger in these cases is not a diffuse sensation, like anxiety or pain, but a clearly defined situation. Furthermore, situational syncope typically occurs more suddenly and without any warning.”

Cardiac syncope shows a clearly raised death rate (18-33%) depending on the study, on which there is no evidence-based drug to treat situational syncope. “The most important recommendation of Prof Schuchert is simply to stand up more slowly so that the cardiovascular system can adapt better to the body being upright.”

Treatments

Orthostatic syncope – if loss of consciousness occurs directly after standing up from having been lying down or sitting, this indicates orthostatic syncope. The most important recommendation of Prof Schuchert is simply to stand up more slowly so that the cardiovascular system can adapt better to the body being upright. “Support hose, the sympathomimetic drug etilefrine or the mineral corticoidsteroid fludrocortisone can also be helpful.”

Situational syncope – mostly occurring during micturition, defecation, coughing or vomiting, in many cases this is not easy to treat and there are no proven evidence-based measures. “Any therapy that is also used for vasovagal attacks is worth a try,” Prof Schuchert says, adding that many patients are helped by support hose or etilefrine.

Summation

● Diagnosis is the priority in vasovagal attacks. People affected should be advised that the loss of consciousness does not indicate a dangerous disease of any organ.

● It is important to avoid factors triggering syncope.

● Create pressure manoeuvres (e.g. squeezing a rubber ball or pulling closed hands apart) have proved valuable to counteract fall in BP during vasovagal attacks.

● Lifestyle changes can be tried in motivated patients, e.g. increasing physical exercise, fluid and salt intake.

● For vasovagal attacks, midodrine is the first drug of choice (3 x 10 mg/d).

● Labile attacks can be tried in motivated patients, e.g. increasing physical exercise, fluid and salt intake.

● Support hose, etilefrine and fludrocortisone can be useful for orthostatic syncope.

● There is no evidence-based drug to treat situational syncope.

Heart sounds

The basic diagnostic physical work-up often only requires a few steps. “The first is auscultation of the heart, during which pathological sounds of any kind must be assessed as warnings of cardiac syncope,” Prof Schuchert emphasizes. “The heart sounds should also be auscultated for stenosis of the carotid artery. The physician should also listen very carefully for an irregular heartbeat or a heart rate below 50 or above 100 beats a minute, which may indicate AV block or atrial fibrillation as the cause of syncope. The most important alarm signals are evidence of cardiac insufficiency – for example, the legs are oedematous or there are rattling sounds from the lungs or a congested liver is detectable more than two finger widths below the rib cage,” he reminds us. “The combination of cardiac insufficiency and syncope indicates a critically raised risk of mortality and therefore needs to be immediately diagnosed.”

Vasovagal events

If that basic procedure indicates no cardiac cause, the physician can focus on determining the actual type of syncope – often possible by looking at the medical history. “A vasovagal attack, the most frequent kind of syncope, must always be assumed, for example, when typical symptoms preceded the fainting attack: nausea, sweating, dizziness, drowsiness, weakness, abdominal discomfort or blurred vision,” he explains. “Similarly when fainting followed a long period of standing tensely or the attack followed pain, emotional stress, exercise or procedures like having blood taken.”

Fainting during defecation

Situational syncope must be assumed if loss of consciousness occurs during defecation, coughing or vomiting. “Unlike the vasovagal attack, the trigger in these cases is not a diffuse sensation, like anxiety or pain, but a clearly defined situation. Furthermore, situational syncope typically occurs more suddenly and without any warning.”

Orthostatic syncope occurs when standing up from lying down or sitting. Unlike a vasovagal attack, an orthostatic syncope typically does not occur after standing for a long period but immediately after the change in position.

A drug-induced syncope should be considered if the blood pressure (BP) has been too drastically modified in hypertensive patients. On the other hand, if fainting occurs when turning the head, for example while shaving or looking over one’s shoulder in a car, carotid sinus syndrome should be considered.

Additional examinations

Depending on the results from the basic diagnosis, various other investigations may be recommended to clarify the type of syncope. If the medical history indicates an orthostatic syncope, for example, diagnosis can be confirmed by the Schellong test, in which the BP taken after five minutes in the lying position is compared to that taken after subsequently standing up. The diagnosis is confirmed when the systolic value after standing up falls below 90 mmHg or is more than 20 mmHg below the measurement taken when lying down. Prof Schuchert points out that, if the previously ascertainment medical history indicates vasovagal syncope, carotid sinus syndrome or situational syncope, the Schellong test is unnecessary. Moreover, tilt tests may be useful, for example when vasovagal syncope is suspected but the medical history does not unambiguously indicate this. However, the predictive value of tilt tests is increasingly challenged.

Laboratory tests of doubtful benefit

The professor believes laboratory tests are almost always unnecessary in clarifying syncope – particularly true for the determination of 1h levels, a test frequently performed due to a lack of other ideas, but which is actually only necessary if anaemia is clinically indicated. “In 99% of syncope diagnoses no laboratory tests are required.”

The same applies to carotid Doppler examinations, which are only indicated when sounds of stenosis can actually be heard on auscultation of the vessels of the neck. “Otherwise the probability of syncope caused by carotid disorders should be ignored.”

Therapy

Vasovagal syncope can often be treated effectively by the simplest methods. Counter pressure manoeuvres are particularly useful in many cases, and in recent years have become a highly popular way to prevent decreasing BP without complications. Before beginning treatment for vasovagal attacks, specialists recommend sufficient time is given to explain the therapy. “Patients should know that fainting attacks are not a symptom of a dangerous disease of an organ,” Prof Schuchert emphasizes. “When they know this they can then react more calmly to the fainting, which for many is already a great relief.”

During a consultation the typical trigger factors for syncope should be addressed. “Someone who tends to have syncope attacks in narrow, overheated spaces should avoid department stores. And a person who has problems when asked for a blood would be wise to lie down before the procedure,” he advises, deploring the omission of these simple but important recommendations.

Counter pressure manoeuvres are in many cases a very effective aid, widely used in clinical practice to counteract the fall in BP in a vasovagal attack. Counter pressure manoeuvres require a hand size rubber ball, simple carried in a pocket or bag. If a fainting attack approaches, in vasovagal attacks not only heralded by typical symptoms, e.g. nausea, dizziness or drowsiness, one squeezes the ball as hard as possible. As a result of muscle contraction, the sympathetic system is evidently activated, producing constriction of the peripheral blood vessels, thus often preventing the fall in BP causing syncope in the preliminary stage.

Alternatively one can perform the manoeuvre shown in the image.
Simply clasp your hands together with arms at about chest height in front of your body and try to pull your arms apart while not loosening your clasp. In both counter pressure manoeuvres muscles contract for as long as it takes for the signals of the attack to disappear.

Medication

Medication can also be useful to treat some vasovagal cases, particularly when other therapies have failed and syncope continues to occur. ‘The drug of choice is the alpha antagonist midodrine. At a dose of 3 x 10 mg/d this effectively raises the BP, and in almost all cases the drug avoids recurrence,’ the professor says. However, it is not suitable for every patient because it potentially increases the BP. This applies particularly to the elderly, whose BP compared to that of younger people is often already raised. Additionally, since this drug must be taken three times a day, many patients have compliance problems.

If patients suffering vasovagal attacks are already hypertensive, beta-blockers can also be a useful alternative. Although not recommended by the ESC due to unproven benefit in vasovagal attacks, studies in recent years in patients aged 40+ indicate positive effects, so for this age group they are often to be recommended, he points out. Other drug alternatives, including selective serotonin re-uptake inhibitors, e.g. paroxetine, are being discussed, but Prof Schuchert recommends their very careful use due to lack of long-term data.

Furthermore, in cases of vasovagal attacks the physician should check whether the patient is taking anti-hypertensive medication, which might cause the syncope and which could be reduced or discontinued.

In some cases a cardiac pacemaker may be an option. ‘Such an implant is indicated if, for example, an event or loop recorder, which records the ECG over several months or even years, shows that asystoles are the cause of the fainting attacks,’ he points out.

Fluids and physical exercise

Often, various lifestyle changes are also recommended to avoid vasovagal attacks: more fluid intake, more salt in the diet and more physical exercise. However, scientifically, he points out their benefit has not been confirmed, which does not mean such changes are not worth a try in sufficiently motivated patients.

For many specialists, less recommendable is ‘tilt training’, in which patients stand leaning against a wall, depending on the treatment plan, say for half an hour daily, to train their circulatory systems. Theoretically it produces good results, the professor says, ‘but it’s time-consuming and thus compliance is very poor.’

Under the banner Hear today the heartbeats of tomorrow, at this year’s ESC meeting GE Healthcare will showcase its latest cardiology technology for the management of cardiovascular disease (CVD) as well as several new products. These include the MAC 1600 electrocardiograph, which is based on Win CES 0 to provide seamless communication to MUSE and CardioSoft and features automatic sync with a time server. GE points out that the device is scalable, ‘to evolve as a department’s needs arise.

* A GE sponsored satellite symposium will be held on Tuesday 2 September.

GE at ESC: Booth C520 + D500 in Hall B2.

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Atrial fibrillation

Experts gathering to define future research

France – Seeking to set the agenda for urgent atrial fibrillation (AF) research, European and international cardiologists will gather this October at the European Heart House, in Sophia Antipolis, the headquarters of the European Society of Cardiology.

A panel of international AF experts has been invited by The European Heart Rhythm Society (EHRA) and the German Atrial Fibrillation Network (APFN) to their second joint conference to define new research perspectives and identify unresolved clinical issues in the diagnosis and treatment of AF.

Among subjects for discussion: anticoagulation in patients at intermediate stroke risk; new concepts for rhythm control drug treatment; what to do if pulmonary vein isolation fails; relevance and intensity of ECG monitoring in clinical practice; relevance of clinically identifiable risk factors for AF progression; what causes the first episode of idiopathic AF, and novel therapeutic goals for AF treatment.
Website advice for HF patients

A new educational website specifically for heart failure patients, their families and carers, has been set up by the Heart Failure Association of the European Society of Cardiology. On this site, host ‘Anna’, an animated woman who speaks in a friendly, matter of fact way, guides the visitor through the website advice sections.

There are also animated explanations covering how the normal heart works, what goes wrong in HF, how the body compensates, and much else (example in illustration). Cardiologists and physicians who wish to advise patients that they can learn more about their HF condition via their own computers, should pass on this address: www.heartfailure.org

Sample of website animated advice:

- How heart failure causes fluid accumulation
- How diuretics work in heart failure

Implantable cardiac monitors

Syncope (fainting) is a leading cause of hospital emergency visits. In almost 30% of patients, syncope has a cardiac cause; in 50%, a non-cardiac cause, and in 40% the cause of syncope is unknown. Syncope is difficult to diagnose as syncopal episodes are often too infrequent and unpredictable for detection with conventional monitoring techniques.

Medtronic reports that its new Reveal DX and Reveal XT can provide diagnostic and monitoring insights into cases of syncope or abnormal heart rhythms, including ventricular tachycardia (VT), fast ventricular tachyarrhythmias (FVT), bradyarrhythmias and asystole. The Reveal DX continuously monitors the heart’s electrical activity to help physicians diagnose whether or not there is a cardiovascular cause for symptoms such as fainting, dizziness and unexplained seizure-like episodes.

During a simple out-patient procedure, the Reveal DX monitor – weighing just 15g and about the size of a memory stick – is placed subcutaneously in the chest area using local anaesthesia. The monitor then records important cardiac rhythm data, which may help a physician to diagnose the patient and provide appropriate treatment. Unlike a pacemaker or implantable cardioverter-defibrillator, there are no leads (tiny wires) that extend from the device into the heart’s chamber(s). To store an electrocardiogram (ECG) at the time of an episode, a patient places a hand-held, pager-sized activator over the device and presses a button. Later a physician analyses the stored information and determines if the episode was caused by an abnormal heart rhythm.

Heart Failure Congress 2009

Among the many aims of the Heart Failure Association of the ESC is the establishment of networks for the HF management, education and research. The HFA’s next annual meeting will be held next summer in the Palais Acropolis, Nice, France.

www.escardio.org/congresses/HF2009
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