

EP-Europace, a recent addition to the family of ESC journals

Moves are underway to make *EP-Europace* more international and less parochial, says Prof John Camm



John Camm

Today the journal is the official journal of the European Heart Rhythm Association (EHRA) and the Working Group on Cardiac Cellular Electrophysiology of the ESC.

The term *Europace* is an abbreviation for The **E**uropean Journal of **P**acing, **A**rrhythmias, and **C**ardiac **E**lectrophysiology. While the official title of the journal has remained the same—changing it would necessitate a new impact factor—the cover title has been changed to *EP*, with the subtitle *Europace*.

EP does not stand for anything in particular, but could stand for any number of things, such as electrophysiology or electrophysiology and pacing. *EP* is also a term used to describe the type of doctors who are interested in the content of the journal. 'This was important because we wanted to try and progressively move away from the notion that this journal was exclusively European,' says Camm 'There's been a big move to make the journal more international and less parochial.'

Similar moves have been made by the *British Medical Journal*, now called *BMJ*, and *British Heart Journal*, now published as *Heart*.

Such changes are a significant step towards attracting readers and authors from the USA. The general notion is that a journal is more international if it is not pegged to a particular continent or country. Although *EP-Europace* is specifically for the membership of the association and working group, it does want to draw the widest readership possible.

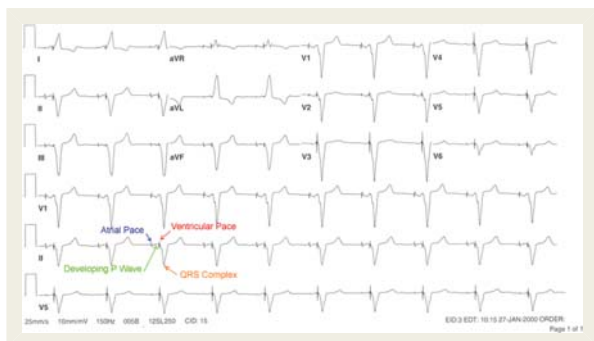
EP-Europace was founded by a group of doctors who were predominantly interested in cardiac pacing. The founding editor, Prof Richard Sutton, was at the Brompton Hospital in London at the time; he now works at St Mary's Hospital in London.

When the journal came into being about 12 years ago, it was at a time when two working groups of the ESC—one on pacing and the other on cardiac arrhythmias—were being amalgamated. The idea was that with the amalgamation, a journal should be set up to cover these two related areas.

Sutton gave up the editorship of the journal 3 years ago and handed the reins to John Camm, MD, FRCP, FESC, Prof of Clinical Cardiology at St George's University of London.

Like all journals, *EP-Europace* kicked off with a relatively small number of issues per year. Now it is up to 12 issues per year, and over the past 3 years it has increased from about 70 pages to nearer 160 pages. The rapid increase in size over recent years has transpired through a concerted effort to make the journal more efficient, to publish articles more quickly and to attract more and more manuscripts.

EP-Europace covers what is now a very large area of cardiology. Put simply, the journal is interested in anything which has an electrical basis to it. Pacemaker therapy is of course covered, as is electrophysiology for diagnosis and treatment, e.g. to pace or ablate cardiac tissue.



Also of fundamental importance to the journal are the many different elements of basic electrophysiology and electrocardiology. For example, the meaning and interpretation of the electrocardiogram in a variety of situations, and the use of the investigation of the electrical properties of the myocardium in the basic laboratory.

All the tests of risk for the development of cardiac arrhythmia also fall within the journal's scope. These include the many non-invasive tests which predict cardiac risk, such as heart rate variability, T-wave alternans and QT-interval dynamics.

The strategy of *EP-Europace* is to improve the journal as much as possible. It is the only European journal in a competitive environment which includes a handful of American journals. The major objective is to make this European journal one of the best electrophysiology journals in the world. To achieve that, efforts are underway to broaden its appeal and attract authors from all parts of the globe.

The editorial board has been enlarged to make it geographically globally representative, and it was decided that a hallmark of the journal should be that it processes submissions as quickly as possible. The time to the first decision is around 21 days, and the time to publication after approval is less than 40 days. It is a good incentive for authors to submit manuscripts, because they are processed very quickly if the paper is a good one.

Achieving such efficiency requires a good team so it was decided that, in addition to having an editor-in-chief, a co-editor and the founding editor (who no longer plays an active role in the journal), there would be 12 associate editors. The associate editors are experts in the smaller areas of this field. They take overall charge of those areas for the journal and can very quickly process the manuscripts.

Many of the journal's strategic objectives have already been accomplished, such as an increase in size. It will probably stay at

about 160 pages for the time being, although there will be some bigger issues from time to time. A major achievement has been moving to a full colour publication, something which none of the other journals in the electrophysiology arena have done. Most journals are published on the internet and there, colour makes no cost difference, so, many papers are available in colour format, but only on the internet.

'Going colour is something all journals will have to do in the near future', says Camm. 'It seemed inappropriate to publish a paper version which was black and white when the images were designed in colour.' There are many images in cardiac electrophysiology where colour is an important element. Previously authors could pay for an occasional colour picture in one of their manuscripts, but now full colour is offered to everybody for no charge, benefiting both authors and readers.

Another goal is to encourage the EHRA to make regular contributions to the journal for a teaching section that is being developed. *EP-Europace* is also the vehicle for publishing the four to six scientific documents produced each year by the EHRA on specialist subjects.

Improving the impact of the journal is of major importance for the future, which means more people reading it and citing it, and hence a bigger impact factor.

EP-Europace wants to attract better quality manuscripts and for this reason has transformed itself into a slick machine that publishes accurately and quickly. Steps are also being taken to encourage authors to submit their best quality manuscripts. And the journal takes papers from *European Heart Journal*, which are very good but too technical for a general cardiology journal.

Building the number of readers is another priority. Increasing the American readership will hopefully be achieved by having more Americans on the editorial board and encouraging more American authors to contribute.

The journal is running a scheme whereby at least half of all manuscripts are associated with an editorial. It is using the editorial invitation scheme to interest people who have previously shown little interest in the journal. Editors from the USA, Canada, and elsewhere are asked to contribute an editorial to a paper in the journal, in an attempt to familiarise them with the publication.

Other efforts to improve quality have been made through changing the complexion and content of the journal. The size of case reports has been reduced, and the number of case reports is now being curtailed. The journal is also cutting down on images and short communications and trying to concentrate on major reviews, original publications, and editorials related to those publications.

The changes have come about because of general editorial policy, feedback from readers, and intelligence about what articles are attractive from the citations that they provoke. Camm says: 'If they're not stimulating any citations, then they're not going to be worth publishing'.

In his own research, Camm is interested in risk stratification, which means working out the risk that patients face when they have various cardiac conditions. He is particularly interested in patients who have suffered an acute myocardial infarction and how to pick out those at risk for subsequent sudden cardiac death.

A second area of interest is identifying the effect of drugs on the heart, especially on its electrical system. These effects could be positive therapeutic effects or negative adverse effects. He has done much research into the effect of drugs that prolong the

recovery of cardiac tissue, making it vulnerable to sudden ventricular arrhythmias that can be fatal.

J. Taylor MPhil

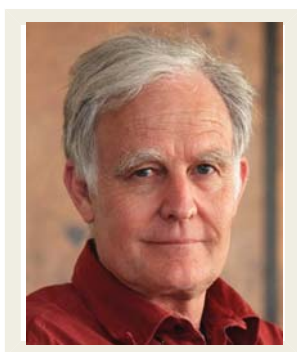
2009 Year-end highlights from Australia and New Zealand

A review of innovative CV research, awards, and exciting developments in Australia and New Zealand through 2009, reviewed by Iona MacDonald MA.

2009 Year-end highlights: medals, grants, and legendary status

2009 Acknowledged some exceptional cardiovascular disease (CVD) researchers in New Zealand and Australia with major awards, grants, and worldwide recognition; fitting tributes for individuals whose innovative findings have helped to advance our understanding into the many complex relationships between physiology, psychology, and the heart beat. Their research spans a wide range of topics in CVD, from the development of computer models providing physiological imaging that may facilitate the diagnosis, therapy planning, and treatment of CVD, to investigations into how mental health may induce the development of CVD, and the advanced medical technology of biodegradable coronary stents.

Skilful engineers and mathematical scientists have greatly enhanced investigations into physiology.



Peter Hunter, a Distinguished Prof. of Engineering Science and Director of Auckland's Bioengineering Institute was awarded New Zealand's prestigious Rutherford Medal for his leading role in the Physiome Project, a major international project that aims to build sophisticated computer models of all the human body's organs. The Rutherford Medal was instituted by the Royal Society of New Zealand in 1991 as the premier New Zealand science award in the recognition of exceptional contributions to New Zealand science and technology by a person or group in any field of

science, mathematics, social science, or technology. Hunter envisages mathematical models linking gene, protein, cell, tissue, organ, and the whole body into one cohesive framework that will serve as a web resource for diagnosing and treating patients, surgical planning, education, and the design of medical devices.

An electronic programme that may be used by primary care physicians both for assessing patients' CVD risk and as a support tool for decision making has attracted a major award in New Zealand. Since 2002, the Peter Gluckman Medal has recognized distinguished research contributions of current and former staff or students of the Faculty of Medical and Health Sciences at the University of Auckland. The recipient for 2009 was Rod Jackson, Prof. of Epidemiology and Head of Epidemiology and Biostatistics at the University of Auckland, whose main focus of research over the last 25 years has been the epidemiology of chronic diseases, particularly CVDs. He is one of the architects of New Zealand risk-based clinical guidelines for managing CVD risk. He is currently involved in developing and implementing PREDICT, a web-based decision support system designed to help primary care practitioners across the country systematically manage CVD and diabetes risk at the 'moment of care' for their practice populations.

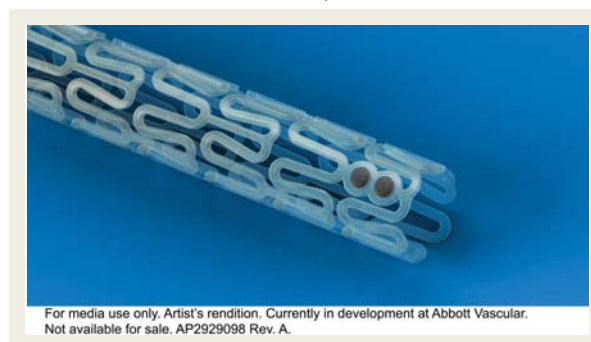
Untreated aortic stenosis kills many New Zealanders every year; those who survive are left with debilitating symptoms. In a retrospective analysis of patients with symptomatic aortic stenosis at Waikato hospital, 48% were declined surgery mainly because of age or co-morbidities. Transcatheter aortic valve insertion is a rapidly growing technology currently used to treat surgically high-risk or inoperable patients. Widespread use of this technology is limited by the cost of the prosthesis, but emerging data demonstrate cost effectiveness in the high-risk population. In August 2008, a programme led by Dr Sanjeevan Pasupati obtained grant support to perform this procedure at Waikato hospital; to date, 31 patients have been treated by the transarterial (femoral 22, axillary 4) or transapical (5) approach. By specializing in both available technologies (Medtronic CoreValve and the Edwards balloon

expandable valve), Pasupati's team has treated the majority of referred high-risk patients with excellent results (1-month transarterial survival 100%). Funding currently limits this programme to Waikato-based patients; Pasupati and colleagues plan to convince the New Zealand health authorities to establish this programme nationwide.

A fascination into how mental events interact with heart health drives the work of neuroscientist Dr Eugene Nalivaiko, at the University of Newcastle, Australia. Much epidemiological data relate different kinds of psychological stresses to various health issues, including sudden cardiac death and hypertension. Although we already understand a great deal about how acute psychological stresses may cause various disturbances in physiological functions, we know very little about how brain mechanisms control cardiovascular responses to chronic stresses. Using animal models to explore stress-induced sudden cardiac death, Nalivaiko hopes that his research findings will help humans better manage stress and avoid heart attacks.

Similarly, another group of Australian researchers launched a major study that aims to understand the link between the mind and CV health. Dr Liu Xin and co-investigators at the School of Medicine, University of Queensland, attracted a grant of almost \$AU700 000 from the National Heart Foundation (NHF) and Beyondblue Cardiovascular Disease and Depression Strategic Research Program, for their study evaluating the effects of an innovative Tai Chi programme on depression in adults who are at risk of developing CVD. Liu hopes that his research reveals beneficial effects of this Tai Chi-based programme on indicators of depression and other risk factors for developing CVD. Beyondblue is Australia's national depression initiative working in partnership with health services, schools, workplaces, universities, media, and community organizations, as well as people living with depression, to bring together their expertise around depression.

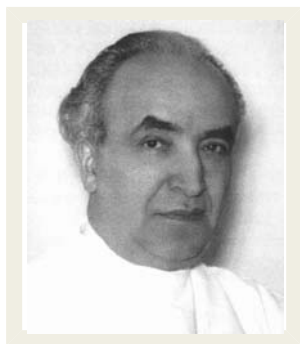
Successful advancements in promising bioabsorbable technology were announced during the year by Abbott Vascular. The first New Zealand patients with coronary artery disease in the second phase of Abbott's global ABSORB clinical trial were implanted with the company's innovative fully bioabsorbable everolimus-eluting device by Dr Dougal McClean, Interventional Cardiologist and Director of Interventional Research at Christchurch Hospital and by Dr John Ormiston, Medical Director at Mercy Angiography in Auckland. Three-year follow-up data from the 30 patients in New Zealand and Europe in the first phase of the trial show successful expansion and contraction of the treated vessel without restriction, indicating absorption of the device into vascular tissue. In addition, there were no cases of thrombosis and no new major adverse cardiac events (MACE) between 6 months and 3 years; the 3-year MACE rate was 3.6% (one patient). Bioabsorbable drug-eluting stents may eventually offer an alternative to the currently available metallic stents.



In conclusion, 2009 witnessed leading cardiovascular research experts exploring some fascinating topics that show enormous potential in the prevention and treatment of CVD. Patients and physicians alike will reap the benefits.

Pioneers in cardiology

Eduardo de Araújo Coelho, MD, PhD—the first to perform coronary angiography *in vivo*



With the ever present and increasing prevalence of cardiac disease in the Western world the search goes on for the most reliable and

informative diagnostic procedures. Now, in the 21st century, we have very detailed and specific comparisons between the effectiveness of various techniques for revealing coronary artery disease (CAD). The optimal device should be as non-invasive as possible. On-going trials and comparisons of procedures, such as magnetic resonance imaging (MRI) and multi-slice computed tomography (MSCT), indicate that currently MSCT has a significantly higher accuracy than MRI to detect or exclude significant CAD: *American Heart Journal* 2006;151:404–411.

We have obviously made some amazing progress since the early days of electrocardiology researched, developed, and refined so determinedly in the 1920–30s by the renowned physiologist Willem Einthoven (1860–1927) in collaboration with physician and physiologist Sir Thomas Lewis (1881–1945) and cardiologist

Augustus Desiré Waller (1856–1922). Back in the 1950s, however, an overlooked Portuguese cardiologist Eduardo de Arayjo Coelho (1896–1974) published in France in 1934 the first European monograph on myocardial infarction entitled ‘L’Infarctus du Myocarde’ (Masson, Paris) and went on to undertake interesting work producing the first coronary angiographies in living man.

Coelho was born in Guimareí in Portugal in 1896. He began his medical studies at Coimbra University, then having completed his final year at the Faculty of Medicine in Lisbon, he graduated in 1922 and produced his PhD thesis¹ ‘Da Relação do Estado Mental com o Estado Cerebral: O Critério Biológico em Neurologia’. He later spent a year in Berlin at the University Department of Clinical Practice where he studied electrocardiography with Dr Rudolph Kraus then went back to set up a department of electrocardiology in the Santa Marta Hospital in Portugal.

The 1934 monograph was the summary of experimental, clinical, electrocardiographic and anatomic pathology studies and was a work published in collaboration with José Rocheta a physician–registrar colleague. Having observed the obvious correlation between pathological alterations appearing in the coronary arteries and myocardial infarction Coelho set out some possible scenarios such as: the possibility of a completely obstructed coronary artery displaying neither fibrosis nor infarction; the latter but displaying multiple scars in a myocardial region independent of the obstructed artery. He also concluded that there could be thrombosis of a coronary artery without infarction yet displaying several scars in the area of the two coronaries and also the possibility of the complete obstruction of the right and left coronaries without infarction or fibrosis. Finally, he concluded that it was possible to find multiple scars or infarction in apparently normal arteries.

Interestingly, Coelho proved that the development of collateral circulation was proportional to the degree of occlusion and that thrombosis, obstruction, and infarction could form silently, while the symptoms of angina pectoris could exist with normal arteries. He also produced some pioneering studies on endocavitary electrocardiography, presenting a paper entitled ‘The Endocardial Electrocardiogram under Experimental Pathological Conditions of the Pericardium and the Myocardium’ at the third Inter-American Cardiology Congress in Chicago. Later studies looked at endocavitary electrocardiology in constrictive pericarditis, myocardial infarction, valvular cardiopathies, ventricular hypertrophies, branch blockage, and the Wolff–Parkinson–White syndrome. In the same year, 1948, Coelho initiated the study of acquired cardiopathies and cor pulmonale via right heart catheterization; the first results were published in 1951.

In 1952 at the first European Cardiology Congress in London Coelho’s major work was revealed, the first coronary angiographies in a living patient. In the written account (in French) of their experiments, Coelho *et al.*² introduce the study by explaining that the only method available to study coronary arteries *in vivo* was electrocardiography. They thought that severe anatomic lesions (stenosis, thrombosis, and so on) could be present without ECG changes, now common knowledge. Coelho *et al.* decided to experiment using a contrast material, diodrast, testing in six dogs for several months, before attempting such experimentation in humans.

The 10 patients forming the study group were fasting and were given a heparin injection prior to catheterization. A ‘Cournand probe’ was introduced in the right or left radial artery—the paper then gives details of the diodrast injection concentration required: ‘We began giving low concentration diodrast (20–30%) of 20, 30, 40, and 50 cc in 7 s. With this concentration, the angiograms did not show the any trace of the coronaries and therefore these first cases were unsuccessful’. They went on to a higher concentration, 50–60 cc of a 70% solution, and they were then able to see the two coronary arteries. It took 4–5 s to administer the injection and they managed to get 10 X-rays in just a few seconds. The carotid arteries were compressed during the procedure to avoid tenderization of the brain by the high level of diodrast in the blood. The following day the patients were sedated and over the during the next 2 days received heparin, the amount determined by the observed clotting time. In conclusion, Coelho’s team felt that coronary arteriography in live patients was risk-free provided the carotids were compressed during the injection, and, the catheter was placed facing the coronary arteries and not in them. They believed that one could not ‘deny the importance of this method, the only means by which we are able to see a stenosis or an occlusion of the coronaries’.

Although that Coelho’s work did not immediately receive the expected acclaim, in the 1972, second edition of H.A. Zimmerman’s book ‘Intracardiac Catheterization’, Godofredo Gensini MD wrote that ‘Eduardo Coelho and his colleagues were pioneers in searching for new methods specifically intended for deliberate, satisfactory, human coronary visualization’.

Dr F. Mason Sones (1918–85) a paediatric cardiologist at the Cleveland Clinic was also credited with being the first to use contrast dye to detect lesions in the coronary arteries but in 1980 Professor Coelho’s son Dr Macieira-Coelho received a letter from Professor J. Willis Hurst MD, Professor of Cardiology and Chairman of the Department of Medicine at the Emory University School of Medicine, Atlanta Georgia. The letter affirms that ‘Sones should be credited for developing the technique and moving on to its chemical usage . . . Dr. Coelho should be credited with originating the technique.’

Writing for the Sociedade Portuguesa de Cardiologia in 2006, Prof. Coelho’s son, Dr Macieira-Coelho described his father as one who ‘always aimed at being considered an intern who scientifically developed Cardiology as a medical specialty. He was a man of science with creativity and innovation and, as a man of critical culture, he was a universalist when he conceived the concept of scientific humanism as an intertwining of humanist culture and science’.³

Diana Berry MA

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The future of medical trials in the 21st century

Medical research has come a long way since Old Testament times, when the first clinical trial was conducted. Helen Jaques speaks to three renowned trialists to find out where clinical trials are headed in the 21st century.

Clinical trials have been around for a long time—since the first ever documented clinical trial conducted by King Nebuchadnezzar, the ruler of Babylon in the Old Testament Book of Daniel¹—and have had a huge influence on the way medicine is practiced. In fact, the first ever randomized controlled trial in 1948 is considered by some to be the most important scientific development of the 20th century.² But how are the principles and practice of the linchpin of medical research going to develop in the 21st century?

In the past, treatments often had dramatic effects on outcome that could be demonstrated in small observational trials. The trial that proved the efficacy of cardiopulmonary resuscitation, for example, involved only 20 patients.³ Nowadays, however, researchers need to detect small incremental benefits and moderate improvements in long-term outcome. 'Nowadays, it's not like giving penicillin to people and things like that, it's more subtle', says Prof. Peter Sleight. 'You might have a 10 or 15 percent increase in benefit with some treatment versus another.'

In order to detect such small effects, trials need large numbers of patients to avoid random errors and a heterogeneous sample to ensure the applicability of the results. Large trials can easily get too complicated though, and the dozens of research centres usually involved can struggle to deal with elaborate protocols and endless data collection.

The future of medical research might thus lie in the concept of large simple trials. By using a straightforward protocol and minimal data requirements, 'it is possible to randomize thousands of patients and follow them for the needed period of time, and to spend less and less', says Dr Aldo Maggioni. Huge trials are important not just for proving efficacy. One reason for doing large trials is for safety. 'I don't think you're going to get away from that in the 21st century', says Sleight.

There is an alternative approach to conducting trials that might in the future prove just as fruitful as the 'large and simple' strategy. Maggioni suggests that we 'focus not on the all comers patients with a specific cardiac disorder or cardiovascular disorder but to include in a trial just the subgroup of patients for whom something more should be done.' In many patients with cardiovascular disease, the risk of an adverse event—such as myocardial infarction or stroke—is very low and current treatment strategies are probably sufficient, he points out. In the future, research should instead focus on patients who are still at high risk despite the best treatments.

Prof. Andrew Tonkin feels that inclusion criteria for clinical trials should if anything become wider, not narrower. 'We've tended to ignore women in cardiovascular trials, we tend to ignore the elderly, and yet increasingly there'll be a growing burden of

disease in [these groups]', he says. 'In being overstringent in our terms of inclusion and exclusion criteria, we're really diminishing the relevance of the intervention to usual patients.' In fact, inclusion criteria could expand to the point of deliberately including people with specific co-morbidities and clinical trials could become more multidisciplinary in nature. 'In trials sometimes you select the patient with just one problem and you obtain a result and you have to apply the result to patients that are very different', says Maggioni. 'What is important in the future is to consider not only cardiovascular disease but to include in studies all the metabolic diseases and renal diseases.' In addition, a new perspective on endpoints is crucial for 21st century research, says Tonkin; for example, current surrogates are shoddy. 'In previous years, surrogates have proven disappointing . . . I think there will be greater interest in other measures, such as imaging measures or biomarkers and the way that they might be related to outcomes.' In addition, hard endpoints aren't the be all and end all for some patients. 'In the elderly, it may not be the clinical endpoint—such as myocardial infarction—that is most important to the individuals compared with quality of life', he says.

In order to meet recruitment goals and ensure heterogeneity of the patient population, future trials will need to use many centres in many countries. In particular, trials will recruit in developing countries such as China that have large populations and are associated with low costs. This tactic is already being applied in clinical research at the moment and is providing sound results. 'There is a clear demonstration that Far East countries or India or those in the eastern part of Europe are performing trials very well', says Maggioni, 'so [there is no] issue in terms of quality of data.'

Conducting trials in developing countries is important not just to make up numbers, but also to address the changing disease burden in such countries. 'The obvious one is the increasing burden of cardiovascular disease in such countries, which already exceeds that in the major populations in Europe and the Americas', says Tonkin. That is not to say that conducting trials in developing countries is without its problems. 'Sometimes in Eastern countries the people are smaller, so the drug dose [being investigated] may not be appropriate for smaller bodied people', says Sleight. Researchers also need to take into account divergent background co-morbidities and therapies around the world. The importance of these countries in the future research agenda cannot be overemphasized though. 'I think that in the future if we plan a trial of 10,000 patients, 4,000–5,000 should be randomised in these kinds of countries because the costs are less and the quality is good', says Maggioni.

Information technology will become important not just for researchers but also for participating patients, who might in the future be able to report progress and adverse effects on web forms rather than directly to their clinician. 'We'll become more sophisticated in the way in which trials are managed', says Tonkin. This approach has limitations, however. 'I think if you got the patients to [report] online, you'd have a highly selected population, you wouldn't have the sort of generality of people that you'd want to get into a clinical trial', says Sleight. 'Even in the UK, which has one of the highest uptakes of computers in households in the world, it will be difficult, and in other countries it just wouldn't work. But it may come.'

It is likely that trial designs will become more complex in the future as funding bodies and researchers look to get as much data for their money as possible. Factorial designs are already becoming popular in clinical research, not least because of the cost effectiveness of this approach. 'You can buy two hypotheses just for one if you use a two by two factorial design', points out Maggioni. 'Other time and cost effective strategies—for example, using large trials as a launchpad for a longitudinal cohort trial or including a myriad of substudies—will become more common', said Tonkin.

There may not be room in the future for a revolution in the way trials are conducted—for the advent of a technique with as much importance as randomization or the use of placebo groups, for example. It seems that rather than looking for big ideas, the future instead lies in big trials. And, as Sleight says, 'keep it as simple as possible'.

Profiles

Dr Aldo Pietro Maggioni



Director of the Research Centre of the Italian Association of Hospital Cardiologists (ANMCO).

Member of the steering committee of the Gruppo Italiano per la Sperimentazione della Streptochinasi nell'Infarto Miocardico (GISSI) studies.

Research interests: epidemiology, controlled clinical trials, and outcomes research in ischaemic heart disease, heart failure, arrhythmias, and cardiovascular prevention.

Professor Peter Sleight

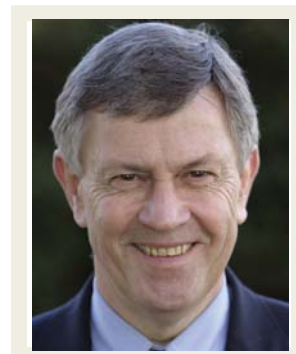


Honorary Consultant Physician at the Oxford Radcliffe NHS Trust (since 1964), Emeritus Professor of Cardiovascular Medicine University of Oxford, and Emeritus Fellow, Exeter College, Oxford, UK.

Chair of the ISIS group steering committee and the related coronary prevention studies coordinated by the Clinical Trials Service Unit in Oxford.

Research interests: prognostic value of measures of heart rate variability and pathophysiological processes underlying the changes found in patients prone to ischaemic heart disease, heart failure, and hypertension.

Professor Andrew Tonkin



Head of Cardiovascular Research Unit at the Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia.

Chair of the management committee of the Long-term Intervention with Pravastatin in Ischaemic Disease (LIPID) study.

Member of the steering committee of the ASPirin in Reducing Events in the Elderly (ASPREE) and Home Automated External Defibrillator Trial (HAT) studies, and the National Cardiac Procedures Register Working Group.

Research interests: epidemiology, translational research, health inequalities, and innovative care strategies.

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