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CARDIOPULSE

The ESC's success is leading it more and more towards Brussels

The new ESC President, Prof. Panos Vardas, tells Barry Shurlock PhD that he plans to build on the strengths of the ESC, but also take it into interesting new avenues

Panos Vardas

'Over the next 2 years, from 1 September 2012, as President I will ensure that the ESC keeps going ahead with its main existing successful projects—the Annual Congress and educational activities such as issuing guidelines. These are my top priorities. But I also want to expand the activities of the ESC permanently in Brussels, the political capital of the EU. Then I want to extend the Global Scientific Activities of the Society, making the existing plans more mature and more systematic, especially in the emerging countries, including Brazil, India and China. We have also had collaboration with McKinsey [the management consultants] and intend to diversify our business model to reduce our dependency on the Annual Congress, to offer other educational products, to find out how to encourage European cardiologists to contribute more financially [as industrial support weakens] as well as, encouraging young talents'.

This is the manifesto of the new ESC President, Prof. Panos Vardas, MD, PhD, FESC, FACC (Head, Cardiology Department, University Hospital of Crete, Heraklion, Greece). It is undoubtedly a difficult time for anyone to take on the job, as the balance of power in the world is changing, and even in the corridors of cardiovascular medicine, there is a polite battle in progress between the USA and Europe. Economic difficulties on both sides of the Atlantic make it a priority to find growth elsewhere, and each seeks to enfranchise cardiologists from countries outside their normal geographical reach. But for the ESC the future augurs well with someone who has a track record like Prof. Panos Vardas.

He has long been a strong supporter of the ESC. In 1992, only 2 years after taking on the challenge of building a new Department of Cardiology on Crete, he was elected to the nucleus of the Working Group on Pacing. He said: 'It was humble job, but later I became chairman. It was probably the most active working group in the ESC. For example, more than 30 years ago—even before the ESC started its own Congress—it held the first Europace meeting. Because of the time I worked in London, and the strength of the pacing community, in 1998 I was honoured to stand by Richard Sutton in founding *EP-Europace*, the first ESC subspecialty journal – there are now 5! Then I was elected to the ESC council, then Vice-President for the National Societies. It was an important time for the ESC, because when I was Vice-President we decided to amalgamate the Working Groups on Pacing and Arrhythmias and create a new entity, the European Arrhythmia Association, now called the European Heart Rhythm Association. It was the first ESC Association and was, of course, followed by all the others'.

Commenting on the main achievements of the ESC, he said: 'To bring under one umbrella all the heterogeneous countries of Europe—and elsewhere—is a big success. The mission of the ESC is, of course, to reduce the burden of cardiovascular disease, and over the past 60 years it has managed to do this very successfully. One of its most important functions is the Annual Congress, the largest cardiovascular medicine congress in the world. This is due to many reasons, one of which is the fact that we have avoided the balkanization of cardiology—in the US each of the subspecialties have their own society, whereas in Europe, most of them are under the one umbrella of the ESC. So, there is no competition between colleagues and the ESC itself flourishes. The various guidelines are also very important—recognisable, prestigious, and accurate. National guidelines are diminishing and in Europe, countries now generally follow the ESC recommendations, rather than US guidelines'.

Extension of the ESC beyond the geographical footprint of Europe has, of course, long been in evidence, but Prof. Vardas passionately supports plans to push the borders even further by means of more 'Global Scientific Activities in the Societies

that are affiliated with the ESC'. He said: 'Many delegates from emerging nations attend the Annual Congress. Over the last 3–4 years for example, there has been a 300% increase in attendance from Brazil. We are working hard with senior "scientific ambassadors" on a huge project to provide opportunities for delegates from these countries, especially young talents, to participate within a 1-day meeting during the Annual Congresses of the Affiliated Societies. There are good social, economic and political reasons for doing this. If you invest in a young person and he/she comes to Europe for 2–3 years, they become pro-European forever!'

Making the case for the ESC to have a permanent presence in Brussels, he said: 'We realise that we have to be present in the political capital of Europe. Senior ESC members need to have logistic support, rather than working in the corridors and coffee shops of a hotel! We therefore intend to buy offices, and employ a permanent support staff, starting perhaps with 3 people and increasing to 15. If we have an office in Brussels we shall feel more comfortable to invite key persons to make contacts—with industry and EU specialists. There are many opportunities for the ESC and lots of projects to engage in, but we need a permanent staff to be informed about the details – the deadlines, the rules, etc. Active areas include quality assessment [of healthcare], projects involving novel technologies, and more and more regulations for pharma products and devices. The Heart House will remain as it is—no-one will need to relocate'.

Prof. Vardas was born on Kythira, or Cythera, a 300 km^2 island off the southeast tip of the Peloponnese peninsula, where Aphrodite the goddess of love came out of the foam of the sea, according to Greek mythology. He comes from seafaring stock, but as a young man decided he wanted to be a doctor. Against all odds, he won a place in the Faculty of Medicine at the University of Athens, where he prospered. Later in the Greek capital he trained as a cardiologist under Prof. Spyridon D. Moulopoulos, and fostered his attachment to hard work and a love of research. He then spent 5 years investigating the pathophysiology of arrhythmia with Dr Dimitris Sideris in the Department of Therapeutics at the University of Athens.

So far, so good: he had established a solid career base in Athens, but in 1985 he took his ambition to the UK, where for 4 years he worked as a research registrar at the Westminster Hospital, London (now the Chelsea and Westminster Hospital, within the Faculty of Medicine of Imperial College), supervised by Dr Richard Sutton, now Emeritus Professor of Clinical Cardiology. During this period he published his first paper, on atrial pacing, in a high-impact journal, the *British Medical Journal* and in 1993 he completed a PhD on clinical electrophysiology, pacing, and interventional cardiology at the University of London.

Hereafter, his career took a path that could have been disastrous, but instead was a huge success. He said: 'When I was in London I saw this advertisement for a job as professor of cardiology in a new university, on Crete. I applied and was elected. But I didn't go there for some time, as I had to finalise my PhD and the hospital [in Heraklion] had not been built. But all the time I was pondering whether I really ought to stay in London, or go to Athens where I could get a job as a senior registrar. For $2\frac{1}{2}$ years I lost my smile! Many times I thought, what am I doing?'

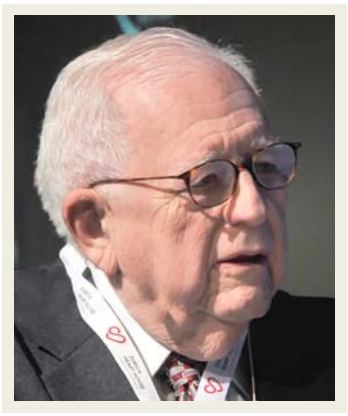
Once in Heraklion, in charge of a clinic with 60 beds and two catheter laboratories he got down to the job of building a department. But at first it was a one-man show: his personal attention around the clock was so crucial that rather than go home he slept in the chronic care unit. Now, 22 years later, he can afford to devote himself to the business of the ESC, knowing that the department is run by a team of 32 doctors and nurses, including four assistant professors. Recalling his early days in the department, he said: 'From the beginning I had to organise the research. I knew that we were never looking to get a Nobel Prize, but I placed the benchmark quite high and emphasised that we should create knowledge and publish in good journals. For the first 17 years every Monday evening, between 8 and 11, all the group were there to discuss the research progress of the week. Over the years we published more than 200 papers, some of them in top journals, including the *Journal of American College of Cardiology*, *Circulation*, and the *European Heart Journal*—and 4 years ago, we published one in the *New England Journal of Medicine*—on the therapeutic concept that pacing patients with sleep apnoea is beneficial. We showed that it does not work'.

Wherever he treads, Prof. Vardas leaves a trail of productive activity: For many years he was the editor-in-chief of the *Hellenic Journal of Cardiology*, and in 1990 decided to publish a version in English, which within 2 years was being cited in Medlines, with not a negligible impact factor! Many of his editorials betray his interest in politics and philosophy and his firm conviction that doctors must embrace health economics if they are to have any influence in the way the healthcare systems are managed. He said: 'Nowadays I perceive that it is important for senior cardiologists to have an understanding of health economics—at least at the level of the basic jargon, otherwise managers and politicians will always have the final word. I often go to meetings where there is the minister of health, journalists and managers, but nobody at all to talk on behalf of doctors. It's like football without footballers!'

Barry Shurlock, PhD

Dr Eugene Braunwald casts an eye on Europe

Drawing on the experience of a long career, Dr Braunwald talks with Barry Shurlock PhD about the ebb and flow of cardiovascular medicine between the USA and Europe



Eugene Braunwald (courtesy H. Utzinger)

Few people can have the perspective on cardiovascular research and practice of Dr Eugene Braunwald, who entered New York University Medical School in 1948.

During the Second World War he and his family fled from Vienna, living for 17 months in a suburb of North London and elsewhere in the UK, before moving to New York City. He might have been an engineer, but 'the engine' he finally plumped for was the heart. Among his many honours and prizes, he is most proud of his election to the US National Academy of Sciences. He is also the Distinguished Hersey Professor of Medicine at Harvard Medical School, but is probably best known as the Founding Chairman of the Thrombolysis in Myocardial Infarction (TIMI) Study Group, based at Brigham and Women's Hospital, Boston, MA.

Thrombolysis in Myocardial Infarction, which is currently running its 57th trial, and is now chaired by Dr Marc Sabatine, has ranged far from its original remit of thrombolysis, but in essence it has stayed close to Dr Braunwald's passion for clinical research and for research conducted as an end in itself, rather than a means to an end. Asked to name one of his most scientifically important papers, he cites one on 'factors influencing infarct size following experimental coronary artery occlusion' (*Circulation* 1971;43:67–82) in which he and his co-authors described the results of experiments on dogs that ultimately spawned TIMI and, more profoundly, ushered in the concept—now taken for granted—that the size of a myocardial infarction can be modified for several hours after coronary occlusion. He said: 'from a clinical perspective, we felt that, yes, this had a great potential for improving patient care. More than four decades later few now disagree that limitation of infarct size is basic to the care of acute myocardial infarction'.

He has a firm grasp of the history of cardiology (see his Paul Lichtlen Lecture 2011 in *Eur Heart J* 2012;33:838–845), much of it from personal experience, and a seasoned knowledge of the ebb and flow of cardiovascular expertise across the Atlantic. He recalls that cardiology was born in continental Europe, where people like the Russian surgeon Niklai Korotov devised the sphygmomanometer and the Dutch physiologist and physician Willem Einthoven the electrocardiograph. Between two world wars Americans wanting to train in academic cardiology were obliged to spend a year or two in Europe.

Many leading cardiologists in Great Britain were in the 'school' of Paul Wood, in London, who was a towering figure in the middle of the twentieth century. Many Americans spent a year at the National Heart Hospital, as it was then called, in London. The influence that Wood and his school had on cardiology was enormous, bringing cardiac physiology and pathophysiology to the bedside. Dr Braunwald said: 'Woods' skill was principally analytic, and he was able to pick up important clues from a patient's appearance. I remember he visited me once at National Institutes of Health (NIH) and successfully made a diagnosis of a complex congenital disorder by examining only the neck of the patient. In 1961 I spent 6 weeks in Australia and New Zealand as visiting professor and I would be met at the airport by the chief of cardiology who would invariably start the conversation [with]: 'I trained with Paul Wood'.

Thereafter, as the US Federal Government set up the NIH at Bethesda, and poured funds into all major areas of medical research, it was the turn of Europeans to cross the Atlantic in the opposite direction—to gain the Been To America diploma. Dr Braunwald recalled: 'When in the late 1950s/early 1960s I started to travel abroad I used to attend the meetings of the ESC, which were then very interesting but very small by American standards. The ESC was not vibrant at this time, like the AHA and the ACC and the leadership of world cardiology had moved largely from Europe to the US'.

'Then in the late 1970s came Andreas Grüntzig, who changed the face of cardiology in a profound way. But after his groundbreaking work in Europe he moved to Atlanta and was working in the US during the later development of percutaneous transluminal angioplasty. In the 1980s the tilt was still in the same direction, but in the 1990s it began to shift back towards Europe, which had got its act together—the ESC and *EHJ* were now major players. I have to credit Paul Hugenholtz [Emeritus Professor of Cardiology, Erasmus Medical Centre, Rotterdam, The Netherlands] with much of this—he built up the annual meetings of the ESC so that they were more like the best of the AHA and ACC. Now the ESC meeting is at least equal to the big American meetings, and some would say it has surpassed them. Certainly the TIMI Study Group works very hard to meet the deadline for abstracts for our research that can be presented at the meeting. It has become a world stage for research'.

Dr Braunwald also believes that there are some other advantages in the 'Old World'. Although he reckons that approval

procedures for drugs are 'about the same' in the USA and Europe, with medical devices he judges that the USA is severely disadvantaged by the 'very conservative' procedures of the US Food and Drug Administration. Even minor production changes to devices have to be submitted for full approval. He said: 'It is the same, whether it's stents, left-ventricular assist devices, or electrophysiological catheters—the barriers to moving forward are much lower in Europe than the US. But devices aren't like drugs—they change constantly! If you change the width of a wire in a stent wall by, say 3%, it is often regarded as a new device in the US and has to go through all the steps. At present, with devices, which are so important in cardiology, Europe is so much more nimble. However, on the whole, basic cardiovascular science is still stronger in the US than in Europe because of the support emanating from the NIH and the American Heart Association'.

In addition to his work on myocardial infarction and the TIMI trials, Dr Braunwald's research has covered several other major areas, including oxygen consumption of the heart, mechanisms of ventricular function, haemodynamics of valvular heart disease and the adrenergic nervous system in heart failure, which he still regards as 'work in progress'. But the studies that he describes as 'the most exciting' were conducted over the decade 1958–68 at NIH in association with the cardiac surgeon Dr Andrew G Morrow.

From time to time all practitioners come across cases that just do not make sense. Often, in the hurly-burly of the daily routine, shoulders are shrugged, brows wrinkled, and the job goes on. Occasionally, the uncertainty of the unknown will not go away and, by worrying away at the puzzle, something very new is discovered. That was how in 1958 Dr Braunwald, still a young cardiologist, but already the director of the cardiac catheterization laboratory, gradually realized that he and Dr Morrow were seeing a new cardiac condition. Two of its key features were 'dynamically changing obstruction and its heritability'. They named it idiopathic hypertrophic subaortic stenosis (IHSS). In a paper published in 1959, they concluded that the obstruction 'can only be explained by muscular hypertrophy of the left outflow tract of sufficient severity that flow is actually impeded during contraction'.

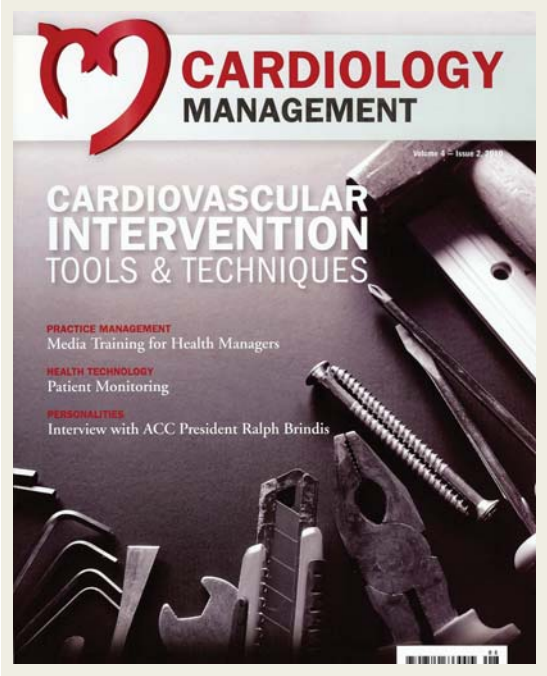
These were crucial steps in the definition of IHSS (now called hypertrophic cardiomyopathy), which is now recognized to affect ~1 in 500 births. The two researchers put the disease firmly on the cardiovascular map in a 213-page supplement to *Circulation* published in 1964. Dr Braunwald commented: 'We "nailed it" by putting together the various components'. Yet he fulsomely acknowledges the key contributions of previous pioneers, including cardiothoracic surgeon Sir Russell Brock, pathologist Dr Donald Teare, and later Dr John Goodwin, in London, and Dr Doug Wigle in Toronto. In fact, the NIH's seminal work was not immediately accepted by his peers and in particular he had to face a barrage of professional criticism from Dr John M Criley and colleagues at Johns Hopkins University. Dr Braunwald recalls that for a while he and Dr Morrow were worried that they were 'fooling themselves'. Of course, history has vindicated their work, but it did have a cruel twist for Dr Morrow, when one day he asked Dr Braunwald to examine his heart. The findings were unmistakeable: the surgeon had the classic signs of the very disease for which he had devised the myotomy–myectomy operation, which is still a standard treatment and bears his name. Sadly, he declined to follow his colleague's advice and much later died, from repeated syncope, atrial fibrillation, and stroke.

Dr Eugene Braunwald remains actively involved in research and education. At an age when many people have distant memories of their professional life, he chairs six global clinical trials. He also keeps an almost daily watch on the world's cardiovascular literature. He monitors late-breaking clinical trials presented at meetings, receives advance notice of the contents of all the major cardiovascular journals, and identifies key papers. Working with a medical writer, these get turned into 'hot off the press' items at the rate of 5–6 a week, or less frequently, in the case of groundbreaking studies, into 'focus reviews'. It is his way of making sure that his iconic textbook, Braunwald's *Heart Disease*, is as up to date as it can possibly be. More than 30 years ago (1978/9) he spent a year's sabbatical from Harvard and the Brigham, working 16 h a day and 6 and a half days a week, to write the first edition, which has ever since dominated the field. He wants the work to endure as a 'living textbook' available online. He commented: 'It's a long-term investment, since textbooks, as we now know them, will disappear. However, I love receiving a letter from a faraway developing country asking for clarification or pointing out an error! It's very satisfying to know that this person has actually read it!'

Barry Shurlock, PhD

Cardiology management

A journal focused on the management and economics of cardiovascular medicine



Prof. Panos Vardas (Greece) founded *Cardiology Management* in 2007 because a gap was emerging between doctors and health economists, administrators, and planners of healthcare systems. 'Healthcare is monopolised not by doctors but by specialists in health economics and health administration', he says.

The publication's aim was to familiarize specialists in cardiovascular medicine with issues related to health economics (including jargon), health technology assessment, administration, and management/planning. Specifically, it supports the management information needs of chairs and directors of cardiology departments.

Cardiology Management claims to be 'distinctive from every other journal in the field, in that we focus purely on management, administrative and economic topics of interest to senior professionals in the field of cardiovascular medicine'. It is an international business and management journal that covers management trends and their impact on cardiovascular business and economics.

The topics covered include leadership and coaching, impact of E-health, patient safety, improving cost-effectiveness, training and education, intervention, imaging and IT, and cath lab management and economics. The website also provides news from industry, research projects, the EU, and conferences, http://cardiologymanagement.eu/.

Cardiology Management is a supplement of *(E)Hospital*, the official Journal of the European Association of Hospital Managers (http://www.myhospital.eu). The supplement is published on average twice a year and is read by cardiologists, hospital administrators, and health economists. As editor-in-chief, Vardas invites people to write articles. 'As a supplement the journal has no impact factor', he says. 'This creates a lot of problems because not many authors like to write articles for a journal without an impact factor'.

The most recent issue was entitled *Cardiovascular Intervention Tools & Techniques*. Previous titles include:

E-Health: New Horizons for Cardiology;

Cost-Effectiveness in the Cardiology Department: Evidence-Based Purchasing, Cost Analysis Methods & More;

Patient Access to Medical Technology in Europe; and

Improving Clinical and Economic Effectiveness: Telemonitoring & Heart Failure.

'Most of the titles tend to do with cost-effectiveness and novel technologies', says Vardas.

Given the irregularity of publication, editing the journal is in some ways a hobby for Vardas, who has a high profile international editorial board for advice when needed. But he remains passionate about the founding principles behind the supplement and the value of the published articles. 'I believe that the rationale behind this supplement is important because more and more physicians, and physicians leading groups, should be closer to healthcare specialists and understand how the whole system works'.

As editor he has spoken with health economists, technicians, and others working in the field of health who are not medically qualified. It has improved his own understanding of health economics, administration, and management, and of jargon used by these groups that is unfamiliar to the average physician.

Jennifer Taylor, MPhil

Book review

The ESC Textbook of Acute and Intensive Cardiac Care

Editor-in-chief: Marco Tubaro
Co-editors: Nicolas Danchin, Gerasimos Filippatos, Patrick Goldstein, Pascal Vranckx, Doron Zahger
Publisher: Oxford University Press 2011
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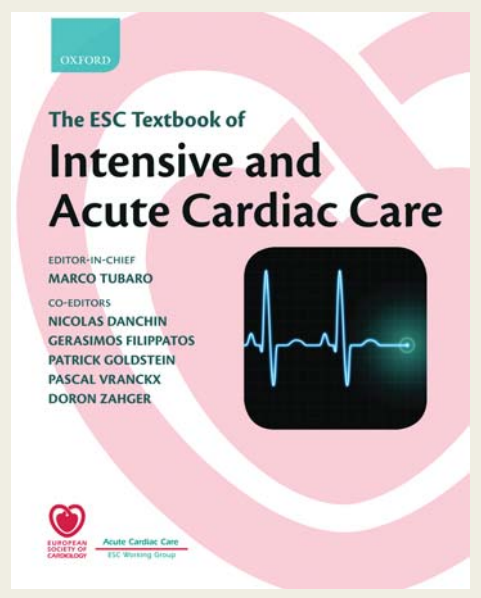


The ESC textbook of *Acute and Intensive Cardiac Care* is the result of an initiative from the ESC Working Group on Acute Cardiac Care. The textbook spearheaded by the Working Group is in fact an ideal source of material for preparation for the ESC certification process and the respective examination in *Acute and Intensive Cardiac Care*, another recent initiative of the working group. The ultimate aim of these initiatives is to improve the quality of treatment for patients requiring acute and intensive cardiac care in all European countries.

The textbook consists of 848 pages and has 360 illustrations in 76 chapters. The chapters have thoughtfully been arranged and include links to the respective European guidelines. These are very useful if one wants to read in more detail the evidence base for specific diagnostic or treatment decisions as provided in the guidelines from different European societies relating to acute and intensive cardiac care.

The textbook covers the important issues in the pre-hospital phase as well as in the emergency department, including a description of chest pain units and their proposed management and structure. There are also chapters devoted to the structure and organization of intensive cardiac care units.

The following section contains chapters dedicated to the monitoring options and procedures performed in patients treated in an intensive cardiac care unit. This is followed by a description of the pathophysiology, diagnostic work-up, and management of different acute cardiac conditions such as acute coronary syndrome, acute heart failure, and atrial or ventricular arrhythmias. Here the book contains excellent chapters providing substantial practical information for the clinical management of these acute cardiac conditions, e.g. dosing of drugs used in acute heart failure, such as inotropes and vasodilators, or in arrhythmias. In addition, there are several chapters describing other acute cardiac conditions, such as myocarditis, acute valvular disease, and pericardial tamponade.

A special further focus of the textbook is the discussion of the management of frequent concomitant acute conditions such as renal injury, infection, and sepsis, which are critical for the clinical outcomes of these patients.

Many key opinion leaders in the field have contributed to this textbook, which is also made attractive by a variety of online material. Overall, both senior physicians and trainees will find this textbook helpful and interesting.

If this textbook achieves wide distribution, it can certainly make a contribution to improving and standardizing acute and intensive cardiac care throughout Europe. The ESC Working Group and the editors of the textbook are to be congratulated for this important contribution.

Ulf Landmesser, MD, FESC, Department of Cardiology, University Hospital Zürich

Beware the dangers of the reply-all button

A concern for cardiologists and all physicians

There are numerous advantages to email, which has transformed our ability to communicate rapidly and effectively. We can swiftly and effortlessly disseminate messages with attachments to single or multiple recipients. This is most convenient for busy health-care professionals. There is no need to dwell further on the obvious pros.

But beware. Included on the menu bar is a powerful and potentially dangerous option termed the *reply-all* button. This may be associated with substantial risks that are not immediately obvious. Pressing this button results in your response to an email being forwarded at the speed of light to all the individuals who appear on the address list, sometimes inappropriately. Receiving numerous unnecessary emails is inconvenient. However, the real consequences of this action may be subtler and you may well inadvertently open a Pandora's box.

All of us have received requests to attend a meeting or participate in a telephone conference that have been sent to a large number of recipients. This frequently leads to an immediate flood of emails into your inbox confirming or declining attendance. Your impression based on the first few responses may influence your decision to attend or not. This is similar to getting the results of exit polls before the polls have closed; it is irritating, but not really dangerous.

Similarly, if most recipients use the reply-all button in responding to a message, one feels pressure to conform or risk being seen as indifferent. For example, when someone sends good news to a large group, many of those on the copy list will send a congratulatory note via the *reply-all* button. If you choose to restrict your response to the sender, you risk being perceived as disinterested. One feels compelled to misuse that nasty button. Again, irritating but not dangerous.

But there are real perils. We occasionally 'shoot from the hip' when we *reply-all* to an email. Our immediate, sometimes hasty, response may not accurately reflect a more considered view. We may not exercise appropriate caution and consider how each individual recipient might interpret our message. This may lead to a minor or major misinterpretation by one of the recipients that might be rapidly and widely disseminated. Especially if the mail contains a chain of previous messages that can be taken out of context and lead to confusion. Further, a misconception may be copied, not only to all addressees, but also to other recipients who should not receive the message. This may spread, perpetuate, and extend the misunderstanding and make a subsequent correction or apology challenging. There is not much room for regrets in email; especially if you have hit the *reply-all* button.

Some good ideas that deserve proper consideration and which might otherwise mature and develop into useful proposals are quickly discarded due to a momentum created by an initial, negative tone, established by the first respondents. Careers can be swiftly compromised by an unfortunate impression based on some early, widely disseminated but unsubstantiated comments. It creates prejudice and inhibits the freedom of expression, if you know that your opinion will not be in alignment with that of the swift responders. The nature or weight of one's view should not be determined by a bias created by the order in which responses are sent. We tend to go with the flow.

Similarly, for example, if you circulate a draft of a paper to all co-authors, you want their frank, unprejudiced comments. The feedback that co-authors provide should not be influenced by the recommendations of the earliest responders. It is not good process. Take the time to send your message and attachment to individual recipients, or alternatively, ask them to send their review back to the sender only.

A rapid-fire, reply-all, exchange of views within a group may occasionally be warranted and can create a productive brain-storming session. Especially for your colleagues who happen to be online at the time. But it may not be the best alternative. It is less democratic as some colleagues are prone to dominate these electronic forum discussions, especially if the written exchange takes place in their native tongue.

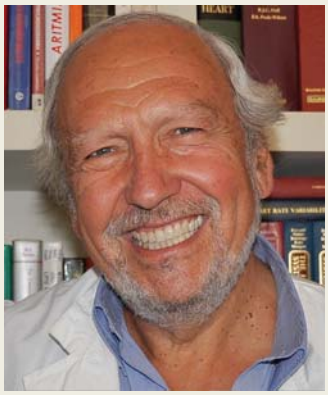
Recommendations

Be considerate and exercise email courtesy. Make the *reply* button become your default option. If you wish to copy your message to other recipients on the copy list, be selective. Take the effort to delete the addresses of colleagues that do not need to, or should not, receive your message. If you really want everybody on the copy list to receive your response, OK, then hit that button. But let us ask Bill Gates to modify the software to include a default pop-up that appears when you press the *reply-all* button asking, '*are you sure*'? This pop-up option could be turned off by users who measure their happiness by the size of their inbox and their clout by the size of their outbox.

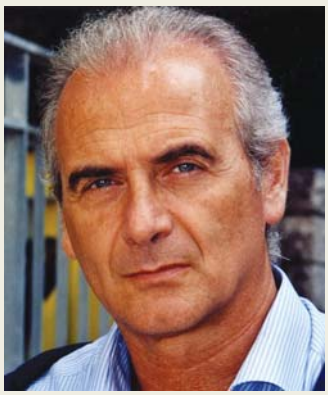
Kenneth Dickstein, Professor of Medicine, University of Bergen, Stavanger University Hospital

Sudden cardiac death in young competitive athletes

Peter J. Schwartz and Domenico Corrado discuss the epidemiology of sudden death in young competitive athletes and available prevention strategies



Peter J. Schwartz



Domenico Corrado

Figure 1 The 23-year-old soccer player Fabrice Muamba collapsed on the pitch during an FA Cup match against Tottenham because of a cardiac arrest. Although his heart stopped beating for a total of 78 min Muamba received life-saving cardiopulmonary resuscitation, including multiple external defibrillations, and was discharged alive from hospital 1 month later.

The sudden cardiac death (SCD) of a young athlete is the most tragic event in sports and devastates the family, the sports medicine team, and the local community. The recent episodes of in-the-field sudden cardiac arrest (SCA) of professional soccer players Fabrice Muamba (*Figure 1*) and Piermario Morosini have dramatically renewed the interest of the media and medical communities on why apparently healthy young individuals unexpectedly die during sports activities and what intervention might have avoided such a fatal event. Here, we briefly review the aetiology of an SCD in young competitive athletes and the currently available prevention strategies such as pre-participation screening (*primary prevention*) and early external defibrillation by using an automated external defibrillator (AED) (*secondary prevention*).

Young competitive athletes are individuals $\leq$35 years who participate in an organized team or individual sport that requires regular training and competition. The annual incidence of SCD in this group is low, from 0.5 in 100 000 among high school athletes in Minnesota to 2.3 in 100 000 among young competitive athletes in Northern Italy. Athletes are at an increased risk of an SCD and in the Veneto region of Italy, where the incidence of fatal events among athletes is 2.8-fold higher compared with age-matched non-athletes. Also, males are at a higher risk than females.

Most young athletes who die suddenly have undiagnosed structural heart disease. Although atherosclerotic coronary artery disease is the most common cause of SCD in middle-aged and senior athletes, younger competitive athletes have a wide range of cardiovascular causes including congenital and inherited disorders. The most common causes are genetic heart muscle diseases, such as hypertrophic cardiomyopathy (HCM) and arrhythmogenic right ventricular cardiomyopathy (ARVC), followed by congenital anomalies of coronary arteries, aortic rupture in Marfan's syndrome, myocarditis, and valvular diseases including aortic valve stenosis and mitral valve prolapse. Sudden death during sports can also be the result of a non-penetrating blow to the chest wall, which can trigger sudden ventricular fibrillation (VF) in the absence of any structural cardiac lesions. Up to 10–15% of sports-related SCD victims have no evidence of structural heart disease at autopsy and the cause of their cardiac arrest is related to primary

electrical cardiac conditions, namely inherited cardiac ion-channel defects (channelopathies) including long QT syndrome,[1] catecholaminergic polymorphic ventricular tachycardia (VT), and Brugada syndrome. The emerging practice of post-mortem molecular genetic screening of victims of unexplained SCD offers the potential to better define the prevalence of these conditions as a cause of sports-related events in young people.

Pre-participation medical evaluation allows the identification of asymptomatic athletes who have potentially lethal cardiovascular abnormalities and their protection from the risk of an SCD through disqualification from competitive sports (*primary prevention of SCD*). Both the American Heart Association (AHA) and the European Society of Cardiology (ESC) consensus panel recommendations agree that cardiovascular screening for young competitive athletes is justifiable and compelling on ethical, legal, and medical grounds. Screening that relies solely on a history and physical examination has limited sensitivity to identify athletes at risk because most individuals with undetected cardiovascular diseases are asymptomatic and cardiac arrest most often represents the first manifestation of disease in athletes with SCD. The long-running Italian experience showed that adding an electrocardiogram (ECG) definitively improves the screening sensitivity and substantially reduces the risk of death on the athletic field. A time-trend analysis of the incidence of SCD in young competitive athletes in the Veneto region of Italy over 26 years (1979–2004) showed a decline of mortality by 90% after the introduction of the nationwide screening programme.[2] Most importantly, the study demonstrated that the mortality reduction was a reflection of a lower incidence of SCD from cardiomyopathies (HCM and ARVC), as a result of increasing identification of the affected athletes at pre-participation screening.

It is noteworthy that no screening strategy will identify all athletes at risk of SCD: some cardiac conditions such as atherosclerotic coronary artery disease and congenital anomalies of coronary arteries usually have no abnormalities on a 12-lead ECG. Moreover, cardiac arrest due to blunt chest trauma (*commotio cordis*) cannot be prevented by screening. This justifies the efforts for implementing cardiopulmonary resuscitation (CPR) intervention programmes including early external defibrillation in the field for unpredictable arrhythmic cardiac arrest (*secondary prevention of SCD*). Drezner *et al*.[3] reported an improved survival rate for young athletes with sudden cardiac arrest if prompt CPR and early defibrillation are achieved. In a cohort of 1710 US high schools with free-standing AED programmes, 23 of the 36 SCA victims (64%) survived to hospital discharge, including nine of 14 student-athletes and 14 of 22 older non-students.

The sudden death of the Italian soccer player Piermario Morosini raises another host of questions and important considerations. While playing in a Series B official match, he dropped to the ground, and after a few seconds he twice raised himself up onto his knees for a brief moment, then swayed and fell down again, This pattern, identical to the televised death of basketball star Hank Gathers, is typical for an initial episode of VT leading to a sudden drop of blood pressure to 40–50 mmHg. Once in a supine position this level of blood pressure allows cerebral perfusion and, hence, the short-lived attempt to stand up. After a while VT degenerates into VF. From this moment on there is precious little time before irreversible brain damage and death. And here is where tragic errors have occurred. Despite the presence of a defibrillator and two physicians of the playing teams, no one attempted CPR and almost worse, no one defibrillated the young dying man. This is inexcusable. When he was put into the ambulance the doctor in attendance chose to wait for defibrillation until arrival at the hospital!

The sad and disquieting reality is that this type of passive behaviour is far from exceptional. The same thing happened when Hank Gathers died: a doctor present at the scene said 'You don't want me to defibrillate him here, in front of everyone!' and more than 12 min elapsed between loss of consciousness and the first shock. Some hard lessons must be drawn.

Sport physicians, those who carry out the pre-participation screening, and those—paid by the teams—who attend these major events need to know a limited number of things. They must know everything about traumatic accidents, muscular lesions, and similar problems, concussions because head-to-head clashes do happen, and they do. They must *also* be fully aware of the few disorders that may lead to cardiac arrest during sports activities and which need to be diagnosed before sporting activities begin. This list is not very long (HCM, ARVC, long QT syndrome, catecholaminergic polymorphic ventricular tachycardia, and a few others) and there is no excuse for not being able to at least suspect these diseases when appropriate. But there is another critical thing that every sport physician MUST know, and that is what to do exactly and promptly in the case of a cardiac arrest. It is essential to stress that cardiac arrest during a competition cannot be labelled as an 'unexpected event'. Unexpected is the possibility of a spectator shooting a player with a gun, not a cardiac arrest. The time has come, and should have come much earlier, to ensure that every physician officially present during a competition knows exactly the correct procedure for interrupting a cardiac arrest. These are electrical disorders that can and must be interrupted. These are not 'inevitable deaths'. Someone must take responsibility and action.

Finally, a word on 'what was the cause'. Well, sometimes it is found and sometimes it is not. Whatever the initial cause, the mechanism of death (with extremely few exceptions) is VF, and this can and must be promptly interrupted. This saves these young athletes. They should *not* die.

In conclusion, the best strategy to fight SCD during sports is to synergistically combine *primary prevention* by pre-participation identification of athletes with at-risk cardiovascular diseases and *secondary prevention* of unpredictable sudden cardiac arrest on the athletic field by timely and effective CPR and back-up defibrillation through prompt access to an AED.

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