President's Page

Highlights of 2007

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Last year there were some important moments in cardiology, while plenty more were left in store for the future. Late thrombosis in drug-eluting stents is a typical example. Despite the fact that its incidence does not exceed 1% it is an emergency condition that usually results in myocardial infarction and is associated with increased mortality. In the coming years we may expect to see the publication of large-scale randomised studies and meta-analyses that will clarify the outcome of treatment with drug-eluting stents. In addition, manufacturing techniques will be perfected and new stents with bioabsorbable polymers will be developed. Until then, angioplasty, when required, should be performed in accordance with the guidelines. Percutaneous angioplasty with the targeted use of drug-eluting stents and dual antiplatelet medication, judiciously suspended during surgical procedures, provides a basic means of protection against early stent thrombosis and its potentially dramatic sequelae.[1-5]

Turning to atrial fibrillation, despite our growing understanding of its pathophysiology, developments in the latest drug therapies have so far fallen short of a solution and it continues to be the most frequent cause of morbidity in patients with cardiac arrhythmias. Studies of various experimental models of atrial fibrillation have revealed that this arrhythmia is associated with a reduction in the duration of the action potential and the refractory period of atrial myocytes and is characterised by dysfunction of specific ion currents. These ion currents are a possible target for pharmaceutical treatment of the arrhythmia. Specifically, inhibiting Na^+ currents extends the arrhythmia's wavelength, while inhibiting K^+ currents prolongs the action potential in human atrial myocytes, causing structural remodelling of the atria via the renin-angiotensin system. Various pharmaceutical substances used as ion current inhibitors are in the phase of experimental and clinical testing, while others that are in the pipeline are expected to improve our ability to prevent and treat atrial fibrillation. Apart from substances that have an inhibitory effect on ion channels, there are other drugs that do not act directly on ion currents. These include converting enzyme inhibitors, angiotensin receptor blockers, anti-inflammatories and anti-oxidative drugs, substances that affect gap connections, antifibrotic agents, as well as drugs that increase the expression of heat shock proteins. A number of other substances, such as Na/Ca exchange inhibitors and serotonin receptor blockers, are under an early stage of investigation. Finally, a better understanding of the pathogenetic mechanisms of atrial fibrillation, in combination with an improvement in strategies for the planning and development of antiarrhythmic drugs, should improve significantly our capability for the pharmaceutical management of this common and persistent arrhythmia.[6-11]

Another topic of great interest is that of progenitor cells in the treatment of heart failure. During the last decade there has been keen research interest in the therapeutic possibilities of the autologous grafting of stem cells into the myocardium. The results of the first studies showed that stem cell therapy can lead to an improvement in left ventricular function, mainly in patients with a prior myocardial infarction. The latest clinical studies show that the intracoronary administration of autologous stem cells is safe and leads to a reduction in the incidence of death, myocardial infarction, the need for reperfusion and heart failure in infarcted patients, to an improvement in coronary flow

reserve, as well as to clinical and haemodynamic improvement in end-stage patients who are refractory to treatment for heart failure. At the same time, according to recent data, regeneration of myocardium may be achieved not so much by differentiation of the transplanted cells into myocardial cells, but mainly via their vascular differentiation and their paracrine action, which induce neovascularisation and a reversal of left ventricular remodelling. The established view that the heart is a fully differentiated organ has begun to be reconsidered, since it is now known that the myocardium contains progenitor cells that are capable of undergoing differentiation. Apart from cell grafting, newer research efforts are also focusing on reinforcing the existing myocardial "repair" mechanisms using growth factors. Alternative sources of stem cells, such as the embryonic cells of the placenta, and newer techniques, such as the combined grafting of more than one type of cell, are under investigation. In addition, new studies are attempting to shed light on the agents that play a determinant role in the migration and engraftment of stem cells after grafting, such as insulin-like growth factor-1. Magnetic resonance imaging, which is a precise method for cell trafficking, depicting engraftment, differentiation and survival, and evaluating the effect of cell grafts on left ventricular geometry and function, promises to allow a better evaluation of results. However, in spite of the initial enthusiasm and the encouraging results of studies to date, there remain many pathophysiological problems that must be solved before stem cell grafting can be used in clinical practice.[12-17]

Finally, progress continues in the field of percutaneous valve replacement. The news is encouraging, especially for high-risk patients who are to undergo surgery. Today there are advanced techniques and devices on the horizon that promise to provide a new approach to the repair of valvular lesions. Many devices are already under investigation in studies aimed at evaluating their potential applications, while at the same time new devices are being developed at a rapid rate. The results for semilunar valves seem to be generally better than those for atrioventricular valves; thus aortic valve replacement is a first priority.[18-21]

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