Moore’s Law describes the breathless pace of development in microelectronics, with a doubling of the number of transistors on a silicon chip every 12–18 months. A phenomenon similar to Moore’s Law seems to apply to the fields of cardiovascular science and cardiovascular medicine, both of which are advancing at a similar breakneck pace. New drugs and therapies appear, only to be superseded or refined within a matter of a year or two. Our understanding of cardiovascular physiology is matching the pace of clinical development. In particular, molecular biology has opened the doors on mechanisms of unimagined complexity responsible for the function of individual cells. These advances have had a wide-ranging impact on the practice of both anaesthesia and critical care medicine. In this Postgraduate Issue, we have brought together a series of views that we hope will illuminate the rapidly evolving science of cardiovascular medicine, giving insight into its clinical applications and exciting the reader with what already has been achieved and with what the future may hold.

Perhaps nowhere is the accelerating pace of advance clearer than in the understanding and treatment of ischaemic heart disease. The link between coronary artery lesions in angina pectoris was postulated in 1799 by Parry, but only 80 years later was angina pectoris interpreted as the result of myocardial ischaemia by Potain. Cholesterol accumulation in blood vessel walls was first described in 1914 using the cholesterol-fed rabbit model. In the 1970s, Ross and Glomset described the ‘response to injury’ hypothesis for genesis of atherosclerosis. We now understand coronary artery disease to be a complex inflammatory disease influenced by both genetic and environmental factors, whose progression and outcome can be modulated in many ways.

This Postgraduate Issue opens with a series of papers that deal with the aetiology, implications and management of perioperative myocardial ischaemia and infarction. Howell and Sear discuss the scale of the problem from a public health perspective and the implications of perioperative cardiac risk for patients and the clinician. Priebe reviews our understanding of mechanisms of perioperative ischaemic injury, bringing together old concepts concerning the importance of coronary flow and myocardial oxygen demand with our modern understanding of the pathogenesis of acute coronary syndromes. Zaugg and colleagues give an overview of our current understanding of the concepts of myocardial hibernation and stunning and examine the role of preconditioning in protecting the heart. They discuss the exciting concept that anaesthetic agents may offer myocardial protection in a fashion similar to ischaemic preconditioning and give an account of the current state of knowledge on this topic. In two further reviews, Zaugg and colleagues examine the role of the sympathetic nervous system in modulating the cardiovascular system and potentially preventing myocardial injury. The first of these is an extensive review of the current state of knowledge concerning the actions of the sympathetic nervous system on the heart. It makes it clear that our understanding has moved far beyond the simple concept of receptor activation and blockade to a much broader insight into the mechanisms that link receptors to biological effects. The daunting complexity of both these systems helps to explain why the drugs that we give often have unexpected effects, and also offers the prospect of new and hitherto unexplored pharmacological targets. In a complementary review, Zaugg and colleagues examine the current state of knowledge with regard to perioperative beta-blockade and other sympatholytic therapies in the prevention of perioperative myocardial injury. Finally, Kemp and colleagues give an account of the role of biochemical markers of myocardial injury in both the diagnosis and understanding of perioperative myocardial injury. This review takes us beyond the simple concepts of creatinine, kinase and troponin release to make it clear that there are a considerable number of serum markers in myocardial injury which may be of value in different situations but which must always be interpreted in the light of the clinical context.

The next section of this Postgraduate Issue examines the pathogenesis and management of heart failure and arrhythmias, two feared manifestations of cardiac disease whether from coronary artery disease or other causes. Magner and Royston give an overview of the current management of heart failure, including an account of the current position in the rapidly evolving field of mechanical support for the failing heart. Thompson and Balser give a detailed account of our current understanding of the genesis of...
arrhythmias at both the cellular and myocardial level. They reveal yet more complexity but also make it clear that a scientific basis is emerging for the treatment of arrhythmias and that, increasingly, a sound scientific understanding is necessary to guide the choice of anti-arrhythmic drug. Salukhe and colleagues give an account of modern pacemakers and implantable defibrillators. These are an essential part of the armamentarium for arrhythmia management but their increasing complexity provides yet another challenge to the anaesthetist. The authors provide sound guidelines for the management of patients who have been treated with these devices.

If much of the focus of the earlier articles is on the myocardium, the review by Galley and Webster redresses this imbalance, giving an account of our current understanding of the physiology of endothelium. It is clear that this imbalance, giving an account of our current understanding of the myocardium, the review by Galley and Webster redresses this imbalance, giving an account of our current understanding of the physiology of endothelium. It is clear that here too what was previously a ‘black box’ is yielding unexpected and complex secrets. This is followed by another challenge to the anaesthetist. The authors provide sound guidelines for the management of patients who have been treated with these devices.

One of the triumphs of modern medicine has to be the steadily improving management of patients with congenital heart disease. Many of these patients now undergo surgery and survive to adulthood. Lovell provides an overview of the clinical conditions and operations that the anaesthetist may meet in patients with grown-up congenital heart disease who subsequently present for other operations. The collection of reviews concludes with a review by Podgoreanu of genomics and the cardiovascular system, which reveals our steadily expanding knowledge of the role of genetics in modulation of the cardiovascular system and makes clear the promise that this holds for the future.

We hope that this Postgraduate Issue leaves the reader with the sense of an exciting arena in which both knowledge and clinical practice are developing apace. We have found these reviews inspiring as we have them as much enjoyment and inspiration as we have.

S. J. Howell*
Senior Lecturer in Anaesthesia
Academic Unit of Anaesthesia, University of Leeds
Leeds General Infirmary
Great George Street
Leeds LS1 3EX
UK

J. W. Sear
Professor of Anaesthesia

University of Oxford, Nuffield Department of Anaesthetics
John Radcliffe Hospital
Oxford
UK

J. D. Young
Consultant and Senior Clinical Lecturer in Anaesthesia and Intensive Care
Adult Intensive Care Unit
John Radcliffe Hospital
Oxford
UK

*Corresponding author. E-mail: s.howell@leeds.ac.uk

References

1 Moore GE. Cramming more components onto integrated circuits. Electronics 1965; 38: 114–17

DOI: 10.1093/bja/aeh173