response. However, rather more important was the finding that whatever the length of the nitrate free interval the therapeutic effects became somewhat attenuated within eight hours of the start of treatment and appreciably so after 12 hours. There was therefore a point in testing a shorter nitrate free interval because important therapeutic effects do not seem to last for over 12 hours of continuous therapy. Waters et al were also able to show therapeutic efficacy of a similar magnitude to those treatment when they tested 12 and 16 hours after patch application and though Schaer et al showed significant effects at four and eight hours it was clear from inspecting their data that these were rather small. Nevertheless, it is statistically significant that those at four hours. It thus seems likely that tolerance develops so quickly during transdermal therapy that it limits its efficacy as a day long prophylactic agent.

The study reported by Fox et al rather supports our findings because treatment had very little influence on the circadian pattern of silent ischaemia—i.e. one would expect treatment had only been effective during the first few hours. It is certainly not justified to conclude that the significant treatment effects demonstrated between three and five hours after patch application indicate that tolerance has been "avoided" Our results supported by data from other studies suggest that while the effects measured at 3-5 hours may have remained significantly better than those during placebo treatment, they are likely to be significantly worse than those seen after only 30-60 minutes of treatment and significantly better than those measured after eight hours or more. In other words, it seems likely that tolerance is a gradual but continuous process beginning from the moment that treatment is initiated.

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Novel exercise protocol suitable for use on a treadmill or a bicycle ergometer

Siz.—In their letter Dr Essamri and colleagues correctly state that the standardisation of exercise tests is now a major issue (British Heart Journal 1991;66:405-6). However, the use of standardised exponential exercise protocol (STEEP) devised by Dr Northridge and colleagues (British Heart Journal 1990;64:313-6). In this useful protocol external work rate increases at regular intervals. It tends to keep exercise duration within the "ideal" range of 5-15 minutes even if exercise capacity in terms of peak external work rate differs widely. Detailed tables are provided for cycle ergometry and work rates adjusted for the subject's weight so that their STEEP will be similar on a cycle ergometer and on a treadmill.

The differences between the cycle ergometer STEEP and treadmill STEEP protocols reported by Dr Essamri are relatively small—approximately a 13-19% difference in V02 over the last six minutes of exercise. Such differences are expected because the cardiovascular responses to exercise vary according to the mass of active muscle: at a given submaximal workload, V02 tends to be higher with cycle ergometry, whereas peak heart rate and V02 max tend to be higher on treadmill exercise. Standardisation of work rate according to lean body mass alone might further reduce these differences,4 but to expect cycle ergometry and a motorised treadmill to be equivalent is unrealistic.

Dr Essamri and Jones also suggest that the relatively slow rise in V02 over the first minutes of the STEEP makes it an unsuitable basis for the prediction of Vo2max from V02 at submaximal work rates. However, such extrapolations are always subject to large errors5 and maximal tests are preferred when V02 max is to be determined.

However, in the graphs presented by Dr Northridge and Dr Essamri we note that V02 continues to increase steeply as a function of time over the last few minutes of exercise, whereas in many other protocols V02 tends towards a plateau—i.e. rarely ever attains a plateau but at least becomes less steep, with a near constant derivative dVo2/d(time)7. If subjects perform maximal symptom limited exercise then the effect of the continued steep rise in V02 may be to amplify the effects on measured V02peak of small changes in exercise duration due to variations in motivation and encouragement.

The debate between proponents of the cycle ergometer and proponents of the motorised treadmill is likely to continue for many years—the advantages and disadvantages of each are balanced and preferences often differ on a geographical basis.6 As it is unlikely that cardiologists in all countries will agree to standardise on one or other form of exercise testing, the STEEP is a useful attempt to bridge this divide.

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BOOK REVIEW


This book is in many ways a testimony to the extraordinary progress in the subject over the past two or three decades. Indeed, 30 years ago there would have been little worth writing save for the six chapters on clinical and physiological electrophysiology in the still substantially influenced by the advent of clinical electrophysiological studies.

The editors, two leaders in the field, and cardiologists because they have themselves in the classic tradition over the years, are to be commended for the fact that they have broadened the scope so considerably beyond Fisch's own recent book on the pathology of the sinus node and atrioventricular node. The first two major parts include chapters on mechanisms and on experimental arrhythmias which some might, unwisely, decide to gloss over. Difficult though some matters for the clinician, that portion reading for them form the scaffolding upon which the edifice of clinical arrhythmias, their diagnosis and management, depend. Over the past 20 years we have all become aware of the importance of the cardiac conducting system and the work of ion movements, both in the genesis of normal and abnormal rhythms and in consideration of their treatment in some instances. But no longer can one divide arrhythmias into "idiopathic" and "induced". They are now independent entities. In the former case, automaticity and those that arise because of reentry; one can get deeper, by looking into the factors that promote such changes and also give rise to beat-to-beat influences, the relevance of some are therefore better appreciated.

Many will turn first, and justifiably, to the two excellent chapters on the differential diagnosis of tachycardia dependent on the window of the QRS, by Fisch and by Wollens; but there is important information in all the other chapters on clinical arrhythmias, and many who read these chapters will thereby be well informed of difficulties that persist in every day practice. The use of exercise testing, signal averaged electrocardiography, and programmed electrical stimulation are all well discussed in separate chapters. The pharmacological section offers practical advice for those who counsel and treat patients, the relevance of which are now becoming better appreciated.

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