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 unable to show therapeutic benefit in an intermittent treatment regime when they tested 12 and 16 hours after patch application and though Scharer et al showed significant effects at four and eight hours it was clear from inspecting their data that many of the tolerances were rather more statistically significant than 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—it is one we expect that 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 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

Six—in their letter Dr Essamri and colleagues correctly state that the standardisation of exercise tests is now a major issue (British Heart Journal 1990;64:405–6) but they raise the issue of the standardised exponential exercise protocol (STEEP) devised by Dr Northridge and colleagues (British Heart Journal 1990;64:313–6). In this useful protocol a linear increase in work rate 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 ergometer 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 13–15% difference in Vo2 over the last six minutes of exercise. Such differences are expected because the cardio-pulmonary responses to exercise vary according to the mass of active muscle: at a given submaximal work rate and heart rate Vo2 tends to be higher with cycle ergometry, whereas peak heart rate and Vo2max tend to be higher on treadmill exercise. Standardisation of work rate according to lean body mass is advocated by some authors, and each of these might further than reduce these differences, but to expect cycle ergometry and a motorised treadmill to be equivalent is unrealistic.

Dr Essamri and colleagues also suggest that the relatively slow rise in Vo2 over the first minutes of the STEEP makes it an unsuitable basis for the prediction of Vo2max from Vo2 at submaximal work rates. However, such extrapolations are always subject to large errors and maximal tests are preferred when Vo2max is to be determined. However, in the graphs presented by Dr Northridge and Dr Essamri we note that Vo2 remains significantly greater over the first few minutes of exercise, whereas in many other protocols Vo2 tends towards a plateau—it rarely if ever attains a plateau but at least becomes less steep, with a more or less steady VO2 (time). If subjects perform maximal symptom limited exercise then the effect of the continued steep rise in Vo2 may be to amplify the effects on measured Vo2 peak 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. 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 arrhythmias and the equally small number of chapters on the field, which was substantially influenced by the advent of clinical electrophysiological studies.

The editors, two leaders in the field, and researchers because they are 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 diagnosis of tachycardias dependent on the heart's duration of the QRS, and the chapter on clinical arrhythmias, and many who read these chapters will thereby be reminded of difficult but peripheral "out of this world". The exercise of exercise testing, signal averaged electrocardiography, and programmed electrical stimulation are all well discussed in separate chapters. The pharmacological sections offer the student and for many cardiologists, the relevance of which are now becoming better appreciated.

Many will turn first, and justifiably, to the two excellent chapters on the differential diagnosis and management of supraventricular and ventricular arrhythmias, and many who read these chapters will thereby be reminded of difficult but peripheral "out of this world". The use of exercise testing, signal averaged electrocardiography, and programmed electrical stimulation are all well discussed in separate chapters. The pharmacological sections offer the student and for many cardiologists, the relevance of which are now becoming better appreciated.

Virtual all the chapters are well written and refereed and the book not only has current usefulness but will continue to be a reliable and substantial source of information for some time to come. Many cardiologists will wish to keep it at their disposal and will refer to it as well as to see it on departmental library shelves.

DENNIS M KRIKLER

The title reviewed here is available from the BMJ Bookshop, PO Box 295, London WC1H 9TE. Prices include postage. An examination copy is available on request, including for many cardiologists, the relevance of which are now becoming better appreciated.

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