

leg exercise. Individuals who are untrained for arm work have been shown to demonstrate a lower lactate threshold as well as an increase in rate of lactate release as compared with trained individuals for cycle ergometry (Pendergast et al, 1979). The resultant early disruption of homeostasis may be attenuated for untrained individuals performing incremental arm ergometry using an accelerated incremental protocol such as that used by Walker et al (1986). One would expect to find that the moderately aerobically trained subjects in the present study to have increased oxidative enzyme activity, higher myoglobin concentration, higher mitochondrial density (Holloszy and Booth, 1976), and increased vascular bed capillarisation (Saltin, 1977) in the exercising muscle. The result may be a lowered glycolytic flux at any given work rate and enhanced lactate clearance. Thus, the accelerated cycle ergometry protocol may not have been as advantageous to this subject pool in order to achieve a higher peak $\dot{V}O_2$. The possible interaction between state of training and test protocol warrants further investigation.

Although the proposed JMT protocol to determine peak oxygen consumption offers a time saving advantage when compared to the total time of test administration involved in the DT and CT (Table I), the JMT presents a disadvantage in that it does not allow for accurate determination of the anaerobic threshold or the ventilatory threshold. Further, the proposed JMT would not seem appropriate for patients with heart or lung disease since this protocol may not provide the slow work rate progression often required for clinical cardiopulmonary assessment (Buchfuhrer et al, 1983).

In any experiment designed to compare exercise protocols for cardiopulmonary assessment, it is essential that the experimental design employ a set of "fixx" criteria to determine peak $\dot{V}O_2$ and a highly motivated subject pool. The present experiments met both of the above criteria. First, all but two of the subjects reached the established criteria for peak $\dot{V}O_2$ on each of the individual tests. The two subjects who failed to meet the established criteria were retested and both obtained the required peak $\dot{V}O_2$ criteria upon the second test. Secondly, the nine subjects chosen for study were highly motivated individuals. Hence, it seems unlikely that the results obtained in the present experiments were due to a lack of sustained subject commitment.

In summary, these data do not support the notion that the proposed JMT elicits a higher peak $\dot{V}O_2$ during cycle ergometry than the continuous or discontinuous tests studied. However, the JMT does save time while achieving similar results. Therefore, it appears that the proposed JMT might be particularly useful in studies requiring determina-

tion of peak $\dot{V}O_2$ in large numbers of subjects.

References

- Åstrand, I., Åstrand, P.-O. and Rodahl, K., 1959 "Maximal heart rate during work in older men". *Journal of Applied Physiology* 14: 562-566.
- Åstrand, P.-O. and Saltin, B., 1961 "Maximal oxygen uptake and heart rate in various types of muscular activity". *Journal of Applied Physiology* 16: 977-981.
- Balke, B. and Ware, R. W., 1959 "An experimental study of "physical fitness" of Air Force personnel". *U.S. Armed Forces Medical Journal* 10: 675-688.
- Buchfuhrer, M. J., Hansen, J. E., Robinson, T. E., Sue, D. Y., Wasserman, K. and Whipp, B. J., 1983 "Optimising the exercise protocol for cardiopulmonary assessment". *Journal of Applied Physiology* 55: 1558-1564.
- Fardy, P. S., Webb, D. and Hellerstein, H. K., 1977 "Benefits of arm exercise in cardiac rehabilitation". *Physician and Sports Medicine*, October: 31-41, 1977.
- Glassford, R. G., Baycroft, G. H. Y., Sedgwick, A. W. and McNab, R. B., 1965 "Comparison of maximal oxygen uptake value determined by predicted and actual methods". *Journal of Applied Physiology* 20: 509-513.
- Gleser, M. A. and Vogel, J. A., 1973 "Endurance capacity for prolonged exercise on the bicycle ergometer". *Journal of Applied Physiology* 34: 438-442.
- Hettinger, T., Birkhead, N. C., Horvath, S. M., Issekutz, B. and Rodahl, B., 1961 "Assessment of physical work capacity". *Journal of Applied Physiology* 16: 153-156.
- Holloszy, J. O. and Booth, F. W., 1976 "Biochemical adaptations to endurance exercise in muscle". *Annual Reviews in Physiology* 38: 273-291.
- Kamon, E. and Pandolf, K. B., 1972 "Maximal aerobic power during laddermill climbing, uphill running, and cycling". *Journal of Applied Physiology* 32: 467-473.
- Magel, J. B., McArdle, W. D., Tone, T. and Delio, D. J., 1978 "Metabolic and cardiovascular adjustment to arm training". *Journal of Applied Physiology* 45: 75-79.
- McKay, S. A. and Banister, E. W., 1976 "A comparison of maximum oxygen uptake determination by bicycle ergometry at various pedalling frequencies and by treadmill running at various speeds". *European Journal of Applied Physiology* 35: 191-200.
- Michael, E. D. Jr. and Horvath, S. M., 1965 "Physical work capacity of college women". *Journal of Applied Physiology* 20: 263-266.
- Pendergast, D., Cerretelli, P. and Rennie, D. W., 1979 "Aerobic and glycolytic metabolism in arm exercise". *Journal of Applied Physiology* 47: 754-760.
- Petrofsky, J. S., Phillips, C. A., Sawka, M. W., Hanpeter, D. and Stafford, D., 1981 "Blood flow and metabolism during isometric contractions in cat skeletal muscle". *Journal of Applied Physiology* 50: 493-502.
- Saltin, B., 1977 "The interplay between peripheral and central factors in the adaptive response to exercise and weight training". *Annals of the New York Academy of Sciences* 301: 224-242.
- Scholander, D., 1947 "Analyzer for accurate estimation of respiratory gases in one-half cubic centimeter samples". *Journal of Biological Chemistry* 21: 1108-1116.
- Schwade, J., Blomqvist, G. G., Shapiro, W., 1977 "A comparison of the response to arm and leg work in patients with ischemic heart disease". *American Heart Journal* 94: 203-208.
- Walker, R., Powers, S. K. and Stuart, M. K., 1986 "Peak oxygen uptake in arm ergometry, effects of testing protocol". *British Journal of Sports Medicine* 20: 25-26.
- Washburn, R. A. and Seals, D. R., 1983 "Comparison of continuous and discontinuous protocols for determination of peak oxygen uptake in arm cranking". *European Journal of Applied Physiology* 51: 3-6.
- Withers, R. T., Sherman, W. M., Miller, J. M. and Costill, D. L., 1981 "Specificity of anaerobic threshold in endurance trained cyclists and runners". *European Journal of Applied Physiology* 47: 93-104.

ERRATA

Details of two texts reviewed in 21:3 were incorrectly recorded. The correct information is as follows:

21:3, p. 124: W. E. Prentice, *Therapeutic Modalities in sports medicine*. Publisher C. V. Mosby, UK agents Blackwell Scientific. Price \$24.

21:3, p. 129: D. Peterson, G. Lapenskie and A. W. Taylor: *The medical aspects of dance*. Publisher: Sports Dynamics, London Ontario. Date: 1986.

We apologise for these errors.

Eds.

In Dr. Lorna Fisher's review in BJSM 21:3 p. 144 a line was inadvertently omitted, which altered the meaning substantially. The first paragraph should therefore read —

This book is well written and presented with clear headings, tables and illustrations. It is also very well referenced. The authors have tried to address the problem of non-articular and non-inflammatory soft tissue rheumatic disorders. Reference is made to inflammatory conditions when these need to be considered in the differential diagnosis. A very relaxed interpretation of what constituted 'soft tissue' has allowed the inclusion of conditions such as osteochondritis, osteomalacia and osteoporosis. Conversely, virtually no mention is made of metabolic and endocrine causes of soft tissue rheumatic pain.

We apologise for this error.

H. E. Robson