Consistency of the Talk Test for Exercise Prescription

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ABSTRACT

PERSINGER, R., C. FOSTER, M. GIBSON, D. C. W. FATER, and J. P. PORCARI. Consistency of the Talk Test for Exercise Prescription. *Med. Sci. Sports Exerc.*, Vol. 36, No. 9, pp. 1632–1636, 2004. **Introduction/Purpose**: The Talk Test has been shown to be well correlated with the ventilatory threshold, with accepted guidelines for exercise prescription, and with the ischemic threshold. As such, it appears to be a valuable although quite simple method of exercise prescription. In this study, we evaluate the consistency of the Talk Test by comparing responses during different modes of exercise. **Methods**: Healthy volunteers ($N = 16$) performed incremental exercise, on both treadmill and cycle ergometer. Trials were performed with respiratory gas exchange and while performing the Talk Test. Comparisons were made regarding the correspondence of the last positive, equivocal, and first negative stages of the Talk Test with ventilatory threshold. **Results**: The $\%\dot{V}O_{2peak}$, $\%\dot{V}O_2$ reserve, $\%HR_{peak}$, and %HR reserve at ventilatory threshold on treadmill versus cycle ergometer (77%, 75%. 89%, and 84% vs 67%, 64%, 82%, and 74%) were not significantly different than the equivocal stage of the Talk Test (83%, 82%, 86%, and 80% vs 73%, 70%, 87%, and 81%). The $\dot{V}O_2$ at ventilatory threshold and the last positive, equivocal and negative stages of the Talk Test were well correlated during treadmill and cycle ergometer exercise. **Conclusions**: The results support the hypothesis that the Talk Test approximates ventilatory threshold on both treadmill and cycle. At the point where speech first became difficult, exercise intensity was almost exactly equivalent to ventilatory threshold. When speech was not comfortable, exercise intensity was consistently above ventilatory threshold. These results suggest that the Talk Test may be a highly consistent method of exercise prescription. **Key Words:** VENTILATORY THRESHOLD, EXERCISE GUIDELINES, HEART RATE, FITNESS

There are well-accepted guidelines for exercise prescription, both for healthy individuals and for patients with cardiovascular or other chronic diseases (1,11). These guidelines are generally related to achieving well-defined percentages of the peak heart rate (HR), peak oxygen consumption ($\dot{V}O_{2peak}$), or of the HR or $\dot{V}O_2$ reserve. Conformance with these guidelines maximizes the likelihood that the health and fitness goals of exercise training will be achieved while minimizing the risk of exertion related complications (8). However, prescription of exercise can be a difficult process requiring diagnostic exercise testing and/or skills outside the training of many physicians or other healthcare providers. Monitoring of training intensity can also become a barrier to compliance by many patients in that exercise is usually prescribed using objective criteria (e.g., target HR), but most exercisers prefer subjective methods of monitoring exercise training intensity.

Until now, the rating of perceived exertion has been the dominant tool for subjective monitoring of exercise training intensity (1,11). As a method of making the exercise prescription more simple, an informal guideline, widely referred to as the Talk Test, has arisen within the exercise community. This guideline suggests that if the exercise intensity is sufficient so that the patient can "just respond to conversation," then the exercise intensity may be "just about right" (i.e., within accepted ranges of exercise training intensity). Within the last several years, the validity of this simple guideline has been systematically evaluated. The ability to converse during exercise (i.e., to pass the Talk Test) has been shown to produce exercise intensities consistently within the parameters suggested in clinical guidelines for exercise training in a variety of populations including university students (6), clinically stable patients with cardiovascular disease (13), and athletes (12). After studies that have demonstrated that the ventilatory threshold often precedes the ischemic threshold in patients with exertional ischemia (9), the Talk Test (which appears to be a surrogate of the ventilatory threshold) has been shown to effectively mark the ischemic threshold in patients with exertional ischemia (5). With this background, and considering that exertion related complications are often related to inappropriately severe exercise (8), the Talk Test appears to be a simple, practical, and yet fairly precise method of exercise prescription. That it does not require preliminary exercise testing or sophisticated monitoring strategies further adds to its appeal. However, before making broad recommendations regarding a new method, it is important to examine the consistency of the method. Will recommendations to exercise at an intensity that "just allows comfortable speech" be

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TABLE 1. Descriptive characteristics (mean ± SD) of the subjects.

Variable	Males ($N = 10$)	Females ($N = 6$)
Age (yr)	25.0 ± 3.3	23.0 ± 1.0
Height (cm)	180.1 ± 3.4	164.7 ± 2.4
Mass (kg)	80.7 ± 3.7	58.0 ± 1.7
$\dot{V}O_{2peak}$ treadmill ($L \cdot min^{-1}$)	4.18 ± 0.20	2.62 ± 0.14
$\dot{V}O_{2peak}$ treadmill ($mL \cdot min^{-1} \cdot kg^{-1}$)	52.3 ± 8.4	45.2 ± 6.2
$\dot{V}O_{2peak}$ cycle ($L \cdot min^{-1}$)	3.68 ± 0.21	2.41 ± 0.15
$\dot{V}O_{2peak}$ cycle ($mL \cdot min^{-1} \cdot kg^{-1}$)	46.1 ± 7.9	41.2 ± 4.7
HR_{peak} treadmill (bpm)	194 ± 16	199 ± 10
HR_{peak} cycle (bpm)	182 ± 12	193 ± 8
VT treadmill ($L \cdot min^{-1}$)	3.24 ± 0.68	2.02 ± 0.38
VT (%$\dot{V}O_{2peak}$) treadmill	76.9 ± 5.8	76.5 ± 6.5
VT cycle ($L \cdot min^{-1}$)	2.46 ± 0.62	1.63 ± 0.27
VT (%$\dot{V}O_{2peak}$) cycle	66.4 ± 8.3	68.0 ± 7.6

widely useable for individuals using different modes of exercise? Accordingly, the purpose of the present study was to evaluate the consistency of the Talk Test as a method of exercise prescription by comparing responses in subjects undertaking different modes of exercise. Specifically, we hypothesized that the last positive stage of the Talk Test represented an exercise intensity that was less than the ventilatory threshold (VT) and within accepted training intensity guidelines for both modes of exercise. We also hypothesized that the equivocal stage of the Talk Test represented an exercise intensity that was equivalent to VT and within accepted intensity guidelines for both modes of exercise. Lastly, we hypothesized that the negative stage of the Talk Test represented an exercise intensity beyond VT and outside accepted guidelines for exercise training intensity.

METHODS

Sixteen apparently healthy and moderately active individuals (10 males, 6 females) volunteered and participated in this study. All provided informed consent before participation, and the protocol had been approved by the Institutional Review Board for the Protection of Human Subjects of the University of Wisconsin-La Crosse. The subjects were prescreened for contraindications to exercise testing and training using a questionnaire developed by the American Heart Association and American College of Sports Medicine (2). Characteristics of the subjects are provided in Table 1. We included both male and female subjects on the basis that we wanted the results to be as generalizable as possible and because previous studies have not suggested a gender bias in the relationship between the ventilatory threshold and the Talk Test.

After habituation to the laboratory setting, equipment and exercise tests, each subject performed four, randomly ordered, exercise tests, each on a separate day, but at the same hour of the day. Each subject performed two incremental exercise tests on a treadmill and two on an electrically braked cycle ergometer. One of the exercise tests on each ergometer included measurement of respiratory metabolism using open circuit spirometry (Quinton Q-MC, Seattle, WA). The exercise protocol was individualized to each subjects' exercise capacity, but all included stage durations of 2 min. The speed of the treadmill belt was fixed based on responses during habituation trials at a level where the subject was very comfortable and indicated that they could exercise virtually indefinitely. For some subjects, this represented walking, for others jogging. For most subjects, the initial cycle ergometer power output was 25 W, and stage increments were 25 W. For subjects who weighed <60 kg, the initial power output and increments were 20 W. Exercise was continued to the maximal level of exertion sustainable, and all subjects received vigorous verbal support during the tests. Predetermined heart rate end points were not used for termination of the exercise tests. Heart rate was measured throughout the exercise tests using radio telemetry (Polar Electro-Oy, Finland). $\dot{V}O_{2peak}$ was defined as the highest consecutive 30-s measurement of $\dot{V}O_2$ observed during the test. The VT was defined using the V-slope method, with confirmation by changes in the ventilatory equivalents for O_2 and CO_2 (7).

The other exercise test on each ergometer involved having the subject recite, aloud, a standard paragraph (The Pledge of Allegiance) during the last 30 s of each exercise stage. This 31-word passage is familiar to most people in the United States and can usually be recited without the need of cue cards, which were available if necessary. Immediately upon the completing the passage, the subject was asked "can you still speak comfortably?" One answer to this question was "yes," which we refer to as "passing" or a "positive" Talk Test result. If the subject equivocated in any way, their Talk Test result was referred to as "equivocal." At the first time that the subjects reported that they definitely could not speak comfortably, we took this result as "failing" or a "negative" Talk Test result. The exercise protocol was terminated at this time. In the case where the investigator thought that the subject was having difficulty speaking, we gently asked the subject if they were sure of their answer. However, at a fundamental level we tried to minimize the influence of the investigator and encouraged the subject to make the subjective determination of whether or not they could speak comfortably. This procedure is the same as we have used in other studies (5,6,12,13). We have previously shown that the HR response to the exercise protocol is unaffected by reciting the standard paragraph (6), which we have interpreted to mean that the necessity for performing two exercise tests (gas exchange and Talk Test) to link the ventilatory threshold to the Talk Test does not introduce systematic errors into the relationship.

The positive, equivocal, and negative stages of the Talk Test were then compared with VT and to widely accepted %HR and %$\dot{V}O_{2peak}$ guidelines for exercise prescription (1,11). The results were analyzed using multiple comparison repeated measures ANOVA. *Post hoc* tests were accomplished using the Tukey test. Correlation coefficients between Talk Test related measures and VT, as well as between ergometer responses were computed using the Pearson product moment correlation.

RESULTS

On the treadmill, the mean $\dot{V}O_2$ at VT was not significantly ($P \leq 0.05$) different than the $\dot{V}O_2$ at either the last

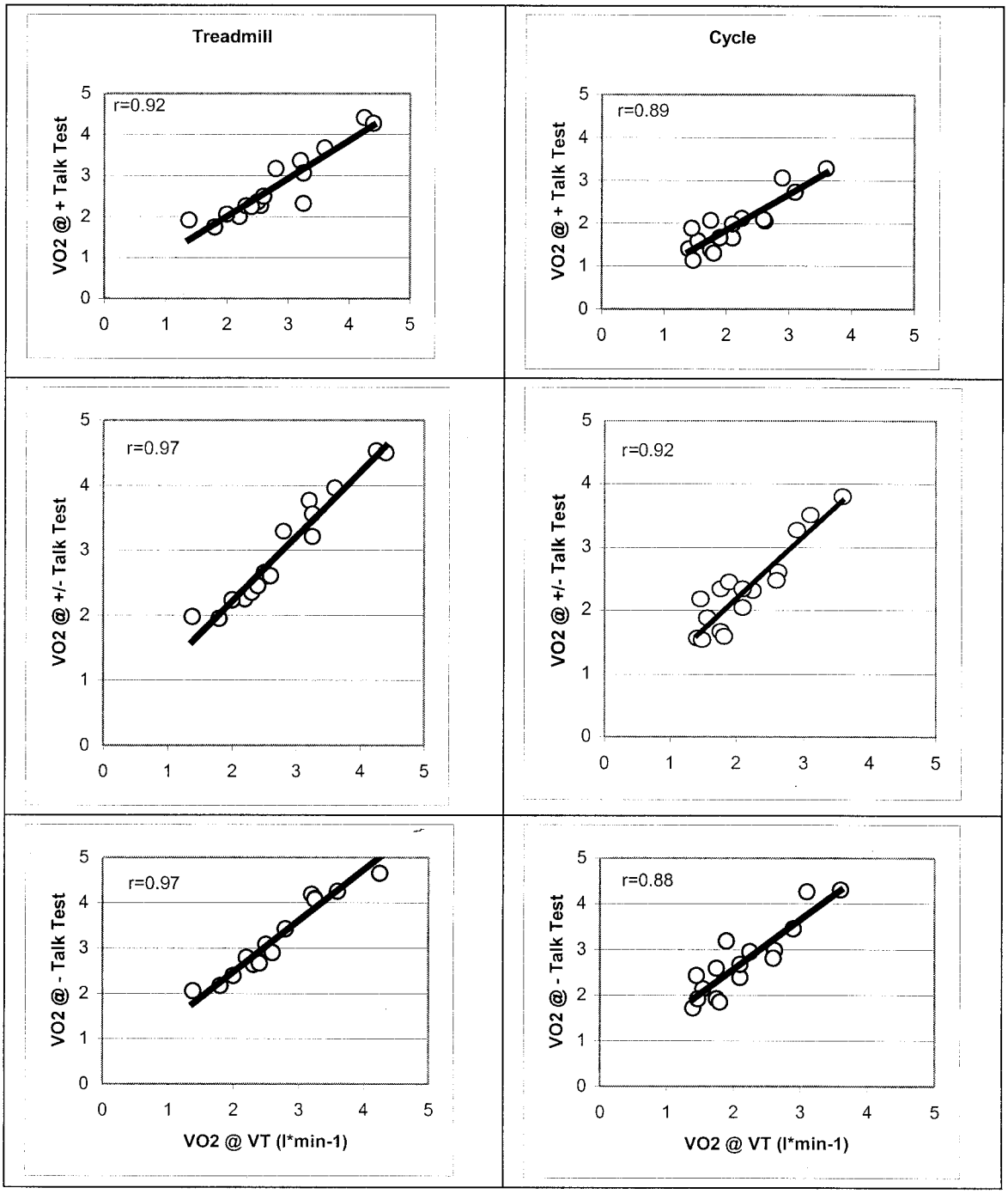

FIGURE 1—Relationship between the $\dot{V}O_2$ ($L \cdot min^{-1}$) at VT and the last positive, equivocal, and negative stages of the Talk Test for treadmill and cycle ergometer exercise. For both modes of exercise, the $\dot{V}O_2$ at the last positive stage of the Talk Test is not significantly different, the equivocal stage is not significantly different, and the negative stage is significantly greater than the $\dot{V}O_2$ at the VT.

positive or equivocal stages of the Talk Test (Table 2, Fig. 1). The $\dot{V}O_2$ at VT was significantly less than the $\dot{V}O_2$ at the first negative stage of the Talk Test. On the cycle, the $\dot{V}O_2$ at VT was not significantly different than the $\dot{V}O_2$ at either the last positive or equivocal stages of the Talk Test but was significantly less than the $\dot{V}O_2$ at the first negative stage of the Talk Test. The $\dot{V}O_2$ at the VT was well correlated with the $\dot{V}O_2$ at the positive, equivocal, and negative stages of the Talk Test, on both treadmill and cycle ergometer (Fig. 1). The absolute values of $\dot{V}O_2$ on treadmill vs cycle ergometer at VT, the positive, equivocal, and negative stages of the Talk Test were consistently larger on the treadmill. This reflected the difference in $\dot{V}O_{2peak}$ between exercise modes (3.59 $\pm$ 0.94 vs 3.20 $\pm$ 0.84 $L \cdot min^{-1}$). The pattern of differences was highly consistent and well correlated for VT, and for positive, equivocal, and negative stages of the Talk Test (Table 2, Fig. 2).

When comparing responses on the treadmill versus cycle ergometer, the $\%\dot{V}O_{2peak}$ at the VT and at the positive and

TABLE 2. Mean (±SD) responses of $\dot{V}O_2$, $\%\dot{V}O_{2peak}$, $\%\dot{V}O_2$reserve, $\%HR_{peak}$, and %HR reserve at VT and during the positive (+), equivocal (±), and negative (−) stages of the Talk Test.

Intensity Measure	Treadmill	Cycle
VT $\dot{V}O_2$($L \cdot min^{-1}$)	2.78 ± 0.84	2.15 ± 0.65
+TT	2.73 ± 0.88	1.96 ± 0.62
±TT	2.99 ± 0.86	2.33 ± 0.69
−TT	3.35 ± 0.96*	2.73 ± 0.79*
VT $\%\dot{V}O_{2peak}$	77 ± 6	67 ± 8
+TT	76 ± 11	61 ± 8
±TT	83 ± 8	73 ± 6
−TT	93 ± 6*	85 ± 6*
VT $\%\dot{V}O_2$ reserve	75 ± 7	64 ± 9
+TT	74 ± 11	57 ± 9
±TT	82 ± 9	70 ± 7
−TT	92 ± 6*	83 ± 7*
VT $\%HR_{peak}$	89 ± 6	82 ± 8
+TT	82 ± 9*	78 ± 9
±TT	86 ± 7	87 ± 8
−TT	91 ± 6	91 ± 6*
VT %HR reserve	84 ± 9	74 ± 12
+TT	73 ± 13*	67 ± 13
±TT	80 ± 11	81 ± 13
−TT	87 ± 9	86 ± 9*

* $P < 0.05$ vs VT.

equivocal stages of the Talk Test were not significantly different, suggesting that the Talk Test represents a common, mode-independent metabolic intensity for both modes of exercise. The $\%\dot{V}O_{2peak}$ at the negative stage of the Talk Test was significantly greater than at VT. Similar results were observed relative to $\%\dot{V}O_2$ reserve (Table 2).

On the cycle ergometer, $\%HR_{peak}$ and %HR reserve at the positive and equivocal stages of the Talk Test were not significantly different than at VT. At the negative stage of the Talk Test, $\%HR_{peak}$ and %HR reserve were significantly greater than at VT (Table 2). This general pattern was also observed during treadmill exercise, although in some cases the $\%HR_{peak}$ and %HR reserve observed at the positive and equivocal stages of the Talk Test were significantly greater than at VT. The mean values for $\%HR_{peak}$ and %HR reserve at VT and at the positive and equivocal stages of the Talk Test were at exercise intensities within generally accepted recommendations for exercise training intensity (1,11) (Table 2). The mean value of $\%HR_{peak}$ and %HR reserve at the negative stage of the Talk Test was greater than accepted recommendations for appropriate exercise training intensity.

DISCUSSION

The main finding of this study was the similarity of the correspondence to the ventilatory threshold during treadmill

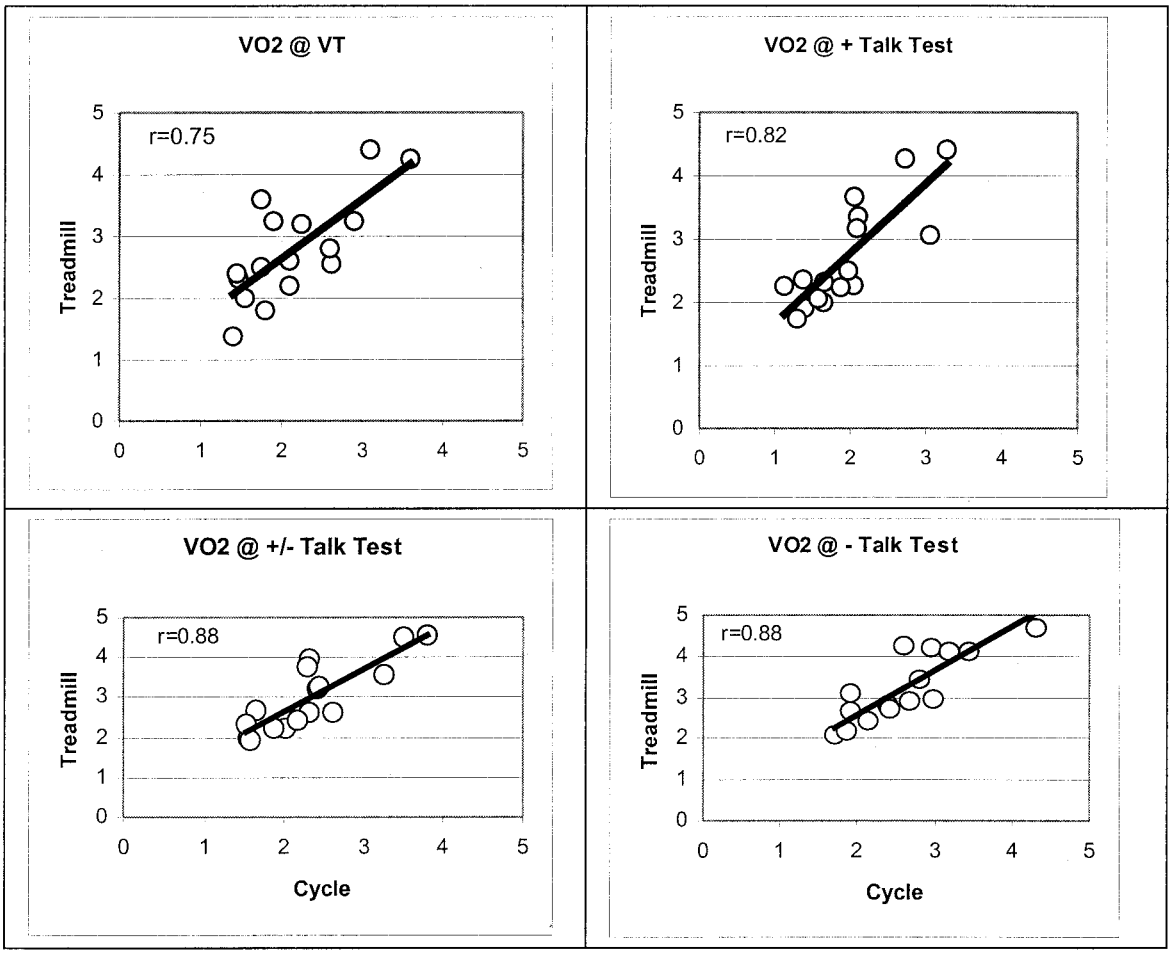

FIGURE 2—Relationship between the $\dot{V}O_2$ ($L \cdot min^{-1}$) for cycle ergometer vs treadmill for VT, and the positive, equivocal, and negative stages of the Talk Test. The values of the relevant outcome measures are generally well correlated between ergometers, with the different absolute values representing the normally expected difference between treadmill and cycle ergometer exercise.

and cycle ergometer exercise when compared using a simple marker of exercise intensity, the Talk Test. Whereas the treadmill elicited higher absolute values for exercise intensity at all measured points, when the data were expressed in terms of the metabolic sustainability of the exercise (represented by VT), the results between ergometers were remarkable in their consistency. Similarly, it appears that the exercise intensity associated with either the last positive or equivocal stage of the Talk Test is comparable to the intensity suggested by widely accepted guidelines for exercise prescription (1,11). When comfortable speech was no longer possible (e.g., negative stage of the Talk Test), the exercise intensity consistently exceeded guidelines for exercise prescription (1,11). Accordingly, the results support all three of our hypotheses.

Previous studies have shown a close relationship between VT and both the last positive and equivocal stages of the Talk Test (6,12,13), a correspondence reflected in the current data. The absolute values of $\%\dot{V}O_{2peak}$, $\%\dot{V}O_2$ reserve, $\%HR_{peak}$, and %HR reserve in the present data at the last positive stage of the Talk Test is substantially similar to that observed in previous studies (6,12,13). Although the present research and other studies (6,12,13) have used recitation of a standard paragraph as the challenge, other slightly different speech provoking strategies have proven equally effective in approximating exercise intensity (3,4,10). In any case, the Talk Test can reliably produce exercise intensities within accepted guidelines for exercise prescription. That this technique can also apparently help to avoid exertional ischemia (5) makes it very attractive for healthcare professionals counseling their patients regarding exercise. The similarity between the treadmill and cycle ergometer results suggests that the Talk Test is a consistent tool, applicable to a variety of exercise settings.

The present study was conducted using relatively young, healthy and physically active individuals. Previous results from our laboratory using clinically stable patients participating in a community-based cardiac rehabilitation program (13) and in patients undergoing diagnostic exercise testing (5) suggest the population generalizability of the technique. The one qualification that needs to be applied to the technique is that whatever provocative stimulus is used to define the Talk Test, it must be recited aloud. Many individuals will be able to exercise at a much higher intensity if the standard paragraph is recited silently or "under one's breath." We believe that this occurs because the striking increase in ventilatory frequency, which typically occurs at VT, interferes with the ventilatory control that is necessary for vocalized speech.

In summary, the results of this study demonstrate that the simple monitoring device of asking whether comfortable speech is possible results in exercise intensities that are within well-accepted guidelines for exercise prescription, without the necessity for preliminary exercise testing. Further, because the results are very similar between modes of exercise, it seems reasonable to suggest that the Talk Test technique is highly consistent. Accordingly, it may represent a clinically useful tool for clinicians faced with the need to provide exercise training guidelines for their patients.

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