

## ARTICLES

## A new method for detecting anaerobic threshold by gas exchange

W. L. Beaver, K. Wasserman and B. J. Whipp

Excess CO<sub>2</sub> is generated when lactate is increased during exercise because its [H<sup>+</sup>] is buffered primarily by HCO<sub>3</sub><sup>-</sup> (22 ml for each meq of lactic acid). We developed a method to detect the anaerobic threshold (AT), using computerized regression analysis of the slopes of the CO<sub>2</sub> uptake (VCO<sub>2</sub>) vs. O<sub>2</sub> uptake (VO<sub>2</sub>) plot, which detects the beginning of the excess CO<sub>2</sub> output generated from the buffering of [H<sup>+</sup>], termed the V-slope method. From incremental exercise tests on 10 subjects, the point of excess CO<sub>2</sub> output (AT) predicted closely the lactate and HCO<sub>3</sub><sup>-</sup> thresholds. The mean gas exchange AT was found to correspond to a small increment of lactate above the mathematically defined lactate threshold [0.50 +/- 0.34 (SD) meq/l] and not to differ significantly from the estimated HCO<sub>3</sub><sup>-</sup> threshold. The mean VO<sub>2</sub> at AT computed by the V-slope analysis did not differ significantly from the mean value determined by a panel of six experienced reviewers using traditional visual methods, but the AT could be more reliably determined by the V-slope method. The respiratory compensation point, detected separately by examining the minute ventilation vs. VCO<sub>2</sub> plot, was consistently higher than the AT (2.51 +/- 0.42 vs. 1.83 +/- 0.30 l/min of VO<sub>2</sub>). This method for determining the AT has significant advantages over others that depend on regular breathing pattern and respiratory chemosensitivity.

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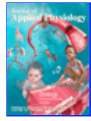
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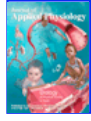
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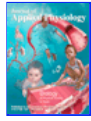
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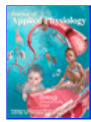
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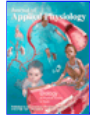
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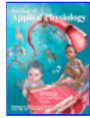
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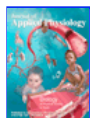
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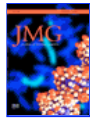
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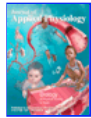
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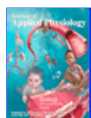
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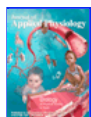
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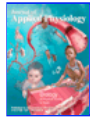
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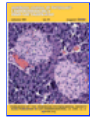
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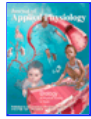
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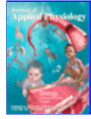
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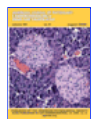
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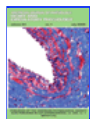
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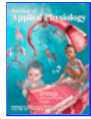
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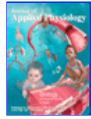
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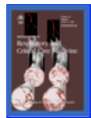
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