

Circulation. 1990 Jan;81(1 Suppl):II38-46.

A comparison of methodologies in detection of the anaerobic threshold.

Dickstein K, Barvik S, Aarsland T, Snapinn S, Karlsson J.

Source

Cardiology Department, Central Hospital in Rogaland, Stavanger, Norway.

Abstract

Peak cardiopulmonary exercise performance is readily evaluated. The most appropriate methodology for assessment of submaximal exercise performance, however, is a subject of controversy. Therefore, we assessed the difference between conventional methodologies using standard criteria to estimate the onset of anaerobiosis and compared them with known gas exchange and blood lactate ([La]) concentrations. Oxygen uptake (VO_2) was determined at both the gas exchange anaerobic threshold (ATge) and the lactate threshold (LaT) using the following three types of commonly used methodologies in a blinded fashion: 1) conventional techniques based on manual inspection of plots of gas exchange indexes and [La] versus time, 2) computerized linear regression analysis of two-segment model plots for VCO_2 versus VO_2 and \log [La] versus \log VO_2 , and 3) fixed values determining the VO_2 at a respiratory exchange ratio (VCO_2/VO_2) of 1.00 and at an [La] of 2 mmol/l. Respiratory exchange data were collected on a breath-by-breath basis in 30 men with documented myocardial infarction. Simultaneously, arterial blood was sampled for [La] every 20 seconds during maximal exercise on an upright bicycle ergometer programmed for a continuous ramp protocol of 15 W/min. The mean (\pm SD) peak VO_2 was 1,463 (\pm 312) ml/min. The mean (\pm SD) VO_2 values for each method were as follows: (table; see text) These results indicate that a good positive correlation exists between the gas exchange and lactate data by all three approaches. The chosen fixed values yield the highest threshold detection for both ATge and LaT. Detection was lowest using regression analysis for LaT.