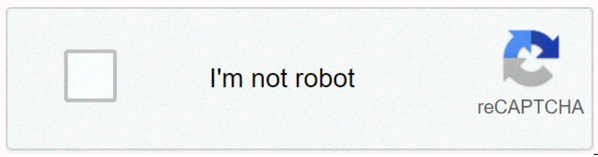

Continue

Modified bruce protocol vo2max equation

Bruce ProtocolPurposevaluate Cardiac function The Bruce protocol is a diagnostic test used in the evaluation of heart function, developed by Robert A. Bruce. History Before the development of the Bruce protocol there was no safe and standardized protocol that could be used to monitor heart function in patient exercise. Sometimes the two-step test of the master was used, but it was too tiring for many patients and inadequate for the evaluation of respiratory and circulatory function during various amounts of exercise. Most doctors relied on patients' complaints about the effort and only examined them at rest. To address these problems, Bruce and his colleagues began developing a treadmill exercise test. The test made extensive use of relatively new technological developments in motorized electrocardiographs and treadmills. A bruce test involved walking on a treadmill while the heart was monitored by an electrocardiograph with various electrodes attached to the body. Ventilation volumes and exchanges of respiratory gases were also monitored, before, during and after exercise. Since the speed and inclination of the treadmill could be adjusted, this physical activity was tolerated by most patients. The initial experiments involved a one-stage test, in which subjects walked for 10 minutes on the treadmill with a fixed workload. Bruce's first reports on treadmill exercise tests, published in 1949, analyzed minute-by-minute changes in respiratory and circulatory function of normal adults and patients with heart or lung disorders. [2] In 1950 Bruce joined the University of Washington, where he continued research on single-phase testing, particularly as a predictor of the success of surgery for valvular or congenital heart disease. He later developed the multistage test, consisting of several phases of progressively larger workloads. It was this multistage test, the description of which was first published in 1963, that became known as the Bruce Protocol. In the initial paper, Bruce reported that the test could detect signs of such conditions as angina pectoris, a previous heart attack, or a ventricular aneurysm. Bruce and colleagues also demonstrated that exercise tests were useful in screening seemingly healthy people for the first signs of coronary heart disease. Typically during a Bruce protocol, heart rate and perceived effort assessment are taken every minute, and blood pressure is taken at the end of each stage (every three minutes). There are Bruce protocol tables available for effort and Sub Maximal (more practical with most competitive non-athletic or athletic efforts) (see below). Stage minutes % grade MPH min/mile km/h min/km METS 1 3 10 1.7 35:18 2.7 22:13 3 2 3 12 2.5 24:00 4.0 15:00 4-5 3 3 14 3.4 17:39 5.5 10:55 557 4 3 16 4.2 14:17 6.8 8:49 10 5 3 18 5.0 12:00 8.0 0 07:30 14 6 3 20 5.5 10:55 8.9 6:44 17 7 3 22 6.0 6.0 9.7 6:11 21 Total duration = 21 minutes Changes Modified Bruce protocol starts with a lower workload than the standard test and is typically used for elderly or sedentary patients. The first two phases of the Modified Bruce Test are performed at a grade of 1.7 mph and 0% and 1.7 mph and 5% degree, and the third stage corresponds to the first phase of the Standard Bruce Test protocol as listed above. Results The test score is the time it takes for the test, in a few minutes. This can also be converted to an estimated VO2max score (maximum oxygen absorption) using the calculator below and the following formulas, where the T value is the total completed time (expressed in minutes and fractions of one minute for example 9 minutes and 15 seconds = 9.25 minutes). As with many equations of exercise tests, there have been many developed regression equations that can give variable results. If possible, use the one derived from a similar population that best suits your needs. VO2max (ml/kg/min) = 14.76 - (1,379 × T) + (0.451 × T²) - (0.012 × T³) Women: VO2max (ml/kg/min) = 2.94 x T + 3.74 Young Women: VO2max (ml/kg/min) = 4.38 × <4> T - 3.9 Men: VO2max (ml/kg/min) = 2.94 x T + 7.65 Young: VO2max (ml/kg/min) = 3.65 6 2 x T + 3.91 ref: ACSM's health-related fitness assessment manual Maximum heart rate formulas (MHR) are often calculated with the formula 220-age, which is quite inaccurate. The most often used heart rate formula for Bruce is Karvonen's formula (below). A more accurate formula, offered in a study published in the journal Medicine & Science in Sports & Exercise, is 206.9 - (0.67 x age) which can also be used to more accurately determine VO2 Max, but can produce significantly different results. A diagnostic (for example, physiotherapist, personal trainer, doctor, athletic trainer, nurse, professional doctor, dietician, etc.) can be better served to conduct the test twice using parameters and formulas. Karvonen Method The Karvonen method resting heart rate factors (HRrest) to calculate target heart rate (THR), using a range of 50-85%: THR = ((HRmax − HRrest) × %Intensity) + HRrest Example for someone with an HRmax of 180 and an HRrest of 70: intensity of 50%: ((180 − 70) × 0.50) + 70 = 125 bpm 85% intensity: ((180 − 70) × 0.85) + 70 = 163 bpm References ^ Robert A. Bruce; Frank W. Lovejoy, Jr.; Raymond Pearson; Paul N. G. Yu; George B. Brothers; Tulio Velasquez (November 1949). Normal respiratory and circulatory tracts of adaptation in physical exercise. J. Clin. Invest. 28 (6 Pts 2): 1423–1430. doi:10.1172/JCI102207. PMC 439698. PMID 15407661. ^ Robert A. Bruce; Raymond Pearson; Frank W. Lovejoy, Jr.; Paul N. G. Yu; George B. Brothers 1949). Variability of respiratory and circulatory performance during standardized exercise. J Clin Invest. 28 (6 Pts 2): 1431–1438. doi:10.1172/JCI102208. PMC 439699. 439699. Retrieved In Print: Volume 26: Number 1 Testing and Measurement are the means to collect information on which subsequent performance assessments and decisions are made. In the analysis, we must bear in mind the factors that can influence the results. Objective The goal of the Bruce treadmill test (Bruce 1972)[1] is to monitor the development of the athlete's overall endurance (VO2 max). To perform this test, you need: Treadmill Stopwatch Assistant How to conduct the test This test requires the athlete to run as long as possible on a treadmill whose speed and slope increase at regular intervals. The athlete warms up for 10 minutes The assistant sets the treadmill with a speed of 2.74 km/h. and a slope of 10% (Phase 1) The assistant gives the GO command, start the stopwatch, and the athlete starts the test The assistant, at the appropriate times during the test, adjusts the speed and slope of the treadmill according to the table (for example after 3 minutes the speed is adjusted to 4.02 km/h and the slope to 12% and so on) The assistant stops the stopwatch when the athlete is unable to continue and records the time (T). Stage time (min) km/h Slope 1 0 2.74 10% 2 3 4.02 12% 3 6 5.47 14% 4 9 6.76 16% 5 12 8.05 18% 6 15 8.85 20% 7 18 9.65 22% 8 21 10.46 24% 9 24 11.26 26% 10 27 12.07 28% Conversion from grade percentage to grade Rating Active and Sedentary Men - (Foster et al. 1984)[2] From total walking/running time, an estimate of the athlete's maximum VO2 can be calculated as follows: VO2 max = 14.8 - (1,379 × T) + (0.451 × T²) - (0.012 × T³) T is the total time of the test expressed in minutes and minute fractions, for example 13 minutes 15 seconds=13.25 minutes Active and sedentary women - (Pollock et al. 1982)[3] From total walking/running time , an estimate of the athlete's maximum VO2 can be calculated as follows: VO2 max = (4.38 × T) - 3.9 T is the total time of the test expressed in minutes and minute fractions. For an analysis of your maximum VO2 score see the VO2 max page. Analysis The analysis of the test result is comparing it with the previous results of the athlete for this test. It is expected that, with proper training between each test, the analysis would indicate an improvement in the athlete's VO2 max. Target Group This test is suitable for active and sedentary individuals but not for those where the test would be contraindicated. Reliability The reliability of the test refers to the degree to which a test is consistent and stable in measuring what you intend to measure. Reliability will depend on the severity with which the test is conducted and the level of motivation of the individual to perform the test. The following link provides a variety of factors that can influence the results and reliability of the test. The validity of the validity test refers to the degree to which the test measures what it claims to measure and the extent to which the deductions, conclusions and decisions made on the basis of test scores are appropriate and significant. This test provides a means to monitor the effect of training on the physical development of the athlete. There are published vo2 max tables and the correlation with actual vo2 max is high. For an assessment of your VO2 max, see the VO2 max regulatory data tables. Benefits Minimal equipment required simple to set up and conduct disadvantages Specialist equipment required the assistant needed to administer the Free References Calculator BRUCE, R.A. test (1972) Maximum and sub maximum multi-station treadmill testing. Exercise Testing and Training of apparently Health Individuals: A handbook for physicians FOSTER et al. American Heart Journal, 107 (6), p. 1229-1234 POLLOCK et al. American Heart Journal, 103 (3), p. 363-373 If you cite information from this page in your work, the reference for this page is: MACKENZIE, B. (2002) Bruce Tapis treadmill Test [WWW] Available from: [Accessible Related Pages The following Sports Coach pages provide more information on this topic: Performance Assessment and Performance Testing Articles Test