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| **Cardiorespiratory Fitness-Exercise Test Estimate [Treadmill Test]** | |
| **Protocol Id** | 150102 |
| **Version #** | 1 |
| **Description of Protocol** | The participant is asked to walk on a treadmill at a 5% grade for 4 minutes. A technician utilizes a stopwatch to time the walk. The participant wears a heart rate monitor that records h/her heart rate continuously through the test. After the test is completed the technician records the heart rate from the last 15 seconds of the test. In addition, the participant’s age and gender are needed to complete an equation to determine maximal oxygen consumption (VO2max). |
| **Specific Instructions** | A heart-rate monitor (e.g. Polar® heart-rate monitor) should be used since the heart-rate (HR) that is used in the equation is taken during the last 10 sec of the test and not after the test is completed (HR will decline rapidly after test is completed). If HR is taken after the test is completed, this will introduce error to the prediction of VO2max.  The HR monitor must store HR so the technician can easily access the results after the test is completed. The manufacturer’s user manual should be followed for proper calibration and usage.  A screening instrument such as the PAR-Q (Physical Activity Readiness Questionnaire, The Canadian Society for Exercise Physiology) should be completed with the participant prior to the treadmill test to make certain he/she is physically capable of performing the test. If the person is elderly or in poor health, a physician’s examination and approval is preferable prior to the test.  Polar® is a trademark of Polar Electro Oy |
| **Protocol Text** | **Treadmill (alternate protocol)**  Secure the heart-rate monitor chest strap and wrist receiver. Ask the study participant to warm up by walking on a treadmill at 0% grade at a brisk, but comfortable pace of 2 to 4.5 mph for 4 minutes. The warm up pace should produce a heart rate that is 50-70% of the age-predicted maximum heart rate (220 - age in years). After 4 minutes at 0% grade, begin the test by increasing the grade of the treadmill to 5%, start the stopwatch. The speed should remain the same for 4 minutes at the 5% grade. Heart rate from a heart-rate monitor should be obtained for the last 15 sec of the test. Record the speed, heart rate, age, and gender into the following scoring equation to determine predicted relative VO2max (maximal oxygen consumption).  Scoring  VO2max = 15.1 + 21.8\*SPEED (mph) - 0.327\* HEART RATE (bpm) - 0.263\*SPEED\*AGE (yrs) + 0.00504\*HEART RATE\*AGE + 5.98\*GENDER  (0 = female, 1 = male)  Units are milliliters of oxygen per kilogram body weight per minute expressed as mil/kg/min. |
| **Selection Rationale** | This is a standard assessment of aerobic capacity that has been widely utilized for the past two decades. It is low burden for healthy participants and relatively easy for a technician to administer. |
| **Source** | Ebbeling, E. B., Ward, A. Puleo, E. M., Widrick, J., & Rippe, J. M. (1991). Development of a single-stage submaximal treadmill walking test. *Medicine and Science in Sports and Exercise*. *23*(8): 966-973. |
| **Language** | English |
| **Participant** | Ages 20 to 59 |
| **Personnel and Training Required** | A technician who has been trained in monitoring a treadmill test, and properly recording the data. |
| **Equipment Needs** | Treadmill A heart-rate monitor with chest strap and wrist receiver that stores heart rate data is recommended. |
| **Standards** | |  |  |  |  | | --- | --- | --- | --- | | **Standard** | **Name** | **ID** | **Source** | | Common Data Elements (CDE) | Person Cardiorespiratory Fitness Treadmill Test Estimate Text | 3060850 | [CDE Browser](https://cdebrowser.nci.nih.gov/CDEBrowser/search?elementDetails=9&FirstTimer=0&PageId=ElementDetailsGroup&publicId=3060850&version=1.0) | | Logical Observation Identifiers Names and Codes (LOINC) | Cardioresp fitness treadmill proto | 62815-6 | [LOINC](http://s.details.loinc.org/LOINC/62815-6.html?sections=Web) | |
| **General References** | *Physical Activity Readiness Questionnaire (PAR-Q)* © 2002. Used with permission from the Canadian Society for Exercise Physiology. |
| **Protocol Type** | Physical Measurement |
| **Derived Variables** | None |
| **Requirements** | |  |  | | --- | --- | | **Requirement Category** | **Required** | | Average time of greater than 15 minutes in an unaffected individual  Average time of greater than 15 minutes in an unaffected individual | No | | Major equipment  This measure requires a specialized measurement device that may not be readily available in every setting where genome wide association studies are being conducted. Examples of specialized equipment are DEXA, Echocardiography, and Spirometry | No | | Specialized requirements for biospecimen collection  This protocol requires that blood, urine, etc. be collected from the study participants. | No | | Specialized training  This measure requires staff training in the protocol methodology and/or in the conduct of the data analysis. | No | |