

Gender-specific Equations for Predicting Maximal Heart Rate in Exercise Stress Testing

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PURPOSE: To compare the commonly used maximal heart rate (HR_{max}) prediction equation to the newer gender-specific equations in the clinical setting. **METHODS:** This retrospective study randomly reviewed 1,233 exercise treadmill tests (stress echocardiograms and exercise tolerance tests) done between 2010 and 2012. A total of 516 participants' (266 men, 250 women) met the inclusion criteria and did not have coronary artery disease, congenital heart disease, a pacemaker, or beta-blocker medication. Data analysis included repeated measures ANOVA and linear regression using $P < 0.05$ for significance. **RESULTS:** The majority (85%) of the stress tests were stress echocardiograms with chest pain (63%) as the main indicator for the test. The mean age was 53 yrs \pm 1 (range 18-91yrs) and 52 yrs \pm 1 (range 18-86 yrs) for men and women, respectively. Our generated gender-specific HR_{max} prediction equation for men ($212 - .94(\text{age})$) was similar to the commonly used Fox (1971) prediction equation ($220 - \text{age}$) than the prediction equations by Tanaka (2001) and Inbar (1994). However for women, our gender-specific HR_{max} prediction equation ($205 - .85(\text{age})$) was similar to Gulati's (2010) prediction equation ($206 - .88(\text{age})$) than the Fox or Tanaka equations. The exercise treadmill tests revealed that 4.6% of the total tests were positive and 6.3% of the total tests were non-diagnostic. In examining the percentage of men and women who were unable to achieve 85% HR_{max} by the Fox or gender-specific equations, we showed a two- fold increase of non-diagnostic tests for men using the Tanaka and Inbar equations compared to the Fox equation (7.8%, 7.8%, and 3.1%, respectively). For women who were unable to achieve 85% HR_{max}, Tanaka's equation showed a two-fold increase of non-diagnostic tests compared to the Fox and Gulati equations (8.0%, 4.6%, and 5.0%, respectively). **DISCUSSION:** We concluded that the use of a gender-specific exercise HR_{max} prediction equation for women needs to be highly considered in the clinical hospital setting.
