Non-Exercise-Based Estimation of $\dot{V}O_2$max

Non-exercise-based equations have been developed by Malek and colleagues (21, 22) to estimate a client's $\dot{V}O_2$max from various demographic and descriptive variables. These equations have been used to provide reasonable estimates of $\dot{V}O_2$max for both trained and untrained men and women. In addition, the errors associated with these equations range between ±10% to 15% of $\dot{V}O_2$max, which are similar to the errors often encountered with exercise-based estimates of $\dot{V}O_2$max (21, 22). Overall, non-exercise-based equations for the prediction of $\dot{V}O_2$max can be very useful, especially when the risk of conducting an exercise-based $\dot{V}O_2$max assessment is too high or unknown for clients who may be susceptible to exercise-induced stress.

Equipment

- Standard platform scale with anthropometer arm or flat, ridged, right-angled device (to simultaneously slide against a wall and rest on top of client's crown)
- Calibrated and certified scale
- Rating of perceived exertion scale

Procedure

1. Record the client's height in centimeters, body weight in kilograms, and age in years.
2. Estimate the typical intensity of training using the Borg RPE scale (e.g., 6-20).
3. Indicate the number of hours per week your client exercises.
4. Indicate the number of years your client has been training consistently with no more than one month without exercise.
5. Determine the natural log of the years of training. That is, enter the client's years of training and then hit "LN," or the natural log, on a handheld calculator.
6. Determine $\dot{V}O_2$max in L/min using the following equations.
7. Calculate $\dot{V}O_2$max in ml · kg^{-1} · min^{-1} using equation 11.7.
8. Compare your client's scores to table 11.14.

Equations

Population	Equation for predicting $\dot{V}O_2$max (L/min)
Untrained males	(0.046 × H) – (0.021 × A) – 4.31
Untrained females	(0.046 × H) – (0.021 × A) – 4.93
Aerobically trained males*	(27.387 × BW) + (26.634 × H) – (27.572 × A) + (26.161 × D) + (114.904 × I) + (506.752 × Y) – 4609.791
Aerobically trained females*	(18.528 × BW) + (11.993 × H) – (17.197 × A) + (23.522 × D) + (62.118 × I) + (278.262 × Y) – 1375.878

H = height in cm; A = age in years; BW = body weight in kg; D = duration of training in hours per week; I = intensity of training using the Borg scale; Y = natural log of years training.

**Aerobically trained* is defined as having participated in continuous aerobic exercise for a minimum of 1 hour per workout session, three or more sessions per week, for at least the last 18 months (21, 22)