

Validation of the Mio Alpha Heart Rate Monitor during Graded Exercise Testing in Trail Runners

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The accurate measurement of heart rate (HR) is important for both exercise testing and intensity prescription. Electrocardiography (ECG), considered the gold standard in HR measurement, is not practical for exercise performed outside of the clinical laboratory setting. Polar HR monitors, which include a chest strap transmitter and wrist watch receiver, have been validated for use in a wide variety of exercise settings. However, anecdotal reports suggest the chest-strap is uncomfortable. The Mio Alpha HR monitor involves an electro-optical cell that “senses” the pulse of blood under the skin using a wrist watch only. It is unknown whether the accuracy of the Mio Alpha has been independently tested.

PURPOSE: To determine the validity of the Mio Alpha during graded treadmill exercise using ECG as the criterion HR measurement. **METHODS:** Ten trail runners (6 men, 4 women, 35.8 ± 7.8 yrs, $VO_2\text{max} = 57.1 \pm 9.6 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, running volume = $351 \pm 116 \text{ min}\cdot\text{wk}^{-1}$) performed a Bruce Protocol graded exercise test until volitional fatigue. HR was measured continuously by ECG and Mio. HR was recorded simultaneously by ECG and Mio at rest and each min of exercise. HR was compared between methods across the entire testing session (rest and exercise values) using a paired-samples *t*-test. The validity coefficient was determined using the Pearson correlation. **RESULTS:** HR across the entire intensity range (rest to maximal exercise) was similar between methods (overall mean HR: ECG = $122 \pm 38 \text{ b}\cdot\text{min}^{-1}$, Mio = $122 \pm 37 \text{ b}\cdot\text{min}^{-1}$, $p > 0.05$). In addition, a strong relation was observed between methods ($r = 0.98$, $p < 0.001$). **CONCLUSION:** The Mio Alpha can be considered a valid HR monitoring technology for use during graded exercise testing.