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VALIDATION OF HEART RATE MONITORING OF FENIX 5 DURING MOUNTAIN BIKING

Brenna Barrios. *UNLV, Las Vegas, NV.* (Sponsor: James Navalta, FACSM)

(No relationships reported)

The availability of fitness trackers have increased in recent years. These trackers claim to accurately depict Heart Rate - among other factors. Little if any studies have looked into the accuracy of the HR sensor within these systems.
PURPOSE: The Garmin Fenix 5 watch boasts about its performance tracking capabilities, claiming that it will accurately track heart rate, this study aims to assess its accuracy using the Polar H7.
METHODS: Sixteen participants (males = 8, females =8, 24.69 ± 4.44yrs, 171.45 ± 8.9cm, 74.23 ± 21.07kg) rode a mountain bike a total of 3.22km along the McCullough hills trail (Henderson, NV) while simultaneously wearing both the Garmin Fenix 5 and the Polar H7. Participants rode the same trail twice, each ride was1.61km (round trip), with a10 minute break in between ride. Validity was determined using the MeanAbsolute Percent Error (MAPE), Bland-Altman analysis with accompanying bias and Limits of Agreement (LoA), and single measures Intraclass Correlations (ICC). Prior to testing, the benchmark for validity was established as aMAPE <10% and anICC>0.7(p <0.05), with the lower limit of the ICC95% confidence interval (CI) set at >0.7
RESULTS: During mountain biking the MAPE was 13.30%. The single measures ICC was .16 with a 95% confidence interval of .068 to.243(F (17142, 17142) =1.495, p <0.000.
CONCLUSION: This data shows that the Fenix 5 does not produce a valid measure of heart rate while mountain biking due tothe MAPE being above 10% and the ICC being well below .7.

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Confounding Variables Influence Utility Of Heart Rate Measures In Collegiate Athletes.

Nguyen D. Nguyen, Ashley Arnett, Ethan S. Gross, Haylee A. Bettencourt, J. Mark VanNess, Courtney D. Jensen. *University of the Pacific, Stockton, CA.*
Email: n_nguyen55@u.pacific.edu

(No relationships reported)

Heart rate is easy to measure and a useful variable for determining training intensity, training status and fitness levels. The downward rate of the heart following a standardized stressor (heart rate recovery; HRR) and resting heart rate (RHR) are autonomically-mediated and can be used to detect training distress. However, confounding variables can limit the usefulness of heart rate when criteria for rate changes are not individualized, especially when applied to entire sporting teams.
PURPOSE: To determine influences of sex, training status, player position and season duration have on the RHR and the HRR response following a standardized physical stressor.
METHODS: Subjects were male (n=17) and female (n=26) collegiate soccer players aged 17 to 22 years. RHR (taken in the morning just after awaking) and the HRR following a 300-yard shuttle run and maximal treadmill test were collected four times during one entire season: Beginning of August (pre-season), September (mid-season), October (mid-season), and end of November (post-season). Polar monitors were used to record heart rate.
RESULTS: A comparison between shuttle run times showed men had faster times (p<0.001) and higher VO_2 max (p<0.05) than women. Shuttle run performance and athlete's class standing were not found to be significantly different but trended towards significance (p=0.052). HRR examined by sex found that men had a faster HRR time than women (p=0.010). A multivariate analysis examining RHR and player position found that there was a statistically significant difference (p=0.015): The forward players had higher RHR compared to defenders (p=0.051) and midfielders (p=0.049).
CONCLUSION: Player fitness, sex, position and year in school should be considered when establishing guidelines for using heart rate information.

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The Accuracy Of Heart Rate Monitors And Determination Of Heart Rate Percentages At Anaerobic Threshold

Muhammet Enes Erol[1], Michael A. Figueroa[2]. [1]*William Paterson University, clifton, NJ.* [2]*William Paterson University, Wayne, NJ.*
Email: meneserol11@gmail.com

(No relationships reported)

PURPOSE: To examine the heart rate percentage (HR%) at the Anaerobic Threshold (AT) in order to determine the appropriate exercise intensity below or above the AT. A second goal was to assess the accuracy of different types of wearable heart rate monitors (HRMs) during a graded exercise test.
METHODS: Thirty healthy individuals (n=21 male & n=9 female; aged 24.5 ± 3.5 years) participated in a single incremental exercise protocol on a cycle ergometer (CE). AT was detected through a metabolic cart by using V-slope method, which determined the point of a nonlinear increase in carbon dioxide output (VCO2) against oxygen uptake (VO2). HR was measured each minute of exercise test via two optical-based monitors (Cellular Watch [IW] & Fitness tracker [FB]) and two electrical-based monitors (traditional monitor [ECG] & heart rate monitor [PL]). Electrocardiography (ECG) was used as a "Gold Standard" for comparison in this study.
RESULTS: AT was reached at the mean and standard deviation (SD) of 130 ± 16 bpm. HR% at AT was observed 67 ± 8 % of HRpeak, Heart Rate Reserve Percentages (HRR%) at AT were observed at 42 ± 15 % of HRpeak. Across all exercise testing stages (Stage 1 [S1], Stage 2 [S2], Stage 3 [S3], etc.), no significant differences were found in HR values between ECG and PL. The most statistical differences were found in HR between ECG and IW, (S5=[p=0.018], S6=[p=0.041] and S7=[p=.005],respectively). As intensity increased, FB and IW underestimated the HR values throughout all stages when compared with the ECG.
CONCLUSIONS: Analysis of HR% at AT was estimated at approximately 67% of participant maximum effort as well as HRR% at AT was estimated at 42%. At the light-intensity, accurate outcomes of HR values were observed from all wearable HRMs. However, with increased intensity, the accuracy of wearable devices was varied at moderate and high-intensity exercise testing. The PL had the greatest agreement with ECG when compared to other devices. This might be due to the fact that both HRMs utilize a similar mechanism of measurement. The electrical-based HRM was found to be more accurate in comparison to the optical-based HRMs.

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Effect Of Practice And Game-Related Impacts On Common Indicators Of Concussion: A Pilot Study

Jocelyn N. Simons[1], Anne-Sophie J. Lasley[2], Matthew B. Grunstein[3], Genevieve E. Smith[1], Gregory W. Stewart, FACSM[1]. [1]*Tulane University School of Medicine, New Orleans, LA.* [2]*Tulane University School of Public Health and Tropical Medicine, New Orleans, LA.* [3]*Tulane University, New Orleans, LA.*
(Sponsor: Dr. Gregory W. Stewart, FACSM)
Email: jsimons1@tulane.edu

(No relationships reported)

Previous studies have suggested that football players not clinically diagnosed with concussion may still demonstrate differences in balance and neurocognitive performance by end of season. Clinically this is important as it indicates the athlete with sub-clinical injuries that may contribute to long-term deficits.
PURPOSE: A pilot study to determine if non-concussive impacts sustained during normal play at NCAA Division I football practices and spring season scrimmage are sufficient to elicit detectable changes in oculomotor (OM) and balance performance.