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**The Index Of Physical Performance In Muscle Damage Biomarker In Youth Athletes**

Tsai-Hsuan Ho, Linda Li-chuan Lin, Wei-Chi Tseng, Chun-Kai Tsai. *National Cheng Kung University, Tainan, Taiwan.*

Email: ohetya@gmail.com

(No relationships reported)

**PURPOSE:** To investigate the index of the physical performance among different levels of serum creatine kinase in youth athletes.

**METHODS:** 53 youth male athletes ages of 12 to 18 years were divided into three groups, low-level group (LL, n=17), middle-level group (ML, n=20), and high-level group (HL, n=16) by CK level of serum (reasonable CK range: 82-1,083 U/L for male athletes). Fasting blood samples of CK and myoglobin were collected in the morning. The physical performance test included gripping, low back muscle strength, curl up, standing broad jump, lower limb flexibility, 30m sprint, vertical jump, whole-body reaction time, agility, and yo-yo test for aerobic endurance. One-way ANOVA and Pearson's correlation were used to determine the difference between physical performance and biomarkers.

**RESULTS:** In biomarkers, the value of CK had positive correlation between low back muscle strength ( $r=0.278$ ,  $p < 0.05$ ) and reaction time ( $r=0.412$ ,  $p < 0.01$ ). There was a negative correlation between CK and aerobic endurance ( $r=-0.288$ ,  $p < 0.05$ ). The myoglobin of LL(19.76 ng/ml) was significantly lower than ML and HL (25.18 ng/ml; 28.96 ng/ml) ( $p < 0.05$ ). The aerobic endurance of LL was significantly higher (26.6%) than HL ( $p < 0.05$ ). In reaction time, LL and ML(267.12ms; 284.95ms) were significantly faster than HL(367.27ms)( $p < 0.05$ ). There were no significant differences in other physical performance.

**CONCLUSIONS:** This study suggested that the performance of whole-body reaction time and yo-yo test perhaps to be reminded for muscle damage or fatigue in the reasonable CK range. In addition, future research can regularly implement both physical indexes to track muscle fatigue.

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**Chronotropic Intolerance In Patients With Chronic Lyme Disease Identified By Serial Cardiopulmonary Exercise Testing**

Saejel G. Mohan<sup>1</sup>, Courtney D. Jensen<sup>2</sup>, Staci Stevens<sup>3</sup>, Jared Stevens<sup>3</sup>, Todd Davenport<sup>2</sup>, J. Mark VanNess<sup>2</sup>. <sup>1</sup>University of California at Berkeley, Berkeley, CA. <sup>2</sup>University of the Pacific, Stockton, CA. <sup>3</sup>Workwell Foundation, Ripon, CA.

(No relationships reported)

In the U.S., annual incidence of Lyme disease is approximately 300,000. In an estimated 5-30% of cases, post-treatment Lyme disease syndrome (PTLDS) develops; symptoms include post-exertional malaise characteristic of myalgic encephalomyelitis. The contribution of autonomic regulation has not been elucidated.

**PURPOSE:** To evaluate cardiovascular responses to serial cardiopulmonary testing in patients with PTLDS.

**METHODS:** 14 patients with PTLDS and 8 sedentary controls underwent 2 maximal exercise tests separated by 24 hours. Heart rate (HR) was measured continuously via electrocardiogram. Expired air was collected for determination of anaerobic threshold (AT) using V-slope methodology and maximal exertion was defined as a respiratory exchange ratio  $>1.09$ . Independent-samples t-tests compared baseline characteristics of PTLDS patients and controls. Linear regression determined the effect of PTLDS diagnosis on HR at AT and peak holding workload constant.

**RESULTS:** Patients were  $44.0 \pm 10.1$  years old, weighed  $69.8 \pm 16.2$  kg, and achieved a peak  $VO_2$  of  $23.8 \pm 6.2$  mL/kg/min during test 1. HR was  $116.2 \pm 21.8$  bpm at AT and  $162.6 \pm 25.1$  at peak. PTLDS and controls did not differ in peak  $VO_2$  during test 1 ( $p=0.161$ ), test 2 ( $p=0.134$ ), or the difference between test 1 and test 2 ( $p=0.498$ ). HR at AT was comparable in test 1 ( $p=0.127$ ) but different in test 2 ( $p < 0.001$ ). HR at peak was different in test 1 ( $p=0.001$ ) and test 2 ( $p < 0.001$ ). During test 1, holding workload constant, PTLDS patients had lower peak HR by 19.5 bpm ( $p=0.033$ ; 95% CI: -37.3 to -1.8). During test 2, holding workload constant, PTLDS predicted a lower HR by 26.8 bpm at AT ( $p=0.004$ ; 95% CI: -43.9 to -9.8) and 24.3 bpm at peak ( $p=0.007$ ; 95% CI: -40.9 to -7.7).

**CONCLUSIONS:** Patients with PTLDS demonstrated abnormal cardiovascular responses to exercise. Despite accomplishing the same  $VO_2$ , and holding workload constant, the HR response was diminished in the post-exertional state, potentially indicating dysautonomia in PTLDS.

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**Normalizing Cardiorespiratory Fitness To Fat-free Mass Improves Mortality Risk Prediction In Overweight Adults From The Ball St Cohort**

Mary T. Imboden<sup>1</sup>, Leonard A. Kaminsky, FACSM<sup>2</sup>, James E. Peterman<sup>2</sup>, Haylee L. Hutzler<sup>2</sup>, Mitchell H. Whaley, FACSM<sup>2</sup>, Bradley S. Fleenor<sup>2</sup>, Matthew P. Harber, FACSM<sup>2</sup>. <sup>1</sup>George Fox University, Newberg, OR. <sup>2</sup>Ball State University, Muncie, IN. (Sponsor: Matthew P Harber, FACSM)

Email: mimboden@georgefox.edu

(No relationships reported)

**PURPOSE:** Cardiorespiratory fitness(CRF) is a significant predictor of mortality outcomes in various populations, including overweight and obese adults. However, CRF is commonly expressed normalized to total body weight ( $VO_{2peakTBW}$ ) which may weaken the relationship in obese adults as fat-free mass (FFM) is directly related to CRF, and increased body fat is associated with lower CRF in adults. Therefore, this study aimed to assess the relationship between CRF normalized for FFM( $VO_{2peakFFM}$ ) and all-cause mortality, as well as compare the predictive ability of  $VO_{2peakFFM}$  and  $VO_{2peakTBW}$  in a cohort of self-referred overweight and obese adults.

**METHODS:** Participants included 1,021 overweight and obese adults (520 men, 501 women; BMI:  $30.8 \pm 5.3$ ) who completed a cardiopulmonary exercise test (CPX) and body composition assessment between 1970-2016 to determine CRF. Participants were included if their BMI  $>25$  kg·m<sup>-2</sup> and/or waist circumference was  $>88$  cm in women and  $>102$  cm in men. FFM was estimated using the skinfold method to estimate FFM. Participants were followed for  $17.8 \pm 10.8$  years after their CPX and body composition assessments for mortality outcomes. Cox-proportional hazard models were performed to determine the relationship of  $VO_{2peakFFM}$  with mortality outcomes. A Wald Chi-square test of equality was performed to compare the predictive ability of CRF expressed as  $VO_{2peakTBW}$  and  $VO_{2peakFFM}$ .

**RESULTS:** Overall,  $VO_{2peakFFM}$  was inversely related to all-cause mortality, with an 11.8% lower risk per 1 ml·kgFFM<sup>-1</sup>·min<sup>-1</sup> improvement, respectively ( $p < 0.01$ ).  $VO_{2peakFFM}$  was shown to be a significantly stronger predictor of all-cause mortality than  $VO_{2peakTBW}$  (parameter estimates: -0.44 vs. -0.18,  $p < 0.05$  respectively).

**CONCLUSIONS:** Body composition is an important factor when considering the relationship between CRF and mortality risk. Clinicians should consider normalizing CRF to FFM when feasible, especially in individuals with excess body fat as it will strengthen the predictive power of the measure.

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**Hemodynamic Performance In Patients With A Bicuspid Aortic Valve During Treadmill Ramp Exercise Testing**

Malloree C. Rice, Wayne A. Mays, Andrea L. Grzeszczak, Sandra K. Knecht, Justine D. Shertzer, Samuel G. Wittekind, Clifford Chin, Adam W. Powell, Michael Khoury. *Cincinnati Children's Hospital Medical Center, Cincinnati, OH.*

Email: Malloree.Rice@cchmc.org

(No relationships reported)

**PURPOSE:** To evaluate the effect of a bicuspid aortic valve on the hemodynamic response to a treadmill ramp protocol in pediatric patients.

**METHODS:** We evaluated 18 patients with a bicuspid aortic valve (BAV) and 18 normal subjects (C), age and size matched, using a Ramp Treadmill protocol. Neither group was treated with a Beta Blocker. Resting aortic valve peak gradient (PG) and shortening fraction (SF) were evaluated by echocardiography for the BAV group. Systolic blood pressure (SBP), cardiac output and