

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/316337441>

PHYSIOLOGICAL PROFILE OF MONOZYGOUS TWINS WITH 35 YEARS OF DIFFERING EXERCISE HABITS

Conference Paper *in* The Journal of Strength and Conditioning Research · December 2016

CITATIONS

0

READS

11,411

9 authors, including:



Katie Bathgate

California State University, Fullerton

6 PUBLICATIONS 0 CITATIONS

[SEE PROFILE](#)



James R Bagley

San Francisco State University

59 PUBLICATIONS 65 CITATIONS

[SEE PROFILE](#)



Edward Jo

California State Polytechnic University, Pomona

56 PUBLICATIONS 419 CITATIONS

[SEE PROFILE](#)



Lee E Brown

California State University, Fullerton

758 PUBLICATIONS 3,829 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Effects of different isokinetic training protocols aimed to knee flexors and extensors on H:Q ratio [View project](#)



Effect of Different Concentric and Eccentric Muscle Action Training Protocols on Knee Strength Ratios, Neuromuscular Adaptations, and Functional Performance [View project](#)

All content following this page was uploaded by [Cassio V Ruas](#) on 21 April 2017.

The user has requested enhancement of the downloaded file.

baseline condition] $\times 100$. **Results:** Despite substantial variability within the SFGT time samples, time to complete the SFGT 10 minutes post-exercise (relative difference = $5.2 \pm 11.9\%$; Min-Max: -20.2 to 25.8%) and 60 minutes post-exercise (relative difference = $9.4 \pm 24.2\%$; Min-Max: -25.5 to 50.6%) were similar to the baseline SFGT ($p = 0.45$). Firefighters' RPE was greater following the SFGT in the 10 minutes trial compared to baseline and 60 minutes trials ($p \leq 0.023$). Pre-SFGT blood lactate was similar between all trials. There were no significant differences in post-SFGT blood lactate concentrations between all trials. **Conclusions:** Performing 30 minutes of aerobic exercise at 60% HRR does not decrease the work rate of subsequent fire ground tasks, however, perception of effort to complete occupational tasks increased for the 10 minutes post-exercise trial. Despite the non-significant findings, there was considerable variability in the effect that the exercise stimulus had on individual firefighters' occupational performance. There are a host of factors that influence recovery rates from exercise that may include fitness level, genetics, sleep levels, dietary/hydration status, psychological stress and lack of motivation prior to performing the exercise and SFGT protocols. **Practical Applications:** Most firefighters can safely perform 30 minutes of vigorous aerobic exercise while on-duty, without experiencing a negative impact on subsequent occupational performance. This suggests that aerobic exercise may be a recommended mode of exercise to perform while on-duty given that it will reduce cardiovascular disease risk and improve aerobic aspects of occupational tasks. **Acknowledgments:** We would like to thank the Ruston Fire Department, Lincoln Parish Fire Department, and the firefighters for their participation and support in this study.

THURSDAY ABSTRACT POSTER PRESENTATIONS— SESSION B

July 07, 2016, 3:00 PM–4:30 PM—Celestin ABC

Thursday, July 07, 2016, 3:00 PM–4:30 PM

PHYSIOLOGICAL PROFILE OF MONOZYGOUS TWINS WITH 35 YEARS OF DIFFERING EXERCISE HABITS

K. BATHGATE,¹ J. BAGLEY,² E. JO,³ N. SEGAL,⁴
L. BROWN,⁵ J. COBURN,¹ C. GULICK,¹ C. RUAS,¹
AND A. GALPIN⁵

¹Human Performance Laboratory, Center for Sport Performance, California State University, Fullerton, California; ²Muscle Physiology Laboratory, Department of Kinesiology, San Francisco State University; ³Human Performance Research Laboratory, California State

Polytechnic University, Pomona, California; ⁴Department of Psychology, California State University, Fullerton, California; and ⁵Department of Kinesiology, Center for Sport Performance, California State University, Fullerton, California

Variations in physical ability between individuals depend on both training background and genetics. Previous research has investigated the details of this phenomenon by studying monozygous (identical) twins with long-term, moderate differences in physical activity patterns and/or monozygous twins with short-term, but greater differences in physical activity patterns. However, no previous research has used monozygous twins with both substantial and long-term differences in physical activity patterns. **Purpose:** Thus, to enhance our understanding of heritability and adaptability of various performance factors we analyzed the physiological profile of a set of monozygous twins with 35 years of differing exercise habits. **Methods:** One pair of male monozygous twins (age = 52 years) participated in this study. DNA testing confirmed zygosity. The trained twin (TT, ht = 186 cm mass = 94 kg) is a physical education teacher and track coach who began running cross-country and track in 1981. TT has been training and competing in endurance sports (e.g., running, triathlons, etc.) consistently over the past 35 years. He has ~39,431 running miles recorded from July 1993 to June 2015. In 2005, he qualified for All World Bronze Level in the Ironman. The untrained twin (UT, ht = 183 cm, mass = 104.5 kg) is a delivery truck driver. He was recreationally active in swimming, biking, and team sports early in life, but, has not engaged in regular or structured exercise since then (~35 years). Since 1991 UT recreational physical activity has been limited to ~20–30 min walks, $3\text{--}4 \times \text{wk}^{-1}$. Both participants performed 4 trials of 6-second maximal isometric contractions of the right leg extensors, 5 trials of grip strength testing with both hands (hand grip dynamometer), as well as a maximal aerobic capacity ($\dot{V}O_{2\text{max}}$) test (cycle ergometer). Additionally, a dual-energy X-ray absorptiometry scan was used to determine body composition and total bone mineral content (BMC). **Results:** UT displayed higher absolute peak torque (254 vs. 137 N·m, 59.9% difference) and grip strength (right = 56.5 vs. 44.3 kg, 24.2% difference; left = 51.7 vs. 43.7 kg, 16.8% difference). When normalized to lean body mass (LBM), UT continued to display higher peak torque (3.40 vs. $1.83 \text{ N} \cdot \text{m}^{-1} \cdot \text{kg}^{-1}$, 60% difference) and grip strength (right = 76 vs. 59% of LBM, 25.2% difference; left = 69 vs. 58% of LBM, 17.3% difference). However, UT had a lower absolute (3.67 vs. $4.66 \text{ L} \cdot \text{min}^{-1}$, 23.9% difference) and relative (35.1 vs. $47.5 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, 30.1% difference) $\dot{V}O_{2\text{max}}$. UT also had a higher body fat percentage (BF%) (27.8 vs. 19.2%, 36.6% difference), but nearly identical LBM (74.6 vs. 74.7 kg, 11.0% difference) and BMC (3575.7

vs. 3653.0 g, 2.1% difference). **Conclusions:** Long-term, mixed mode endurance training positively influenced $\dot{V}O_{2\max}$ and BF%, did not alter LBM or BMC, and was associated with lower isometric leg extensor and handgrip strength. The percent difference between the participants also demonstrates a level of “trainability” that exceeds previous research. **Practical Applications:** Leg strength and $\dot{V}O_{2\max}$ are significant and independent predictors of mortality. Training can influence both of these variables. However, adaptations are specific to imposed demands. Therefore, an ideal lifestyle approach should incorporate resistance exercise and endurance training to maximize both leg strength and aerobic capacity.

EFFECT OF IBUPROFEN ON ANTI-INFLAMMATORY CYTOKINE RESPONSES TO ULTRA-ENDURANCE CYCLING IN A HIGH TEMPERATURE ENVIRONMENTS

S. ROJAS,¹ D. LEVITT,¹ H. LUK,¹ A. MCKENZIE,² M. GANIO,³ B. McDERMOTT,³ K. WILLIAMSON,⁴ C. MUNOZ,² E. LEE,² L. ARMSTRONG,² B. McFARLIN,¹ D. HILL,⁵ AND J. VINGREN¹

¹Applied Physiology Laboratory, University of North Texas; ²University of Connecticut; ³University of Arkansas; ⁴Midwestern State University; and ⁵University of North Texas

Introduction: Endurance exercise, especially under extreme environmental conditions such as heat and humidity, elicits an inflammatory response coordinated by cytokines. Anti-inflammatory cytokines aid in limiting the magnitude of inflammatory signaling. The inflammatory response could be affected by common behavioral practices such as ingestion of ibuprofen before the exercise bout. Independently, ibuprofen and ultra-endurance exercise affect the production of cytokines. However, the effect of ibuprofen on the anti-inflammatory cytokine response to an ultra-endurance cycling event in the heat has not been previously investigated. **Purpose:** To examine the effect of ibuprofen consumed before an ultra-endurance road cycling (164 km) event in the heat on anti-inflammatory cytokines. **Methods:** Thirty-one men experienced in cycling (age = 51 ± 9 years, height = 171 ± 20 cm, body mass = 81.2 ± 15.0 kg, body fat = $22 \pm 6\%$) registered for the August 2015 Hotter’N Hell Hundred ride in Wichita Falls, TX. Participants ingested either ibuprofen (600 mg) or placebo (rice flour) prior to completing a 164-km bicycle ride in the heat (WBGT: 23.7–32.8° C). Blood was collected within the 2 hours prior to the ride (PRE, 0500–0700 hours) and immediately after event completion (POST). Serum was analyzed for anti-inflammatory

cytokines interleukin (IL)-4, IL-5, IL-7, IL-10, and IL-13. **Results:** A significant ($p \leq 0.05$) time \times condition interaction effect was found for IL-10. From PRE to POST, there was a greater increase in IL-10 for placebo than for ibuprofen. A significant main effect for time was found from PRE to POST, which led to an increase in production of IL-4, IL-5, IL-7, and IL-13. No main effect for condition was found. **Conclusions:** Ingesting ibuprofen prior to an ultra-endurance cycling event in the heat attenuates the increase in production of IL-10, a key anti-inflammatory cytokine. However, ibuprofen did not affect the exercise-induced increase in the production of anti-inflammatory cytokines IL-4, IL-5, IL-7, and IL-13. Thus, ingesting ibuprofen in this context inhibits some, but not all, anti-inflammatory signaling. **Practical Applications:** Ibuprofen ingestion prior to ultra-endurance cycling in the heat can blunt the IL-10 response, which could alter the recovery process. Athletes should use caution when consuming ibuprofen before ultra-endurance exercise since anti-inflammatory signaling is important for exercise recovery.

IBUPROFEN DOES NOT AFFECT CHANGES IN LEUKOCYTE SUBSETS IN RESPONSE TO ULTRA-ENDURANCE CYCLING IN THE HEAT

K. CARTAS,¹ D. LEVITT,² H. LUK,¹ B. McFARLIN,² L. ARMSTRONG,³ D. HILL,¹ B. KUPCHAK,⁴ A. MCKENZIE,³ K. WILLIAMSON,⁵ L. KUNCES,⁶ C. MUNOZ,³ E. LEE,³ AND J. VINGREN²

¹University of North Texas; ²Applied Physiology Laboratory, University of North Texas; ³University of Connecticut; ⁴Uniformed Services University; ⁵Midwestern State University; and ⁶EXOS

Introduction: We have previously found that after a 164-km ultra-endurance cycling event in the heat, the concentration of leukocytes in circulation substantially increases, with an unequal contribution from each leukocyte subset. It is popular practice for participants to consume non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen prior to the start of an ultra-endurance event. However, the potential effect of ibuprofen on leukocyte subsets in the context of ultra-endurance cycling in the heat remains unknown. **Purpose:** To determine the effect of consuming ibuprofen prior to an ultra-endurance cycling event in the heat on the leukocyte subset response. **Methods:** Twenty-7 experienced cyclists (age = 52 ± 10 years, height = 170 ± 17 cm, body mass = 81.1 ± 15.7 kg, body fat = $22 \pm 6\%$) participating in the August 2015 Hotter’N Hell Hundred bicycle ride in Wichita Falls, TX were recruited, and randomly assigned to consume ibuprofen (600 mg) or placebo (rice flour) prior to beginning the 164-km ride. The wet-bulb globe temperature