DOES RACE MATTER ? THE ROLE OF RACE IN THE BLOOD LACTATE LEVELS OF SUB-ELITE RUNNERS.

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Abstract

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Introduction: Lactic Acid is a byproduct of anaerobic metabolism. In the absence of oxygen, pyruvate undergoes fermentation instead of entering into the pyruvate dehydrogenase complex, which occurs during aerobic glycolysis. During fermentation, pyruvate is reduced to lactate. At about 50-70% of VO_{2max}, there is a substantial increase in lactate accumulation, otherwise known as the Lactate threshold. At this work rate, energy is obtained from glycolysis. Glycolysis at high intensity exercise increases CO_2 levels which in turn trigger an increase in ventilation and heart rate. This system is short lived and fatigue sets in quickly due to glycogen depletion, a decrease in pH due to excess H+ ions, and many other factors. Blood lactate levels are a reflection of the amount of lactic acid present in the muscle.

Purpose: The purpose of this study was to investigate the variance in exercise blood lactate accumulation between African Americans and Caucasians that were well trained.

Methods: Five African American Males (age 22 ± 1.7) and five Caucasian Males (age 22 ± 4.4) from the University of Texas at Arlington volunteered to participate in this study. Each subject filled out a questionnaire where they indicated that their minute mile run time was between six to eight minutes. Before exercise resting blood lactate was measured for each subject. Each subject performed a graded exercise test on the treadmill with increasing speed and elevation until exhaustion. During each test heart rate (HR) and rate of perceived exertion (RPE) were recorded along with the maximal values measured by the metabolic cart, relative maximal oxygen consumption (VO_{2max}) and minute ventilation (V_E). After exercise, post exercise blood lactate was measured for each subject.

Results: The post exercise blood lactate was (AA: 12.5 ± .93 mmol/L ; C 16.3 + 2.2 mmol/L) which was significantly different (p = 0.04). The net accumulation variance between African Americans and Caucasians was also significantly different (p = 0.008). The maximum values: HR (AA: 184±10.1 bpm; C 188± 4.4 bpm) ; V_E (AA: 96 ± 14.6 L/min ; C 101 ± 9.5 L/min); and relative $VO_{2\,max}$ (AA: 47.2 ± 4.2 mL/kg/min; C : 53.2 ± 6.5 mL/kg/min) were not significantly different between African Americans and Caucasians.

Conclusion: The results of this study indicate that sub elite African Americans have a lower blood lactate levels than sub elite Caucasian runners post maximal exercise.

Purpose

The purpose of this study was to investigate the variance in exercise blood lactate accumulation between African Americans and Caucasians that were well trained.

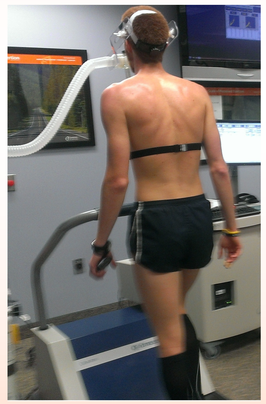
Introduction

- **Previous literature suggests that plasma lactate levels in elite distance runners are less in black African runners in comparison to Caucasian runners.**
- **Blood lactate is a by-product of anaerobic metabolism of glycogen.**
- **Glycolysis at high intensity exercise increases CO_2 levels which in turn trigger an increase in ventilation and heart rate. This system is short lived and fatigue sets in quickly due to glycogen depletion, a decrease in pH due to excess H+ ions, and many other factors**
- **Lower Lactate levels in skeletal muscle will delay the onset of fatigue results in delayed fatigue.**

Methods

Five African American Males (age 22 ± 1.7) and five Caucasian Males (age 22 ± 4.4) from the University of Texas at Arlington volunteered to participate in this study

	Age	BMI
African American	22 ± 1.7 yrs	24± 2.1
Caucasian	22 ± 4.3 yrs	22± 3.0



- **Each subject performed a graded exercise test on the treadmill with increasing speed and elevation until exhaustion. During each test heart rate (HR) and rate of perceived exertion (RPE) were recorded along with the maximal values measured by the metabolic cart, relative maximal oxygen consumption (VO_{2max}) and minute ventilation (V_E)**
- **Blood Lactate was measured using blood drawn by a finger prick before and after exercise using the Accusport Lactate Analyzer**

Results (cont'd)

The post exercise blood lactate was (AA: 12.5 ± .93 mmol/L ; C 16.3 + 2.2 mmol/L) which was significantly different (p = 0.04). The net accumulation variance between African Americans and Caucasians was also significantly different (p = 0.008).

Figure 1. Variance in ne Accumulation of blood lactate

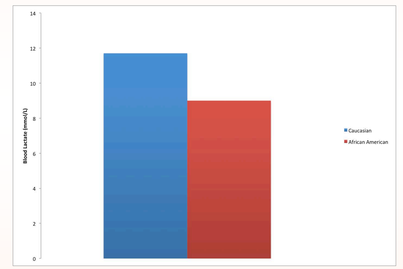
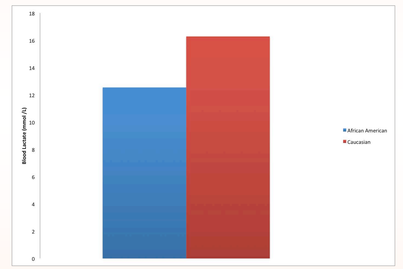


Figure 2. Variance in post exercise blood lactate



Conclusions

Few studies have been completed to clarify the physiological differences between African and Caucasian runners. The findings of this study indicate that blood lactate levels are lower in African Americans, despite comparable VO_2 max, V_E, and Heart rate max. Due to the complex nature of lactate kinetics, it is difficult to clarify the relationship between blood lactate and ethnicity. A consideration for future studies would be to investigate the disappearance rate of blood lactate in African Americans and Caucasians, as well as the physiological differences responsible for blood lactate variance between African Americans and Caucasians.