Effect of a 10 Day Decrease in Physical Activity on Circulating Angiogenic Cells

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A Thesis Presented

By

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ABSTRACT

EFFECT OF A 10 DAY DECREASE IN PHYSICAL ACTIVITY ON CIRCULATING ANGIOGENIC CELLS

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Circulating angiogenic cells (CACs) are early predictors of cardiovascular health and are inversely proportional to related outcomes. Increased number and function of CACs is seen in healthy individuals compared with individuals with cardiovascular disease (CVD). Exercise increases CAC number and function in CVD populations, through a nitric oxide-mediated mechanism. Inactivity is a growing concern in industrialized nations; it is an independent risk factor for CVD and is linked to increased mortality. The purpose of this study was to understand the effect of reduced physical activity (rPA) on two CAC populations (CFU-Hill and $CD34^+$) in highly active individuals. We examined the mechanisms underlying changes in CAC function as a result of rPA with maintained energy balance. The two sub-populations of CACs responded differently to rPA. CFU-Hill CACs, decreased in number and amount of intracellular nitric oxide while $CD34^+$ cells, did not change. Gene expression analyses indicated that oxidative stress-related genes did not change in CFU-Hill cells with rPA. However, correlations between CFU-Hill cell numbers, intracellular nitric oxide, and genes that are related to nitric oxide were observed. We concluded that rPA caused the observed decrease in CFU-Hill number and intracellular nitric oxide through a decrease in nitric oxide cellular availability, not oxidative stress.

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