DATA SET GROUP C EXPLORE 2 LESSON 27



Study 1

Treadmill Exercise Induces Neutrophil Recruitment into Muscle Tissue in a Reactive Oxygen Species-Dependent Manner. An Intravital Microscopy Study

Publish Date: 2014 Journal: PLOS ONE Authors: Albená Nunes-Silva, Priscila T. T. Bernardes, Bárbara M. Rezende,Fernando Lopes, Elisa C. Gomes, Pedro E. Marques, Paulo M. A. Lima, Cândido C. Coimbra, Gustavo B. Menezes, Mauro M. Teixeira, Vanessa Pinho Link: <u>https://doi.org/10.1371/journal.pone.0096464</u>

Overview of the Study

In this study, scientists were trying to investigate how cells of the immune system, called leukocytes or white blood cells, responded to exercise. The initial speed was set at 5 meters per minute (m/min) for 30 minutes to familiarize the mice with the apparatus and task. The speed was then increased by 1 m/min every 3 min, at a 5% grade, until the animal stopped running and was fatigued, which was judged by the refusal of the mouse to continue moving on the treadmill belt for more than 10 seconds. A mild electrical stimulus (0.5 mA) was applied to mice that stepped off the treadmill to keep them exercising. The control group did not perform the fatiguing exercise protocol.

Twenty microliters (μ L) of blood were collected from the brachial plexus of anesthetized mice directly into a tube containing Turk's solution. Total cell counts were performed in a modified Neubauer chamber. A blood smear was prepared and stained with Giemsa and May-Grumwald stains. The percentage of lymphocytes, monocytes, and neutrophils was determined by counting at least 300 cells and using standard morphological criteria.

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Figure 1. Number of leukocytes in the peripheral blood. Fatigue was induced by spontaneous running on an electric treadmill. At different time points after the exercise protocol, blood samples were collected, and numbers of total cell (A) neutrophils (B), monocytes (C), and lymphocytes (D) were evaluated. In this study, WT C57BI/6 mice were used. The results are presented as the mean \pm SEM (n=4–6). *P<0.05 when compared with the control group.

Study 2

Exercise-induced muscle damage, plasma cytokines, and markers of neutrophil activation

Publish Date: 2004

Journal: Medicine & Science In Sports & Exercise Authors: Jonathan M. Peake, Katsuhiko Suzuki, Gary Wilson, Matthew Hordern, Kazunori Nosaka, Laurel Mackinnon, and Jeff S. Coombes Link: <u>https://doi.org/10.1249/01.mss.0000161804.05399.3b</u>

Overview of the Study

Scientists set out to examine how downhill running could lead to changes in the amounts of various cells of the immune system in the blood. To study these changes, scientists took ten well-trained male runners and had them run downhill on a treadmill at a gradient of 10% for 45 min at 60% of their max effort. Their blood was sampled immediately before (PRE) and after (POST), one hour (1 h POST), and 24 hours (24 h POST) after exercise. Blood samples were analyzed for the number of leukocytes and neutrophils present.



Figure 2. Changes in total leukocyte (A) and neutrophil (B) counts before and immediately after, and one hour and 24 hours after 45 min of running downhill (10% gradient). Data are mean SD; N 10; † significantly different from PRE, P < 0.01.