Immune Biomarkers in Sports and Exercise

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Abstract

Aim: The aim of this article is to review immune biomarkers which are commonly used in sports and physical exercise. **Results:** Leukocytes (neutrophils, basophils and eosinophils), Monocytes, C- Reactive Protein (CRP) and Cytokines (TNF-α, IL-1β, IL-2, IL-5, IL-6, IL-8, IL-10) are commonly used as immune biomarkers in sports and exercise. **Conclusion:** Exercise changes in leukocyte numbers in circulating blood and the largest changes occur in the number of granulocytes (mainly neutrophils).Exercise intensity, duration and/or the fitness level of the individual may all play a role in regards to the degree of leukocytosis occurring. A short-term increase in serum CRP has been reported and increases in IL-6 over 100 times above resting values have been found after exhaustive exercise.

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Introduction

Blood biomarkers are measureable characteristics that reveal a particular physiologic state (Coriell institute 2016) and in the general population are important in risk evaluation and diagnosis of pathology, as well as in determining effectiveness of treatment. In sports and exercise, biomarkers may be used to assess an athlete's overall health or to determine positive/negative adaptations to training/environmental stimuli (San Millan 2013; Meyer and Meister 2011). Although limited, recent literature does provide evidence that monitoring specific blood biomarkers can lead to insights in immune biomarkers in sports and exercise. The present technological advances in mass spectrometry allowed system biology approaches (i.e. metabolomics, proteomics, lipidomics, and microbiome characterization) to be applied to sports and exercise immunology studies. The future of sports and exercise immunology will take benefit of these technologies to provide new insights on the interactions between sports and exercise and immune function. Moreover, these methodologies will improve mechanistic understanding of how sports and exercise-induced immune perturbations reduce the risk of common chronic diseases.

Immune system

The immune system is large and complex and has a wide variety of functions. The major role of the immune system is to defend the body against germs and microorganisms. Bacteria and viruses can do damage to our body and make us sick. The immune system does a great work in keeping individual healthy and preventing infections, but problems with the immune system can still lead to illness and infections. The immune system is divided into two functional divisions: the *innate immunity*, referred to as the first line of defense, and the *acquired (or adaptive) immunity*, which, when activated, produces a specific reaction and immunological memory to each infectious agent (Roitt and Male 2001).

Innate Immune System

The innate immune system consists of anatomic and physiological barriers (like skin, mucous membranes, body temperature, low pH and special chemical mediators such as complement and