

Title	Physical activity for health: the impact of exercise on the human gut microbiota and pro-inflammatory cytokines
Authors	Cronin, Owen
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Abstract

Introduction

Promotion of regular physical activity is a critical tool in the fight against chronic disease. However, our knowledge of the interplay between host organ systems and exercise is limited, preventing us from harnessing the full potential exercise promises in the prevention and treatment of chronic disease.

Methods

To maximize our ability to use exercise-related adaptations for health improvement, we focussed on practical and translational areas of Exercise Medicine, centred on 1) the anti-inflammatory effects of exercise and 2) the impact of exercise and associated diet on the intestinal microbiota. To do so we used a combination of systematic review, randomized control trials, and prospective observational analyses.

Results

Relating to the impact of exercise on the gut microbiome, this work suggests that favourable microbial profiles are evident in the elite athlete in comparison to healthy controls. It is apparent that short-term increases in physical activity are not sufficient to induce major changes in physically inactive individuals. Furthermore, we unearth a relationship between whey protein intake, often used as a dietary adjunct to exercise in recreational and elite sport, and altered diversity of the gut virome.

We demonstrate that short-term combined cardiorespiratory and resistance exercise does not lead to significant reductions in the circulating inflammatory biomarker profiles of

sedentary individuals or patients with stable inflammatory bowel disease. In contrast, we show that periods of intense exercise, such as those performed during pre-season training in elite sport, alters important components of the innate immune response.

Conclusions

Implications of the findings in this thesis are far-reaching and have translational learning points for athletes, patients and physically inactive populations. The work performed underlines the need for further research including the effects of long-term fitness improvement on the gut microbiota and the effects of exercise on disease activity in patients with Inflammatory Bowel Disease.