



**TIME-RESTRICTED EATING EFFECTS ON PERFORMANCE, IMMUNE FUNCTION, AND BODY COMPOSITION IN ELITE CYCLISTS: A RANDOMIZED CONTROLLED TRIAL**

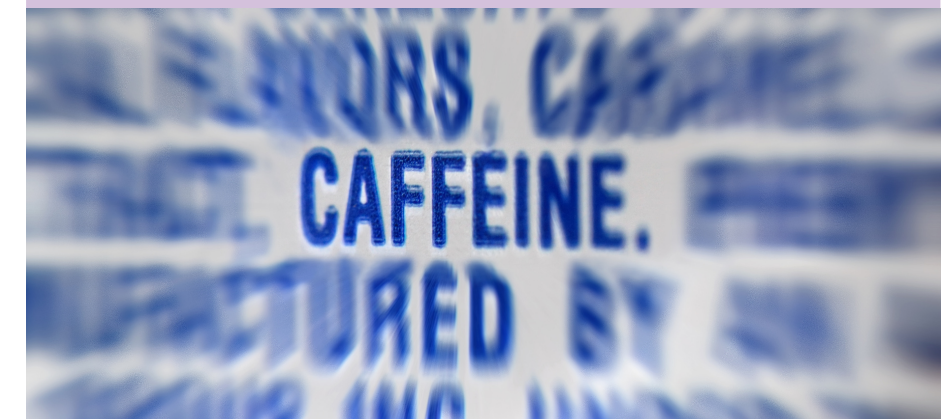
Moro, T ; Tinsley, G ; Longo, G ; Grigoletto, D ; Bianco, A ; Ferraris, C ; Guglielmetti, M ; Veneto, A ; Tagliabue, A ; Marcolin, G ; Paoli, A  
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Adequate nutrition is important for elite athletes, as nutrient availability influences energy expenditure, body composition, performance and exercise-induced immune responses. Time-restricted eating (TRE) is a form of intermittent fasting that has received much interest in recent years. Previous research of TRE suggested beneficial effects on performance in untrained individuals, by allowing weight loss whilst maintaining muscle functions. These qualities are of interest for endurance cyclists hence the authors of this study sought to investigate the impact of TRE in elite cyclists. Sixteen under-23 year old, elite cyclists were randomly assigned to eat within a TRE window of 8-hr or 15hr window during a 4-week, high-level endurance training phase. Both groups consumed their full estimated energy needs and markers such as fat and fat-free mass, VO2 max, basal metabolism, blood counts, anabolic hormones and inflammatory markers were measured. As a result, TRE produced weight loss, improved body composition and increased peak power output in relation to body weight without compromising aerobic performance. Furthermore, the TRE pattern proved helpful in mitigating some of the exercise-induced suppressions of the immune system. The authors concluded that TRE could be considered as part of a performance nutrition plan in endurance athletes. Particularly where there is a need to reduce body fat mass or for the management of training-induced depression of the immune system and associated respiratory infection susceptibility. This can be of clinical relevance in the support of endurance athletes.

**ERGOGENIC EFFECTS OF ACUTE CAFFEINE INTAKE ON MUSCULAR ENDURANCE AND MUSCULAR STRENGTH IN WOMEN: A META-ANALYSIS.**

Grgic, J ; Del Coso, J  
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Caffeine is a well-documented ergogenic aid. Among the existing studies that have explored this topic, women are largely underrepresented in the data. The aim of this meta-analysis was to evaluate whether the ergogenic effects of caffeine on strength and endurance known to be true for men could also be extended to women. The analysis included studies that used women as participants and found caffeine to have a significant ergogenic effect on both endurance and strength. When a sub-group analysis differentiated between upper- and lower-body exercises independently, only upper-body performance was improved by caffeine ingestion. Based on the current literature, the authors conclude the ergogenic effects that were previously observed in men are also applicable to women. They suggest further investigation as to why the ergogenic effect differs between upper- and lower-body performance.



**EFFECT OF DIETARY NITRATE ON HUMAN MUSCLE POWER: A SYSTEMATIC REVIEW AND INDIVIDUAL PARTICIPANT DATA META-ANALYSIS**

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Previous reviews have concluded that dietary nitrate (NO<sub>3</sub><sup>-</sup>) improves maximal neuromuscular power in humans, but these were based on a limited number of studies. This is the first systematic review and meta-analysis evaluating the effects of dietary NO<sub>3</sub><sup>-</sup> supplementation on muscular power in humans. The study also aims to quantify the size of this beneficial effect. 19 studies with a total of 268 participants were included. Most of these used concentrated beetroot juice as the source of NO<sub>3</sub><sup>-</sup> given as an acute dose (short term high level). A positive effect of dietary NO<sub>3</sub><sup>-</sup> on muscle power was observed in all 19 studies. Analyses were done on sub groups - age, sex and the amount of muscle mass engaged in the activity. Dietary NO<sub>3</sub><sup>-</sup> intake significantly increases maximal muscle power in humans. The magnitude of this effect has practical and clinical importance; not just for athletes but also for patient groups. This effect is independent of subject age, sex, or the amount of muscle mass engaged in the activity but may be greater with acute vs. repeated dosing. Further research is needed to determine factors such as the optimal supplementation regimen and target population.



**IMPACT OF PROBIOTICS ON THE PERFORMANCE OF ENDURANCE ATHLETES: A SYSTEMATIC REVIEW**

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The relationship between the gut microbiome and exercise has recently been explored to ascertain potential methods of improving athletic performance. Athletes have begun utilising probiotics to improve performance, support the immune system and reduce gastrointestinal problems, however no systematic review has been done to assess the efficacy behind these notions. The aim of this study is to review the use of probiotics in endurance athletes and assess both the direct and indirect associative factors. This review included nine studies and found improvements in athletic performance, oxidative stress markers, immune support, and incidence of upper respiratory tract infections with probiotic use. While there is little scientific evidence on the causative relationship between probiotics and performance, the authors conclude probiotics can enhance athletic performance by ameliorating the indirect consequences of oxidative stress and infection.

