The effect of a short term exercise schedule on oral bioavailability, iron incorporation and blood volume

Project 450

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Abstract:

A 3-week running schedule in recreationally trained men increases both inflammation and erythropoiesis, resulting in lower hepcidin and an increase in oral iron absorption.

Background:
Regular exercise may increase the risk for iron deficiency. It has been hypothesized that exercise may increase low grade inflammation, thus increasing hepcidin and decreasing oral iron absorption, but this mechanism has not been directly measured.

Objective:
We hypothesized that a 3-week intensified exercise schedule in recreational runners would increase inflammation and hepcidin and thereby decrease oral iron bioavailability.

Design:
We recruited 10 male subjects and followed them for a 14 day control phase and a 20 day exercise period where participants conducted an 8 km run every second day for 11exercise bouts. We measured oral iron absorption and intravenous iron systemic utilization using stable isotopic labels at the start of the control phase (dayl) and after three exercise bouts in the training phase (day 20). We assessed hemoglobin mass (nHb) and red cell volume (RCV) with the CO-rebreathing method at the start and at the end of the study, and monitored iron status, inflammation markers, hepcidin and erythropoietin (EPO) throughout.

Results:
All subjects completed the study and were iron replete. Exercise resulted in a 3% increase in nHb and a 6% increase in RCV (both $P<0.05$). EPO and IL6 increased with exercise ($P<0.05$), while hepcidin decreased compared to the control period ($P<0.05$). There was a borderline significant '"20% increase in oral iron absorption during exercise, when compared to the control period (19.3 vs 15.6%; $P=0.083$). Hepcidin was negatively correlated with nHb and RCV ($P<0.05$) and the change in oral iron absorption was significantly correlated with the change in nHb ($R2=0.510$; $P<0.05$).

Conclusions:
In iron replete male subjects, an increase in training load increases erythropoiesis and this offsets an increase in inflammation, resulting in lower hepcidin and a modest increase in oral iron absorption.