

1.10 Hemoglobin Mass and Endurance Performance in Elite Sport

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Hemoglobin mass and endurance performance in elite sport

Submitted by: **Jon Wehrlin** (Swiss Federal Institute of Sport Magglingen, Section for Elite Sport, Switzerland.)

Performance and maximal oxygen uptake (VO₂max) in endurance sports is mainly limited by the oxygen supply to active muscle. Since total amount of hemoglobin (Hbmass) determines in large part the oxygen transport capacity of the blood, Hbmass is a main limiting factor for endurance performance. The importance of a high Hbmass in endurance athletes is also shown by the problem of blood doping in elite sport. It is well known, that senior elite endurance athletes are characterized by about 35% higher Hbmass than untrained individuals. From a sport practical point of view, therefore several key-questions arise: 1) Does Hbmass in senior endurance athletes increase with endurance training over years? 2) Does Hbmass increase more in adolescent endurance athletes with a high load of endurance training than in control subjects between age 16 and 18.5 yrs? 3) Does normobaric and hypobaric altitude training in senior athletes evoke similar Hbmass responses and is there a substantial inter-individual variability in Hbmass response? In the three presentations of our session, these key-questions will be answered and an outlook for further investigations in this relevant field for endurance performance will be addressed.

Presentations of the Symposium

Hemoglobin mass does not change over years in Swiss senior male elite endurance athletes

Jon Wehrlin, Anna Hauser, Severin Troesch, Thomas Steiner

Swiss Federal Institute of Sport, Magglingen, Switzerland.

Theoretical Background

In aerobic sport disciplines – such as cross-country skiing or mountainbiking - a main important factor determining aerobic performance is the total amount of hemoglobin, hemoglobin mass (Hbmass). Since endurance athletes are characterized by an about 30-40% higher Hbmass than untrained subjects, the question arises if this is due to endurance training over years (yrs) or other factors like genetic predisposition. Very little is known about the Hbmass changes with training over yrs. From cross sectional data from athletes at age 23 and age 28 (2) as well as Hbmass data measured over one training year (1), it can be hypothesized there is no relevant Hbmass increase over yrs (3).

Research Question

Does Hbmass in Swiss national team endurance athletes change with several yrs of endurance training?

