Highly intensive interval like training and its impact on endurance and recovery capacity
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Introduction
Interval and continuous training (CT) are routinely used methods to enhance endurance capacity. Comparison of their effectiveness is difficult as interval training often uses a lower total energy consumption (tEC). The aim of this study is to systematically compare these methods applying the same tEC. To enlarge the tEC at the interval training we reduced the recovery times between the intervals which should not only increase endurance capacity but also increase power and recovery abilities.

Methods
Male subjects (20-31 years), performing ball- and/or endurances sports were assigned to two groups (Interval Group (IG) n=10; Control Group (CG) n=10). The average performance in each group was 4.16 Watt/kg. IG conducted an highly intensive interval like training (IT) of 1 hour and CG conducted an CT of 1 hour. The average training intensity was 50% of the maximal power reached in an incremental test (Pow_max). The training was added to their normal training and performed 3 times a week for 3 weeks. Before and after the training an endurance test at 80% Pow_max to exhaustion and 2 days later 2 Wingate-tests (WT), separated by 1 min, were carried out.

Results
The improvement of endurance time in IG was significantly larger than in CG (50% vs. 21%, p<0.05) (Fig.1). The respiratory exchange ratio (RER) during the endurance test was lower in both groups (IG p<0.05). [Lac] in IG was decreased after 3 min at 80% Pow_max. Both groups had decreased [Lac] after 3, 5 and 10 min after the end of the endurance test.
Total hämoglobin per kg (tHb/kg) increased in both groups by 5.8% (p<0.05). The mean power at the 1. WT (sprint ability) in IG was improved by 3.4% and in CG by 1.6%. The performance at the 2. WT (recovery ability) in IG was improved by 7.4% (p<0.01) and in CG by 3.4% (n.s.) (Fig. 2). During and after the WT [Lac] was unchanged. [K+] was unchanged, too.

Discussion/Conclusion
The increased VO2 in IG at the 2. WT and the unchanged [Lac] show a greater contribution of the oxidative metabolism and an unchanged anaerobic metabolism. Further both groups show similar adaptations in the RER, [Lac], [K+] and (tHb/kg). Unchanged [K+] in spite of the greater power suggest an increased activity of the Na+/K+-ATPase. Thus IT is significantly more effective with the same total amount of work than CT in improving endurance and recovery abilities. Also the sprint ability may be improved.

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