PROJECT REVIEW

"Boosting the 15-nitric oxide sensitivity for total hemoglobin mass measurements using an optical cavity"

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The aim of all kinds of blood manipulation is to increase the total hemoglobin mass (tHb-mass), which is directly correlated to maximum aerobic power and hence performance.

To minimize these illegal practices we recommend monitoring tHb-mass of endurances athletes over time Serial measurements of tHb-mass can also be used to demonstrate objectively that an athlete has or has not used blood doping practices.

The practicability of a 15NO-rebreathing method in analogy to the established optimized CO-rebreathing method was evaluated in a scientific project by Prof. Schmidt, Prof. Bloch and Dr. Gäbler and funded by WADA (2010-2012). 15NO has several advantages compared to CO, which could lead to a broad acceptance of the method in federations and athletes.

The amount of tracer gas which has to be inhaled can be 4000-fold reduced, avoiding a toxic load for the athlete. Furthermore, NO has a 200-fold higher affinity to hemoglobin reducing the influence of possible confounding factors. We expect the NO-rebreathing technique using 15NO as innovative tracer gas as an optimal method to determine tHb-mass.

The practicability of the new 15NO-method is still limited by the sensitivity of the detector. Physiological loss mechanisms and handling of the blood samples as test routine method require a higher sensitivity than commercially available. With the further improvement of the 15NO-sensor, setup in the first project, we expect to meet the demanding detection limit for a tHb-mass routine test. As a consequence tHb-mass can be introduced as a key parameter into the athlete's biological blood pass.