PROJECT REVIEW

"Study of a new procedure to detect haemoglobin-enhancing substances or methods that improve oxygen transfer"

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The aim of the project is to evaluate a procedure to detect the use of any substance (i.e. erythropoietin and analogs) or method (i.e. homologous or autologous transfusions) that induce an increase in total haemoglobin.

The proof of principle is based in monitoring variations in the oxygen saturation curve by comparing measurements under normoxia or hypoxia in the resting state. It is proposed that the results will show that individuals who resorted to any of the aforementioned prohibited substances or methods will show a better adaptation under hypoxic conditions, evidenced by a significantly increased oxygen saturation value.

In all, the overall objective is to develop an indirect field test to instantly measure this type of doping in addition to urinary and/or blood tests used to that effect. It is envisioned to use such method on the same grounds as the currently utilized hematocrit determination.

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Results and Conclusions

The aim of this study was to investigate an indirect method based on variations in haematological markers that could be used to identify haemoglobin-enhancing substances or methods that improve oxygen transfer.

The selection of statistical markers has been realised from experimental variations obtained during different phases including an increase in training volume at sea level, high altitude training, blood withdrawal and autologous blood transfusion. Blood arterial oxygen saturation under hypoxia conditions at resting state, like other markers, could not be taken into account due to the absence of statistical uniformity. The markers selected were hematocrit (Hct), haemoglobin concentration ([Hb]) and stimulation index (Off-hr). An absolute norm of variation (normΔ) for each selected markers allowing the distinction between normal and abnormal variations was established at the time. The absolute norms of variation obtained are:

normΔHct>6%
normΔ[Hb]>4%
normΔOff-hr>20%

Application of this method for one day competitive trials would ideally consist in taking the first blood sample 15 days before the competition and the second one upon its completion. For competitive trials of several days or weeks or during championships lasting several months blood samples should be taken without warning at a maximum interval of 15 days. In the future, this maximal interval could be increased with use of localisation data collected with the ADAMS system, and specifically those linked with presence at high altitude or not of an athlete.