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Effect of rhEPO administration on serum levels of sTfR and cycling performance.

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PURPOSE:
We assessed the possibility of using soluble transferrin receptor (sTfR) as an indicator of doping with recombinant erythropoietin (rhEPO).

METHODS:
A double-blind, placebo-controlled study was conducted with the administration of 5,000 U of rhEPO (N = 10) or placebo (N = 10) three times weekly (181-232 U x kg(-1) x wk-1) for 4 wk to male athletes. We measured hematocrit and the concentration of hemoglobin, sTfR, ferritin, EPO, and quantified the effects on performance by measuring time to exhaustion and maximal oxygen uptake (VO2max) on a cycle ergometer.

RESULTS:
Hematocrit increased from 42.7 +/- 1.6% to 50.8 +/- 2.0% in the EPO group, and peaked 1 d after treatment was stopped. In the EPO group, there was an increase in sTfR (from 3.1 +/- 0.9 to 6.3 +/- 2.3 mg x L(-1) , $P < 0.001$) and in the ratio between sTfR and ferritin (sTfR-ferritin(-1)) (from 3.2 +/- 1.6 to 11.8 +/- 5.1, $P < 0.001$). The sTfR increase was significant after 1 wk of treatment and remained so for 1 wk posttreatment. Individual values for sTfR throughout the study period showed that 8 of 10 subjects receiving rhEPO, but none receiving placebo, had sTfR levels that exceeded the 95% confidence interval for all subjects at baseline (= 4.6 mg x L(-1)). VO2max increased from 63.6 +/- 4.5 mL x kg(-1) x min(-1) before to 68.1 +/- 5.4 mL x kg(-1) x min(-1) 2 d post rhEPO administration (7% increase, $P = 0.001$) in the EPO group. Hematocrit, sTfR, sTfR-ferritin(-1), and VO2max did not change in the placebo group.

CONCLUSION:
Serum levels of sTfR may be used as an indirect marker of supranormal erythropoiesis up to 1 wk after the administration of rhEPO, but the effects on endurance performance outlast the increase in sTfR.

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