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REPLY

Of intermittent hypoxia and doping

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Sanchis-Gomar et al. (2009) performed an interesting experiment on rats, who had received 500 IU of rHuEPO-alpha three times a week for 2 weeks. These rats were then divided into two groups: one group was exposed intermittently to hypoxia (equivalent altitude of 4,000 m, 12 h per day), the other was not. The rats of the former group had variations of haematological parameters that are coherent with the concept of altitude acclimatization. This includes, of course, an increase in endogenous EPO, so that the erythropoietic stimulation index was altered. So, the authors conclude, intermittent hypoxic treatment after rHuEPO-alpha administration can significantly modify the main haematological parameters tested by the anti-doping authorities. Consequently, Lippi and Franchini argue in their letter that intermittent hypoxic training should be banned as a doping procedure. They seem to overlook the fact that rats were exposed to an equivalent altitude of 4,000 m, which is not exactly the altitude were athletes use to go, but this is not a main point: some athletes could well spend 12 h per day (over night, for instance) in a hypobaric chambers at that altitude.

The main point, since we deal with doping, is the following. According to the World Anti-Doping Code (available at http://www.wada-ama.org) of the World Anti-Doping Agency (WADA), a substance or a method is recognised as doping when it meets, or it is a demonstrated masking agent of a substance that meets, at least two of these conditions: (1) it improves performance, (2) it carries along health risks, (3) it is contrary to what the International Olympic Committee calls "the spirit of sport". Intermittent hypoxia exposure does not improve performance per se, is not harmful to health, is not contrary to the spirit of sport more than altitude acclimatization. So the argument of Luzzi and Franchini must rely on the concept that intermittent hypoxia is a masking agent (of rhEPO) of exogenous EPO administration at anti-doping control. But is it really a masking agent? Exogenous EPO can be identified directly in urine and in blood with electrophoresis, since the electric charge of the rhEpo molecule is less negative than that of endogenous Epo (Wide et al. 1995). The method underwent extensive validation, has been finely tuned, is highly reliable nowadays, and has been formally recognised by WADA in 2003. Intermittent hypoxia exposure does not conceal rhEPO from detection by electrophoresis. Thus, it cannot be considered, to my mind, a masking agent. In conclusion, none of the conditions established by WADA for the inclusion of a substance or a method in the doping list is fulfilled by intermittent hypoxia exposure. So, I kindly disagree with the proposal by Luzzi and Franchini of banning intermittent hypoxia exposure as a doping procedure.

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