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Letter to the Editor

Immature reticulocyte fraction (IRF) monitored in elite athletes during a whole season

Sir, in a previous report (Banfi *et al.*, 2004), we described the peculiar behaviour of the parameter immature reticulocyte fraction (IRF) in elite athletes. This parameter showed higher values in athletes than those in sedentary people, although the reference ranges are also applicable to them. The bone marrow of athletes is continuously stimulated because of the accelerated iron metabolism. The evaluation of reticulocyte counts and related parameters are crucial to monitor iron metabolism in sportsmen and to prevent problems (sports anaemia) or abnormal and illicit erythrocyte maturation.

We calculated IRF in elite skiers and football players, before the start of the training programme. In order to study the possible modification of the bone marrow stimulation and, consequently, the release of young reticulocytes in bloodstream from bone marrow during the competition season, and to outline eventual association among training programmes, workload intensity and psychophysical stress because of competitions and reticulocyte characteristics, we collected reticulocyte counts and IRF during the whole season 2003–2004 of skiers of the Italian National Team. We used Cell-Dyn 4000 (Abbott, Chicago, IL, USA) regularly controlled and calibrated and we strictly observed preanalytical warnings for haematological samples (D'Onofrio *et al.*, 1997; Banfi & Dolci, 2003).

Blood drawings were performed in May at rest, before the start of training programme, in July, during the aspecific training programme, in September, during the specific training programme, in November, before the start of the international competitions, and finally in May 2004 at rest, before the start of the training programme. The males were from downhill teams ($n = 4$), special ($n = 5$) and giant ($n = 8$) slalom teams, whereas females came from special slalom teams ($n = 9$). In Table 1 we specify the number of athletes drawn; in the September blood drawing only males were recruited. The values of reticulocytes and IRF are presented in Table 1.

We remark that the values of reticulocytes and IRF are not significantly modified by training and competition programmes (Student *t*-test). We confirm that IRF values in athletes are near the higher level of the reference range and that there are no differences between males and females. In November, the mean IRF values were the lowest, although in that period the athletes were highly stimulated by training and competitions. It seems that bone marrow is continuously and constantly stimulated in elite athletes, and external physiological factors are not sufficient to modify the production of reticulocytes and their characteristics. In the three females who had high values of soluble receptor of transferrin (>1.75 mg/l) during the study period, praecox sign of iron functional decrease, the reticulocyte values were not different from those of the other athletes.

The evaluation of reticulocytes and, possibly, related parameters, for studying the possible bone marrow stimulation by using drugs is currently used and it is corroborated by our results, showing constant values in elite athletes during a whole season.

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Table 1. Values of reticulocytes counts and immature reticulocyte fraction in skiers

	May	July	September	November	May
Athletes	25 (16 M, 9 F)	24 (17 M, 7 F)	13 (13 M)	16 (9 M, 7 F)	25 (16 M, 9 F)
Reticulocytes (%, mean values)	1.11	0.91	1.21	1.09	1.01
IRF (%, mean values)	0.30	0.30	0.33	0.27	0.29

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