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Statistics of Blood Test in 5th National Urban Games of China 2003

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Introduction

National Games in China are the largest sport event in China, in which the delegations are organized by provinces. National Urban Games are the second largest sport event, in which all the delegations are sent by cities, not by provinces. Both of these two Games present the national level and are held every four years. In the 5th National Urban Games in Changsha (Hunan Province), China, there were 25 different sports with over 6000 athletes. During the Games, blood tests were carried out for doping control pre-competition test. As On Model ($M > 2.5$, $F > 2.4$) as Hct ($M > 0.50$, $F > 0.48$) were used as the criteria for the further EPO urine test.

Experiment

131 venous blood samples were collected before breakfast in the morning and tested within 4 hours after samples have been taken. 2 ml of the blood sample was for serum and 2 ml for whole blood. As suggested by Sydney EPO 2000 Group⁽¹⁾, Hct, %Macro and RetHct were measured using Bayer Advia 120, sTfr was measured with R&D ELISA kits and serum EPO was measured with DPC Immulite. Statistics were carried out with SPSS using t-test.

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Results and Discussion:

Tab.1 The sports, gender and age of the athletes for the 131 Blood Samples

Sports \ Gender	Female		Male	
	Number	Age	Number	Age
Swimming	12	15 ± 1.76	13	17 ± 2.39
Track and Field	16	18 ± 1.35	16	19 ± 1.19
Rowing, Canoe, etc	29	18 ± 1.83	27	18 ± 1.83
Cycling	9	18 ± 1.06	9	17 ± 0.73
Sum	66	17 ± 1.92	65	18 ± 1.76

The volunteers involved in EPO 2000 project for On Model were 21.7 ± 2.0 of age for males and 21.7 ± 2.9 for females⁽¹⁾. Only one female of the athletes in this Urban Games of China was older than 20 years and only one male older than 21 years. The athletes in this Urban Games of China were younger than the volunteers involved in EPO 2000 project.

Tab.2 Serum EPO level (mIU/mL)

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	10.73 ± 3.11	8.91 ± 5.05	10.28 ± 4.52	11.75 ± 5.45	10.32 ± 4.51
M	10.65 ± 1.74	11.17 ± 4.03	9.38 ± 3.53	12.45 ± 4.92	10.48 ± 3.68

From Tab.1 no significant difference of serum EPO level between these four sports could be observed. Six samples shown in the following Tab.3 are not included in Tab.2 and Tab.4 to Tab.8 because 5 of them showed significant higher serum EPO levels than the remaining 126 blood samples and 1 showed its Hct value over the criteria.

Tab.3 Five Blood Samples with High Serum EPO Level (mIU/mL)

Age	Sex	On Model	Hct(L/L)	Macro%	RetHct(L/L)	EPO (mU/ml)	sTfR (mg/L)
19	M	2.6	0.44	0.3	0.0088	55.35	1.64
20	F	2.3	0.366	1.1	0.0097	23.25	1.76
19	F	2.1	0.373	0.2	0.0049	25.7	1.61
18	F	2.3	0.393	0.1	0.0078	31.2	2.58
21	F	2.5	0.387	0.3	0.015	32.05	2.50

The EPO urine test confirmed the presence of exogenous EPO in the urine sample associated with the first blood sample in Tab.3. In this case Hct did not show any indication for doping with EPO but the value of the On-model was clearly over the criteria. If the use of Hct as an indication for doping with EPO is valid, is still in discussion⁽²⁾. The presence of exogenous EPO in the four urine samples associated with the rest four blood samples in Tab.3 could not be confirmed by the EPO urine test.

Tab.4 sTfr (nmol/L) Level

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	0.964±0.25	1.786±0.37	1.742±0.33	1.540±0.33	1.571±0.458
M	1.248±0.74	1.875±0.45	1.631±0.36	1.768±0.22	1.630±0.513

The swimming player showed the lowest sTfr (nmol/L) level. There is significance between the sTfr levels of female swimmers and other athletes of the three sports (P<0.001). Except cycling, there is significance between the sTfr levels of male swimmers and other two sports (P<0.05).

Tab.5 Hct (L/L) Results

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	0.386±0.03	0.419±0.03	0.407±0.03	0.420±0.02	0.407±0.03
M	0.431±0.02	0.450±0.03	0.449±0.02	0.460±0.02	0.447±0.03

Swimmers blood samples showed the lowest Hct.

Tab.6 Macro% Results

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	0.200±0.21	0.733±0.76	0.515±0.38	0.678±0.70	0.529±0.53
M	0.123±0.09	0.560±0.57	0.500±0.35	0.433±0.40	0.410±0.41

Again the swimmers' blood samples showed the lowest levels of Macro%.

Tab.7 RetHct(%) Results

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	0.510±0.11	0.701±0.31	0.779±0.21	0.606±0.15	0.687±0.23
M	0.647±0.25	0.910±0.27	0.765±0.17	0.643±0.09	0.756±0.23

One more again the swimmers' blood samples showed the lowest values of RetHct.

Tab. 8 Values of On Model

Sex	Swimming	Track and Field	Rowing, Canoe, etc	Cycling	Mean
F	1.863±0.15	2.165±0.16	2.167±0.17	2.157±0.17	2.106±0.21
M	2.081±0.18	2.413±0.27	2.288±0.16	2.33±0.11	2.275±0.21

There is significance between the On Model values of the swimmers and the players for other three sports ($P<0.001$). None of the result was over the On-model criteria.

All 126 athletes, excluding these 5 blood samples in the Tab. 3, can be divided into four groups, none high altitude training and high altitude training for one, two and three months.

Tab. 9 and Tab. 10 show the blood test results of the different high altitude training time.

Tab. 9 High Altitude Training (males)

	None N=38	One Month N=8	Two Months N=8	Three Months N=8
EPO (mIU/mL)	10.7 ±3.6	11.8±4.03	8.450±2.75	10.056±4.12
sTfR(nmol/L)	1.67±0.50	1.41±0.70	1.604±0.39	1.700±0.35
HCT(L/L)	0.452±0.02	0.429±0.03	0.447±0.02	0.447±0.03
Macro%	0.411±0.32	0.467±0.69	0.363±0.41	0.388±0.46
RetHct(L/L)	0.0075±0.002	0.0073±0.003	0.0071±0.0018	0.0086±0.0020
OnModel	2.306±0.171	2.190±0.352	2.215±0.197	2.288±0.238

Tab. 10 High Altitude Training (females)

	None N=43	One Month N=11	Two Months N=3	Three Months N=6
EPO (mIU/mL)	9.956±4.50	10.632±5.69	14.933±5.32	12.192±4.46
STfr (nmol/L)	1.618±0.44	1.379±0.51	1.737±0.64	1.529±0.35
HCT(L/L)	0.410±0.03	0.398±0.04	0.392±0.03	0.402±0.02
Macro%	0.551±0.51	0.427±0.68	0.233±0.15	0.800±0.43
RetHct(L/L)	0.0070±0.002	0.0063±0.003	0.0074±0.0036	0.0076±0.0030
OnModel	2.125±0.186	1.992±0.251	2.115±0.241	2.213±0.139

From Tab. 9 and 10, high altitude training did not play a significant role on the values of

the On-model but may make some difference in other blood parameters. The values of macro% in this table are higher than the values in the publication⁽³⁾.

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