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RECENT ADVANCES IN DOPING ANALYSIS (11)

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Doping Control During the VII South American Games in Brazil

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Introduction

The VII South American Games were held from 1-11 August and from 30 November-01 December (only for rowing), 2002 in Brazil, with the participation of athletes from 14 different countries. Four cities hosted the event located in the north (Belém), southeast (Rio de Janeiro and São Paulo) and south (Curitiba) parts of the country.

These games were the first international major event realized in the laboratory after the IOC and ISO 17025 accreditations.

This report presents the procedures, instrumentation, staff organisation and statistical data referred to the event.

A peculiar longitudinal study of an athlete with naturally elevated T/EpiT ratio (11.2 ± 1.5) is also presented.

Tasks, instrumentation and staff

All "A" samples were analysed using 7 screening procedures. One GC/NPD, four GC-MSD and one GC-ITD were used for the analysis. Fifteen members of laboratory worked during the competition. Table 1 shows the classes of the compounds monitored, as well as the instrumentation and the personnel involved in the analytical tasks.

Sample reception

The delivery of the samples to the laboratory was not based on a daily frequency. The number of samples sent to the laboratory in each delivery ranged from 5 to 100, with the maximum on 12th August (Figure 1).

A total of 270 samples were analysed from 30 different sports (Figure 2). Among them, 59.6% were from males and 40.4% from females.

Table 1. Monitored compounds, instrumentation and personnel.

	Classes of monitored compounds	Instrumentation	Personnel
1A	volatile nitrogen containing compounds excreted free.	GC/NPD GC/MSD (HP 5970)	1 supervisor 1 analyst 2 technician
2	volatile and semi-volatile compounds excreted free and conjugated.	GC-MSD (HP 5972)	1 supervisor 1 analyst 1 technician
4A	clenbuterol, anabolic steroids and/or their metabolic products excreted free.	GC-MSD (HP 5973)*	1 supervisor 1 analyst 2 technicians
4B	anabolic agents (steroids and β_2-agonists) and/or their metabolic products excreted free and conjugated.	GC-MSD (HP 5973)*	1 supervisor 1 analyst 2 technicians
4C	anabolic agents (steroids and β_2-agonists) and/or their metabolic products excreted free and conjugated by high sensitive technique.	GC-ITD (VARIAN-SATURN 2000)	1 supervisor 1 analyst 2 technicians
4D	β_2-agonists and/or their metabolic products excreted free and conjugated.	GC-/MSD (HP 5973)*	1 supervisor 1 analyst 2 technicians
5B	diuretics and probenecid excreted free.	GC-MSD (HP 5973)	1 supervisor 1 analyst 1 technician

* same equipment.

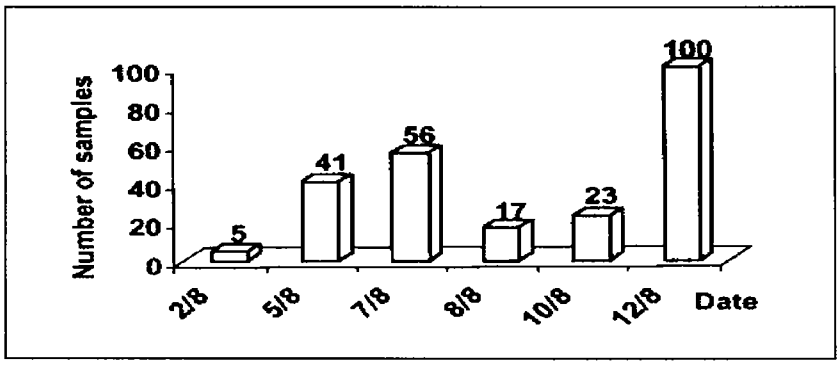

Figure 1. Sample delivery frequency on the VII South American Games*.
* The delivery of the 28 samples from rowing (12th december) was not included.

Urine volumes ranged from 30 to 100mL with 80.7% of the samples between 50-80mL. However, for 9.6% of the samples, the volume was insufficient for all screening procedures and quantitations, if necessary (see Figure 3).

pH measurements ranged from 5.0 to 10.0 with most of the samples (69.3%) showing pH values between 6.0 and 7.0. However, for some cases, values reported during sample collection by the Medical Comission officers were significantly different from values reported by the laboratory. Two samples presented pH 10 at the laboratory, showing differences in

measurement above 4 pH units. For values reported by the Medical Commission officers, pH ranged from 5.0 to 9.0 with 63.6% of the cases showing values between 5.0 and 6.0 (Figure 4). Measurements, both in the field and at the laboratory were made using Merck pH strips (1 to 10 pH, 1 unit scale).

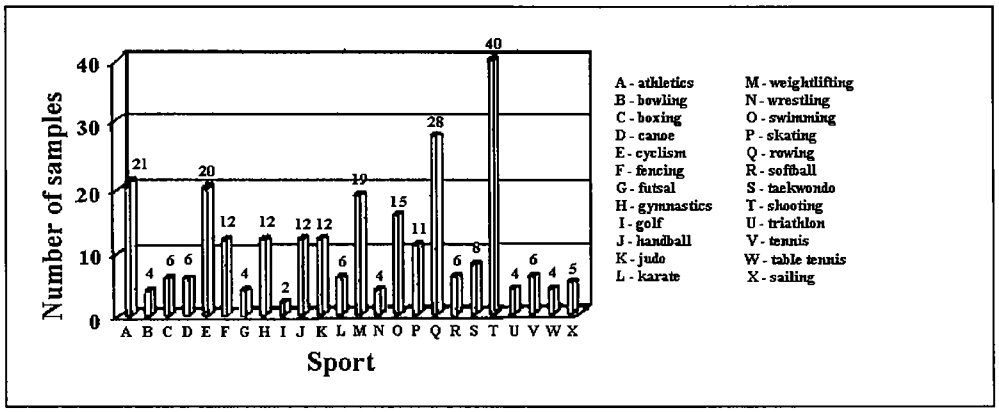

Figure 2. Samples per sport received during the VII South American Games.

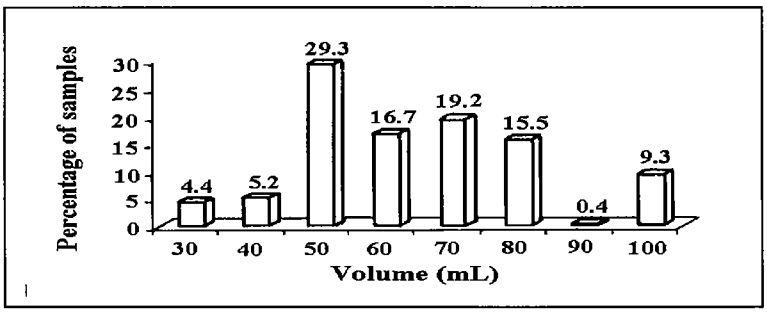

Figure 3. Sample volume frequency (percentage).

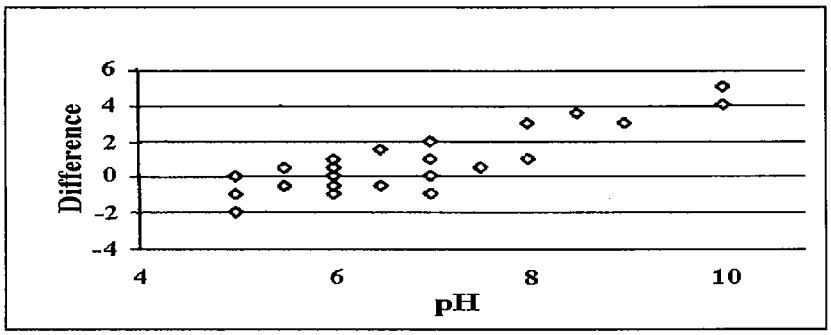

Figure 4. pH differences between laboratory and Medical Comission officers measurements.

The specific gravity ranged from 1.000 to 1.035 with 14.8% of the samples lower than 1.010 and 4.1% presented values higher than 1.030. Differences between values on specific gravity showed similar discrepancies as reported for pH values when comparing the laboratory and the Medical Comission officers measurements. In this case, field measurements were made using Merck strips and at the laboratory, an ATAGO (model UG-1, ATAGO Co, Japan) densitometer with 1.000 to 1.040 scale was used, giving more exact and

reproducible values. Better laboratory density values are mandatory due to possible density corrections for the measurements. Exact pH values are not that necessary and the strips were used to speed up determinations and also to save urine. Figure 5 shows these differences.

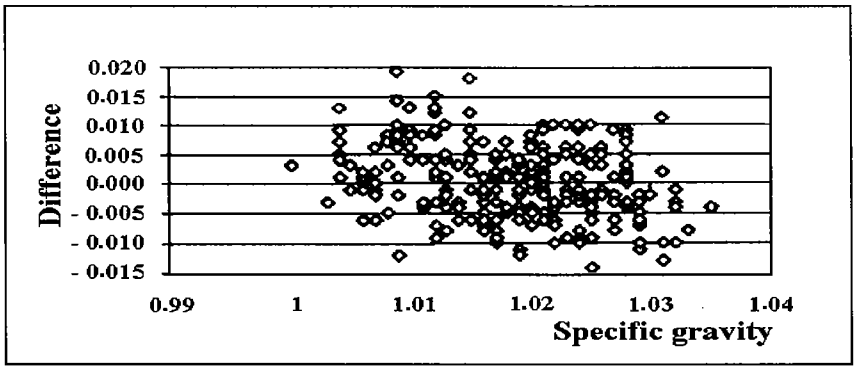

Figure 5. Differences between Medical Comission and IOC laboratory values to specific gravity measurements.

Discussion

The VII South American Games provided an opportunity to analyse 270 samples for over 250 compounds in 8 days with a response time of only 24 hours.

Seven samples presented T/EpiT ratios above 6. One sample was declared positive as confirmed by C^{13}/C^{12} isotope ratio (by Cologne laboratory). While waiting for the isotope data, it was reported to the Chairman of the Medical Commission and followed after the games. Two samples showed T/EpiT values modified by bacteria (free testosterone was detected in the free fraction [1]. Three samples showed T/EpiT higher than 6. According to our criteria (SD ± 20%; 6.1, 6.2 and 6.3) they were reported as negative results, because their lower theoretical SD value was bellow the cut off value of 6. The T/EpiT ratios data are shown in Figure 6.

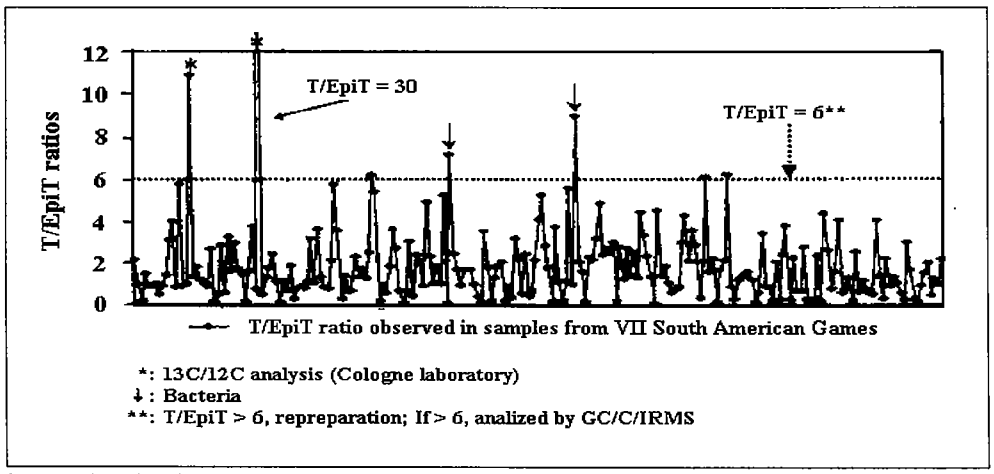

Figure 6. T/EpiT ratio profile for the samples on VII South American Games.

The longitudinal endocrinological study (2 months) of the athlete with T/EpiT ratio 11 demonstrated that this T/EpiT ratio was naturally elevated (values = 11.2 ± 1.5 (mean ± SD), n = 4, CV = 13.8%). The GC/C/IRMS results do not indicate the application of testosterone or testosterone prohormones.

Positive cases were found in a much higher percentage than IOC averages. 3.3% of the samples (n=9) were found to contain substances banned by the IOC [2]. However, only five samples "B" were analysed. Table 2 presents each positive substance found with its respective sport.

Table 2. List of prohibited substances found.

	Substance	Sport	Remarks
1	p-OH-ethylamphetamine	shooting	same athlete as reported in case 7; sample B not analyzed
2	indapamide	shooting	sample B not analyzed
3	stanozolol	athletics	concentration > 2.0ng/mL
4	T/EpiT ratio > 6	athletics	ratio = 30; sample B not analyzed
5	chlorthalidone	judo	----------
6	p-OH-ethylamphetamine	shooting	same athlete as reported in case 1
7	stanozolol	wrestling	sample B not analyzed
8	THC	swimming	concentration > 15ng/mL
9	amfepramone	triathlon	----------

Wrestling and triathlon were the sports showing higher incidence of positive cases, followed closely by athletics (9.46%). Although only 4 samples were analyzed for wrestling and triathlon, 25% of these samples were positive. Figure 7 shows the percentage of positive cases in each sport where positive cases were found.

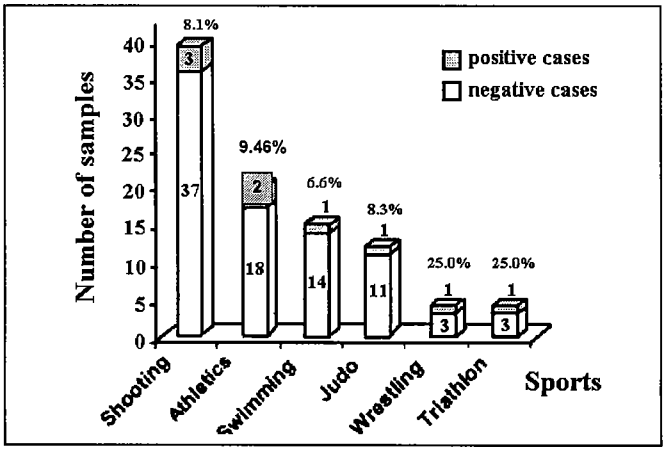

Figure 7. Percentage of positive cases by sports.

Conclusion

In the VII South American Games in Brazil, 6 out of 24 sports had positive doping cases. Swimming, judo and shooting between 5 and 10% positives. Wrestling, triathlon and athletics from 9.46 to 25% positive cases. Even the overall positive cases percentage was high (3.3%) as compared with IOC ranges.

References

[1] Geyer, H. Schanzer, W. Mareck-Engelke, U. Donike, M.. In: M. Donike, H. Geuer, A. Gotzman, U.Mareck-Engelke (Eds) Recent advances in Doping Analysis (3) Sport und Buch StrauB, Kolm (1996) 94-115.

[2] Medical Commission, IOC List of Prohibited Classes of Substances and Prohibited Methods, Olympic Movement Antidoping Code, Appendix A, International Olympic Committee, Lausanne, 1 September 2001.

Acknowledgements

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