



# S P O R T S P H Y S I O L O G Y

## THE AIR UP THERE - I.H.T. THE NEW FORCE IN ALTITUDE TRAINING

**1998 saw the cycling world rocked to its very foundations by the well publicised exposure of the widespread use of performance enhancing drugs during the Tour de France. Since then athlete after athlete, in a myriad of different sports around the world, have 'gone positive' as Sports Drug Agencies and law enforcement agencies worldwide crack down on the use and traffic of performance enhancing drugs in sport.**

*By Rod Cedaro (M.App.Sc.)*

The UCI, in a 'knee jerk' reaction to the scandal surrounding the '98 Tour, introduced 'blood testing' as a means of determining potential illicit use of erythropoitin (EPO) as an ergogenic agent. By setting an arbitrary figure of 50 per cent as a haematocrit 'competition cut off', the UCI opened a Pandora's box of potential 'false positive' disqualifications from competition against 'clean' athletes.

In a recent paper by Browne *et al* (1999),



the authors concluded blood testing as a means of detecting the illicit use of performance enhancing substances such as EPO is 'not yet justifiable in sport' (Browne *et al*, 501, 1999).

The International Triathlon Union has been able to adopt a more conservative approach to

drug control within triathlon. It would, however, be naive to believe a sport such as triathlon, which has its training basis in aerobic strength/endurance, requires voluminous repetitive training and offers the elite of the sport a lucrative lifestyle, is immune from drug abuse.

The last few years have seen major advancements in sports science and bio-technical instrumentation that provide startling new possibilities in leveling the playing field between those athletes who chose to avail themselves to illicit, performance enhancing drugs, and those who wish to compete clean.

Without doubt, 'hypobaric' or altitude training warrants further investigation as a means of improving athletic performance. Recent research has shown a swing away from 'conventional' altitude training whereby athletes live and train for periods of 4-6 weeks at altitudes of 2,500 to 3,000 metres. Recent trends (e.g. Levine 1997) suggest athletes should 'live high and train low'. However, another school of thought gaining some acceptance within both the athletic and sports science worlds suggests Intermittent Hypoxic Training (IHT) could well be the way of the future.

IHT, which has its origins in the Russian military and aero-space programs may well herald the new frontier in altitude training. Approximately 18 months ago this form of altitude simulation was introduced to New

Zealand sports by Dr. Alexei Korolev of the former Soviet Union.

Claimed to be equivalent, and even superior, to conventional altitude training as it can control the altitude 'dose', IHT is achieved by exposing athletes to hypoxic air containing 9-16 per cent oxygen, equating to altitude exposures of 2,000 to 6,500 metres above sea level. This occurs intermittently at 4-6 minute intervals interspersed with breathing normoxic air for the same periods, for 60-90 minutes per session, once or twice a day.

Exposing the athlete to such hypoxic gases in this manner, via a hypoxicator, is thought among other physiological and biochemical reactions, to stimulate EPO release, hence, red blood cell production which results in greater oxygen carrying capacity within the blood.

### PRELIMINARY RESEARCH AND CASE STUDIES

In a pilot study of a group of 10 elite endurance athletes (swimmers, triathletes and runners), Dr. John Hellemans of New Zealand (1998), himself a World Age-Group Champion triathlete found endurance performance over a series of tests (swimming, cycling and running) improved on average by 3.1 per cent. Further, hemoglobin concentration increased on average by 4.4 per cent. Hematocrit increased on average by 4.8 per cent and reticulocyte count increased on average by 28.7 per cent.

FINDINGS OF THIS INVESTIGATION AS  
FOLLOWS:

"Ten endurance athletes were tested with the method of Intermittent Hypoxic Training in relation to hematological factors and performance over a period of three weeks. Results show an overall improvement in hematological factors related to oxygen transport and performance. The results indicate that IHT is an effective method to simulate altitude training. On the basis of the results it is recommended further research and testing is done in the area of maximising outcome for individual athletes. However, in general, the method of IHT can be strongly recommended for any serious athlete as part of their training and preparation.

A further case study was recently (September 1999) undertaken at the Runaway Bay Sports Super Centre on Queensland's Gold Coast. The results of this case study are indicated below and occurred over a 10 to 14 day period during which time the training of the athlete involved remained constant.

VARIABLE	Pre IHT exposure	Post IHT exposure
• Resting heart rate (bpm)	35	28
• Body weight (kilograms)	68.7	67.9
• Skinfolds (sum of eight sites mm)	32.3	29.3
• Hematocrit	44%	51%
• Performance time for 4km track time trial at fixed aerobic heart rate of 152bpm (mins/seconds)	15.25	14.55

The athlete in this case study was an elite ultra-distance triathlete (training performances prior to IHT exposure suggested the potential to record a finish time in the vicinity of eight hours even for an Ironman distance triathlon), training 30+ hours per week. Weekly training comprised 25-30km per week of swimming, 400-600km per week of cycling, 100-120km per week of running with two to three weight training sessions per week.

This athlete's training was not altered in any other way during the IHT exposure.

All factors listed above show tendencies to improved aerobic function as a consequence of a greater red cell mass. This is conclusively supported by a 7.5 second per kilometre improvement in performance time for the fixed

aerobic heart rate track run (Cedaro, unpublished observations, 1999).

OTHER POINTS WORTHY OF  
CONSIDERATION:

In addition to the athletic performance enhancement witnessed by both the author of this article and New Zealand's Dr. Hellemans (Hamish Carter has been using the device extensively since 1998), Soviet researchers have also found IHT to be useful as an adjunctive treatment for a variety of maladies as diverse as depression, chronic fatigue syndrome, heart disease and female infertility.

CONCLUSIONS

On the strength of the pilot performance tests conducted by Dr. Hellemans along with the case study data compiled by the author of this article, coupled with the Soviet research referred to above, the Sports Science/Medicine Department of the Runaway Bay Sports Super Centre purchased two hypoxicators (one four station and one two station) for use by Runaway Bay Sports Super Centre Triathlon Squad members and visiting athletes to the facility.

We are of the belief IHT GO2 Altitude™ hypoxicator system, coupled with the other biotechnical devices the Runaway Bay Sports Super Centre will have on offer (altitude simulation rooms, hyperbaric chambers), will go a long way in leveling the playing field between those athletes who want to compete without the 'assistance' of illegal substances.

REFERENCES

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