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The Hypoxicator

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In these times of drug abuse, EPO, human growth hormone, improved doping testing and shameful scandal, athletes must look for legal ways to obtain a competitive advantage. Sports science has recognized the advantages of altitude training ever since the 1968 Mexico Summer Olympics. These Olympics were held at altitude and world records fell like apples off a tree by athletes who had included altitude training in their Olympic preparation.

Many National Speed Skating Teams hold altitude training camps, such as the Calgary-based Canadian Team who hold altitude camps in the Rocky Mountains at Fortress. Unfortunately, New Zealand's National Team cannot do this. The New Zealand National Team is situated in Christchurch, Canterbury, on the South Island, and city center is actually below sea level. To go to altitude, skaters would have to travel to the Southern Alps, which would make for a long journey with limited benefits. Since they are not able to go to altitude, they instead have altitude come to them in the form of altitude simulation.

With the help of QEII Sports Medicine Centre in Christchurch, New Zealand National Team members Mark Jackson and Jono Cliene are able to simulate being at altitude without actually going to altitude. QEII has a machine called the 'Hypoxicator', which simulates altitude air by extracting oxygen out of the sea level air and lowering the oxygen percentage to supply the athlete with rarefied air through an oxygen mask. This simulation is called "Intermittent Hypoxic Training" (IHT).

The athlete sits at the Hypoxicator three to four hours per week for 3-4 weeks on an interval program of 5 minutes of sea level air to 5 minutes of rarefied air. A monitor on the athlete's index finger measures heart rate and blood oxygen saturation. The athlete starts the program at a reduced oxygen saturation of about 92% (normal saturation is 98%) and gradually drops over the course so that by the final week their blood saturation is about 80%. Generally an athlete's heart rate will be 20 beats per minute above resting levels while inhaling the rarefied air. The heart rate is monitored to ensure that the athlete is not being overstressed by too little oxygen at one time. If the heart rate becomes too high, the practitioner may increase the oxygen percentage to increase the blood oxygen saturation levels and return the heart rate to acceptable levels.

The Hypoxicator has been used successfully by New Zealand athletes preparing for overseas competitions such as the Sydney Olympic Games. The New Zealand speed skaters actually used the altitude simulator concurrently with the New Zealand Olympic Triathlon team, as the machine can have up to four people using it at a time.

Mark and Jono used the Hypoxicator to help prepare themselves for the Short Track World Cups in Calgary, Canada, and Salt Lake City, the last two weekends of October. As both meets were held at altitude, it was beneficial for them to simulate this beforehand. As well, the altitude simulator also helped with travel and reduced jet lag, which was very beneficial when you have to fly for 22 hours as they did to get from New Zealand to Calgary.

Jono Cliene and Mark Jackson using the QEII Sports Medicine Hypoxicator. Jono is adjusting the Oxygen percentage.

The benefits of IHT are many. IHT enhances oxygen transport, utilization and efficiency in the blood. It amplifies both aerobic and anaerobic capacities. It boosts the effects of general training and improves performance and endurance. It can give an athlete up to a 10% increase in hemoglobin, up to a 7% increase in blood oxygen capacity, a reduction of up to 13% in heart rate and up to 17% less lactate build up while performing.

Mark and Jono put this to the test in the 3000m event at the New Zealand Short Track Nationals October 1. Aiming to beat the National Record of 5:05, they smashed the record and Mark finished 1st in 4:48.52, less than 2 seconds off of the World Record. Their exceptional race cannot be solely attributed to IHT but no doubt it helped.

With the help of sport science, the goal is to make New Zealand speed skaters competitive at the world level. As we have limited ice time and limited competition while at home, any advantage will be beneficial for the development of speed skating in New Zealand.

The 'Hypoxicator' simulates altitude air by extracting oxygen from sea level air and lowering the oxygen percent to supply rarefied air through a mask.

References: Materials provided by QUII Sports Medicine Centre