



Title: Hyperbaric Oxygen Therapy assisting Elite Sports Recovery & Performance – Cytokine Modulation

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Malcolm Hooper has over 23 years experience in modern applications of Hyperbaric Oxygen Therapy. His patients include the international leadership and life coach Tony Robbins, and many other celebrities. There is a long list of world leading athletes who consult with Mal Hooper, all seeking that extra one per cent in recovery and performance.

The majority of elite athletes are in a constant state of burn-out and with a growing ‘injury list’. High end athletes are confronted with a range of metabolic issues due to chronic mental fatigue, metabolic overload and ... constant international travel. When compared to sea level, international travel exposes the individual to prolonged in-flight “hypoxia” at “lower altitude pressures”.

Preparation, performance, recovery, travel ... it’s an endless loop.

As tissue Oxygenation diminishes, metabolic burden rises and the range of injuries increase dramatically. Tissues exposed to constant hypoxia and excessive inflammation rapidly become ‘energy poor’ acting like a “mitochondrial handbrake”. Simply stated, you’re done! Improvement requires more than replacing your coach or getting another mind therapist, and there is more to it than simply training harder or taking another supplement.

Cytokine gene expression testing is at the forefront of “clinical” sports science. Pro-inflammatory and anti-inflammatory gene expressions are specific to the individual. Cells in a chronic hypoxic state overexpress pro-inflammatory cytokines including IL1, IL6, IL7, IL8, IL17, TNFa, MMP9, S100B. How do these markers affect the athlete? How do you manage an athlete or a “team” in a “cytokine storm”?

Hyperbaric Oxygenation is breathing 100 per cent oxygen at pressures greater than normal. But are the benefits of Hyperbaric Oxygen Therapy (HBOT) boasted? What are the real effects impacting recovery and performance? Can HBOT have a ‘negative effect’ on a competing athlete? Are all pressures and protocols the same? What is normobaric oxygen? What is the difference between an “soft inflatable chamber” versus a solid chamber capable of deeper pressures? How does HBOT for an athlete compare to hospital HBOT for complex medical disorders?

Typically, we breathe 21 per cent oxygen (or less in larger populated cities). Hyperbaric drives greater levels of enriched oxygen into the blood plasma enabling the correction of local and systemic effects of hypoxia. Hyperbaric acts as a ‘catalyst’ promoting immune modulation. The concept of ‘Oxygen in and Garbage out’ will be discussed.

The benefits of HBOT in rehabilitation is well documented. Hyperbaric tissue oxygenation results in increased blood flow by fostering the formation of ‘new capillary dynamics’ (neovascularization) into the damaged

regions of the body. Hyperbaric tissue oxygenation accelerates neuroplasticity, activating damaged and dormant nerve cells (penumbra state).

Approximately 20 to 30 percent of the body's consumption of Oxygen occurs within three to five per cent of the body mass – the brain and spinal cord. These structures are extremely sensitive to Oxygen deficiency and can have the most dramatic results with the use of HBOT.

Increased Oxygenation significantly accelerates the rate of healing, stabilization and repair through numerous immune modulating effects, providing upregulation of anti-inflammatory cytokines, including: Granulocyte Macrophage Colony Stimulating Factor (GM-CSF), Interleukin-3 (IL3), Interleukin-4 (IL4), Interleukin-10 (IL10), Interleukin-13 (IL13), Interleukin-21 (IL21), Brain Derived Neural Growth Factors (BDNF, GDNF), Vascular Growth Factors (VEGF), TGFβ Signaling and IGF1.

“Hyperbaric Oxygen Therapy creates a ‘fertile neurovascular platform’ for emerging stem cell, immunotherapies and nanotechnology techniques. The impact and success of these and future procedures are dependent on the integrity of the underlying supporting neurovascular bed.” (Hooper 2005).

In chronic injuries, the microenvironment is in a constant smoldering “cytokine storm” state. Pro-inflammatory cytokines are important in mobilizing the reparative and regenerative responses when ‘attacked’, but chronic over-expression leads to immune confusion and autoimmune degradation. Over-expressions of pro-inflammatory cytokines can affect synaptic strength and synaptic plasticity, and excess contributes to maladaptive plasticity and chronic pain syndromes.

The extent of neurovascular deterioration can be significantly diminished with HBOT, which 'expands the therapeutic window'.

From the *American Journal Physiology*, [Heart and Circulatory Physiology](#) (2005): Stem Cell Mobilization by Hyperbaric Oxygenation reports a single two hour exposure to HBOT at 2 ATA doubles circulating CD34+ progenitor stem cells (primordial cells targeted to salvage and restore damaged structures). At approximately 40 hours of HBOT, CD34+ cells increase eight-fold (800 percent).

Summary of Benefits:

HBO effects Traumatic Brain Injury: Oxygen, Pressure & Gene Therapy (Harch 2015):

- As many as 8101 genes are directly influenced for over 24 hours after a single exposure to HBOT.
- Upregulated genes are primarily growth and repair hormones and anti-inflammatory genes. Downregulated genes are the pro-inflammatory and apoptotic genes.
- HBO upregulates the patient's own target specific [Stem Cells](#) (with an 8-fold or 800 percent increase in circulating CD34+).
- HBO enhances Mitochondrial respiration.
- HBO proliferates Granulocyte Macrophage Colony Stimulating Factor (GM-CSF), Interleukin-3 (IL3), Interleukin-4 (IL4), Interleukin-10 (IL10), Interleukin-13 (IL13), Interleukin-21 (IL21), Brain Derived Neural Growth Factors (BDNF, GDNF), Vascular Growth Factors (VEGF), TGFβ Signalling, IGF1.
- HBO reduces Telomere degeneration.
- HBO down regulates toxic intra and extra cellular inflammatory Cytokines (IL1, 2, 6, 7, 8, 17), Tumour Necrosis Factor Alpha (TNFα), GlycA, S100B.
- HBO inhibits opportunistic infections (viral, bacterial, parasitic), cell sepsis and more.

Biography

Malcolm Hooper

B.App Sci 1984, D.Acup 1985, Grad Cert 1993, Grad Dip 1995, M.App Sci 1999.

Author *Hyperbaric Medicine: The Life is in the Blood* (2005, 2018 reprint).

*Hyperbaric Oxygen Therapy combined with Lokomat (Robotic Gait Assisted Walking)
assisting Neuroplasticity in Brain and Spinal Cord Injury (forthcoming October 2018)*

Founder Australia's first Lokomat – Robotic Gait Assisted Walking (2006).

Malcolm is an International Executive Director serving on both the International Hyperbaric Medical Foundation (IHMF) and the International Hyperbaric Medical Association (IHMA). He is a regular speaker at international symposiums on the topic of Hyperbaric Oxygen Therapy applications in the modern era.

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Session name/ number: TBC

Category: (Oral presentation)