IMPACT CRYOTHERAPY

Clinical studies conducted worldwide have examined the physical effects of whole body cryotherapy (WBC). The following summarizes the results of several of these studies.

Physical Performance

A single exposure to WBC significantly **decreases inflammation** after strenuous exercise and may **accelerate recovery** and reduce exercise induced muscle damage.
Time-Course of Changes in Inflammatory Response after Whole-Body Cryotherapy Multi Exposures following Severe Exercise. Herve Pournot, Francois Bieuzen, Julien Louis, Jean-Robert Fillard, Etienne Barbiche, Christophe Hausswirth. Research Department, National Institute of Sport, Expertise and Performance (INSEP), Paris, France.

A single WBC session before exercise seemed to have **beneficial effect** on the **antioxidant** and **anti-inflammatory** markers when compared with control.
The Effect of Submaximal Exercise Preceded by Single Whole-Body Cryotherapy on the Markers of Oxidative Stress and Inflammation in Blood of Volleyball Players. Celestyna Mila-Kierzenkowska, Alicja Jurecka, Alina Wozniak, Michal Szpinda, Beata Augustynska, and Bartosz Womiak. Oxidative Medicine and Cellular Longevity Volume 2013, Article ID 409567, Page 10.

Three WBC sessions within 48 hours after damaging running exercises **accelerate recovery** from exercise-induced muscle damage to a greater extent than from passive modalities or far-infrared modalities.
Effects of Whole-Body Cryotherapy vs. Far-Infrared vs. Passive Modalities on Recovery from Exercise-Induced Muscle Damage in Highly Trained Runners. Christophe Hausswirth, Julien Louis, Francois Bieuzen, Herve Pournot, JeanFournier, Jean-Robert Filliard, Jeanick Brisswalter. Research Department, National Institute of Sport, Expertise and Performance (INSEP), Paris, France.

WBC caused a decrease in pro-inflammatory (bad) interleukins (ILs) and rise in anti-inflammatory (good) ILs. By contrast, ice application has been shown to increase pro-inflammatory ILs by as much as 29% (8, ref in article). In any case, whether blood flow is shunted away from muscles is slowed and physiologically results in **less muscle damage and faster recovery.** (Ref 49 in article).

Norepinephrine is the only hormone that responded positively to WBC (3x/wk) and may play a role in **pain relief** effect. (Ref 60, in article).
Time-Course of Changes in Inflammatory Response after Whole-Body Cryotherapy Multi Exposures following Severe Exercise. Herve Poumot, Francois Bieuzen, Julien Louis, Jean-Robert Fillard, Etienne Barbiche, Christophe Hausswirth. National Institute of Sports, Expertise and Performance, Paris, France.

No effect on **aerobic** or anaerobic capacity.
Impact of 10 Sessions of Whole Body Cryostimulation on Aerobic and Anaerobic Capacity and on Selected Blood Count Parameters. Dybek T, Szygula R., Klimek A., Tubek S. Biology of Sport 2012; 29:39-43.

Medical Conditions

A study of **rheumatoid arthritis** patients reported the one variable that showed definite improvement with WBC (vs local cold treatment) was pain. Patients report **less pain** following WBC. (Note: This is stated clearly in discussion (the paper) but contradicted in the conclusion of the abstract.)
Effectiveness of different cryotherapies on pain and disease activity in active rheumatoid arthritis. A randomized single blinded controlled trial. H.E. Hiroven, M.K. Mikkelsson, H. Kautiaine, T.H. Pojolainen, M. Leirisalo-Repo. Clinical and Experimental Rheumatology 2006; 24:295-301.

Effects of whole body cryotherapy on **multiple sclerosis** patients was positive (and postulated to be) beneficial. The total antioxidative state is distinctly reduced in MS patients vs. healthy population. The WBCT proved **beneficial** in treatment of MS patients and **better than exercise alone.**
Effects of the whole-body cryotherapy on a total anti-oxidative status and activities of some antioxidative enzymes in blood of patients with multiple sclerosis - preliminary study. Elizabeth Miller, Malgorzata Mrowicka, Katarzyna Malinowska, Krystian Zolynski, and JozefKedziora. The Journal of Medical Investigation 2010; 57:168-173.

"WBC is used widely in many applications, especially **degenerative and inflammatory** joint diseases and **fibromyalgia."** (Ref. 2 Sieron A, Cieslar G. The application of cold in medicine – cryosurgery and cryotherapy. Bielsko-Biala Poland:a-Meica Press; 2003 (in Polish)).
Thermovision diagnostics in chosen spine disease treated by whole body cryotherapy. Armand Cholewka, Zofia Drzazga, Aleksander Sieron, and Agata Stanek. J Therm Anal Calorim 2010; 102:113-119.

Study of a small sample suggests positive effects on treatment of **depressive** and **anxiety** disorders. It is postulated/suspected that the pain relief associated with WBC and that commonly accompany emotional disorders may be responsible for the perceived benefits.
Whole-body cryotherapy as adjunct treatment of depressive and anxiety disorders. Joanna Rymaszewka, David Ramsey and Sylwia Chladzinska-Kiejna. Department of Psychiatry, Wroclaw Medical University, Wroclaw, Poland. Arch lmmunol. Ther. Exp., 2008; 56:63-68.

Lung and Cardiac Function

Blood Pressure is not affected with acute or long-term WBC.
The blood pressure response to an acute and long-term whole-body cryotherapy (-110C) in men and women. Tmja Westerlund, Juhani Smolander, Arja Uusitalo-Koskinen, Marja Mikkelsson. Journal of Thermal Biology 2004; 29:285-290.

WBC has no effect/does not impair **cardiac** function.
Effects of the whole-body cryotherapy on NTproBNP, hsCRP and troponin I in athletes. Giuseppe Banfi, Gianluca Melegati, Alessandra Barassi, Gianlodovico Melzi d'Eril. Journal of Science and Medicine in Sport 2009; 12:609-6I0.

WBC has no demonstrated or reported adverse effects on **lung function** in normal individuals and only minimal effect on **asthmatics**. When they occur, those mild effects reverse quickly after treatment. There are no reports of need to terminate treatment due to interference with lung function. If concerned about potential adverse effects a simple paper

face mask can be worn during treatment. Lung function after repeated WBC treatment: several pressure studies have demonstrated pain relief from **fibromyalgia** and **arthritis** (Metzger 2000) as well improved lung function (Yamauchi 1988). This study focused on lung function and showed a mild bronchoconstriction effect as opposed to bronchodilatory effect reported by Yamauchi. This effect was "minor" after 30 minutes total WBC time.

Asthmatics exposed to WBC had minor bronchoconstriction and had full recovery in 30 minutes to 2 hours duration. Use of a thin paper mask may be protective against facial cold exposure. These patients were in an enclosure higher than head level. Impact Cryotherapy does not cover the head or mouth and therefore any effect would be much less likely.

No significant effect on forced expiratory volume.

Lung function after acute and repeated exposures to extremely cold air (-110C) during whole-body cryotherapy. J. Smolander, T. Westerlund, A Uusitalo, B. Dugue, J. Oksa and M. Mikkelsson. 2006 Blackwell Publishing Ltd. Clinical Physiology and Functional Imaging 2006; 26, 4:232-234.