

Included are the full-length peer reviewed medical research papers. For your convenience, we have also included short summaries of each article with quotes taken directly from the corresponding research study.

WHOLE BODY ARCTIC CRYOTHERAPY FOR ATHLETIC RECOVERY AND PERFORMANCE

The Effect of Whole-Body Cryostimulation on Lysosomal Enzyme Activity in Kayakers During Training

Alina Wozniak, Bartosz Wozniak, Gerard Drewa, Celestyna Mila-Kierzenkowska, Andrzej Rakowski

Summary: “Effects of whole-body cryostimulation on lysosomal enzyme activity acid phosphatase (AcP), arylsulphatase (ASA) and cathepsin D (CTS D), as well as on creatine kinase (CK), and the cortisol concentration in the serum of kayakers during training were studied.”

“The single cryostimulation caused a 30% decrease in the CK activity in untrained men. After the sixth day of training with cryostimulation, the activity of ASA was 46%, AcP 32% and CK 34% lower than after the sixth day of training without cryostimulation. The results support that preceding training with whole-body cryostimulation alleviates exertion stress by a stabilization of lysosomal membranes.”

Effects of Cryotherapy on Muscle Damage Markers and Perception of Delayed Onset Muscle Soreness After Downhill Running: A Pilot Study

M Rossato, E. de Souza Bezerra, DA de Ceselles Seixas da Silva, T Avila Santana, W Rafael Malezam, FP Carpes

Summary: “Use of cryotherapy after exercise with eccentric contractions was effective to re-establish the level of biochemical markers of muscle damage and reduce muscle soreness and pain perception in subjects submitted to downhill running.”

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

Summary: “Overall, the results indicated that the WBC was effective in reducing the inflammatory response. These results may be explained by vasoconstriction at the muscular level, and both the decrease in cytokines activity pro-inflammatory, and increase in cytokines anti-inflammatory.”

Effects of Whole-Body Cryotherapy vs. Far-Infrared vs. Passive Modalities on Recovery from Exercise-Induced Muscle Damage in Highly-Trained Runners

Cristophe Hausswirth, Julien Louis, Francois Bieuzen, Herve Pournot, Jean Fournier, Jean-Robert Fillard, Jeanick Brisswalter

Summary: “The purpose of this study was to test the efficacy of whole body cryotherapy (WBC), far infrared (FIR) or passive (PAS) modalities in hastening muscular recovery within the 48 hours after a stimulated trail running race.”

“In all testing sessions, the simulated 48 min trial run induced a similar, significant amount of muscle damage. Maximal muscle strength and perceived sensations were recovered after the first WBC session (post 1 hour), while recovery took 24 hours with FIR, and was not attained through PAS recovery modality. No difference in plasma CK activity were recorded between conditions. Three WBC sessions performed within the 48 hours after a damaging running exercise accelerate recovery from EIMD to a greater extent than FIR or PAS modalities.”

Interval Cryotherapy Decreases Fatigue During Repeated Weight Lifting

Frank M Verducci

Summary: “Cryotherapy between sets resulted in a significantly greater number of total joules and arm pulls when compared with the towel treatment. Velocity was significantly faster for the first to fourth sets, matched sets, and all sets when subjects received intermittent cryotherapy. Power also was significantly higher for the first to fourth sets and matched sets. The all-sets comparison consistent of 14.5% more cryotherapy arm pulls.”

“Interval cryotherapy between weight-pulling sets is associated with increased work, velocity and power.”

Whole-Body Cryotherapy in Athletes

Giuseppe Banfi, Giovanni Lombardi, Alessandra Colombini, and Gianluca Melegati

Summary: “Cold therapy is commonly used as a procedure to relieve pain symptoms, particularly in inflammatory diseases, injury and overuse symptoms... In sports medicine, WBC has gained wider acceptance as a method to improve recovery from muscle injury.”
“We conclude that WBC is not harmful and does not induce general or specific negative effects in athletes. The treatment does not induce modifications of biochemical or hematological parameters, which could be suspected in athletes who may be cheating.”

Effects of Whole-Body Cryotherapy on Serum Mediators of Inflammation and Serum Muscle Enzymes in Athletes

Giuseppe Banfi, Gianluca Melegati, Alessandra Barassi, Giada Dogliotti, Gianvico Melzi d'Eril, Benoit Dugue, Massimiliano M Corsi

Summary: “As measured by changes in serum CK and LAD concentrations, and cytokines pathway, short-term cold air exposure was found to improve recovery from exercise-induced muscle injury and/or damage associated with intense physical training.”

“The blood chemistry values demonstrate that this treatment cannot be considered as an illegal or unethical procedure, e.g. blood boosting (Banfi et al., 2008).”

IN-DEPTH SCHOLARLY REVIEWS OF CRYOTHERAPY (more applicable to physicians than general population)

Cryotherapy in Sports Medicine

C Swenson, L Sward, J Karlsson

- Scholarly review article summarizing the many benefits and applications of cryotherapy

Thermal, Circulatory and Neuromuscular Responses to Whole-Body Cryotherapy

Tarja Westerlung

- Scholarly review discussing the mechanisms of cryotherapy (how it works, why it works, etc.)
- Examines the thermal (body temperature, thermal sensation, and comfort ratings), circulatory (blood pressure, heart rate variability) and neuromuscular performance responses to whole-body cryotherapy)

Cryotherapy Studies Overview

- Summary of 30+ clinical studies reviewing the efficacy, mechanism and benefits of WBC

Preliminary Overview: Clinical Relevance of Whole Body Cryotherapy

- History, description, mechanism and therapeutic applications (medical vs. athletic) of WBC

WHOLE-BODY ARCTIC CRYOTHERAPY AND MOOD DISORDERS

Influence of Whole Body Cryotherapy on Depressive Symptoms- Preliminary Report

J Rymaszewska, A Tulczynski, Z Zagrobelny, A Kiejna, T Hadrys

Summary: “Almost for each individual Hamilton Depression Rating Scale (HDRS) item, the overall score for all patients together was significantly lower after WBCT. This means that for all symptoms, except for day-night mood fluctuations, were presumably positively influenced by cryotherapy.”

“It appears that WBCT helps in alleviating depression symptoms... WBCT may become an auxiliary treatment in depression.”

Whole-Body Cryotherapy as Adjunct Treatment of Depressive and Anxiety Disorders

Joanna Rymaszewska, David Ramsey and Sylvania Chladzinska-Kiejna

Summary: “After three weeks, a decrease of at least 50% from the baseline HDRS-17 scores in 34.6% of the study group and 2.9% of the control group and a decrease of at least 50% from baseline HARS scores in 46.2% of the study group and in none of the control group were noted.”

“These findings, despite such limitations as a small sample size, suggest a possible role for WBCT as a short-term adjuvant treatment for mood and anxiety disorders.”

WHOLE-BODY CRYOTHERAPY AND MULTIPLE SCLEROSIS

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

Elzbieta Miller, Malgorzata Mrowicka, Katarzyna Malinowska, Krystian zolynski, and Jozef Kedziora

Summary: “Our results suggest positive antioxidant effects of WBCT as a short-term adjuvant treatment for patients suffering from MS.”
“The obtained results suggest that cryotherapy may play an important role in the process of activation of antioxidative properties in MS patients, since the increase in the TAS was considerably greater after using WBCT than after physical exercise.”
“Our observations showed that WBCT resulted in the increase in TAS ten days after the exposure.”

LOCAL CRYOTHERAPY AND PAIN MANAGEMENT

Prolonged Superficial Local Cryotherapy Attenuates Microcirculatory Impairment, Regional Inflammation, and Muscle Necrosis After Closed Soft Tissue Injury in Rats

Klaus-Dieter Schaser, Alexander Disch, John Stover, Anette Lauffer, Herman Bail, Thomas Mittlmeier

Summary: “Cryotherapy for 6 hours significantly restored diminished functional capillary density, markedly decreased elevated intramuscular pressure, reduced the number of adhering and invading granulocytes, and attenuated tissue damage.”

“The hypothesis that prolonged cooling reduces posttraumatic microvascular dysfunction, inflammation, and structural impairment was confirmed.”

APPLICATIONS OF WHOLE-BODY CRYOTHERAPY FOR PHYSICAL THERAPISTS

Cryotherapy: Physiological Considerations and Applications to Physical Therapy

Anna Lubkowska

Summary: “In the case of ill patients, cryotherapy is used in the following diseases:

- Inflammatory musculoskeletal disease: rheumatoid arthritis, ankylosing spondylitis, rheumatic fever
- Degenerative diseases and secondary degenerative changes in peripheral joints and the spine
- Joint disease of metabolic origin, such as gout
- Mixed connective tissue disease
- Rheumatic and soft tissue disorders (polymyositis and dermatomyositis)

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- Some skin diseases involving joints: psoriatic arthritis
 - Autoimmune diseases
 - Post-traumatic changes or overload of joints and soft tissues
 - Chronic inflammation of the cervical spine
 - Discopathies
 - Osteoporosis
 - Muscle overload
 - Neurlogical disorders (spastic paresis, multiple sclerosis, radicular neuralgia)
 - Depression syndromes, vegetative neurosis”

“Whole-body cryostimulation is a factor that can influence many physiological and biochemical indicators in the human body. Triggering physiological defensive mechanisms in response to a repeated external stressor (cold) may be widely used in medicine, physiotherapy, sport and athlete recovery.”

Effects of Cryotherapy on Arthrogenic Muscle Inhibition Using an Experimental Model of Knee Swelling

David Rice, Peter McNair, and Nicola Dalbeth

Summary: “Cryotherapy led to a significant increase in quadriceps torque and muscle fiber conduction velocity compared with controls.”

“The study demonstrated that cryotherapy is effective in reducing arthrogenic muscle inhibition induced by swelling. Cryotherapy and may allow earlier and more effective quadriceps strengthening to occur in patients with knee joint pathology.”

Acute Effects of Whole-Body Cryotherapy on Sit-and-Reach Amplitude in Women and Men

Massimo De Nardi, Antonino La Torre, Roberto Benis, Nejc Sarabon, Borut Fonda

Summary: “Experimental groups improved sit-and-reach amplitude to a greater extent than the control group. Our results support the hypothesis that ROM is increased immediately following a single session of WBC.”

Cryogenic Physical Therapy

No information available on author(s).

Summary: “Cryophysiotherapy was conducted in combination with medical treatments prescribed by the doctors. Based on our observation and research, we concluded that it made a positive impact on the physical health condition of the patients in general and accelerated the healing process. The effect of medical treatment combined with cryophysiotherapy always exceeded expectations.”

WHOLE-BODY CRYOTHERAPY AND RHEUMATIC CONDITIONS

Effectiveness of Different Cryotherapies on Pain and Disease Activity in Active Rheumatoid Arthritis. A Randomized Single Blinded Controlled Trial

HE Hirvonen, MK Mikkelsen, H Kautiainen, TH Pohjolainen, M Leirisalo-Repo

Summary: “Local cryotherapy is used to relieve pain and inflammation in injuries and inflammatory conditions. Pain decreased in all treatment groups, most markedly in the whole-body cryotherapy groups. No serious or permanent adverse effects were detected.

Whole-Body Cryotherapy in Inflammatory and Non-Inflammatory Rheumatic Diseases

D Kargus, K Blum, T Tauber, J Teuber, Bayreuth

Summary: “The mean values of the actual pain scores (VAS) were also significantly reduced after cold chamber exposures, and the overall-being improved. It is concluded that cold chamber exposures have an analgesic effect in patients suffering from fibromyalgia and that in addition the thermal tolerance is increased.”

Cryotherapy Decreases Histamine Levels in the Blood of Patients with Rheumatoid Arthritis

E Wojtecka-Lukasik, K Ksiezopolska-Orlowksa, E Gaszewska, O Krasowicz-Towalska, R Rzodkiewicz, D Maslinska, D szukiewicz, S Maslinksi

Summary: “It may be concluded that the beneficial clinical effects of cryotherapy in RA patients are in part due to the action on the production, release and degradation of histamine.”

WHOLE-BODY CRYOTHERAPY AND SKIN CONDITIONS

Cryotherapy as a Treatment for Psoriasis

Sadollah Shamsadini, Majid Varesvazirian, and Ayeh Shamsadini

Summary: “One plaque was sprayed with liquid itrogen every other day for two weeks and the other plaque was untreated as a control. Complete resolution of the plaque occurred in four patients (6.35%), mild to moderate resolution was evident in 19 cases (30.1%) and no improvement occurred in 40 patients. Cryotherapy may mediate mild resolution of plaques by inducing normal re-epithelization following the physical destruction of the lesions via a reverse Koebner phenomenon.”

Whole-Body Cryotherapy in Atopic Dermatitis

Taras Klimenko, Siru Ahvenianen, Seija-Liisa Karvonen

Summary: “Very cold air has been reported to increase the body’s antioxidative capacity. The cold has also been shown to reduce the conduction velocity of peripheral nerves and the nerve ganglia capacity to synthesize acetylcholine, which is considered a neurotransmitter in atopic pruritis.”

WHOLE-BODY CRYOTHERAPY AND SLEEP

Whole-Body Cryotherapy in Cryo-Chamber for Treating Primary Insomnia

No data available on author(s)

Summary: “In one such treatment concept, whole body cryotherapy can be added as an adjuvant because it can help restore the disrupted hemostasis in central activity levels. Already after a one-week cold therapy, a clear improvement in sleep behavior can be achieved so that sleep becomes more restful and performance improves.”

WHOLE-BODY CRYOTHERAPY AND FAT LOSS

Cryotherapy for Fat Loss

Infinite Labs

- Non-scholarly article describing the mechanism of increased fat metabolism during cold exposure, and how this makes your more lean/healthy at cellular level

