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## Wim hof method scientific

2012 - "The Influence of Concentration/Meditation on Autonomic Nervous SystemActivity and the Innate Immune Response: A Case Study ", authors: M. Kox, M. Hopman, P. Pickkers et al - Radboud University Medical Center Abstract: This case study was conducted after Wim Hof stated that it could influence the autonomic nervous system and thus the innate immune response. Its inflammatory response was measured during an 80-minute immersion in whole body ice and by practicing the concentration technique of Wim Hof. In addition, an endotoxin experiment was conducted to study Wim's innate immune response in vivo. The results showed how the techniques of the Wim Hof method seemed to evoke a controlled response to stress. This response is characterized by an activation of the sympathetic nervous system, which seems to attenuate the innate immune system. Here, Wim Hof proved that it was able to influence its autonomic nervous system and lower inflammation. 2014 - "Voluntary activation of the sympathetic nervous system and attenuation of the innate immune response in humans", authors: M. Kox, P. Pickkers et al - Radboud University Medical Center (published in PNAS) Summary: In this article, the effects of the Wim Hof method on the autonomic nervous system and the innate immune response are evaluated. A group of twelve people were trained in the Wim Hof method before undergoing an experiment to induce inflammation, normally resulting in flu-like symptoms. Compared to a control group that was not trained in the Wim Hof method, trained participants showed fewer influenza-like symptoms, lower levels of pro-inflammatory mediators and increased plasma epinephrine levels. In conclusion, the trained group was able to voluntarily activate their sympathetic nervous system. "Frequent Extreme Cold Exposure and Brown Fat and Cold-Induced Thermogenesis: A Study in a MonozygoticTwin", authors: J. Vosselman, W.D. van Marken-Lichtenbeld - Maastricht University Medical Center Abstract: This study tested the effects of a lifestyle with frequent exposure to extreme cold on brown adipose tissue (BAT) and cold-induced thermogenesis (CIT). The experiment compared Wim Hof, which is accustomed to exposure to extreme cold, to its monozygote twin brother who is not. Both used a breathing technique similar to g-Tummo. The results showed no significant difference in BAT or CIT between the two subjects. However, Wim's internal temperature decreased less than his brother's and his subjective response to cold temperature was more positive. In addition, the body heat generated by both brothers was significantly higher than the average person. Thus, it appears that g-Tummo, like breathing during cold exposure, may cause additional heat production. 2018 - "Brain over body"-A study on the willful regulation of autonomic function during cold exposure", authors: O. Muzik, K. Reilly, V. Diwakkar - Wayne State University School of Medicine Summary: In this article, a brain imaging study was conducted to measure the relative contributions of the brain and the peripheral nervous system that enable the Iceman to withstand the cold using his Wim Hof techniques. The results provide convincing evidence of the primacy of the brain (CNS) rather than the body (peripheral mechanisms) in mediating the responses of the Iceman to cold exposure. They also suggest the compelling possibility that the Wim Hof Method may allow practitioners to develop a higher level of control over key components of the autonomic system, with implications for lifestyle interventions that could improve multiple clinical syndromes. For more information: read this article. 2019 - "Battling Arthritis" - An add-on training program involving breathing exercises, cold exposure, and meditation attenuates inflammation and disease activity in axial spondyloarthritis - A proof of concept trial , authors: G. Buijze, M. de Jong, M. Kox, M. van de Sande, D. van Schaardenburg, R. van Vugt, C. Popa, P. Pickkers, D. Baeten - Amsterdam Medical Centre Abstract: The main objective of this article is to evaluate whether the Wim Hof Method could modulate innate immune responses in patients with axial spondylitis, which is a chronic rheumatic inflammation of the spine. This proof-of-concept study was based on previous research, showing how healthy individuals were able to voluntarily influence the physiological stress response to reduce inflammation after training Wim Hof Method. The study primarily examined the safety of the Wim Hof Method for this group of patients, but also looked at changes in inflammatory markers and disease activity and quality of life reported by patients. The results showed that the WIM HOF METHOD can be safely applied in patients with axial spondyloarthritis, which is a prototypic chronic inflammatory condition. In addition, a significant decrease in inflammatory markers of ESR and CRP levels was found, which are validated biomarkers of disease activity. Finally, various measures of disease activity and quality of life improved after the intervention. Thus, the results suggest that the WIM HOF METHOD not only allows healthy individuals to voluntarily reduce the immune response in acute inflammation but also in chronic inflammation related to immune-mediated inflammatory states. 2020 - "Involvement of lactate and pyruvate in the anti-inflammatory effects exerted by voluntary activation of the sympathetic nervous system "Metabolites 2020. Authors: Zwaag J, Ter Horst R, Blaževčič I, Stoessel D, Rätter J, Worswick JM, Schauer N, Stenstra R , Netea MG, Jahn D, Pickkers P, Kox M. Abstract. This research extends the stray published in 2014 on the effect of WIM HOF METHOD on our sympathetic nervous system and innate immune response. It has been shown that the sympathetic nervous system can be voluntarily activated following WIM HOF METHOD. This study evaluated whether the WIM HOF METHOD affects the plasma metabolome and whether these changes are related to the observed immunomodulatory effects. This study showed that practitioners of WIM HOF METHOD had higher plasma concentrations of lactate and pyruvate (among others). This indicates increased activation of the Cori cycle. The study estimated that within the group, lactate and pyruvate contributed in part to the increase in anti-inflammatory IL-10 and the decrease in pro-inflammatory IL-1beta, IL-6 and TNF alpha. Lactate and pyruvate in sufficiently high amounts have been shown to provoke an anti-inflammatory response from the immune system. It turns out that our metabolism affects the immune system. The Wim Hof Method causes a change in metabolism that contributes in part to an anti-inflammatory response. Current research: Inflammation and pain: in the Netherlands, the Radboud University Medical Centre in Nijmegen is completing a new study on the effects of the various components of the Wim Hof Method on inflammation and pain. Brain activity: Wayne State University in Michigan, USA, measures the effect of WIM HOF METHOD on brain activity. This research is divided into 2 parts: 1. Effects of isolated cold exposure 2. Effects of cold exposure combined with breathing exercises WIM HOF METHOD and state of mind. WIM HOF METHOD on Mental Health and Stress Resilience: University of California at San Francisco measures WIM HOF METHOD on Mental Health and Stress Resilience. Wim Hof, also known as "The Iceman", is a 61-year-old Dutch extreme athlete famous for his ability to withstand extreme cold. He has set several Guinness World Records for swimming under ice, for prolonged full-body contact with ice, and for a barefoot half-marathon on ice and snow. The Wim Hof Method He promotes his Wim Hof Method (WHM) which consists of three pillars: breathing, cold therapy, and commitment (or meditation). The breathing consists of three phases: 30-40 cycles of hyperventilation are followed by breath retention and finally a recovery breath. The cold is applied through cold showers and ice baths. The third pillar trains the brain to improve willpower and self-control, and teaches people to observe their thoughts, emotions and impulses, without identifying or acting on them. He was featured in Gwyneth Paltrow's Netflix series Goop Lab, where he taught Goop staff members to tolerate sitting in the snow and plunging into frigid water wearing only skimpy wimsuits. He explained that his breathing method raises the body's pH levels. Of course it does, because hyperventilation increases the excretion of carbon dioxide; but that's not a good thing. It produces a temporary state of respiratory alkalosis, an abnormal disruption of acid-base homeostasis. When hyperventilation stops, the acid-base balance quickly returns to normal. If hyperventilation persists, the person will pass out, and the body's normal compensatory mechanisms will be able to take over and re-establish homeostasis. Wim Hof cautions against using his method when diving or driving, where passing out could be fatal. In fact, there have been several reports of deaths resulting from his methods. Alleged benefits He claims a multitude of benefits including increased energy, better sleep, heightened focus and determination, improved sports performance, increased willpower, reduced stress levels, greater cold tolerance, faster recovery, enhanced creativity, and a stronger immune system. He also suggests that his WHM may be useful to treat cancer and many other specific diseases. Scientific studies Wim has an identical twin who lives a sedentary lifestyle without exposure to extreme cold. A study comparing their responses to a challenge of cold exposure found no difference in cold-induced thermogenesis, suggesting that habitual exposure to extreme cold was not a factor. However, both twins did have similarly high levels of cold-induced thermogenesis. This was attributed to the brothers' practice of a g-tummo-like breathing technique, suggesting that the vigorous isometric respiratory muscle contractions caused increased heat production. G-tummo breathing techniques have long been practiced in Tibet and are reported to enable practitioners to voluntarily raise their body temperatures. A 2013 study found that forceful breathing during g-tummo increases body heat production, but only temporarily; meditation is required to sustain the response. "The Influence of Concentration/Meditation on Autonomic Nervous System Activity and the Innate Immune Response" was a case study of Wim Hof by a group of researchers in The Netherlands. It was published in Psychosomatic Medicine in 2012. With ice immersion, the cytokine inflammatory response was attenuated; and with intravenous administration of an endotoxin, the cortisol levels were higher than in previously studied individuals. Their conclusion: The concentration/meditation technique used by this particular individual seems to evoke a controlled stress response. This response is characterized by sympathetic nervous system activation and subsequent catecholamine/cortisol release, which seems to attenuate the innate immune response. Another case study of Wim Hof, the 2018 report "Brain Over Body" in NeuroImage by Musik et. al. used fMRI and PET/CT imaging. They found changes in sympathetic innervation and glucose consumption when he used his Wim Hof Method (WHM). Imaging showed that "the WHM also engages higher-order cortical areas (left anterior and right middle insula) that are uniquely associated with self-reflection, and which facilitate both internal focus and sustained attention in the presence of averse (e.g. cold) external stimuli". Their conclusion suggested that "the WHM might allow practitioners to develop higher level of control over key components of the autonomous system, with implications for lifestyle interventions that might ameliorate multiple clinical syndromes". In another study from The Netherlands, 30 healthy Dutch males were randomized into an intervention group and a control group. The first group was trained in "third eye" meditation, voluntarily exposed themselves to cold in various ways (such as taking cold showers), and were instructed in breathing techniques. Then they were injected with an endotoxin. In the intervention group, epinephrine levels increased, and anti-inflammatory markers increased, while levels of proinflammatory markers and flu-like symptoms decreased. They claimed to have demonstrated that voluntary activation of the sympathetic nervous system suppresses the innate immune response. An open-label "proof of concept" study of 24 patients with axial spondyloarthritis was published in PlosOne in 2019. Participants were trained by Wim Hof and then exposed to cold. There was a significant decrease in one inflammatory marker (ESR sedimentation rate) but not in others. They concluded that "the add-on training program used in this study can safely be applied in patients with axial spondyloarthritis and potentially modulates inflammatory response". They acknowledged several limitations of their study and called for further research. Conclusion: The science is lacking A Dutch skeptic, Pepijn van Erp, said it best. He reviewed the scientific evidence and wrote an article about "Wim Hof's Cold Trickery". He says science has shown that hyperventilation reduces the body's inflammatory response; but that isn't always desirable. And when it is desirable, that doesn't necessarily mean there are any practical clinical applications. Inflammation is a normal protective response that promotes healing, and it only becomes a problem when an overactive immune response causes autoimmune diseases. He points out that most of Wim Hof's claims are just speculation and are not supported by any scientific evidence. I agree. His extraordinary resistance to cold is an interesting fact worthy of further investigation, but I don't think it justifies taking cold showers or hyperventilating.

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