## Cold water immersion – potential benefits

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Physiology textbooks as well as interests of medical doctors aim at the description and assessment of systems functioning. All of these systems constantly interact with one another and the external environment. A clear barrier between body and ambient environment is an illusion: in fact, respiratory system consumes oxygen from air but the same pathway is a highway for the exchange of pathogens. In the blink of an eye, uncountable mechanisms are ongoing in our bodies to meet the demands of external environment with a great help of the autonomic nervous system.

All of the elements of nature have been creating a cruel test for survival capacity in humans. A great deal of effort to decrease the need to fight against unfavorable forces of the environment has been taken during the last centuries in developed countries. Technologies of house building improved to keep constant humidity and temperature levels during whole year, regardless of external conditions. Every new public building in developed countries is equipped in air conditioning, and most of them have internal parking lots to give us an opportunity to travel comfortably from one place to another. Looking back, an unbelievable progress has occurred in the last decades. The question is if the adaptation of human physiology will catch up with these changes?

Water has been one of the deadliest elements of nature and it is still such in the present days: every 20 hours in the UK a drowning accident occurs [1]. The character played by Leonardo DiCaprio in one of the most popular movies in history served as an example of how unable humans are to survive for prolonged time in cold water. Several immediate physiological adaptations to cold water immersions occur; sudden heart attack, the loss of capacity to swim and hypothermia increase the risk of drowning. However, as it was already mentioned, much effort has been taken to improve our ability to control the external environment and this applies also to controlled exposure to cold water immersions, which are not exclusively related to unwanted exposure during the sinking of a ship on which one is sailing. Wim Hof [2] is a living example of how cold water immersion could be turned into a double-edged sword in our hands: from a deadly weapon to a potential non-pharmacological treatment option.

Cryotherapy could be defined as cold exposure in a controlled manner for medical purposes. The autonomic nervous system governs the rapid adaptation of systems during cold exposure. Cryotherapy causes a sudden release of stress hormones and gives a solid kick of energy and a sense of being “alive”, and can also serve as a tool in fighting against swelling and inflammation [3]. The inflammatory cascade takes part in delayed onset muscle soreness after strenuous exercise; therefore, the effectiveness of several cryotherapy methods in improving post-exercise recovery has been assessed by sport scientists [3]. However, the inflammation mechanism is a perfect example of one of the rules in science which could be phrased as “nothing is as simple as it looks at first”. In fact, inflammation could play a crucial role in muscle hypertrophy; therefore, cryotherapy can reduce the effects of adaptation to hypertrophic exercise [4]. To urge scientists to conduct further research into the beneficial health effects of cold water immersion therapy, the lack solid evidence supporting the advice repeated for centuries in folk medicine that cryotherapy is the master weapon in common cold prevention should be underlined. However, there is plenty of evidence based on case reports of sportsmen and their faster post-exercise recovery, of ordinary people and their improved immune system functioning, or of euphoria during cold exposure in cold water immersion veterans, which could help convince anyone to start this therapy. Support and supervision from other, more experienced cold exposure-lovers should be provided both when preparing oneself for and performing cold water immersion. Knowing the openness of such winter swimming societies, it is certain that they would be eager to offer you their hospitality.

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1. http://rlss.org.uk/water-safety/drowning-prevention-week/
2. https://www.youtube.com/watch?v=VaMjhwFE1Zw
3. White, G. E., & Wells, G. D. (2013). Cold-water immersion and other forms of cryotherapy: physiological changes potentially affecting recovery from high-intensity exercise. *Extreme physiology & medicine*, *2*(1), 26.
4. Roberts, L. A., Raastad, T., Markworth, J. F., Figueiredo, V. C., Egner, I. M., Shield, A., Cameron-Smith D., Coombes J.S. & Peake, J. M. (2015). Post-exercise cold water immersion attenuates acute anabolic signalling and long-term adaptations in muscle to strength training. *The Journal of physiology*, *593*(18), 4285-4301.