

Heat Exposure for Health

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The use of heat is an ancient practice that results in purification, cleansing and healing. Examples include sweat lodges, which were used by Native Americans; and the traditional use of sauna in Finland. Benefits range from detoxification to improvement in cardiovascular health.

Understanding how heat, including heat from sauna, can positively affect heart health starts with an understanding of hormesis, which is defined as a compensatory response to a stressor. Hormetic stressors like exercise and heat trigger protective mechanisms that repair cell damage, and also provide protection against more severe stressors.¹

Many types of heat exposure can lead to positive physiological changes, including sauna, heat wrapping, diathermy, and hot yoga. One mechanism by which heat has a positive effect is vasodilation. After exposure to extreme heat, the body cools itself. This requires the dilation of vessels to increase blood flow to the skin and to facilitate the release of heat. This not only lowers body temperature, but also increases heart rate and delivers oxygen to muscles and limbs, similar to the effect of aerobic exercise.

Another mechanism is via heat shock proteins, or HSPs, which are present in all cells and in the extracellular spaces. HSPs are involved in numerous cellular functions, and both aerobic exercise and heat stress increase HSP levels.² HSPs assist in lowering systemic inflammation and can increase exercise tolerance.³ Research shows that within 30 minutes of exposure to heat, heat shock proteins in cells increase and remain elevated over time; again, similar to the effect of exercise.⁴

Many studies have looked at the positive effect of sauna bathing and show that it can improve cardiac output, circulation throughout the body, and vascular endothelial function.⁵ In fact, while in a sauna, cardiac output can increase by as much as 70% while stroke volume remains stable. A study of 19 adults showed that blood pressure and heart rate increase as much during a 25-minute sauna session as both would be expected to increase during moderate exercise; and that blood pressure was lower after than it was before sauna.⁶

A prospective cohort study published in 2015 included 20 years of data on over 2300 Finnish men and showed that those who spent time in a sauna more frequently had a lower risk of death from heart disease and stroke.⁷

The best way to address cardiac risk factors or to improve health in general is via a multifaceted approach incorporating diet, exercise, hydration, and heat exposure through sauna, hot yoga, or even yard work in hot weather. In fact, research shows that a post-workout sauna can enhance the benefits of exercise, and that sauna likely

provides the most benefit when combined with aerobic and strength training.⁸ This makes hot yoga is a good alternative because it combines heat and exercise.

Many people report that they don't like heat or that they are heat intolerant. It's important to keep in mind that almost anything new requires a period of adaptation, and this includes exercise, improved diet, and heat. For most people, the benefits to be gained far outweigh the discomfort of adapting to something new.

¹ McCarthy MF, Barroso-Aranda J, Contreras F. "Regular thermal therapy may promote insulin sensitivity while boosting expression of endothelial nitric oxide synthase – Effects comparable to those of exercise training." *Med Hypoth* 2009 Jul;73(1):103-105

² Yamada PM, Amorin FT, Mosely P, Robergs R, Schneider SM. "Effect of heat acclimation on heat shock proteins 72 and interleukin-10 in humans." *J Appl Physiol* 2007 Oct;103;4

³ Zychowska M, Nowak-Zaelska A, Chruscinski G et al "Association of High Cardiovascular Fitness and the Rate of Adaptation to Heat Stress." *Biomed Res Int* 2018 Feb;1685368

⁴ Patrick, RP, Johnson TL. "Sauna use as a lifestyle practice to extend healthspan." *Exp Gerontol* 2-21 Oct;154:111509

⁵ Blum N, Blum A. "Beneficial effects of sauna bathing for heart failure patients." *Exp Clin Cardiol* 2007 Spring;12(1):29-32

⁶ Ketelhut A, Ketelhut RG. "The blood pressure and heart rate during sauna bath correspond to cardiac responses during submaximal dynamic exercise." *Compl Ther Med* 2019 Jun;44:218-222

⁷ Laukkanen T, Khan H, Zaccardi F et al. "Association Between Sauna Bathing and Fatal Cardiovascular and All-Cause Mortality Events." *JAMA Intern Med* 2015 Apr;175(4):542-548

⁸ Kunutsor SK, Laukkanen JA. "Does the Combination of Finnish Sauna Bathing and Other Lifestyle Factors Confer Additional Health Benefits? A Review of the Evidence." *Proc Mayo Clin* 2023 Jun;98(6):P915-926