

Sauna Use: Health Benefits

Compelling data from a combination of observational, interventional and mechanistic studies point to an increase in lifespan and healthspan using the sauna. To quote one of the world’s experts, “You and the people you care about should be sitting in a hot box.”

Based on the data, sauna use should be part of the standard of care for the prevention and treatment of a variety of cardiovascular conditions.

Mining data from the 20-year-long Kuopio Ischemic Heart Disease study of 2,300 Finnish men has allowed us to link sauna use to reduced risk of death and disease. Compared to men who didn’t use the sauna, those who used the sauna 2 to 3 times a week were 27% less likely to die of cardiovascular causes. Those who used the sauna 4 to 7 times a week were 50% less likely to die from cardiovascular causes, indicating a strong dose dependence. Frequent sauna users were found to have a 40% reduction in the risk of all causes of premature death. This holds even when adjusting for age, activity levels and lifestyle factors.

Sauna Increases Longevity

Table 2. Hazard Ratios of Sudden Cardiac Death, Fatal Coronary Heart Disease, Fatal Cardiovascular Disease, and All-Cause Mortality According to the Frequency of Sauna Bathing

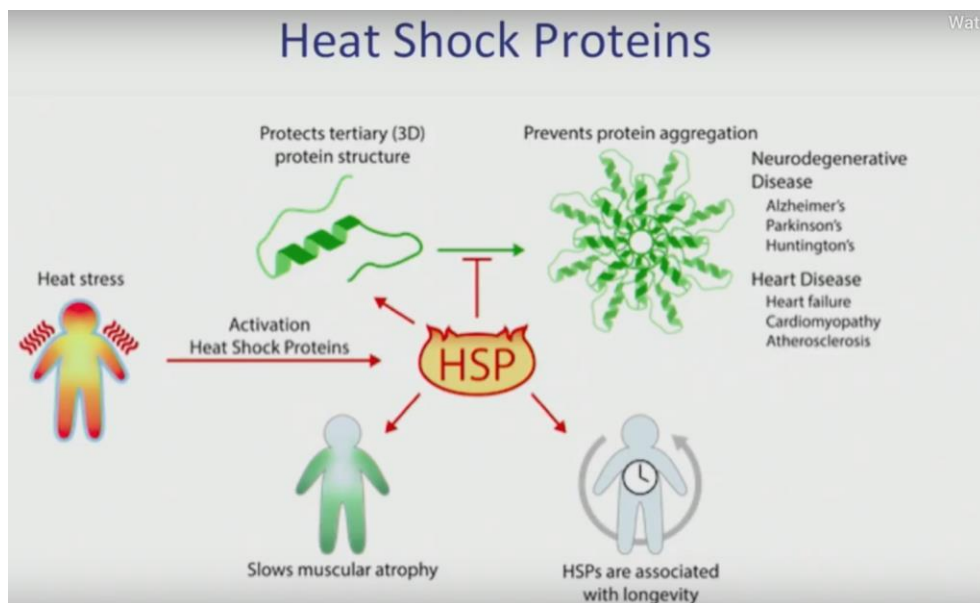
Frequency of Sauna	Sudden Cardiac Death (n = 190) ^a		Fatal Coronary Heart Disease (n = 281)		Fatal Cardiovascular Disease (n = 407)		All-Cause Mortality (n = 929)	
	Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value
Age-Adjusted Hazard Ratios								
1 Time per week (n = 601)	1 [Reference]		1 [Reference]		1 [Reference]		1 [Reference]	
2-3 Times per week (n = 1513)	0.71 (0.52-0.96)	.03	0.71 (0.56-0.93)	.01	0.68 (0.55-0.84)	<.001	0.69 (0.60-0.79)	<.001
4-7 Times per week (n = 201)	0.49 (0.25-0.96)	.04	0.60 (0.35-0.99)	.04	0.55 (0.36-0.85)	.007	0.61 (0.46-0.80)	<.001
P value for trend	.008		.006		<.001		.001	
Multivariable-Adjusted Hazard Ratios^b								
1 Time per week (n = 601)	1 [Reference]		1 [Reference]		1 [Reference]		1 [Reference]	
2-3 Times per week (n = 1513)	0.78 (0.57-1.07)	.12	0.77 (0.60-0.99)	.04	0.73 (0.59-0.89)	.002	0.76 (0.66-0.88)	<.001
4-7 Times per week (n = 201)	0.37 (0.18-0.75)	.006	0.52 (0.31-0.88)	.01	0.50 (0.33-0.77)	.001	0.60 (0.46-0.80)	<.001
P value for trend	.005		.005		<.001		<.001	

The mechanism of effect is predicated on mild hyperthermia leading to a thermoregulatory response involving neuroendocrine, cardiovascular and cytoprotective mechanisms which condition the body for future heat stressors. This falls in the category of hormetic stressors which are those things that cause enough stress to lead to an adaptive and beneficial response. In other words, what doesn’t kill us makes us stronger. Fasting, heat stress, metformin, exercise, sulforaphane from broccoli, and many others, serve the same role.

Most modern saunas heat the air to a high temperature ranging from 158°F to 212°F and averaging 175°F. The warm air transfers heat to the user. Saunas can be dry or wet. The dry saunas have low relative humidity while the “wet” saunas have high humidity and are a bit more stressful on the body as they diminish evaporative cooling through sweat. The skin heats first in a sauna, and then the core body temperature can increase from 98.6 up to 102.2. Cardiac output increases 60-70%. Approximately 50-70% of the body’s blood flow is distributed to the

skin for cooling. In many ways, the physiologic response to the sauna is similar to that experienced during moderate to vigorous exercise.

During heat stress, several molecular adaptations occur. These include increased expression of heat shock proteins (HSP), transcription regulators, and pro- and anti-inflammatory factors. Heat shock proteins are a highly conserved family of proteins found in all cells which impact immune function, cell signaling and cell cycle regulation. In many pathologic conditions, like Alzheimer's and cardiac disease, changes to proteins lead to accumulation of protein aggregates, and it is the job of heat shock proteins to prevent protein aggregation and abnormal accumulation. Fasting also induces HSPs, and it is the heat shock response which protect cells from damage. HSPs also activate Nrf2, which is a transcription factor that orchestrates a variety of cytoprotective and anti-inflammatory activities. Coffee also activates Nrf2. Nrf2 upregulates expression of heme oxygenase-1 which diminishes many cellular adhesion molecules active in recruiting the immune system to the intimal space in CAD. Heat stress also induces a very important anti-aging transcription factor called FOXO3 that complexes with sirtuins. This enhances a cell's stress resistance and can modulate lifespan. Finally, heat stress induces release of IL-6 (the same as exercise), and this transient increase in inflammation then leads to adaptive improvements at the level of the muscle. Using NSAIDs after exercise has been shown to negate this benefit.



Sauna use has been shown to improve each of the following conditions:

1. Coronary artery disease - the impressive data is in the opening paragraph above.
2. CHF - two weeks of Waon therapy, a type of sauna with reduced heat, improved endurance, heart size and disease status vs. only conventional care. It also reduced PVC burden.
3. Chronic stable angina
4. PVD - small studies demonstrate improved pain and walking distance.
5. Hypertension - sauna improves arterial compliance and can help to delay or prevent the development of hypertension.
6. Endothelial dysfunction
7. Inflammation - sauna use reduced CRP levels.

8. Stroke and brain health - sauna induces production of BDNF that promotes new neuron growth.
9. Hormonal status and metabolic function - insulin and cortisol are lower. GH is higher. GLUT4 expression on muscle increases which improves insulin sensitivity.
10. Detoxification - heavy metals can be excreted through sweat. Bisphenol A from plastics, PCBs and phthalates are readily excreted through sweat.

Original Investigation
Association Between Sauna Bathing and Fatal Cardiovascular and All-Cause Mortality Events

Tapanina Laakkonen, MSc; Hasan Khan, MD, PhD; Francesco Zaccardi, MD; Jari A. Laukkanen, MD, PhD

IMPORTANCE: Sauna bathing is a health habit associated with better hemodynamic function; however, the association of sauna bathing with cardiovascular and all-cause mortality is not known.

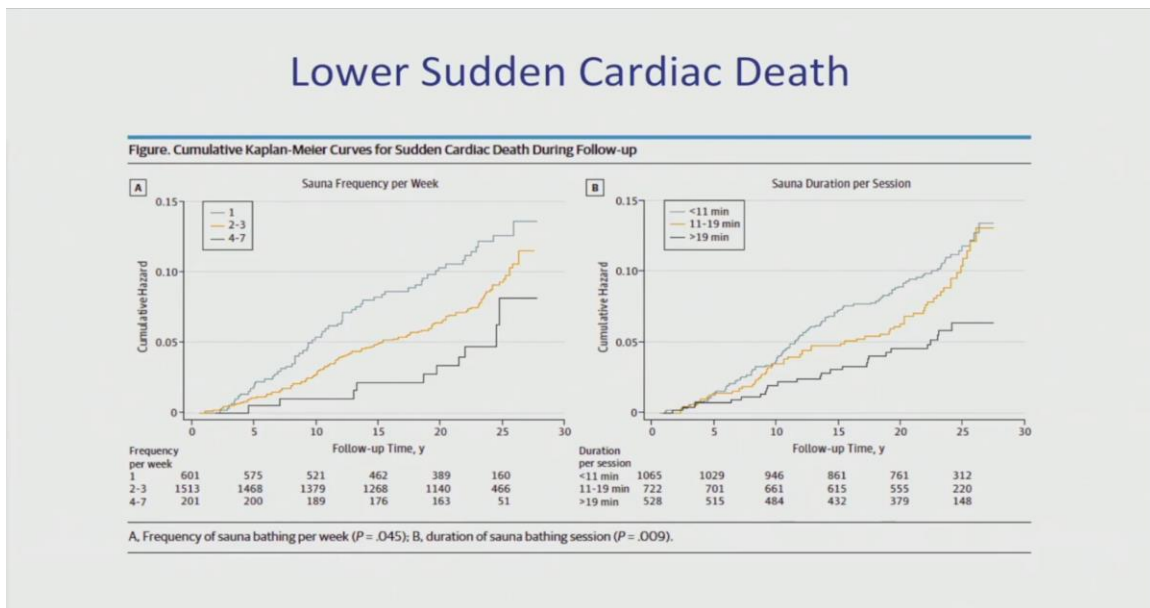
OBJECTIVE: To investigate the association of frequency and duration of sauna bathing with the risk of sudden cardiac death (SCD), fatal coronary heart disease (CHD), fatal cardiovascular disease (CVD), and all-cause mortality.

DESIGN, SETTING, AND PARTICIPANTS: We performed a prospective cohort study (Finnish Kuopio Ischemic Heart Disease Risk Factor Study) of a population-based sample of 2315 middle-aged (age range, 42-60 years) men from Eastern Finland. Baseline examinations were conducted from March 1, 1984, through December 31, 1989.

EXPOSURES: Frequency and duration of sauna bathing assessed at baseline.

RESULTS: During a median follow-up of 20.7 years (interquartile range, 18.1-22.6 years), 190 SCDs, 281 fatal CHDs, 407 fatal CVDs, and 929 all-cause mortality events occurred. A total of 601, 1513, and 201 participants reported having a sauna bathing session 1 time per week, 2 to 3 times per week, and 4 to 7 times per week, respectively. The numbers (percentages) of SCDs were 61 (10.3%), 119 (7.8%), and 10 (5.0%) in the 3 groups of the frequency of sauna bathing. The respective numbers were 89 (14.9%), 175 (11.5%), and 17 (8.5%) for fatal CHDs; 134 (22.3%), 249 (16.4%), and 24 (12.0%) for fatal CVDs; and 295 (49.1%), 572 (37.8%), and 62 (30.8%) for all-cause mortality events. After adjustment for CVD risk factors, compared with men with 1 sauna bathing session per week, the hazard ratio of SCD was 0.78 (95% CI, 0.57-1.07) for 2 to 3 sauna bathing sessions per week and 0.37 (95% CI, 0.18-0.75) for 4 to 7 sauna bathing sessions per week (*P* for trend = .005). Similar associations were found with CHD, CVD, and all-cause mortality (*P* for trend = .005). Compared with men having a sauna bathing session of less than 11 minutes, the adjusted hazard ratio for SCD was 0.93 (95% CI, 0.67-1.28) for sauna bathing sessions of 11 to 19 minutes and 0.48 (95% CI, 0.31-0.75) for sessions lasting more than 19 minutes (*P* for trend = .002); significant inverse associations were also observed for fatal CHDs and fatal CVDs (*P* for trend = .03) but not for all-cause mortality events.

CONCLUSIONS AND RELEVANCE:
 Increased frequency of sauna bathing is associated with a reduced risk of SCD, CHD, CVD, and all-cause mortality. Further studies are warranted to establish the potential mechanism that links sauna bathing and cardiovascular health.



Lower Hypertension

Sauna Bathing and Incident Hypertension: A Prospective Cohort Study

Francesco Zaccardi,^{1,*} Tanjaniina Laukkanen,^{2,*} Peter Willeit,^{3,4} Setor K. Kunutsor,⁵ Jussi Kauhanen,² and Jari A. Laukkanen^{2,6}

BACKGROUND

Sauna bathing is associated with reduced cardiovascular risk, but the mechanisms underlying this beneficial effect are not entirely understood. We aimed to assess the relationship between sauna bathing and risk of incident hypertension.

METHODS

Frequency of sauna bathing was ascertained using questionnaires in the Kuopio Ischemic Heart Disease Study, a prospective cohort study conducted in Eastern Finland that comprised a population-based sample of 1,621 men aged 42 to 60 years without hypertension at baseline. The incidence of hypertension was defined as a physician diagnosis of hypertension, systolic blood pressure (SBP) >140 mm Hg, diastolic blood pressure >90 mm Hg, or use of antihypertensive medication.

RESULTS

During a median follow-up of 24.7 years, 251 incident cases (15.5%) were recorded. In Cox regression analysis adjusted for baseline age, smoking, body mass index, and SBP; compared to participants reporting

1 sauna session per week, the hazard ratio for incident hypertension in participants reporting 2 to 3 sessions and 4 to 7 sessions was 0.76 (95% confidence interval: 0.57–1.02) and 0.54 (0.32–0.91), respectively. The corresponding hazard ratios were similar after further adjustment for glucose, creatinine, alcohol consumption, heart rate, family history of hypertension, socioeconomic status, and cardiorespiratory fitness: 0.83 (95% confidence interval: 0.59–1.18) and 0.53 (0.28–0.98), respectively.

CONCLUSIONS

Regular sauna bathing is associated with reduced risk of hypertension, which may be a mechanism underlying the decreased cardiovascular risk associated with sauna use. Further epidemiological and experimental studies could help elucidate the effects of sauna bathing on cardiovascular function.

Keywords: blood pressure; cohort; hypertension; prevention; Sauna bathing.

doi:10.1093/ajh/hpx102

Sauna bathing reduces the risk of stroke in Finnish men and women

A prospective cohort study

Setor K. Kunutsor, PhD, Hassan Khan, PhD, Francesco Zaccardi, MD, Tanjaniina Laukkanen, MSc, Peter Willeit, PhD, and Jari A. Laukkanen, PhD

Neurology 2018;0:e1–e8. doi:10.1212/WNL.0000000000005606

Abstract

Objective

To assess the association between frequency of sauna bathing and risk of future stroke.

Methods

Baseline habits of sauna bathing were assessed in 1,628 adult men and women aged 53–74 years (mean age, 62.7 years) without a known history of stroke in the Finnish Kuopio Ischemic Heart Disease prospective cohort study. Three sauna bathing frequency groups were defined: 1, 2–3, and 4–7 sessions per week. Hazard ratios (HRs) (95% confidence intervals [CIs]) were estimated for incident stroke.

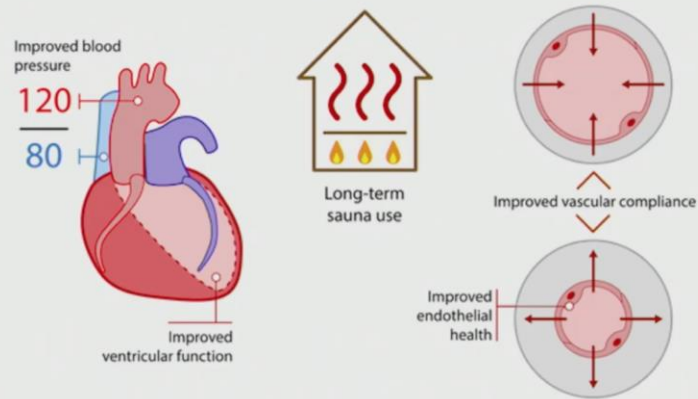
Results

During a median follow-up of 14.9 years, 155 incident stroke events were recorded. Compared with participants who had one sauna bathing session per week, the age- and sex-adjusted HR (95% CI) for stroke was 0.39 (0.18–0.83) for participants who had 4–7 sauna sessions per week. After further adjustment for established cardiovascular risk factors and other potential confounders, the corresponding HR (95% CI) was 0.39 (0.18–0.84) and this remained persistent on additional adjustment for physical activity and socioeconomic status at 0.38 (0.18–0.81). The association between frequency of sauna bathing and risk of stroke was not modified by age, sex, or other clinical characteristics (*p* for interaction > 0.10 for all subgroups). The association was similar for ischemic stroke but modest for hemorrhagic stroke, which could be attributed to the low event rate (*n* = 34).

Conclusions

Higher frequency and duration of sauna bathing are each strongly, inversely, and independently associated with fatal CVD events in middle-aged to elderly males and females. **The frequency of sauna bathing improves the prediction of the long-term risk for CVD mortality.**

Sauna improves blood pressure, endothelial function, arterial compliance, and left ventricular function.



Sauna bathing reduces the risk of stroke in Finnish men and women

A prospective cohort study

Setor K. Kunutsor, PhD, Hassan Khan, PhD, Francesco Zaccardi, MD, Tanjalinna Laukkanen, MSc, Peter Willett, PhD, and Jani A. Laukkanen, PhD

Neurology® 2018;0:e1-e8. doi:10.1212/WNL.0000000000005606

Abstract

Objective

To assess the association between frequency of sauna bathing and risk of future stroke.

Methods

Baseline habits of sauna bathing were assessed in 1,628 adult men and women aged 53–74 years (mean age, 62.7 years) without a known history of stroke in the Finnish Kuopio Ischemic Heart Disease prospective cohort study. Three sauna bathing frequency groups were defined: 1, 2–3, and 4–7 sessions per week. Hazard ratios (HRs) (95% confidence intervals [CIs]) were estimated for incident stroke.

Results

During a median follow-up of 14.9 years, 155 incident stroke events were recorded. Compared with participants who had one sauna bathing session per week, the age- and sex-adjusted HR (95% CI) for stroke was 0.39 (0.18–0.83) for participants who had 4–7 sauna sessions per week. After further adjustment for established cardiovascular risk factors and other potential confounders, the corresponding HR (95% CI) was 0.39 (0.18–0.84) and this remained persistent on additional adjustment for physical activity and socioeconomic status at 0.38 (0.18–0.81). The association between frequency of sauna bathing and risk of stroke was not modified by age, sex, or other clinical characteristics (*p* for interaction > 0.10 for all subgroups). The association was similar for ischemic stroke but modest for hemorrhagic stroke, which could be attributed to the low event rate (*n* = 34).

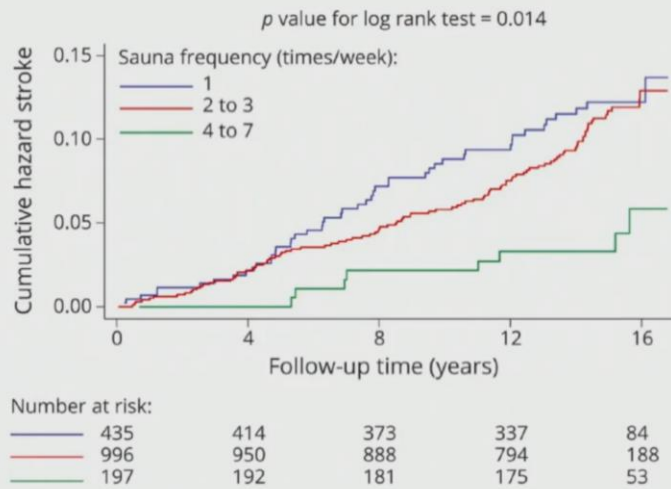
Conclusions

Higher frequency and duration of sauna bathing are each strongly, inversely, and independently associated with fatal CVD events in middle-aged to elderly males and females. The frequency of sauna bathing improves the prediction of the long-term risk for CVD mortality.

Lower Stroke Risk

Figure 1

Cumulative Kaplan-Meier curves for stroke during follow-up according to the frequency of sauna bathing per week.



Sauna Lowers Inflammation

European Journal of Epidemiology
<https://doi.org/10.1007/s10654-017-0335-y>

LETTER TO THE EDITOR



Sauna bathing and systemic inflammation

Jari A. Laukkanen^{1,2} · Tanjaniina Laukkanen¹

Received: 22 October 2016 / Accepted: 23 November 2017
 © Springer Science+Business Media B.V., part of Springer Nature 2017

Abstract

We aimed to investigate whether frequency of sauna bathing is associated with the levels of serum C-reactive protein. C-reactive protein is a leading blood marker of systemic inflammation. The study consisted of 2084 men (42–60 years) without acute or chronic inflammation. A total of 533 (25.6%), 1368 (65.6%), and 183 (8.8%) participants reported having a sauna bath once a week, 2–3 times, and 4–7 times per week; mean serum C-reactive protein levels were 2.41 (standard deviation 2.91), 2.00 (2.41), 1.65 (1.63) mmol/L, respectively. In a multivariable analysis adjusted for baseline age, body mass index, systolic blood pressure, smoking, type 2 diabetes, previous myocardial infarction, and serum low density lipoprotein cholesterol, alcohol consumption and physical activity, there was a significant inverse association between the frequency of sauna bathing and the level of C-reactive protein. Further studies are warranted to investigate the relationship between sauna bathing and systemic inflammation.

Research Article

Association of High Cardiovascular Fitness and the Rate of Adaptation to Heat Stress

Malgorzata Zychowska¹, Alicja Nowak-Zaleska^{1,2}, Grzegorz Chruscicki¹,
 Ryszard Zaleski¹, Jan Mieszkowski¹, Bartłomiej Niespodziński¹,
 Roman Tymański¹ and Andrzej Kochanowicz²

¹Department of Life Sciences, Faculty of Physical Education, Gdańsk University of Physical Education and Sport, Gdańsk, Poland
²Plasma and Microgenetics Collection, Faculty of Biology, University of Gdańsk, Gdańsk, Poland

³Department of Management in Sport, Faculty of Physical Education, Gdańsk University of Physical Education and Sport, Gdańsk, Poland
⁴New Public Health Centre "EFERMED", Gdańsk, Poland

⁵Department of Anatomy and Biomechanics, Institute of Physical Education, Kazimierz Wielki University, Bydgoszcz, Poland
⁶Department of Sport, Gdańsk University of Physical Education and Sport, Gdańsk, Poland
⁷Department of Gymnastics and Dance, Gdańsk University of Physical Education and Sport, Gdańsk, Poland

Correspondence should be addressed to Malgorzata Zychowska; zychowska.m@gmail.com

Received: 30 August 2017; Accepted: 10 January 2018; Published: 28 February 2018

Academic Editor: Yang Bai

Copyright © 2018 Malgorzata Zychowska et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This study aimed to compare changes in gene expression associated with inflammation and apoptosis in response to heat stress caused by sauna between people with varying cardiorespiratory fitness levels. We hypothesized that high cardiorespiratory level caused higher positive changes after four weeks of sauna bathing. Blood samples were taken at rest before and after the first and last sauna sessions and 48 hours after the last sauna session and used to assay HSP70 (HSP70A), HSP27 (HSP27A), interleukin 6 (IL6), and interleukin 10 (IL10) gene expression in blood with quantitative real-time qRT-PCR. Overall, small decreases in rest values of HSP70A and IL6 mRNA, increase in HSP27 mRNA, and a significant increase in IL10 mRNA were observed after four weeks of exposure to heat stress. Our findings suggest that an adaptive response to heat stress (an anti-inflammatory response) occurs faster in people with higher cardiorespiratory fitness.

Finally, sauna use lowers the incidence of dementia. Those spending 20 minutes in a traditional sauna 4 or more times a week had a 66% lower chance of developing dementia over a 20-year period than those not using the sauna.

Sauna Decreases Alzheimer's Disease Risk

Table 2.

HRs of dementia and Alzheimer's disease according to frequency of sauna bathing

Frequency of sauna bathing (number of subjects)	Dementia (N = 204)		Alzheimer's disease (N = 123)	
	HR (95% CI)	P value	HR (95% CI)	P value
Age adjusted				
1 time/week (601)	1.00 (reference)		1.00 (reference)	
2-3 times/week (1,513)	0.77 (0.57- 1.04)	0.090	0.80 (0.54- 1.20)	0.278
4-7 times/week (201)	0.38 (0.18- 0.80)	0.011	0.41 (0.16- 1.07)	0.069

I was so compelled by the data a few years ago that we purchased an in-home sauna. There are many companies that sell either infrared or regular dry heat saunas, and many of these are reasonably priced and small enough to fit in a 4' X 4' spot. The cost for one of these home saunas is comparable to a Peloton bike. I think sauna use probably deserves to be a topic of discussion in our MDVIP wellness practices. I can't think of another intervention besides exercise that delivers the pervasive benefits that sauna use does.

My primary source for this Academy article is Rhonda Patrick, PhD.