



Sauna Use for Detoxification After Fire Suppression

March 2017

Saunas use a heat or light (in the case of infrared saunas) source in a defined space to generate heat. “Wet” saunas use steam in addition to the heat source, to generate moist heat. Use of saunas results in sweating which has been advocated by some as a way to remove chemical toxicants from the body. Sauna manufacturers may market their products to fire departments and provide materials on the benefits of saunas.

How do chemicals enter the body?

Chemicals enter the body in three main ways:

1. Inhalation from the air we breathe
2. Absorption across the skin (dermal)
3. Ingestion, for example from food or drink contaminated by chemicals from hands

Once chemicals enter the body, they cross the lungs, skin or gastrointestinal tract and enter the blood stream and circulate in the body.

How does the body remove chemicals?

Chemicals are removed from the blood by the liver where they are metabolized. Generally, metabolism in the liver results in smaller, less toxic chemicals that can be excreted in urine or stool. Chemicals that evaporate easily can also be exhaled when we breath out. Fortunately, the human body efficiently metabolizes most chemicals so they are not stored long-term in the body.

What is the history of saunas for detoxification?

The use of saunas for detoxification dates back to at least the 1980s when L. Ron Hubbard and the Scientology community utilized saunas in what has become known as the Hubbard program. This involves 20-30 minutes of aerobic exercise followed by as close to 5 hours spent in a sauna at 140–180°F “as could be comfortably taken”, nutritional supplements (vitamins and minerals), increasing niacin doses, water and various salts to avoid dehydration and salt depletion, balanced meals, adequate sleep, and avoidance of alcohol and illegal drugs.¹ This method of removing toxicants from the body has been advocated by the alternative medicine community.

Results of the use of this program have been published in fire fighters,² workers exposed in the World Trade Center, including fire fighters,^{3, 4, 5, 6, 7, 8} and police officers exposed to methamphetamine labs.⁹ This extreme regimen has obvious risks including “brief full blown 'LSD trips' with hallucinations”¹ and the requirement to discontinue prescription medications.¹⁰ Furthermore, IAFF has not identified any publications of adequate quality to evaluate effectiveness. Specifically, existing publications on the Hubbard program have one or more of the following research problems: small participant numbers, inadequate control groups, lack of peer review, and subjective outcomes.

Are there risks from sauna use?

Sauna use is relatively common and a range of health benefits have been reported including reduced rates of death from cardiac disease¹¹ and of dementia diagnosis¹² in residents in Finland who use saunas very frequently (4-7 times per week). However, saunas can cause dehydration and heat stress. Death from sauna use is not common but can occur in the presence of pre-existing health problems, such as heart disease,^{13,14,15} and from burns, which can develop in as little as 10 minutes.¹⁶ The influence of alcohol and drugs is important in these deaths.¹³

Is there any science supporting detoxification through sweating?

Data to address this question are very limited. A recent review summarized 24 articles that examined metal levels in sweat. The authors concluded that excretion of metals through sweat could match or exceed that through urine (1-2 liters of urine are produced per day and the review stated that fluid loss from sweat could be as high as 2 liters per hour).¹⁷ The volume of sweat is less than that of blood (blood volume varies by weight and sex; 6 liters for a 180 pound male¹⁸). Therefore, higher concentrations of chemicals in sweat compared to blood could be simply due to volume. However, although the authors conclude that sweating should receive additional consideration for toxic element detoxification, they noted that much of the data they reviewed was old and that research was needed to establish safe, effective therapeutic protocols. IAFF further notes that they did not select their studies based on quality. Small participant numbers were common and variation in collection and measurement methods make comparisons difficult.

A research project entitled the “Blood, Urine, and Sweat (BUS) Study” analyzed these three fluids for approximately 120 chemicals.¹⁹ The authors reported that some toxic elements were present in sweat but not serum in some participants. As noted above, that may be due to smaller volumes resulting in more concentrated, easier to measure chemical levels in sweat. The authors also noted loss of required trace minerals into sweat. The authors specifically mentioned fire fighters as a group “who by the nature of their occupations are exposed to toxic elements, may be advised to regularly undertake induced sweating.” They noted that “Further research is required, however, to determine whether induced sweating on the day of exposure is beneficial or detrimental because enhanced circulation to the skin associated with sauna may stimulate greater absorption of toxicants on the skin.” Importantly, this was a small study that included only 20 participants.

Why isn't IAFF recommending the use of saunas for detoxification after fire suppression activities?

IAFF understands that fire fighters are concerned about reducing health risks from their occupational chemical exposures. However, there are a number of reasons why IAFF does not recommend the use of saunas after fire suppression activities:

- The science on sauna use is still too limited to determine if this increases excretion of chemicals in a significant way. Most chemicals are not stored long term in the body and are excreted normally by the body.
- Saunas use immediately after fire suppression activities has the potential to increase absorption. Chemicals on the skin may evaporate and be inhaled. The heat in the sauna increases blood flow to the skin which also has the potential to increase absorption across the skin including any contaminants on the skin.²⁰
- Fire suppression can cause heat stress and heat illnesses.^{21,22} Just walking on a treadmill in turn-out gear increases body temperature.²² Increased body temperature results in sweating and fluid loss, which can cause serum electrolyte changes and dehydration. The lower blood volume from dehydration causes less blood to be pumped with each heartbeat. These effects contribute to the well-documented increased risk of heart attack during and in the hours immediately after fire fighting. Use of saunas after fire fighting may increase the potential for dehydration, heat-related illnesses and heart and kidney disorders.

In summary, at the present time, there is insufficient medical evidence to support a recommendation for use of saunas to remove toxicants from the body after fire fighting, and the potential adverse health effects outweigh potential benefits.

What does IAFF recommend?

Prevent exposure — Fire fighters should continue to use self-contained breathing apparatus during all fire suppression and overhaul activities. Fire fighters should decontaminate their skin after fire suppression activities with wipes at the scene and showering as soon as possible after fire fighting and/or overhaul activities. Turnout gear, helmets, and equipment should be cleaned regularly per the manufacturers' recommendations in order to reduce exposure to chemical contaminants.

Wellness Fitness Initiative — Cancer screening based on recommendations of established organizations such as the American Cancer Society and the US Preventive Services Task Force with modifications to address the increased risk of certain cancers in fire fighters. (<https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html>). In addition, fire fighters should maintain a healthy weight, exercise regularly, eat a diet rich in fruits, vegetables and whole grains, and get a medical physical annually.

References

-
- ¹ Schnare DW, Denk G, Shields M, Brunton S. Evaluation of a detoxification regimen for fat stored xenobiotics. *Med Hypotheses*. 1982 Sep;9(3):265-82.
- ² Kilburn KH1, Warsaw RH, Shields MG. Neurobehavioral dysfunction in firemen exposed to polychlorinated biphenyls (PCBs): possible improvement after detoxification. *Arch Environ Health*. 1989 Nov-Dec;44(6):345-50.
- ³ Cecchini M. Chemical exposure at the World Trade Center: Use of the Hubbard sauna detoxification regimen to improve health status of New York City rescue workers exposed to toxicants. *Townsend Lett*. 2006;273:58–65.
<http://www.townsendletter.com/Dec2006/chemexp1206.htm>
- ⁴ https://en.wikipedia.org/wiki/New_York_Rescue_Workers_Detoxification_Project
- ⁵ Dahlgren J, Cecchini M, Takhar H, and Paepke O. Persistent organic pollutants in 9/11 world trade center rescue workers: Reduction following detoxification. *Chemosphere*. 2007;69:1320–1325.
- ⁶ O'Donnell, M. "Scientologist's Treatments Lure Firefighters" *New York Times*,
<http://www.nytimes.com/2003/10/04/nyregion/04DETO.html?ex=1148011200&en=c46507c25827d1c3&ei=5070> (accessed 3/15/17)
- ⁷ Gittrich, G. "Bravest taking the Cruise cure". *New York Daily News*.
<http://web.archive.org/web/20031216055606/http://www.nydailynews.com/news/local/story/145576p-128631c.html> (accessed 3/15/17)
- ⁸ Crouch EA and Green LC. Comment on "Persistent organic pollutants in 9/11 world trade center rescue workers: Reduction following detoxification. *Chemosphere*. 2007;69:1330–1332.
- ⁹ Ross GH, Sternquist MC. Methamphetamine exposure and chronic illness in police officers: significant improvement with sauna-based detoxification therapy. *Toxicol Ind Health*. 2012 Sep;28(8):758-68
- ¹⁰ Dahlgren J, Cecchini M, Takhar H, and Paepke O. Reply to Comment of Edmund A.C. Crouch and Laura C. Green, on: "Persistent organic pollutants in 9/11 world trade center rescue workers: Reduction following detoxification" *Chemosphere*. 2007;69:13330–1336.
- ¹¹ Laukkanen T, Khan H, Zaccardi F, Laukkanen JA Association between sauna bathing and fatal cardiovascular and all-cause mortality events. *JAMA Intern Med*. 2015;175:542-8
- ¹² Laukkanen T, Kunutsor S, Kauhanen J, Laukkanen JA. Sauna bathing is inversely associated with dementia and Alzheimer's disease in middle-aged Finnish men. *Age Ageing*. 2016
- ¹³ Press E. "The Health Hazards of Saunas and How to Minimize Them", *Am J Public Health*. 1991 Aug;81(8):1034-7.
- ¹⁴ Rodhe A1, Eriksson A Sauna deaths in Sweden, 1992-2003. *Am J Forensic Med Pathol*. 2008;29:27-31.
- ¹⁵ Giannetti N1, Juneau M, Arsenault A, Behr MA, Grégoire J, Tessier M, Larivée L. Sauna-induced myocardial ischemia in patients with coronary artery disease. *Am J Med*. 1999 Sep;107(3):228-33.
- ¹⁶ Lindroos K, Keltanen T. Sudden Death in Sauna Due to Fatal Burns: A Case Report. *Am J Forensic Med Pathol*. 2016 Mar;37(1):1-3
- ¹⁷ Sears ME1, Kerr KJ, Bray RI. Arsenic, cadmium, lead, and mercury in sweat: a systematic review. *J Environ Public Health*. 2012;2012:18474

¹⁸ <http://reference.medscape.com/calculator/estimated-blood-volume> (accessed March 15, 2017)

¹⁹ Genuis SJ1, Birkholz D, Rodushkin I, and Beesoon S. Blood, urine, and sweat (BUS) study: monitoring and elimination of bioaccumulated toxic elements. Arch Environ Contam Toxicol. 2011;61:344-57.

²⁰ Gordon CJ and Leon LR. Thermal Stress and the Physiological Response to Environmental Toxicants. Rev Environ Health. 2005;20:235-263

²¹ Preventing Fire Fighter Fatalities Due to Heart Attacks and Other Sudden Cardiovascular Events", DHHS (NIOSH) Publication Number 2007-133, June 2007

²² Smith DL, Barr DA, and Kales SN. Extreme sacrifice: sudden cardiac death in the US Fire Service. Extreme Physiology & Medicine. 2013;2:6