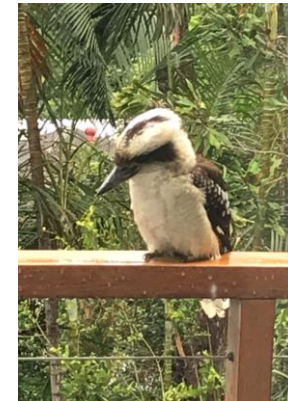


Exploring the clinical effects of repeated dry sauna bathing – a systematic review

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XVII International Sauna Congress – June 2018

Systematic Review of Sauna Literature



Inclusion Criteria:

- English language
- Jan 2000 – April 2017
- Humans

Exclusion Criteria:

- wet/steam sauna
- hydrotherapy
- partial body
- sauna as location
- animal-based
- single session sauna
- case reports/ case studies

PRISMA =
Preferred Reporting Items for Systematic
Reviews and Meta-Analyses

Figure from: J. Hussain and M. Cohen, "Clinical Effects of Regular Dry Sauna Bathing: A Systematic Review", Evidence-Based Complementary and Alternative Medicine, vol.2018, Article ID 1857413, 30 pages, 2018.

40 Studies of the Systematic Review[∞]



- 13 RCTs
- 2 large prospective cohort studies
- 3/13 RCTs with low overall risk of bias¹⁻³
- Most studies with $n < 40$

[∞] J. Hussain and M. Cohen, "Clinical Effects of Regular Dry Sauna Bathing: A Systematic Review", Evidence-Based Complementary and Alternative Medicine, vol.2018, Article ID 1857413, 30 pages, 2018.

¹ J.P.T. Higgins et al., "The Cochrane Collaboration's tool for assessing risk of bias in randomized trials", BMJ, vol. 343, no. 7829, 2011.

² A.R. Jadad et al., "Assessing the quality of reports of randomized clinical trials: is blinding necessary?", Controlled Clinical Trials, vol. 17, no.1, pp1-12, 1996.

Results: health effects of sauna

<https://pixabay.com/en/sauna-infusion-sauna-time-981027/>



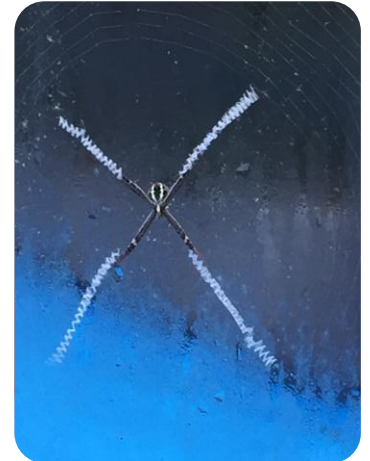
- 38/40 studies reported beneficial health effects
- 2010 Pach et al. reported negligible health benefits (n= 157)^a
- 2013 Garolla et al. reported adverse health effect of impaired male spermatogenesis, reversed after 6 months of ceasing sauna activity (n= 10)^b

^a D. Pach et al., "Visiting a sauna: Does inhaling hot dry air reduce common cold symptoms? A randomized controlled trial," *Medical Journal of Australia*, vol.193, no.11-12, pp.730-734, 2010.

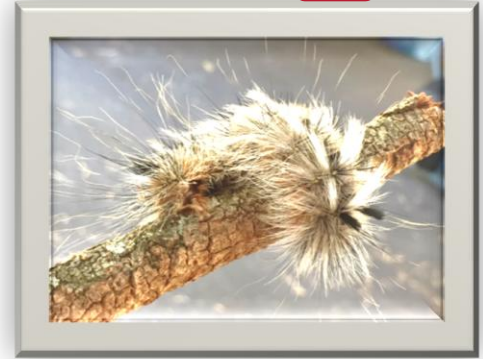
^b A. Garolla et al., "Seminal and molecular evidence that sauna exposure affects human spermatogenesis", *Human Reproduction*, vol.28, no.4, pp.877-885, 2013.

Adverse side effects

- 8/40 studies reported on adverse side effects (all mild – moderate in level):
 - heat discomfort & intolerance (especially CFS/ME, chronic pain, rheumatoid arthritis, ankylosing spondylitis populations)
 - light-headedness (low blood pressure)
 - transient leg pain
 - airway irritation
 - claustrophobia
- **NO REPORTS OF SEVERE ADVERSE EVENTS!**



Main research highlight – CVD



Laukkanen et al. 2015, 2016 cohort studies¹⁻³:

- 40% reduced risk of all-cause mortality (men, if sauna 4 -7 x/wk)¹
- 63% reduced risk of sudden cardiac death (men, if sauna 4 -7 x/wk)²
- 66% reduced risk of dementia (men, if sauna 4-7 x/wk)³



Tei et al. 2016 multi-centre RCT⁴:

- Significant improvements compared to control ($p < 0.05$) in 6-min walking distances, reduced CTR (measure of heart enlargement), improved NYHA classification after 2 weeks of infrared sauna protocol.⁴

¹ HR (hazard ratio) = 0.60, 95% CI (confidence interval): 0.46 -0.80, $p < 0.001$ from Laukkanen et al., "Association between sauna bathing and fatal cardiovascular and all-cause mortality events", JAMA Internal Medicine, vol.175, no.4, pp.542-548, 2015.

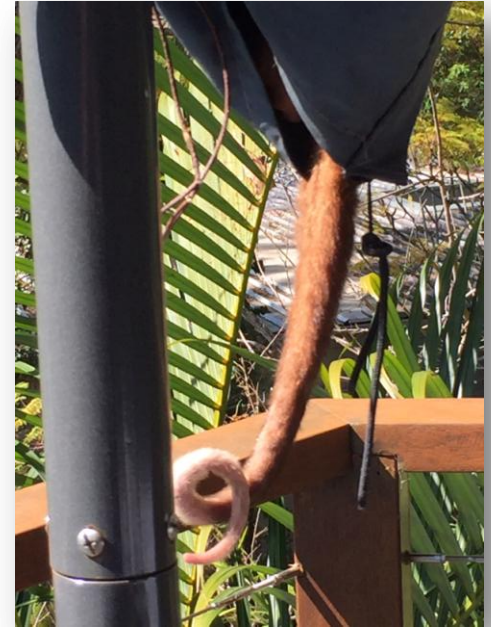
² HR = 0.37, 95% CI: 0.18 - 0.75, $p = 0.005$ from Laukkanen et al., "Association between sauna bathing and fatal cardiovascular and all-cause mortality events", JAMA Internal Medicine, vol.175, no.4, pp.542-548, 2015.

³ HR = 0.34, 95% CI: 0.16-0.71, $p = 0.004$ from Laukkanen et al., "Sauna bathing is inversely associated with dementia and Alzheimer's disease in middle-aged Finnish men", Age and Ageing, 2016.

⁴ C. Tei et al., "Waon therapy for managing chronic heart failure", Circulation Journal, vol.80, no.4, pp.827-834, 2016.

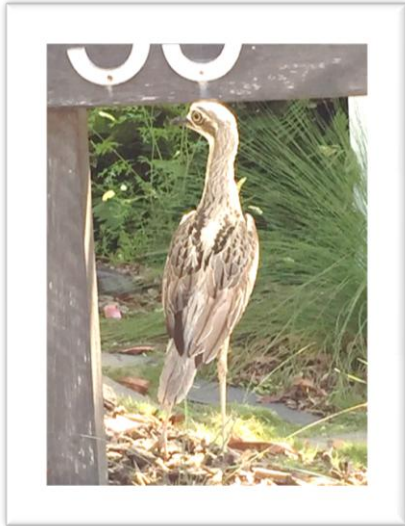
Other remarkable results

- 2015 Kanji et al. – RCT, $n = 37$; 44% reduction in headache intensity within 6 weeks of 8 week sauna intervention group (decrease of 1.27 pts with 95%CI: 0.48–2.07; $p=0.002$).
- 2013 Kunbootsri et al. – RCT, $n = 26$, improvement of 43 L/sec peak nasal inspiratory flow rates ($p=0.002$) and 18.1% improvement in FEV_1 ($p=0.002$) after 6 weeks in sauna group.



- G. Kanji et al., "Efficacy of regular sauna bathing for chronic tension-type headache: a randomized controlled study," *The Journal of Alternative and Complementary Medicine*, vol.21, no.2, pp.103-109, 2015.
- N. Kunbootsri et al., "The effect of six-weeks of sauna on treatment autonomic nervous system, peak nasal inspiratory flow and lung functions of allergic rhinitis Thai patients," *Asian Pacific Journal of Allergy and Immunology*, vol.31, no.2, pp.142-147, 2013.

Other remarkable results



- 2008 Kowatzki et al. – $n = 41$; decreases in NaCl sweat concentrations (change of 30 mmol/L \pm 10 mmol/L, $p = 0.0167$); 25% lower pre-sauna forehead sebum levels ($p < 0.05$); and more acidic skin surface pH in regular sauna bathers compared with newcomer sauna bathers.*
- 2009 Hüppe et al. – RCT, $n = 36$; improvements in somatic well-being scores in both sauna groups compared with control group. ($p < 0.01 - 0.05$); no changes in serum organochloride levels.

*Both groups had similar elevations in pH with sauna interventions, from D.Kowatzki et al. "Effect of regular sauna on epidermal barrier function and stratum corneum water-holding capacity in vivo in humans: a controlled study", *Dermatology*, vol.217, no.2, pp.173-180, 2008.

†M.Huppe et al. "Treatment of patients burdened with lipophilic toxicants: a randomized controlled trial", *Activitas Nervosa Superior Rediviva*, vol.51, no.3-4, pp.133-141, 2009.

Clinical Health Effects – Repeat Sauna Bathing



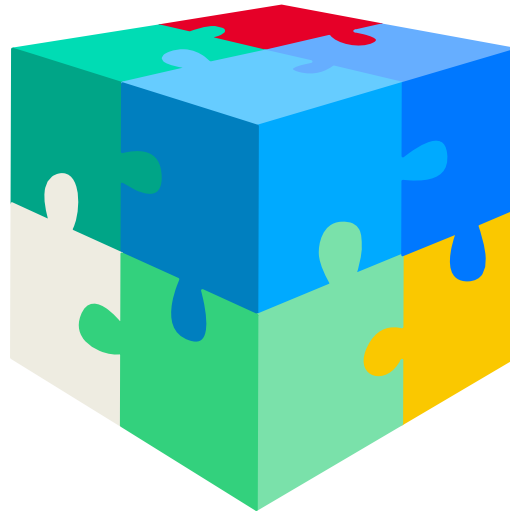
Cardiovascular benefits

- Association with cardiovascular benefits on many levels
- Both traditional and infrared saunas



Adverse effects

- More study – male spermatogenesis ≠ male fertility
- Intolerance more common in CFS/ME, RA, AS



Complexity with other hormetic stressors

- Exercise
- Cooling Exposures
- Sauna fitness



Limitations/ Bias

- Need for larger interventional studies
- Need for more demonstrated objective outcome measures



Sweating

- Further analysis of sweat
- Skin as organ with excretion mechanisms

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- RMIT Global Sauna Survey
respondents



Photo: ASBA visit to Finnish Embassy in Canberra, Australia-
January 2017