



Published in final edited form as:

Obesity (Silver Spring). 2018 November ; 26(11): 1672. doi:10.1002/oby.22330.

Dosing Exercise: Is More Really Better for Obesity Related Outcomes?

Steven K. Malin^{1,2,3}

¹Department of Kinesiology; University of Virginia, Charlottesville, VA

²Division of Endocrinology & Metabolism; University of Virginia, Charlottesville, VA

³Robert M. Berne Cardiovascular Research Center, University of Virginia, Charlottesville, VA

INVITED COMMENTARY

There is much debate regarding the exercise dose (e.g. intensity, duration, and frequency) required to impact obesity related diseases such as type 2 diabetes and metabolic syndrome. Typically, a high amount of exercise is associated with elevated aerobic fitness, heightened insulin sensitivity, favorable blood lipid profiles, and low body fat. However, groups over the last two decades have challenged the dogma that “more is better”, and clinical trials have sought to determine the dose by which exercise yields metabolic benefit in individuals with obesity (1-4). This issue of *Obesity* presents novel work examining the impact of exercise dose on body composition under controlled conditions (5).

Cowan et al. (5) tested the effect of exercise amount (kilocalories/session) and intensity (% VO₂peak) under energy-matched treatments on adipose tissue and skeletal muscle in adults with obesity and related these changes in blood glucose, circulating lipids, and insulin resistance. Participants were middleaged men and women that were randomized to: control (no exercise), low amount low intensity (LALI), high amount low intensity (HALI), or high amount high intensity (HAHI) treadmill based exercise 5 d/wk under supervision for 24 weeks. Energy expenditure was clamped between groups based on VO₂-heart rate relationships, and magnetic resonance imaging (MRI) was utilized to determine abdominal adiposity as well as skeletal muscle. Non-exercise physical activity was assessed using accelerometers and diet was monitored via food records throughout the intervention. Overall, subcutaneous and visceral fat were reduced comparably across exercise doses compared with control, and lower, but not upper, body skeletal muscle was preserved.

While some of the body fat observations by Cowan et al. (5) were known from prior studies matching for energy expenditure (1), the context which these findings occurred are noteworthy. In particular, 300 participants were provided exercise doses equivalent to 150 min/wk of moderate intensity or 75 min/wk of vigorous intensity of activity and attention

Users may view, print, copy, and download text and data-mine the content in such documents, for the purposes of academic research, subject always to the full Conditions of use:http://www.nature.com/authors/editorial_policies/license.html#terms

Correspondence: Steven K. Malin, PhD, Department of Kinesiology, 210 Emmet St., Room 225A Memorial Gymnasium, University of Virginia, Charlottesville, VA, Phone: (434) 243 - 6624, Fax: (434) 924-1389, skm6n@virginia.edu.

was made to maintain non-exercise activity and diet. Thus, these data confidently demonstrate that exercise performed most days of the week promote significant fat loss independent of amount or intensity. This has public health relevance as it highlights that individuals may not need to follow the adage “more is better” with regard to weight/fat loss as long energy expenditure is the focal point. Additionally, considering the Exercise is Medicine campaign by the American College of Sports Medicine (<https://www.exerciseismedicine.org>), an interesting aspect to the study is the disconnect between fat loss and metabolic benefit. LALI reduced abdominal obesity in association with lower circulating lipids (e.g. triglyceride and total cholesterol) and insulin resistance (i.e. homeostatic model assessment of insulin resistance). In contrast, increasing exercise amount and intensity revealed that a lowering of body fat only related to reduced LDL cholesterol, with the exception of HAHl observing a link with post-prandial insulin. These metabolic findings complement work showing that energy expenditure may be important for pancreatic function (3), exercise amount may offset intensity for increased insulin sensitivity (1), but intensity may have protective atherogenic effects (2). Thus, work by Cowan et al. (5) provides a timely reminder that answering the question of what the best exercise dose is for health is complicated given that each exercise prescription affects obesity related outcomes in a distinct manner. Further work is warranted to elucidate how exercise can be personalized to reduce chronic disease.

Acknowledgments

Funding: SKM is supported by National Institutes of Health RO1-HL130296.

REFERENCES

1. Slentz CA, Houmard JA, Kraus WE. Exercise, Abdominal Obesity, Skeletal Muscle, and Metabolic Risk: Evidence for a Dose Response. *Obesity*. 2009; S27–33. [PubMed: 19927142]
2. Sarzynski MA, Ruiz-Ramie JJ, Barber JL, et al. Effects of Increasing Exercise Intensity and Dose on Multiple Measures of HDL (High-Density Lipoprotein) Function. *Arterioscler Thromb Vasc Biol*. 2018; 38(4):943–952. [PubMed: 29437573]
3. Malin SK, Solomon TPJ, Blaszczyk A, Finnegan S, Filion J, Kirwan JP. Pancreatic beta cell function increases in a linear dose-response manner following exercise training in adults with prediabetes. *Am J Physiol Endocrinol Metab*. 2013; 15(305): E1248–54.
4. Hamer M and Stamatakis E. Low-dose physical activity attenuates cardiovascular disease mortality in men and women with clustered metabolic risk factors. *Circ Cardiovasc Qual Outcomes*. 2012 5: 4: 494–499. [PubMed: 22619275]
5. Cowan TE, Brennan AM, Stotz PJ, Clarke J, Lamarche B, Ross R, Separate Effects of Exercise Amount and Intensity on Adipose Tissue and Skeletal Muscle Mass in Adults with Abdominal Obesity. *Obesity*. 2018 [Epub ahead of print].