

COMMENTS AND RESPONSES

Effects of Different Modes of Exercise Training on Glucose Control and Risk Factors for Complications in Type 2 Diabetic Patients: a Meta-Analysis

Response to Snowling and Hopkins

We read with great interest the results of the meta-analysis by Snowling and Hopkins (1) on the effects of different modes of exercise training on glucose control and risk factors for complications in type 2 diabetic patients. This most recent meta-analysis of post-2000 randomized controlled trials is perhaps most important because of the size of the cohort (over 1,000 type 2 diabetic patients) and for the study of characteristics and magnitude of effects in more detail than in the previous Boulé meta-analyses (2). Snowling and Hopkins determined that an A1C reduction of $0.8 \pm 0.3\%$ is "small" and affirmed in their conclusion that "there are sufficient studies to allow us to conclude that aerobic, resistance, and combined exercise have small to moderate beneficial effects on glucose control in type 2 diabetic patients and small beneficial effects on some related risk factors for complications of diabetes." They thereby suggest that all forms of exercise training produce small benefits in the main measure of glucose control: A1C. I object to this term "small" on two grounds.

First, exercise training has been frequently associated with trivial effects or unclear measures of conventional cardiovascular risk factors, generally in trials of short duration. These measures themselves are affected by many other confounding factors. According to the U.K. Prospective Diabetes Study, exercise therapy can cause an A1C lowering of -0.9% (A1C median 7.0% with intensive therapy vs. 7.9% with conventional therapy)

and may reduce retinopathy, nephropathy, and neuropathy in type 2 diabetic patients. Moreover, the overall microvascular complication rate was decreased by 25%, and there was a 25% reduction in diabetes-related deaths, a 7% reduction in all-cause mortality, and an 18% reduction in combined fatal and nonfatal myocardial infarction (3). These results confirm previous conclusions of two randomized clinical trials: the Diabetes Control and Complications Trial and the Stockholm Diabetes Intervention Study. These are not "small" improvements.

Moreover, in our recent study, we have shown that long-term aerobic exercise training can modify the natural history of peripheral diabetic neuropathy or even prevent its onset. The difference in A1C values between two groups through the 4 years of the study was only -0.42% (4). I think it would do us well to remember the positive pleiotrophic effects of continuous physical exercise. Second, exercise training has been associated recently with substantial and positive effects on plasma lipoprotein profile (5), inflammation markers (6), and endothelial dysfunction (7), with probable consequential positive effects on cardiovascular morbidity and mortality.

Finally, it could be deleterious and counterproductive to continuously refer to the idea of "small" benefits, given the notorious difficulty in some medicoscientific circles to accept the idea that physical exercise may constitute therapeutic treatment for a disease such as type 2 diabetes. Despite concrete evidence in favor of exercise as therapy, it is already difficult to translate the proof of benefits of exercise as therapy into everyday practice. It is belittling of the significance of the findings of very real benefits derived from exercise as therapy and, I believe, reflects a dismissive evaluation of our own work and weakens the already fragile applications of the concept of exercise as therapy for diabetic individuals.

While I agree with the authors that it is necessary to investigate the combined effect of exercise, training, diet, and drugs in order to rationalize therapy to achieve the best use and to implement any synergistic effects of a combination therapy, I still affirm that it is a big achievement that, as the authors claim, "the effects of exercise are similar to those of dietary, drug, and insulin treatment." This is no mean result.

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