Editorial Commentary

People With Type 2 Diabetes Can Have Healthy Muscle if Physically Active

Regular physical activity is arguably the single most important treatment tool for the prevention and treatment of type 2 diabetes mellitus (1). Imagine an oral agent that reduces visceral fat, lowers acute glucose concentrations, improves A1C levels, decreases blood pressure and circulating lipid levels, reduces insulin resistance and improves an individual's sense of well being. Large cohort studies demonstrate that in people with type 2 diabetes, regular physical activity and/or moderate to high cardiorespiratory fitness are associated with reductions in cardiovascular and overall mortality of ~40 to 70% over 15 to 20 years (1). Just walking ~150 minutes per week reduces the likelihood of developing type 2 diabetes from a state of impaired glucose tolerance by ~60% (2). Indeed, it is the only single treatment option to treat nearly *all* of the clinical features of the metabolic syndrome and type 2 diabetes.

Although regular, moderate to vigorous exercise may not be a safe treatment option for all patients with diabetes, particularly if they have advanced microvascular or macrovascular complications, it is less likely to cause adverse effects than several pharmacological options. Indeed, the promotion of "walking for diabetes" is now a regular prescription. A basic scientific and practical question remains: Do otherwise healthy persons with diabetes have any physical limitations that might prevent them from being active?

A number of complications from diabetes can lower exercise capacity. For example, walking capacity and performance decrease with progression of foot complications in those with type 2 diabetes (3). In those with type 1 diabetes, a number of subtle cardiorespiratory limitations are associated with a reduced maximal capacity for exercise (4). But what about those individuals who tend to be physically active and free from complications? In a recent cross-sectional study, muscle quality, was reported to be slightly but significantly lower in men and women with diabetes than those without diabetes in both upper and lower extremities (5). Diabetes of >6 years and A1C >8.0% were associated with poorest muscle quality. A number of questions remain, however. Is it that poor glycemic control causes a lower muscle quality and then physical inactivity in diabetes? Or does inactivity cause both type 2 diabetes and poor muscle function? Moreover, what is the quality of muscle in persons with diabetes who are engaged in regular exercise?

In this issue of *Canadian Journal of Diabetes*, Jakobi and colleagues report that, in a small cohort of regularly active women with type 2 diabetes, tibialis anterior strength and contractile properties are identical to age-, weight- and physical-activity-matched women without diabetes. This muscle is a key dorsi flexor during normal gait cycle (6). This is the first study to measure muscle strength and contractile properties and to carefully match physical activity levels between groups of middle-aged women with type 2 diabetes and those without: When physical activity was matched between groups, there was no difference in functional capacity.

Based on this study, what appears to be more important than the diagnosis of diabetes is the level of regular physical activity. In other words, "use it or lose it" applies to those with diabetes the same as it does to healthy individuals. The authors correctly point to other sources suggesting that decreased mobility may be 2 to 3 times higher in older individuals with diabetes compared with those without diabetes and that functional deterioration is exacerbated in women with diabetes-related complications. Their findings imply that increased physical activity might help delay this unfortunate loss of physical capacity. The question remains, however: How can we motivate women and men with diabetes to engage in more activity?

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