Research In Focus: A Weekly Digest of
New Research from the NIDILRR Community

Exercise Training or a High-Protein Diet May Improve Insulin Sensitivity in People with Long-Standing Spinal Cord Injury

A study funded by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR).

A spinal cord injury (SCI) is damage anywhere along the spinal cord from an accident or other trauma. People with SCI may become less physically active due to limited mobility. As a result, they may be at a higher risk for obesity or insulin resistance. Insulin resistance is a condition in which the body processes glucose less efficiently by becoming less sensitive to the hormone insulin. People with insulin resistance may develop Type II diabetes, which can have a negative effect on their overall health. Past studies with people without SCI have found that following either a full-body exercise regimen or a high-protein diet can reduce insulin resistance and improve insulin sensitivity. In a recent NIDILRR-funded study, researchers looked separately at the effects of exercise training and a high-protein diet on body mass and insulin sensitivity for people with SCI. They wanted to find out if an exercise program or a high-protein diet could reduce body fat, blood glucose levels, or improve insulin sensitivity in people with SCI, and whether one program might provide better health benefits over the other.

Researchers enrolled 11 people with SCI in a study of Novel Exercise and Diet Prescription to Improve Body Composition and Metabolic Health in Individuals with Long-Standing Spinal Cord Injury. The participants were 46 years old, on average, and had had their SCI for an average of 22 years. The participants were randomly divided into two groups: an exercise group and a high-protein diet group.

The participants in the exercise group came to the research center 3 days per week for 8 weeks, where they participated in a structured exercise program. The program included a combination of upper-body weight training (resistance) exercises, aerobic exercise using an arm crank, and lower-body exercises using electrodes to stimulate their leg muscles.

The participants in the high-protein diet group consumed meals prepared by the researchers during the same 8-week period. Participants picked up their meals for the week from the research center and consumed them at home. The meals were prepared to include about 30% protein, 40% carbohydrates, and 30% fat. The meals' total calorie count was set for each participant based on the participant's activity level and a measure of how many calories the participant burned at rest.

Before and after the 8-week study, the participants in both the exercise and the high-protein diet groups were weighed and their body fat and lean mass were measured. Each participant also had blood tests before and after drinking a high-sugar solution, to test their baseline blood glucose and how much their blood glucose and insulin levels changed in response to the sugary drink. The blood samples were also

tested for levels of certain inflammatory markers, such as TNF-α, which can be higher in people with poor insulin sensitivity.

The researchers found that:

- The participants in both groups lost weight and body fat, but the participants in the high-protein diet group lost more weight (3.8 kg) than the participants in the exercise group (1.1 kg).
- The participants in both groups showed better insulin sensitivity at the end of the study than at the beginning of the study, but the change was larger for the participants in the high-protein diet group than for the participants in the exercise group. The participants in both groups also had lower levels of TNF-α at the end of the study than at the beginning of the study.
- The participants in the exercise group had lower baseline blood glucose levels at the end of the study than at the beginning of the study. There were no changes in baseline blood glucose levels for the participants in the high-protein diet group.

The authors noted that following a program of combined exercise training or a high-protein diet may both lead to improved metabolic health for people with SCI, including modest weight and fat loss and better insulin sensitivity. These changes may lower the risk of developing Type II diabetes and related conditions. Future research may be useful to test the possible benefits of combining exercise training and a high-protein diet for people with SCI.

To Learn More

The Model Systems Knowledge Translation Center (MSKTC) offers a variety of information resources for individuals living with SCI including

- Adapted Sports and Recreation
- Exercise After SCI

Disability FEAST (Food Education, Access, Support, and Training) is a cookbook and food education program developed by the World Institute on Disability under a NIDILRR grant.

Please note: You should consult with your primary care provider before beginning any diet or exercise regimen.

To Learn More About this Study

Li, J. et al (2018) A high-protein diet or combination exercise training to improve metabolic health in individuals with long-standing spinal cord injury: A pilot randomized study. Physiological Reports, 6(16). This article is available from the publisher and from the NARIC collection under Accession Number J79737.

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