

Effect of the Physical Inactivity Duration on Postprandial Lipid Metabolism the Morning After Exercise

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ABSTRACT

In physically active people (e.g., ~8,000 steps/d), an acute bout of exercise improves postprandial fat metabolism when measured the morning after exercise. However, in people who have been inactive for more than two days, the acute bout of exercise does not improve postprandial fat metabolism as reflected by a greater increase in plasma triglyceride concentration and a reduced whole body fat oxidation. This phenomenon whereby fat metabolism is suppressed by prior inactivity is termed 'exercise resistance'.

PURPOSE: The purpose was to determine if shorter periods (i.e., less than two days) of inactivity (i.e., 12, 24, 36 h) induce 'exercise resistance'. **METHODS:** In a randomized crossover design, 7 healthy adults (24.9 ± 4 y) participated in three different lengths of inactivity trials separated by at least 5 days. The lengths of physical inactivity prior to the postprandial measures of fat metabolism were for 12, 24, 36-h. During each trial, participants moved from a physically active phase ($> 10,000$ steps/d) to a physically inactive phase ($< 1,000 - 1,500$ steps/12-h) for the required durations. Participants in all trials underwent a postprandial high fat tolerance test (HFTT) the morning following 1-h of cycling (62% VO_{2peak}). During the HFTT, expired gas and blood were collected at baseline and hourly for 4-h after the meal for determination of fat oxidation and plasma triglyceride concentration. **RESULTS:** Total fat oxidation in the 12-h inactivity trial (3.94 kcal/min) was significantly higher ($p < .05$) than both in the 24-h trial (3.29 kcal/min) and the 36-h trial (3.14 kcal/min). The total area under the curve (AUCt) of plasma triglyceride in the 12-h trial (308 mg/dL x 4-h) was found to be significantly lower ($p < .05$) than the 24-h trial (398 mg/dL x 4-h) and the 36-h trial (417 mg/dL x 4-h). Total fat oxidation and plasma triglyceride AUCt did not differ between the 24-h trial and the 36-h trials. **CONCLUSION:** 'Exercise resistance' reflects unhealthy postprandial fat metabolism which occurs with 24-h and longer of physical inactivity, as evidenced by elevated plasma triglyceride concentration and lowered fat oxidation even when a 1-h bout of aerobic exercise is performed the day before.