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Effects of short-term very low-calorie diet on intramyocellular lipid and insulin sensitivity in nondiabetic and type 2 diabetic subjects.

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The study aimed to analyze the effects of a short-term very low-calorie diet (VLCD) on intramyocellular lipid (IMCL), total body fat, and insulin sensitivity in a group of obese nondiabetic and type 2 diabetic subjects. Seven untreated type 2 diabetic and 5 obese nondiabetic individuals were studied before and after a 6-day VLCD using proton magnetic resonance spectroscopy to quantify IMCL, dual-energy x-ray absorptiometry to assess body fat, and hyperinsulinemic-euglycemic clamps to measure peripheral insulin sensitivity. In both groups, decrements in total body fat mass and body mass index were small but statistically significant. In contrast, the diet resulted in a pronounced reduction in IMCL compared with baseline values in nondiabetic subjects (56% decrease) and type 2 diabetic subjects (40% decrease) ($P < .05$), and this was accompanied by an overall 9.3% increase in maximally stimulated glucose disposal rate ($P < .01$). Intramyocellular lipid was significantly correlated with insulin sensitivity ($r = -0.69$, $P < .01$) and waist circumference ($r = 0.72$ and 0.83 , baseline and postdiet, respectively; both $P < .01$), but neither IMCL nor insulin sensitivity was related to measures of general adiposity such as body mass index, percentage of body fat, or total body fat ($P =$ not significant). In conclusion, short-term VLCD is accompanied by small decrements in general adiposity, marked decrease in IMCL, and an increase in insulin sensitivity in nondiabetic and type 2 diabetic subjects. Therefore, rapid amelioration of insulin resistance by VLCD can be partially explained by loss of IMCL both in nondiabetic and type 2 diabetic subjects in the absence of substantial changes in total body fat. These observations are consistent with the idea that insulin resistance is more directly related to IMCL rather than to body fat per se.