Calorie restriction does not appear to induce bone loss in overweight adults

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Young adults who follow a diet that is low in calories but nutritionally sound for six months appear to lose weight and fat without significant bone loss, according to a report in the September 22 issue of *Archives of Internal Medicine*.

Calorie restriction is the only intervention known to decrease the rate of biological aging and increase longevity, according to background information in the article. However, it is well known that chronic energy deficiency impairs bone mineral uptake and that weight loss is associated with bone loss in obese individuals. Calorie restriction, therefore, could also lead to bone loss and fracture.

Leanne M. Redman, Ph.D., and colleagues at Pennington Biomedical Research Center, Baton Rouge, La., studied 46 healthy, overweight men and women (average age 37) who were randomly assigned to one of four groups for six months. Eleven formed the control group, assigned to eat a healthy diet; 12 were assigned to consume 25 percent fewer calories than they expended per day; 12 were assigned to create a 25 percent energy deficit through eating fewer calories and exercising five days per week; and 11 ate a low-calorie diet (890 calories per day) until they achieved 15 percent weight loss, at which time they switched to a weight maintenance plan. All diets included recommended levels of vitamins and minerals, including calcium, and contained 30 percent fat, 15 percent protein and 55 percent carbohydrates, based on American Heart Association guidelines.

After six months, average body weight was reduced by 1 percent in the control group, 10.4 percent in the calorie restriction group, 10 percent in the calorie restriction plus exercise group and 13.9 percent in the low-calorie diet group.

Bone mineral density and blood markers of bone resorption and formation (processes by which bone is broken down and regenerated on a regular basis) were measured at the beginning of the study and again after six months. "Compared with the control group, none of the groups showed any change in bone mineral density for total body or hip," the authors write. Markers of bone resorption were increased in all three intervention groups, while markers of bone formation were decreased in the calorie restriction group but were unchanged in the low-calorie diet or calorie restriction plus exercise group.

"Our data do not support the notion that extreme weight loss (more than 10 percent) over short periods (three months) has a worse prognosis on bone health than gradual weight loss achieved over six months by moderate calorie restriction with or without aerobic exercise," the authors write. "We speculate that in young individuals undergoing calorie restriction, minor adjustments in bone occur as a normal physiological adaptation to the reduced body mass. Further studies of longer duration are warranted and should include an assessment of bone architecture to ensure that bone quality is preserved with weight loss."

Source: JAMA and Archives Journals