

Whole grains deliver on health benefits

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At HNRCA, Susan Roberts (left) and nutrition technician Wintlett Williams prepare and measure food for study volunteers. Credit: Deb Dutcher

All hail the whole grain!

A human nutrition study reaffirms the health benefits of substituting refined-grain products like white bread with whole-grain foods like

whole-wheat bread, oatmeal, barley, rye, and brown or wild rice.

Scientists with the Jean Mayer USDA Human Nutrition Research Center on Aging (HNRC)A—jointly run by the Agricultural Research Service (ARS) and Tufts University in Boston, Massachusetts—conducted the study to clarify the role of whole grains in helping regulate [weight](#), [blood sugar levels](#), and calorie (energy) use, among other benefits. Unlike [refined grains](#), which undergo extensive milling or other processing, whole grains are sold for consumption with their bran and other constituents intact—all rich in vitamins, minerals, fiber, carbohydrates, and phytonutrients.

The study, published in the February 2017 online issue of the *American Journal of Clinical Nutrition*, is the first to strictly control participants' diet, weight, and type of whole-grain products they consumed, according to the HNRC)A researchers and their coauthors. Previous clinical trials, they add, didn't incorporate these important study design criteria, leaving the benefits of whole-grain diets—especially on weight management—open to question.

"Epidemiological studies have previously shown that consuming whole grains is associated with better weight management, but that kind of research can't tell what is cause and what is effect," notes Susan B. Roberts, a senior author and director of the center's Energy Metabolism Laboratory. "What this study did was provide a metabolic explanation for why whole grains help weight management."

In the eight-week study, the researchers determined the weights and calorie (energy) intake needs of 81 participants—healthy, nonsmoking men and women ages 40 to 65—and started them on a diet free of whole grains. At week two, the researchers randomly switched some participants to diets containing the daily recommended allowance of whole grains (a minimum of three ounces for women and four ounces

for men).

Besides measuring weight and waist circumference, the researchers monitored all participants' insulin and blood sugar levels, resting metabolic rates (energy expenditures while sedentary), and adherence to the whole-grain diets using specialized tests. The participants were also asked about their dietary habits and activity levels. Analysis of stool samples helped to calculate calories excreted rather than burned or stored.

Among the results, participants in the whole-grain group lost approximately 100 more calories per day than refined-grain eaters—the equivalent of walking briskly for 30-minutes, notes Roberts. Her team attributes the lost calories in the whole-grain group primarily to increased metabolic rate and increased fecal energy losses.

In a tandem study, Simin Nikbin Meydani, director of HNRCA's Nutritional Immunology Lab, led a team in comparing the dietary effects of whole or refined grains on certain types of immune system cells, changes in populations of intestinal microbes, and concentrations of cytokines—proteins that can serve as markers of inflammation in the body. Inflammation is associated with cardiovascular disease, type 2 diabetes, and certain cancers.

With this study, "We wanted to see if whole-grain consumption—under conditions where food intake was controlled and weight was maintained—would impact [gut microbiota](#) and the ability of immune cells to fight against infection as well as produce inflammatory markers," says Meydani. "We found that whole grains, even in the absence of a significant difference in weight, have a modest effect on gut microbiota, which could be beneficial in terms of reducing inflammation and improving immune response to pathogens. Related to that, we observed that participants in the whole-grain group had cytokine levels similar to

those of the refined-grain group but slightly higher number of [immune cells](#) involved in defense against pathogens—notably of infection-fighting memory T cells."

Specifically, the whole-grain diet gave a moderate boost to populations of beneficial Lachnospira bacteria, which make protective short-chain fatty acids and help counteract another bacterial species that contributes to inflammation. Such gut bacteria comprise a larger community of microorganisms, called the microbiota, that live on or in the human body. They are of increasing interest to scientists for the diverse and often beneficial roles they play, including helping digest food, extract nutrients, regulate metabolism, and protect against disease and infection, among others.

The researchers note that their study used products made from whole-grain flour and one type of grain and that consuming intact whole grain kernels or a mixture of grains may confer even greater benefits than those they observed. In addition, the weight loss that is associated with consuming more whole grain, often observed under uncontrolled conditions, might have additional impact on gut microbiota and associated biological changes, such as those of the immune response.

The take-home message, says Roberts, "is that whole [grains](#) are carbohydrates we can feel good about eating for health as well as enjoyment."

Provided by Agricultural Research Service

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