

# Study finds dietary fat interacts with genes

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Research published in the *Journal of Molecular Medicine* examines how calories from fat, carbohydrate, and protein might interact with genes to affect body mass index (BMI), or body weight-for-height, and risk of obesity among adults in the Framingham Heart Study.

Jose Ordovas, PhD, director of the Nutrition and Genomics Laboratory at the Jean Mayer US Department of Agriculture Human Nutrition Research Center on Aging (USDA HNRCA) at Tufts University, and colleagues analyzed several common gene variants known as single nucleotide polymorphisms (SNPs) of the apolipoprotein A5 gene (APOA5), which produces a protein (APOA5) involved in the metabolism of fats in the body. For 13 percent of people in the study with a specific SNP (-1131T>C), dietary fat intake was not significantly associated with BMI and risk of obesity.

We observed an interaction between APOA5 and dietary fat intake, but we did not see an interaction between APOA5 and carbohydrate or protein intake for any genetic variants of APOA5,” says Ordovas, who is corresponding author of the study.

“For most people in this study, eating more fat was related to a higher BMI. However, for people with a specific SNP (-1131T>C), fat intake was not significantly related to BMI. This contradicts results for most of the study population, where high dietary fat intake was related to obesity,” explains Ordovas, who is also a professor at the Friedman School of Nutrition Science and Policy at Tufts. “These results were true despite a person’s age, sex, physical activity status, or the amount of total

calories consumed.”

Ordovas notes that a high fat intake may potentially have health ramifications other than increased weight. However, in terms of weight, “It seems there might be a lucky few — in this study, 13 percent — who can eat any combination of food and maintain a healthy BMI. Whether they eat cheesecake or four pieces of whole wheat bread will not make a difference in their body weight if the foods have the same amount of calories.

“We have all known people that do not watch what they eat, but usually don’t see any effect on their weight,” says Ordovas. “This is the first study that enables us to identify this segment of the population using information on this gene.

“This does not mean that it is impossible for people with the specific SNP (-1131T>C) to become obese,” Ordovas continues. “While exact components of the diet may not be as critical to maintaining a healthy weight, excessive calories over time can still contribute to obesity. Also, since the specific SNP does not interact with carbohydrate or protein, and does not affect BMI when interacting with fat, it may be more problematic for people in this group to lose weight through dietary changes if they do, in fact, become obese. Our findings demonstrate that although genetics help to determine our risk of obesity, dietary and lifestyle habits are also important to consider.”

Ordovas determined that the interaction between the specific SNP (-1131T>C) and dietary fat was strongest for monounsaturated fatty acids (MUFAs), found in foods such as olive oil and canola oil. People with the specific SNP who consumed 11 percent or more of total calories as MUFAs had a lower likelihood of obesity. “Basically, it appeared that the interaction of the specific SNP with MUFAs was the reason that fat intake did not affect BMI for this group,” says Ordovas.

“This interaction between APOA5 and dietary MUFA intake may explain why the Mediterranean diet, which is rich in MUFAs, is not generally associated with an increase in body weight. However, more studies are needed to confirm this.

“At this point, everyone is encouraged to follow current guidelines that recommend a well-balanced, healthful diet in order to maintain a healthy BMI and to reduce risk of certain diseases. But we study nutrigenomics with the idea that we can pinpoint people who may be at higher risk for certain conditions like cardiovascular disease, allowing these individuals to proactively alter the way nutrition affects their genes,” says Ordovas. “Once we are able to do this, we may develop several sets of guidelines for the public, based upon a person’s genotype.”

Ordovas concludes that, “The problems of obesity are complex and there is variability among people. This study contributes to our knowledge of how APOA5 works and adds to our understanding of genetics and dietary interventions.”

Source: Tufts University

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