Medical Xpress

Higher calcium intake may reduce body fat, mitigating genetic risk for diabetes

April 29 2014

As the number of people with type 2 diabetes continues to rise and its toll increases, scientists are scrambling to unravel the complex genetic and lifestyle factors behind the disease. A new study finds that African American children with a genetic predisposition to diabetes may be able to reduce their risk by getting the USDA-recommended dose of calcium.

"Even though life expectancy for people with diabetes has gone up, the disease has a significant impact on quality of life, so finding ways to prevent people from developing diabetes is critical," said Laura Tosi, M.D., director of the bone health program at Children's National Medical Center and one of the study's lead investigators. "We were excited to find that higher calcium intake appears to mitigate the impact of some of the risk genes for type 2 diabetes, and we're eager to see if these results hold true in other populations."

An estimated 25 million people in the United States have diabetes, or about 1 in 12 people. African Americans are at especially high risk, and the trajectory for the disease is often set in childhood.

The researchers analyzed DNA samples, detailed nutrition information, body mass index and other health indicators in 142 African American children age 5-9. None of the study participants were diabetic, although 40 percent were overweight and 20 percent were obese.

Among children who tested positive for gene variants known to be associated with type 2 diabetes, those who consumed higher amounts of

calcium had a significantly lower body mass index and percent body fat than those with lower calcium intake. Body mass index and percent body fat are strong indicators of a child's risk for developing diabetes later in life.

The USDA recommends children age 4-8 get 1,000 milligrams of calcium per day, the equivalent of about 3.5 8-ounce glasses of milk or 4.5 ounces of cheese. Children age 9-13 years should get about 1,300 milligrams. In addition to dairy products, other calcium-rich foods include tofu, sardines, salmon and some green vegetables.

The study underscores the work of previous researchers, who have shown that many African American children do not get the recommended levels of calcium in their diet. "Twenty percent of participating children consumed no milk in their diet whatsoever and 55 percent consumed less than one serving of milk per day. Only one-quarter of the children met the USDA standard," said Tosi.

Co-investigator Joseph Devaney, Ph.D., said the study could help lead to a more personalized approach to diabetes prevention. "The ultimate goal would be to be able to predict, from a child's genotype, his or her specific risk factors for developing type 2 diabetes, and then develop a targeted preventative approach to mitigate those risk factors with specific lifestyle interventions such as increasing calcium intake or physical activity, for example," said Devaney, director of DNA technologies at Children's National Medical Center.

Although the researchers do not know the exact reason for the association, they speculate that calcium or related dietary factors may cause epigenetic changes that affect how the diabetes-linked genes are expressed.

"What got us interested in this is the whole question of how the

environment—including a person's diet—influences gene expression," said Tosi. Although scientists have intensely studied the impact of environmental factors during prenatal development and early infancy, few researchers have examined the impact of such factors later in childhood.

Understanding the interactions of genes and environmental factors in children is especially helpful for a disease as complex as diabetes, said Devaney. By the time an adult is diagnosed with diabetes, there are usually numerous risk factors that need to be addressed. "The earlier you can identify a person's risk factors, the better the opportunity to prevent, or at least delay, full-blown disease," said Devaney.

More information: Joseph Devaney presented the findings during the Experimental Biology 2014 meeting on Monday, April 28, at the Metabolism and Diabetes poster session in Exhibit Halls A-D (Poster #D160), San Diego Convention Center.

Provided by American Society for Biochemistry and Molecular Biology