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Researchers identify novel biomarker for diabetes risk

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Researchers at the Vanderbilt Heart and Vascular Institute and Massachusetts General Hospital have identified a biomarker that can predict diabetes risk up to 10 years before onset of the disease.

Thomas J. Wang, M.D., director of the Division of Cardiology at Vanderbilt, along with colleagues at Massachusetts General Hospital, report their findings in the October issue of *The Journal of Clinical Investigation*.

The researchers conducted a study of 188 individuals who developed type 2 diabetes mellitus and 188 individuals without diabetes who were followed for 12 years as participants in the Framingham Heart Study.

"From the baseline blood samples, we identified a novel biomarker, 2-aminoadipic acid (2-AAA), that was higher in people who went on to develop diabetes than in those who did not," Wang said. "That information was above and beyond knowing their blood sugar at baseline, knowing whether they were obese, or had other characteristics that put them at risk."

Individuals who had 2-AAA concentrations in the top quartile had up to a fourfold risk of developing diabetes during the 12-year follow-up period compared with people in the lowest quartile.

"The caveat with these new biomarkers is that they require further evaluation in other populations and further work to determine how this

information might be used clinically," Wang said.

The researchers also conducted laboratory studies to understand why this biomarker is elevated so well in advance of the onset of diabetes. They found that giving 2-AAA to mice alters the way they metabolize glucose. These molecules seem to influence the function of the pancreas, which is responsible for making insulin, the hormone that tells the body to take up blood sugar.

"2-AAA appears to be more than a passive marker. It actually seems to play a role in glucose metabolism," Wang said. "It is still a bit early to understand the biological implications of that role, but these experimental data are intriguing in that this molecule could be contributing in some manner to the development of the disease itself."

Future laboratory studies may determine exactly how 2-AAA regulates function of the pancreatic cells and how and when the body makes this molecule. On the clinical side, researchers might study whether the administration of these metabolites to humans causes similar effects to those observed in animal models.

"The value of markers like these, which are metabolites, is that they can be given to people as nutritional supplements. These are amino acid derivatives that are byproducts of metabolism. Studies in humans can be done to see if there are similar patterns to what is seen experimentally," Wang said.

Type 2 diabetes is present in 5 to 10 percent of adults in the United States and is more prevalent among obese and overweight individuals, who comprise two-thirds of adults.

"Diabetes is common and the prevalence will only rise in coming years fueled by the rise of obesity. Understanding why diabetes occurs and

how it might be prevented is a very intense area of investigation because of the serious consequences of having the disease," Wang said. "It is certainly a focus of many research groups to understand how we might develop strategies to detect diabetes risk at an earlier stage and intervene."

Provided by Vanderbilt University Medical Center