

New study explores carb-loading's effect on heart

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Human heart. Credit: copyright American Heart Association

Consuming a high-carbohydrate load may have an acute and detrimental effect on heart function, according to a study published in the *Journal of the American College of Cardiology*.

A team of researchers from the University of Alabama at Birmingham, Massachusetts General Hospital and Vanderbilt University studied 33 individuals who were given an acute carbohydrate load in the form of a 294-kilocalorie shake. They studied the subjects' blood levels for six hours looking for a number of reactions, chief among them whether this acute metabolic challenge could alter the heart's production of [atrial natriuretic peptide](#). ANP is a hormone that helps the body get rid of excess salt and reduces blood pressure.

UAB's Pankaj Arora, M.D., first author of the JACC study, led the recruitment of human subjects and worked to figure out the novel chemical pathways that mediated the effect of glucose on heart cells.

Researchers know through previous studies that obese people make less ANP, predisposing them to salt retention and hypertension.

If a high-dietary-carbohydrate load suppresses circulating ANP concentrations, obese individuals—who have lower ANP levels to begin with—would be at a potential disadvantage, the authors wrote in the JACC study. "It is thought to be common sense that carbohydrate loading is detrimental; but the negative effects are delivered through the principal hormones, the natriuretic peptides, produced by your heart, a system that is suppressed in obese individuals," Arora said.

Before the participants began the study, they were normalized on a standard diet for a couple of days to remove any background dietary variability. The investigators observed that drinking the high-carb shake led to a 25 percent reduction in ANP in participants over the course of several hours.

"The carbohydrate load had a significant and notable effect on circulating ANP levels. Experimental studies suggest that it's not good to make less ANP," said senior author Thomas Wang, M.D., chief of the

Division of Cardiovascular Medicine at Vanderbilt, adding that "carb loading" may not be ideal for the body.

The investigators also looked at the mechanism for the decrease in ANP levels. They were able to reproduce the findings in mice carrying the human ANP gene, and found that the principal driver for the acute reduction in ANP appeared to be the increase in glucose.

This novel mechanism involved a molecule known as miR-425, which the research group has previously described as an inhibitor of ANP production. The glucose causes the cells to make more miR-425 by stimulating a transcription factor (NF- κ B), and that in turn causes a reduction in ANP. This pathway was explored in the lab of Sumanth Prabhu, Ph.D., chief of the Division of Cardiovascular Medicine at UAB.

"Moving forward, we will focus on dissecting the pathophysiological link between miR-425-ANP axis in obesity and diabetes, which can translate into favorable effects on cardiometabolic health in this population," Arora said.

More information: Pankaj Arora et al. Acute Metabolic Influences on the Natriuretic Peptide System in Humans, *Journal of the American College of Cardiology* (2016). [DOI: 10.1016/j.jacc.2015.11.049](https://doi.org/10.1016/j.jacc.2015.11.049)

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