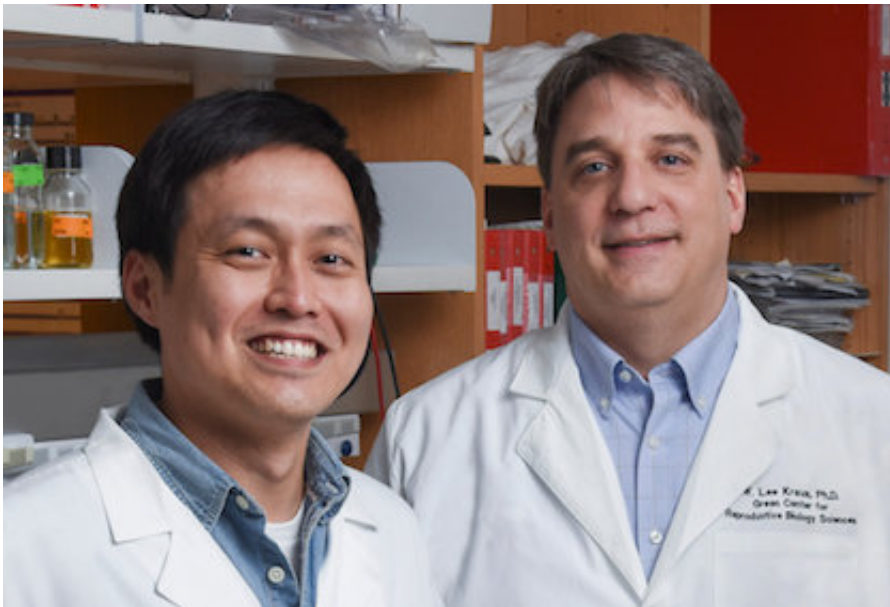


# A new understanding of how glucose makes you fat

May 31 2018, by Remekca Owens

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Drs. Keun Ryu (left) and W. Lee Kraus examined individual compartments inside cells that house NAD<sup>+</sup> molecules to determine how they activate genes that make fat cells. Credit: UT Southwestern

Glucose is the energy that fuels cells, and the body likes to store glucose for later use. But too much glucose can contribute to obesity, and scientists have long wanted to understand what happens within a cell to tip the balance.

To solve this riddle, researchers at UT Southwestern's Cecil H. and Ida Green Center for Reproductive Biology Sciences examined specialized

compartments inside the cell to reveal the role of a molecule termed NAD<sup>+</sup> in turning on genes that make [fat cells](#).

A Google search for NAD<sup>+</sup> reveals that the molecule is found in every cell of the body and that some scientists believe that boosting its production may be tied to better health and to the slowing down of the aging process.

UT Southwestern biologists examined individual compartments inside [cells](#) that house NAD<sup>+</sup> molecules to determine how they control genes that are essential to the fat-storing process—knowledge that could help in a wide range of ailments, including metabolic disorders, neurodegenerative diseases, inflammation and aging, and cancer.

"This compartmentalization ends up having profound effects on gene expression in the nucleus, as well as metabolism in the cytoplasm," (the jellylike substance outside the cell's nucleus), said Dr. W. Lee Kraus, Director of the Green Center and senior author on the research. "We found that these processes play key roles in [fat cell differentiation](#) and in [cancer cells](#)."

"The previous thinking in the field was that NAD<sup>+</sup> was evenly distributed throughout cells and moved freely between different subcellular compartments," said Dr. Kraus, Professor of Obstetrics and Gynecology and Pharmacology. "We showed that NAD<sup>+</sup> is actually compartmentalized—there are separate nuclear and cytoplasmic pools of NAD<sup>+</sup> whose levels change under certain cellular conditions."

The research team's breakthrough is reported in the journal *Science*.

Accounting for the levels of NAD<sup>+</sup> biosynthesis separately rather than in their totality helped increase the understanding of the biology involved, said first author Dr. Keun Ryu, a postdoctoral researcher in Obstetrics

and Gynecology.

"Our study provides a new understanding of NAD+ biology," he said.

**More information:** Keun Woo Ryu et al. Metabolic regulation of transcription through compartmentalized NAD+ biosynthesis, *Science* (2018). [DOI: 10.1126/science.aan5780](https://doi.org/10.1126/science.aan5780)

Provided by UT Southwestern Medical Center

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