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A massive new National Institutes of Health precision nutrition study will give some volunteers controlled meals, like this one being prepared by a dietician at the agency's metabolic research kitchen. NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

Major nutrition study aims to learn which diet best suits your genes and gut

By [Jocelyn Kaiser](#) | Feb. 1, 2021 , 3:20 PM

There's no one-size-fits-all diet. If you want to avoid spiking your blood sugar with a snack, a banana may seem like a better choice than a sugary cookie. But some people in a 2015 study of 800 Israeli volunteers got their biggest blood sugar spike from bananas or bread instead of from sugar-laden baked goods. And as nutrition scientist Elizabeth Parks of the University of Missouri, Columbia, notes, "We all know people who lose weight easily, and others who don't."

Now, the U.S. National Institutes of Health (NIH) is making a major push to understand these individual differences. Last week, the agency announced what it calls the largest study yet to probe "precision nutrition," a \$156 million, 5-year effort to examine how 10,000 Americans process foods by collecting data ranging from continuous blood glucose levels to microbes in a person's gut.

The study "has the potential to truly transform the field of nutrition science," generating new tools, methods, and "a wealth of data to fuel discovery science for years to come," Griffin Rodgers, director of

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the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), said last year at an NIH board meeting where he introduced the project. Ultimately, it might enable nutritionists to tailor diets to an individual's genes and microbiome.

And it is part of a broader push at NIH to boost nutrition science, a field sometimes viewed as "fuzzy" because "we are free-range eaters" and our diets are hard to control, notes Paul Coates, vice president of the American Society for Nutrition, who headed NIH's dietary supplements office until he retired in 2018.

In May 2020, NIH Director Francis Collins released the agency's first-ever 10-year strategic plan for nutrition science, acknowledging the importance of diet in chronic diseases such as heart disease and diabetes. The plan aims to fold in basic disciplines such as neurobiology, study the role of diet across the life span, consider how food can serve as medicine, and elevate precision nutrition. The concept recognizes that how the human body responds to food depends on factors from genetics to sleep habits, social environment, and gut microbes. For example, the Israeli study that found individual differences in the response to refined sugar versus fruit showed the microbiome was largely responsible.

Now comes NIH's Nutrition for Precision Health, which will piggyback on All of Us, the agency's huge genomics and health study that has fully enrolled 272,000 of a planned 1 million participants, more than 50% from minority groups. "We realized it would be a really great fit" to take advantage of the All of Us data and infrastructure, says Holly Nicastro, a study coordinator and program director at NIH's nutrition office.

Some 10,000 All of Us participants who join the nutrition study will wear various monitors to track physical activity, blood sugar, and more; record what they eat; and visit a clinic to consume a specific meal and undergo clinical tests. A subset of up to 1500 will also follow three different diets at home or in the clinic, and then have the same tests. And 500 to 1000 volunteers will live at a clinical center for three 2-week stretches while eating three tightly controlled diets. Such "feeding" studies are the field's gold standard, but their high cost usually keeps them small. NIH has recently conducted some in its clinical center to explore, for example, the effects of ultraprocessed foods, but they involved only 20 people.

By collecting a wide range of personal data, from participants' DNA makeup to their ZIP code, "we are removing a lot of that 'noise' that

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we had for years, created by the factors that we were not measuring before,” says Tufts University nutrition scientist José Ordovás who, with Parks, co-chaired a workshop last month to discuss the study. Artificial intelligence researchers will then use the collected data to create models that predict the best diet for an individual—an effort pioneered by the Israeli study, which spun off a company that developed an algorithm to tailor diets for people who are diabetic or trying to lose weight. A second, 5-year phase could test those models in clinical trials.

NIH is now inviting proposals for study components such as a data center, clinical centers, and a microbiome center. The aim is to begin enrolling volunteers by January 2023. “There’s so much excitement” about the study, Parks says.

She and other nutritionists also welcome other signals of NIH’s new focus on nutrition. Its Office of Nutrition Research, once part of the NIH director’s office, was demoted years ago to NIDDK. Last month, Collins announced it has been restored. Coates hopes that will mean a larger staff—the office now has just six people—and a modest budget to cofund studies with NIH institutes. “A lot [of nutrition science] falls between the cracks,” he says—gaps he now hopes will close.

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