

Food as medicine: translating the evidence



Dietary interventions have the potential to treat a wide variety of chronic conditions and diseases, but generating strong evidence and a framework for their integration into health systems will be critical for their success.

Beyond its essential role in providing nutrients, food can be a powerful tool in the prevention and treatment of disease. In this issue of *Nature Medicine*, several studies shed new light on the impact of diet on cardiometabolic disease. Among these, Heilbronn and colleagues report greater improvements in post-prandial glycemic responses with intermittent fasting plus time-restricted eating than with calorie restriction or standard of care¹ – which suggests that fasting and regulated meal timing could be beneficial for adults at risk of type 2 diabetes. Additionally, Rappaport and colleagues explored the effects of a personalized lifestyle coaching intervention that included nutritional counseling tailored to participants' individualized clinical laboratory findings and genetic predisposition². In response to the intervention, participants with so-called metabolically unhealthy phenotypes had greater improvements in health (defined by multi-omics metrics) than those of participants with healthy metabolic phenotypes, underscoring the potential of personalized nutrition approaches for the treatment of obesity. Understanding the complex interplay between consumption of specific foods and health and disease outcomes thus has enormous potential to inform interventions for prevention and treatment of diabetes, obesity and other metabolic diseases.

The concept that healthy diets support good health is of course by no means new, but for dietary interventions to have meaningful effects on population health outcomes, effective and scalable implementation strategies, in addition to efficacy studies, are needed. Encouragingly, in the United States and elsewhere, momentum has been gathering to turn these concepts into reality. In September 2022, the Biden–Harris administration, in collaboration with dozens of non-profit organizations and companies, announced [initiatives](#)

aimed at addressing access to and affordability of healthy foods, as well as programs to support better integration of nutrition and health and to empower US consumers to make healthy food choices. A total of \$8 billion in private- and public-sector commitments has been pledged. Among these commitments, the US National Institutes of Health is developing a \$140 million grant program to fund approaches for reducing food insecurity, and the Rockefeller Foundation and the American Heart Association have pledged \$250 million to create a [Food Is Medicine Research Initiative](#).

Such initiatives have invigorated the 'Food is Medicine' movement, which highlights several different approaches for improving diet. In one type of treatment, so-called medically tailored meals are customized by a nutritionist to a person's specific needs. Medically tailored meals have shown efficacy in the treatment of patients with diabetes, heart failure and chronic liver disease. Medically tailored meals have also been shown to reduce visits to the emergency department and to reduce medical spending. In a sign of the growing acceptance of this type of treatment, several startup [companies](#) aim to deliver dietitian-designed meals or foods to people with chronic conditions such as diabetes or heart or kidney disease.

In a second type of intervention, called 'medically tailored groceries', participants receive nutritional counseling to help them shop for food. For example, in a randomized clinical trial, nutritional counseling to help participants adhere to the DASH (Dietary Approaches to Stop Hypertension) diet, conducted in grocery stores, was shown to lower blood pressure³. A third avenue for providing more-healthy food choices is so-called [produce prescriptions](#), through which people who have chronic conditions or lack access to nutritious food are provided healthy fruits and vegetables. Helping to combat the increasing levels of obesity and diabetes in children will also require programs to increase access to and encourage children to eat fruits and vegetables.

Leveraging the growing momentum of Food is Medicine approaches will require strong evidence supporting the efficacy of specific diets to prevent or treat diseases. Dietary

research is hard to do right. Nutritional epidemiology studies provide insights into the associations between dietary factors and disease, but they can be difficult to interpret, as they are often based on self-reported dietary assessment tools. Randomized clinical trials, such as that of Heilbronn and colleagues, provide high-quality evidence that certain types of diets or foods are efficacious for the prevention and treatment of chronic conditions such as cancer and cardiometabolic diseases. Food interventions could also conceivably be personalized by tailoring the diet to characteristics of the individual patient, such as their genetics or microbiome composition. For example, person-specific factors such as the gut microbiome substantially influence how blood lipid and glucose levels change after a standardized test-meal challenge⁴. Additionally, implementation studies are needed to evaluate how human behavior can be modified to make adherence to dietary interventions longer lasting.

Translation of the evidence into clinical practice is already underway. The DiRECT trial showed that intensive weight management that used a prescribed dietary program for 12 months, embedded within routine primary care, led to remission of diabetes in almost half of all participants who received the intervention⁵. On the basis of these data, the UK National Health Service is now testing [models](#) for providing low-calorie foods to people with obesity or type 2 diabetes.

However, prescribing food is more complicated than prescribing a pill. Widespread uptake of Food is Medicine approaches will require training clinicians on the appropriateness and use of these interventions. Integration of dietary interventions into routine healthcare will also require comprehensive insurance coverage, including inclusion in national universal health coverage systems. Currently in the United States, for example, governmental health insurance programs offer coverage for food prescriptions only in limited circumstances, and such coverage is rarely offered by private insurance plans. A more solid evidence base for the efficacy of food prescriptions is needed to spur expansion of insurance coverage.

It is indisputable that food has a huge impact on mental and physical health. With

the convergence of public and private initiatives promoting the centrality of food and diet for improving health, the time is ripe for clinical testing of specific approaches for the prevention or treatment of disease using food as medicine. Prescription

pharmaceuticals are commonplace and widely accepted by patients, physicians and insurers. A dietary prescription should also be on the table.

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