FROM DINNER PLATE TO DATASET

To achieve greater objectivity in nutrition research, which has historically relied on self-reports of what subjects eat, scientists are turning to biomarkers in bodily fluids that reveal details about a person’s diet. Much of the work to this point has involved screens to identify novel markers for specific food items (or even for how those foods are prepared). In some cases, researchers have begun to use markers identified in these screens to correlate diet with health risks.

1. In some studies that aim to identify metabolites associated with certain foods or diets, scientists tightly control people’s intakes before analyzing their metabolites. More often, they ask subjects what they’ve been eating.

2. People’s bodies will contain molecules from the foods they eat, as well as metabolites made from or in response to those foods, and even metabolites from their microbiota.

3. Most studies sample blood or urine, but stool, hair, or fingernails might also yield dietary clues.

4. Mass spectrometry allows for highly sensitive analyses of these metabolites in any sample type, even picking up those found at low concentrations. Nuclear magnetic resonance (NMR) provides more reproducible results, but may miss rare molecules.

5. Results can reveal metabolites that are positively (red; example shown) or negatively (blue) associated with specific foods or correlate with the overall healthfulness of a diet.

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Diet 1 (purple) included foods considered healthy by the World Health Organization, including whole-wheat cereal, steamed salmon, and grapes. Diet 4 (brown) represented the opposite end of the spectrum, with sugar-coated cereal, fried pork sausages, and milk chocolate. Diets 2 and 3 fell in between those extremes.

Data display adapted from Am J Clin Nutr, 102:905–13, 2015

Data image courtesy of Isabel García-Penás, Joreme Foerster, and Gary Frost