

A top priority for future nutrition research is the need to better understand variability in metabolic responses to diet and food. All individuals have varying responses to diet and food components and their impact on overall health. Findings in variability will lead to advances in personalized nutrition and will better inform public health and food policy, such as Dietary Reference Intakes for nutrients and recommendations for bioactives. Research in the following areas is necessary to determine the origins and components of variability, and to explain similar responses to diet and food components by subpopulations, such as ethnic and racial minorities:

Omics

Omics research, such as nutrigenomics (e.g. nutrigenetics, epigenetics, transcriptomics), proteomics and metabolomics, will help to determine how specific nutrients interact with genes, proteins and metabolites to predict an individual's health. Omics provides information on individualized nutrient requirements, including how nutrients are digested, absorbed, and metabolized- and their functions in the body. Omics will help to determine and reflect an individual's nutritional status and will aid in the creation of new nutritional and disease biomarkers.

Microbiome

Diverse microbes, such as bacteria and viruses, live in and on each person's body and make up their microbiome, which is estimated to have 10 times as many cells as the body itself. Microbes vary from person to person, making each individual's microbiome unique- although certain subpopulations may have similar microbiome characteristics. Research is needed to determine the microbiome's role in varying metabolic responses to diet and food components and in disease prevention and progression. Conversely, research is also needed to show how the microbiome is influenced by diet and the environment.

Imprinting

Imprinting research examines how exposures to dietary components during critical periods of development "program" and contribute to an individual's long-term health and well-being. Research is needed to determine how early nutritional events contribute to disease later in life and alter an individuals' normal developmental progression.

Biological Networks

Research is needed to provide a better understanding of biological networks, such as an individuals' genome (DNA and RNA make-up), and how these networks impact metabolic responses to diet and food. Environmental interactions, including nutrients and other dietary components, bacteria, viruses and chemical contaminants, all may impact how an individual's biological networks respond to diet and food.

Tissue Specificity and Temporality

Research is needed to describe how dietary factors impact variability in human development and functioning, including when in the life cycle and in which tissues dietary factors have the most impact.

