National Institutes of Health
Office of Dietary Supplements

NIH Perspective on Personalized Nutrition

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Disclosures

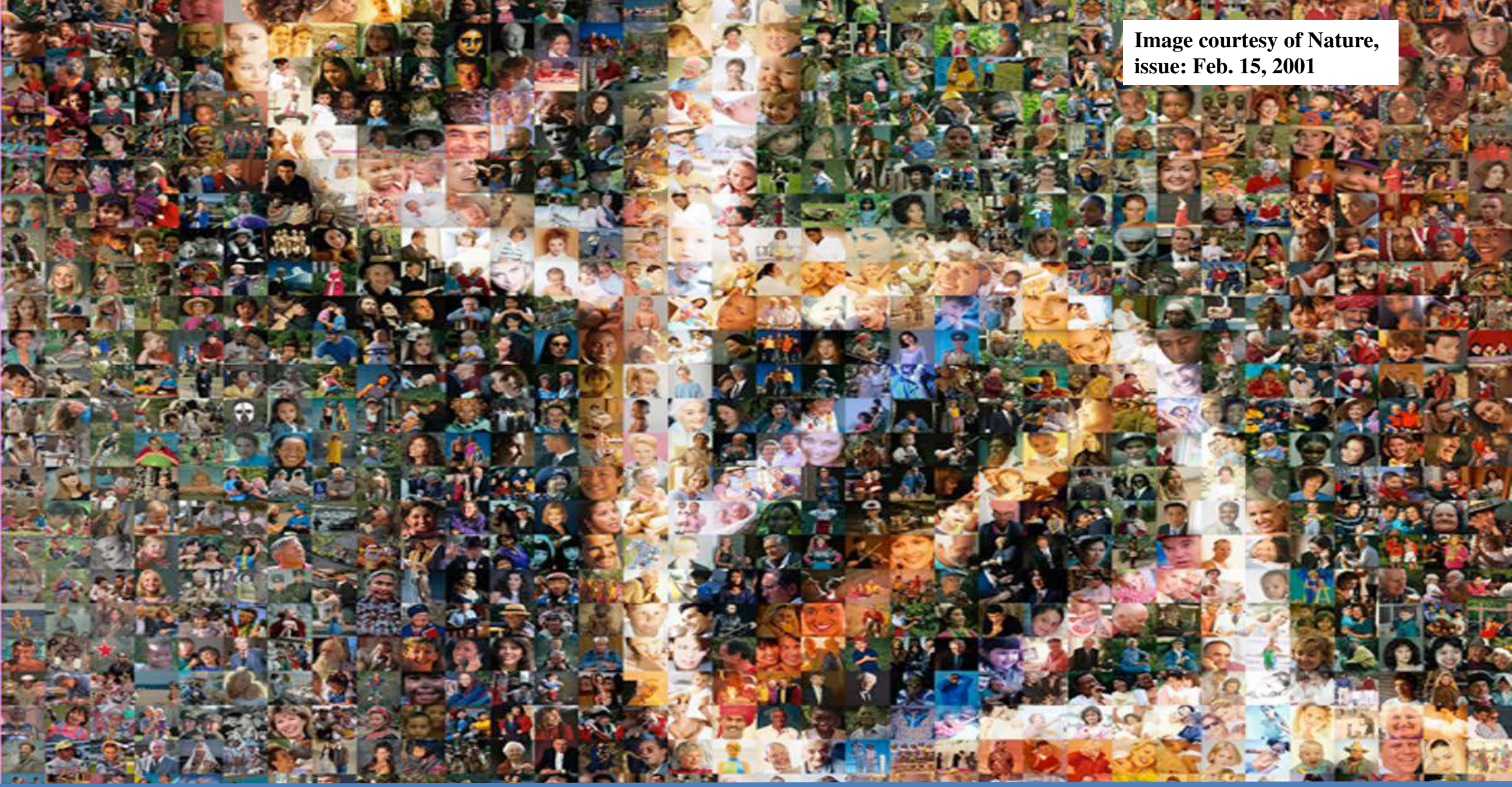


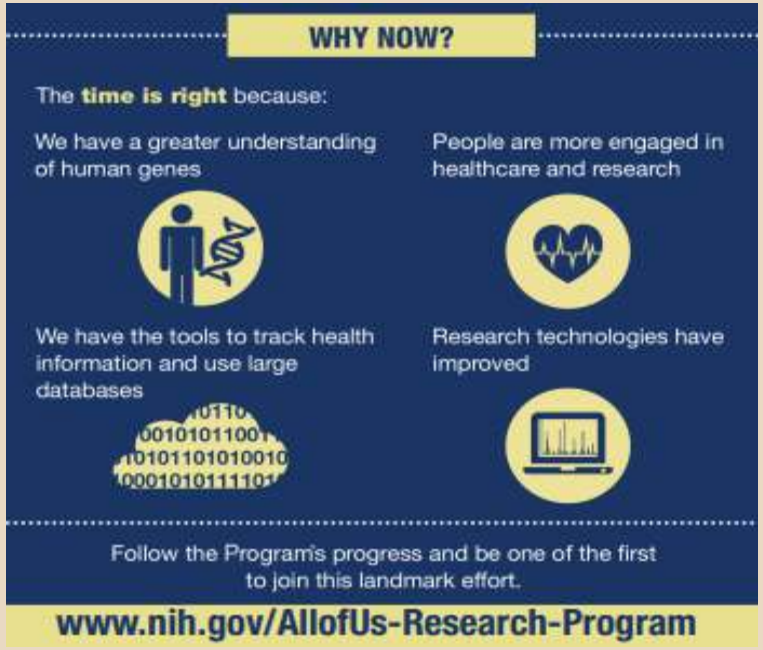
Image courtesy of Nature, issue: Feb. 15, 2001

The Genetic Revolution is Providing a Shift Towards Personalized Recommendations

What is Personalized Medicine?

- Using information about a person's genetic makeup to tailor strategies for the detection, treatment, or prevention of disease.
- Using molecular profiling technologies to assess DNA, RNA, protein, and metabolites to tailor medical care.
- Approach has the promise of delivering the right dose for the right indication to the right patient at the right time.

NIH and Precision (Personalized) Medicine



Environmental Influences on Child Health Outcomes (ECHO)

The basics

NIH plans to support **multiple studies** using **existing cohorts** (groups of women & children who have already participated in other research studies) to answer questions about the effects of a broad range of **environmental factors on child health & development**. This approach will allow the NIH to combine data and maximize the use of this existing resource set to answer questions that could not be addressed by each study alone.

Environmental factors include physical, chemical, biological, behavioral, & social, etc.

What we hope to learn

The ECHO program will allow researchers to **maximize the use of existing resources** such as collections of biological tissues collected during pregnancy and delivery, **leverage available data sets** by funding additional analyses, **develop a repository** on the trajectory of health development, and develop statistical models to **predict disease development**, and **test new tools and approaches** for environmental and pediatric monitoring.

ECHO at its core

In addition to each investigators' specific research questions, all of the ECHO studies will be expected to collect standardized information (Core Elements) on:

- Demographics
- Typical health and development
- Genetic influences on child health and development
- Environmental factors
- Patient/person-reported outcomes (PROs)

ECHO's target areas

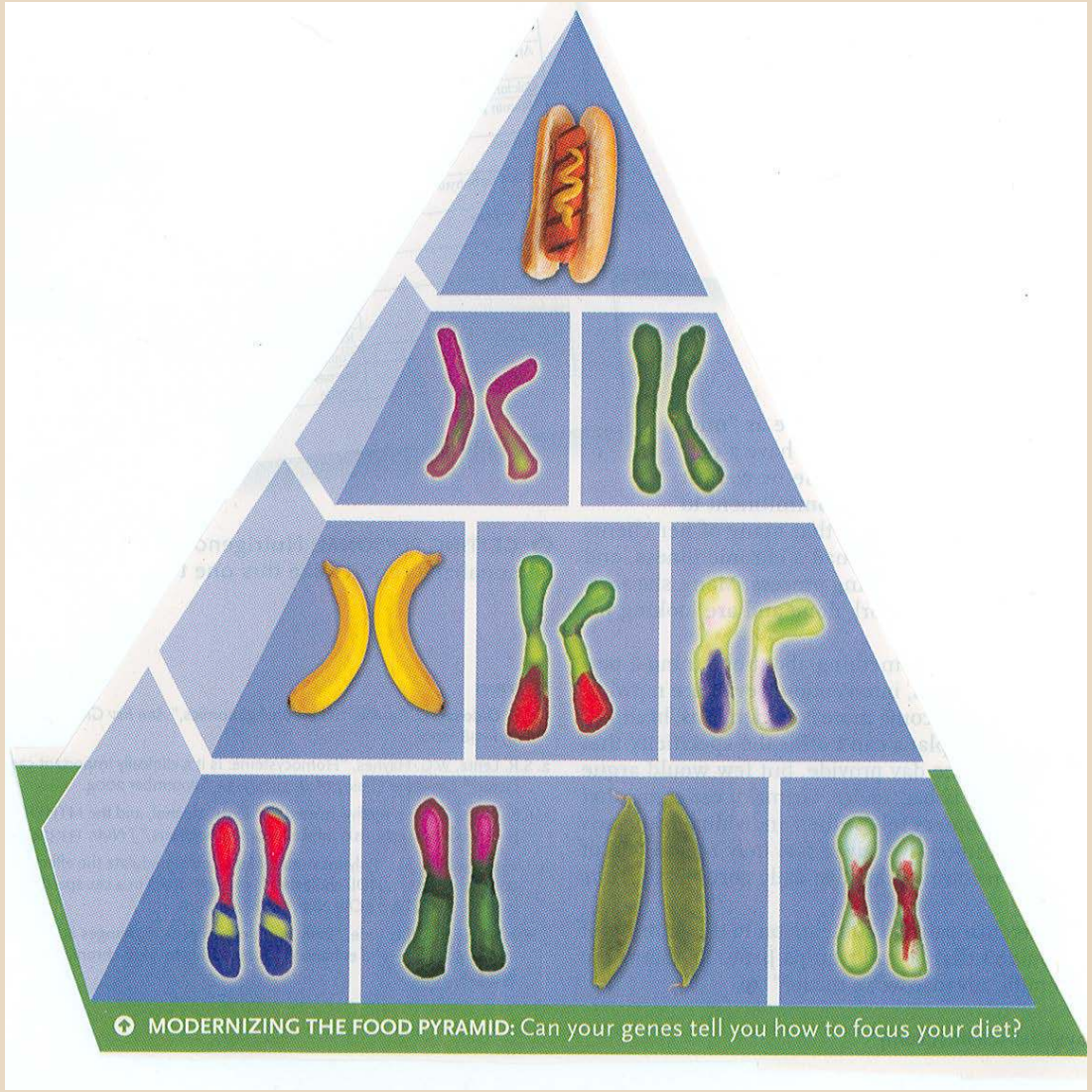
The top priority focus areas for ECHO-funded studies are four pediatric health outcomes with high public health impact:

- Upper and lower airway
- Obesity
- Pre-, peri-, and postnatal outcomes
- Neurodevelopment

ECHO will also create an IDeA States Pediatric Clinical Trials Network leveraging existing IDeA infrastructure to address access gaps for rural children.

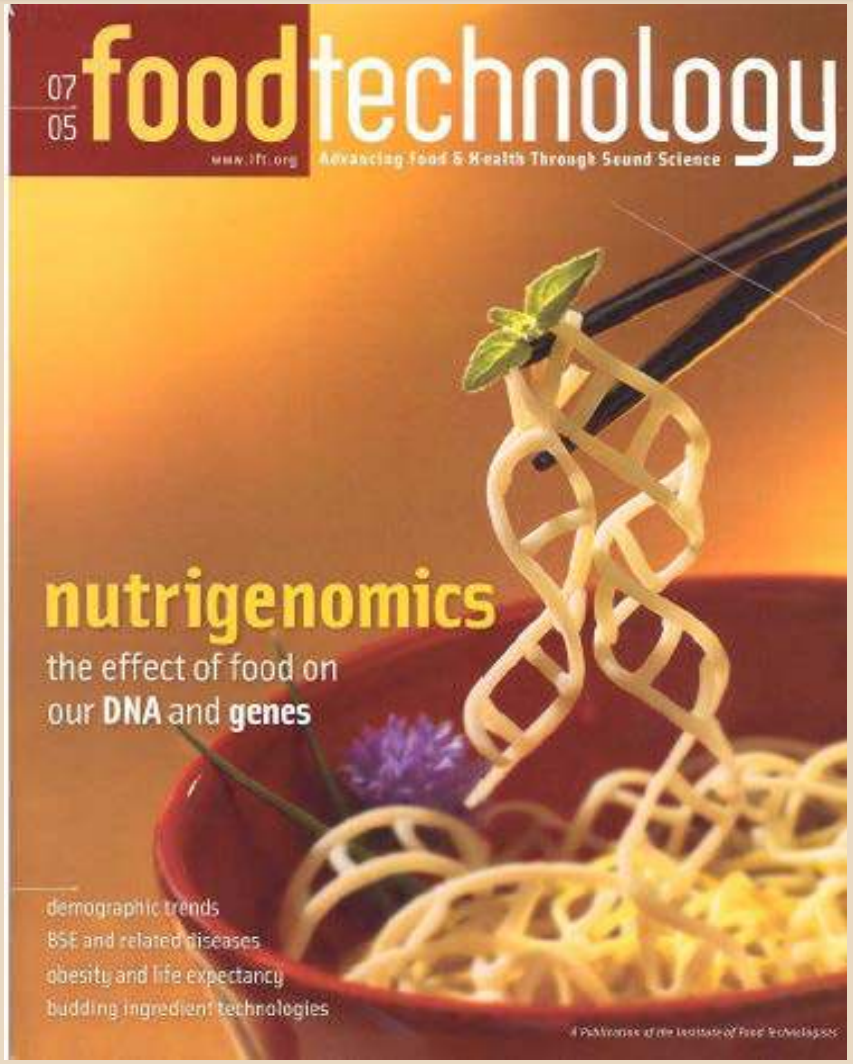
https://www.nih.gov/echo

Can your genes tell you how to focus your diet for disease prevention?



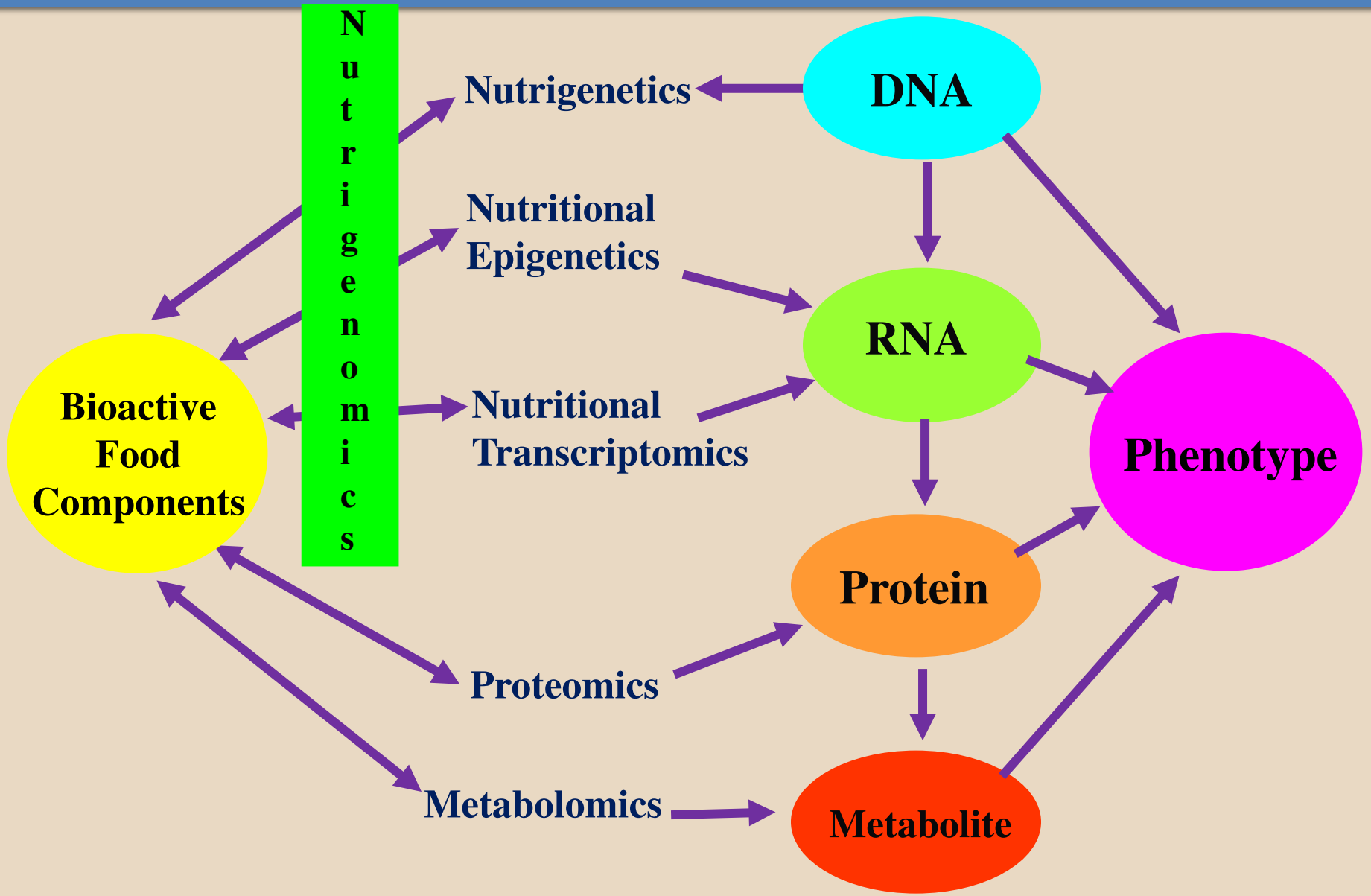
MODERNIZING THE FOOD PYRAMID: Can your genes tell you how to focus your diet?

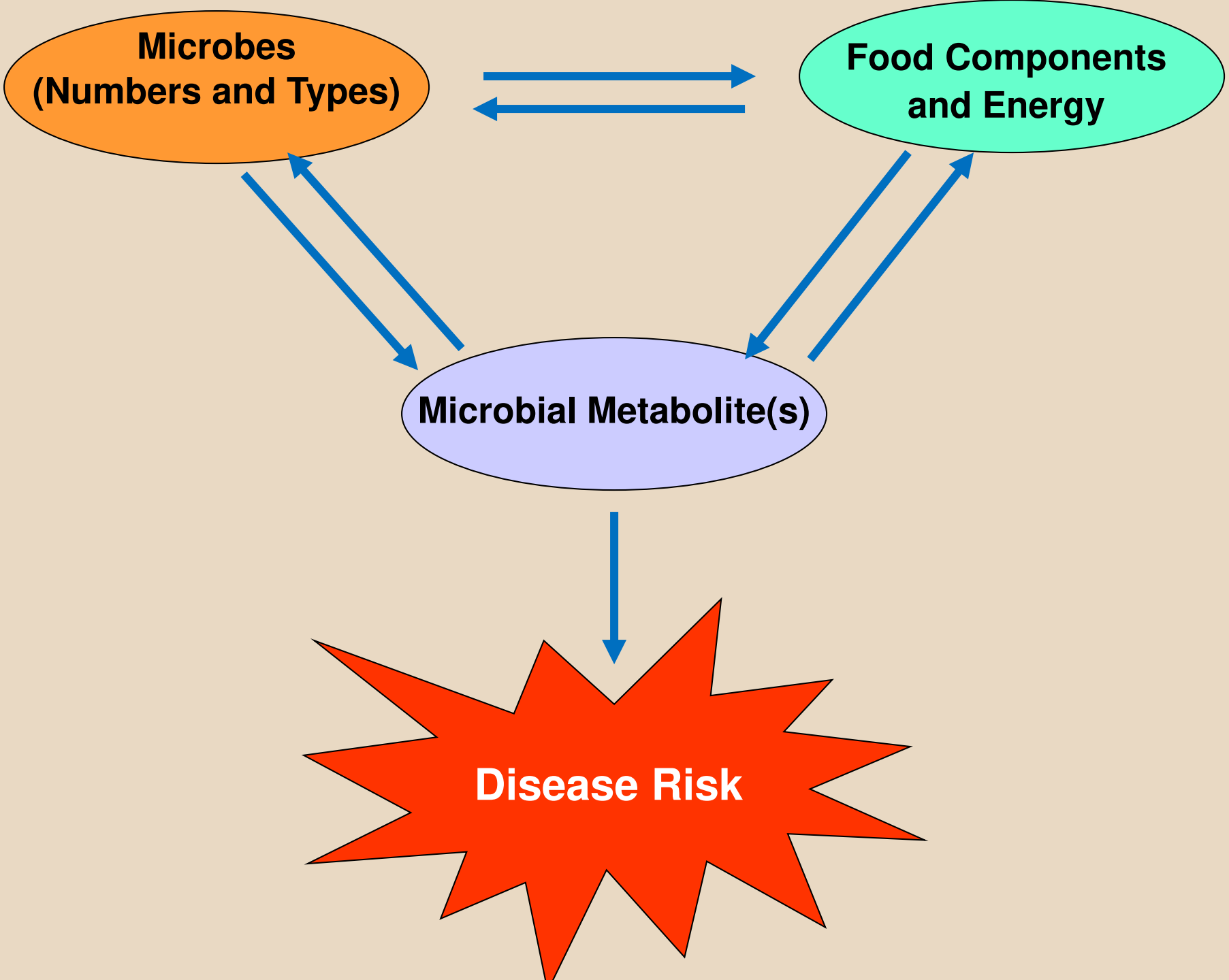
Nutrigenomics



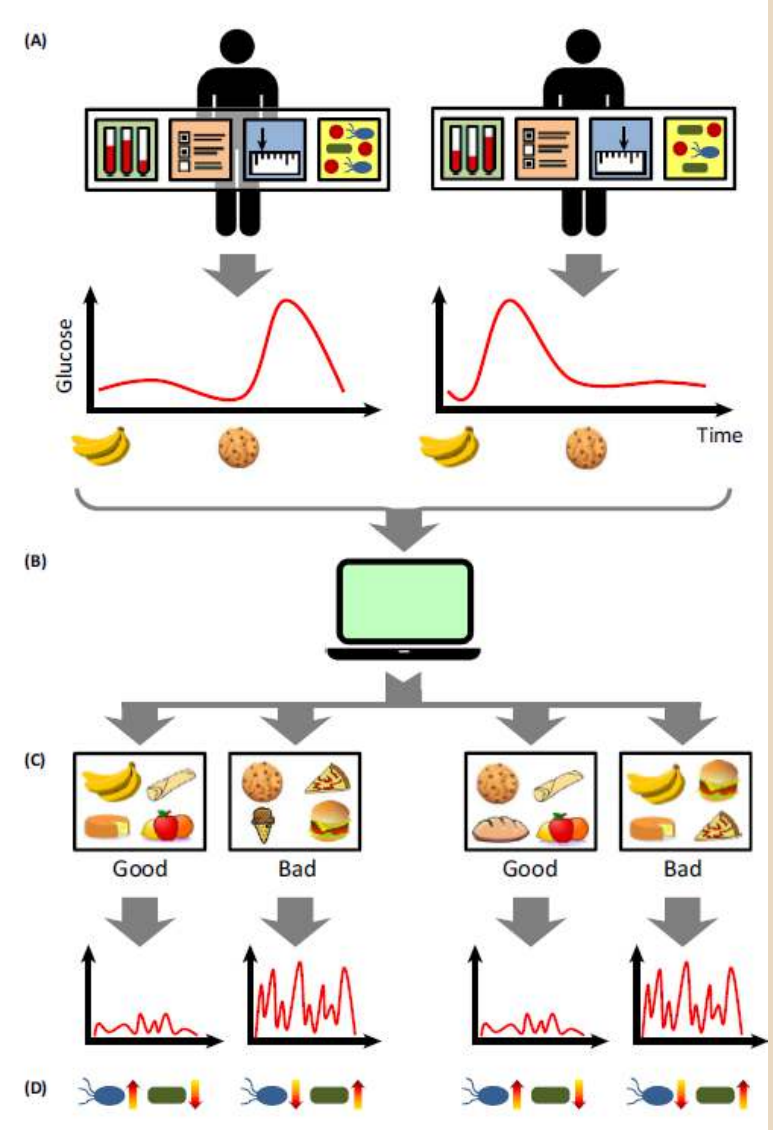
A discipline that investigates the effects of dietary components on the structure, function, and regulation of coding and non-coding DNA segments of all genes present in the genome of a given species.

Using the "Omics" of Nutrition to Identify Responders from Non-Responders to Diet for Disease Prevention




Microbes
(Numbers and Types)
Food Components
and Energy
Microbial Metabolite(s)
Disease Risk

Personalized Nutrition and Glycemic Response



Noecker C. and Borenstein, E. Trends in Molecular Medicine. 22:83-86, 2016

National Nutrition Research Roadmap

- Released on March 4, 2016 by the Interagency Committee on Human Nutrition Research (ICHNR).

- The 5 year roadmap "encourages an increased focus on research that can lead to more **individualized advice** for promoting health and preventing disease".

- Roadmap identifies 3 key questions that cover a broad spectrum of research:
  1. How do we better understand and define eating patterns to improve and sustain health?
  2. What can be done to help people choose healthy eating patterns?
  3. How can we develop and engage innovative methods and systems to accelerate discoveries in human nutrition?

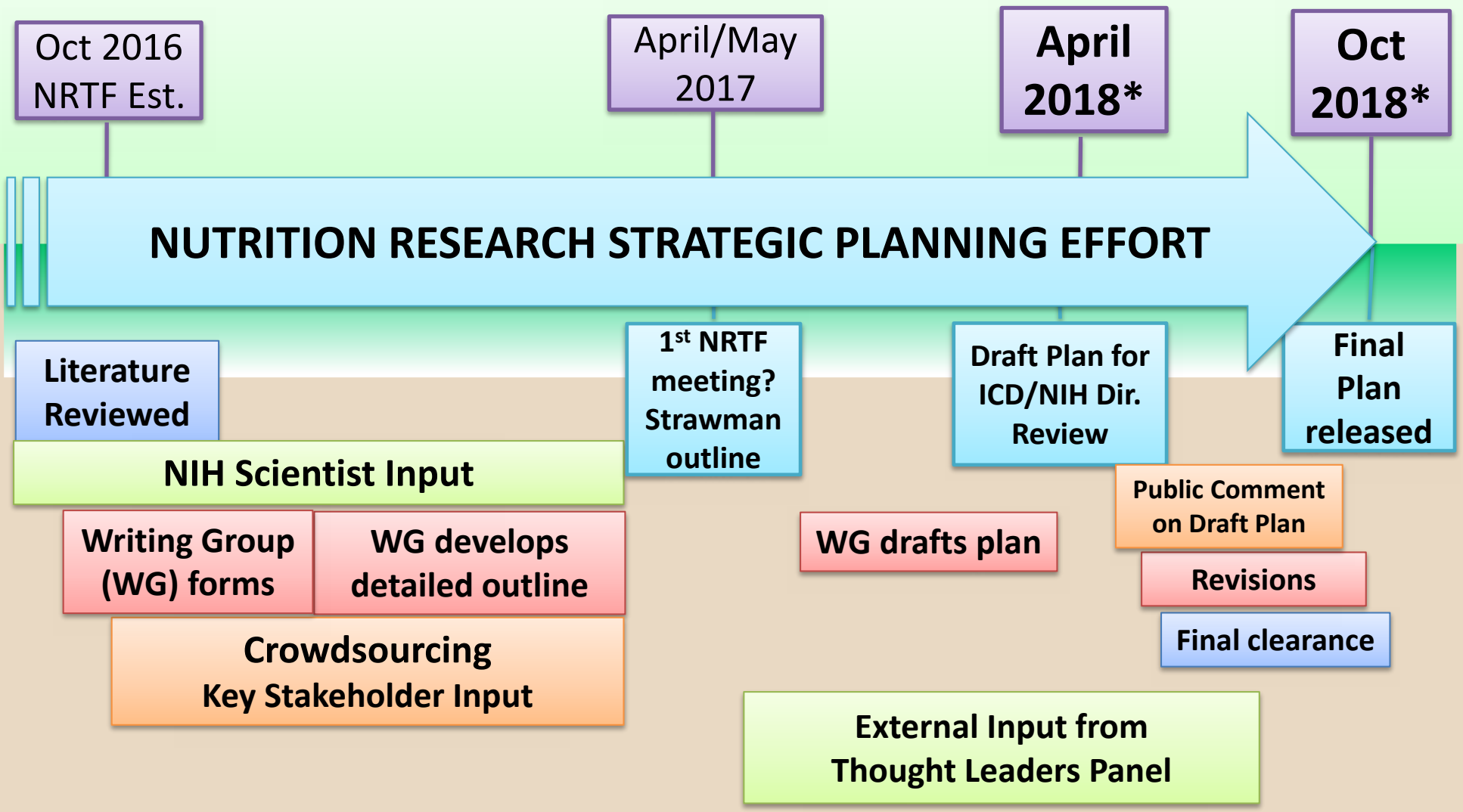
National Nutrition Research Roadmap- Role of the Different Federal Agencies

Agency	Commerce	DoD	EPA	FTC	HHS	NASA	USAID	USDA	VHA
Question 1: How do we better understand and define eating patterns to improve and sustain health?									
Q1T1 Health Promotion and Disease Prevention and Treatment	X	X		X	X	X	X	X	X
Q1T2 Individual Differences Including "Omics"		X			X	X		X	X
Q1T3 Population-Level Monitoring	X	X	X		X		X	X	X
Question 2: What can be done to help people choose healthy eating patterns?									
Q2T1 Influences on Eating Patterns	X	X		X	X	X	X	X	X
Q2T2 Interventions		X		X	X	X	X	X	X
Q2T3 Systems Science					X				X
Q2T4 Environmental Sustainability	X	X					X	X	X
Question 3: How can we develop and engage innovative methods and systems to accelerate discoveries in human nutrition?									
Q3T1 Assessing Dietary Exposures	X	X	X	X	X	X	X	X	X
Q3T2 Biobehavioral Science		X			X	X	X	X	X
Q3T3 Behavioral Economics		X		X	X			X	X
Q3T4 Big Data	X	X		X	X		X	X	X

Development of NIH-Wide Strategic Plan on Nutrition Research

- The National Institutes of Health Nutrition Research Task Force (NRTF) was established in October 2016 to coordinate and accelerate progress in nutrition research across the NIH.
- Dr. Christopher Lynch, director of NIDDK's Office of Nutrition Research, serves as the task force executive secretary.
- NRTF is guiding the development of the first NIH-wide 10-year strategic plan for nutrition research.
- The Task Force is chaired by the directors of 4 institutes (NIDDK, NCI, NHLBI and NICHD).
- NRTF will appoint a senior leadership group to guide implementation of the plan once it is complete.

Proposed NRTF Strategic Planning Timeline



*Deadlines included in NRTF charter.

NIH OFFICE OF DIETARY SUPPLEMENTS

Strategic Plan 2017–2021

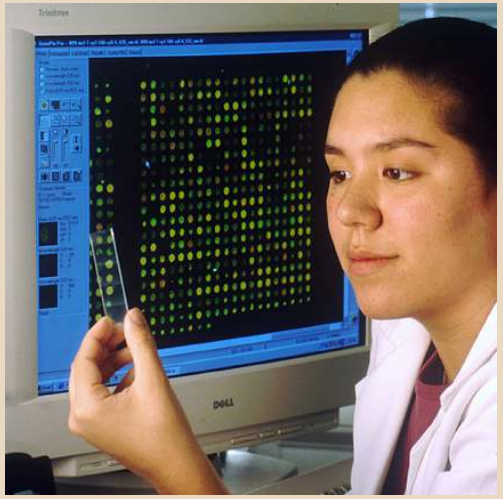
Strengthening Knowledge & Understanding of Dietary Supplements

DECEMBER 2016

National Institutes of Health
Office of Dietary Supplements

https://ods.od.nih.gov

The Future: Personalization



Predictive ⟷ Personalized ⟷ Preemptive

Participatory

Elias Zerhouni, NIH Director, comments to Congress March 5, 2008