NIH Perspective on Personalized Nutrition

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Disclosures
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**

**All of Us℠ Research Program**

**WHAT IS IT?**

**Precision medicine** is a groundbreaking approach to disease prevention and treatment based on people's individual differences in environment, genes and lifestyle.

The All of Us Research Program will lay the foundation for using this approach in clinical practice.

**WHAT ARE THE GOALS?**

Engage a group of 1 million or more U.S. research participants who will share biological samples, genetic data and lifestyle information, all linked to their electronic health records. This data will allow researchers to develop more precise treatments for many diseases and conditions.

Pioneer a new model of research that emphasizes engaged research participants, responsible data sharing and privacy protection.

Research based on the cohort data will:

- Lay **scientific foundation** for precision medicine
- Help identify new ways to **treat and prevent disease**
- Test whether **mobile devices**, such as phones and tablets, can encourage healthy behaviors
- Help develop the **right drug** for the **right person** at the **right dose**

**WHY NOW?**

The **time is right** because:

- We have a greater understanding of human genes
- People are more engaged in healthcare and research
- We have the tools to track health information and use large databases
- Research technologies have improved

Follow the Program’s progress and be one of the first to join this landmark effort.

[www.nih.gov/AllofUs-Research-Program](http://www.nih.gov/AllofUs-Research-Program)
Environmental Influences on Child Health Outcomes (ECHO)

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.

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.

What we hope to learn

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)

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 IDEAS States Pediatric Clinical Trials Network leveraging existing IDEAS 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?
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
The diagram illustrates the relationships between Microbes (Numbers and Types), Food Components and Energy, and Microbial Metabolite(s). These elements interact to influence Disease Risk.
Personalized Nutrition and Glycemic Response

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

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<tr>
<th>Question 1: How do we better understand and define eating patterns to improve and sustain health?</th>
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<tr>
<td><strong>Q1T1</strong> Health Promotion and Disease Prevention and Treatment</td>
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<tr>
<td><strong>Q1T2</strong> Individual Differences Including “Omnics”</td>
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<td><strong>Q1T3</strong> Population-Level Monitoring</td>
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<th>Question 2: What can be done to help people choose healthy eating patterns?</th>
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<td><strong>Q2T1</strong> Influences on Eating Patterns</td>
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<td><strong>Q2T2</strong> Interventions</td>
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<td><strong>Q2T3</strong> Systems Science</td>
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<td><strong>Q2T4</strong> Environmental Sustainability</td>
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<th>Question 3: How can we develop and engage innovative methods and systems to accelerate discoveries in human nutrition?</th>
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<tr>
<td><strong>Q3T1</strong> Assessing Dietary Exposures</td>
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<td><strong>Q3T3</strong> Behavioral Economics</td>
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<td><strong>Q3T4</strong> Big Data</td>
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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

NUTRITION RESEARCH STRATEGIC PLANNING EFFORT

- Literature Reviewed
- NIH Scientist Input
- Writing Group (WG) forms
- WG develops detailed outline
- Crowdsourcing
  - Key Stakeholder Input
- 1st NRTF meeting? Strawman outline
- Draft Plan for ICD/NIH Dir. Review
- Public Comment on Draft Plan
- Revisions
- Final clearance
- External Input from Thought Leaders Panel
- WG drafts plan
- Final Plan released
- Oct 2016 NRTF Est.
- Apr 2017 NRTF Est.
- Apr 2017 NRTF Est.
- Oct 2018*
- Apr 2018*
- Final Plan released

*Deadlines included in NRTF charter.
The Future: Personalization

Predictive  Personalized  Preemptive

Participatory

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