The Food and Nutrition Board:

Authority for Today's Science, Driving Tomorrow's Science

Patrick J. Stover, Ph.D.
Vice Chancellor, Texas A&M AgriLife
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TEXAS A&M AGRILIFE

Disclosures

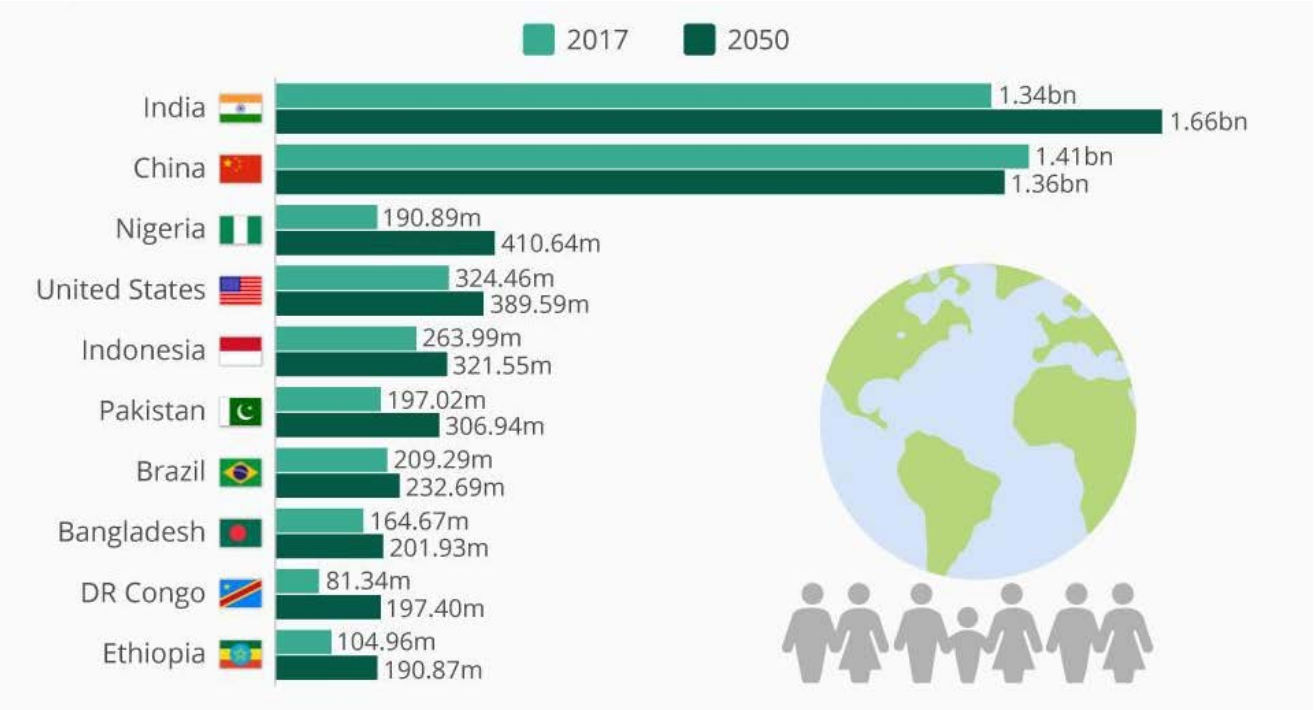
AFFILIATION/FINANCIAL INTERESTS (prior 12 months)	ORGANIZATION
Grants/Research Support:	NIH: T32-DK007158 R37DK58144; ODS Supplement HD059120
Scientific Advisory Board/Memberships:	Marabou Foundation, National Academy of Sciences, American Society for Nutrition, ICAAS Scientific Advisory Board
Speakers Bureau:	None
Stock Shareholder:	TIAA

Greatest Challenges of Our Time

FOOD **PEOPLE**

ECONOMICS **ENVIRONMENT**

Greatest Challenges of Our Time: Population Growth and Farmland



The U.S. loses about 175 acres of farmland every hour, mostly due to the expansion of urban and suburban areas.

American Farmland Trust

https://www.forbes.com/sites/niallmccarthy/2017/06/22/the-worlds-most-populous-nations-in-2050-infographic/#726189339f60

Agriculture's URBAN FOOTPRINT

Greatest Challenges of Our Time: The Future of Food

We can engineer the food supply with unprecedented capability.

What do we want to achieve?

- Avoid nutrient deficiency
- Optimize function
- Chronic disease prevention
- Disease management
- Lower health care costs
- Lower environmental footprint
- Economic sustainability
- Be affordable & accessible
- ……

NEW EXPECTATIONS:
Agriculture and Food Systems

Historical Expectations—

Produce

- Food
- Fiber
- Fuel

New Expectations—

Nourish and Sustain

- Food for life-long health
- Protect and sustain our environment
- Ensure agriculture is economically viable

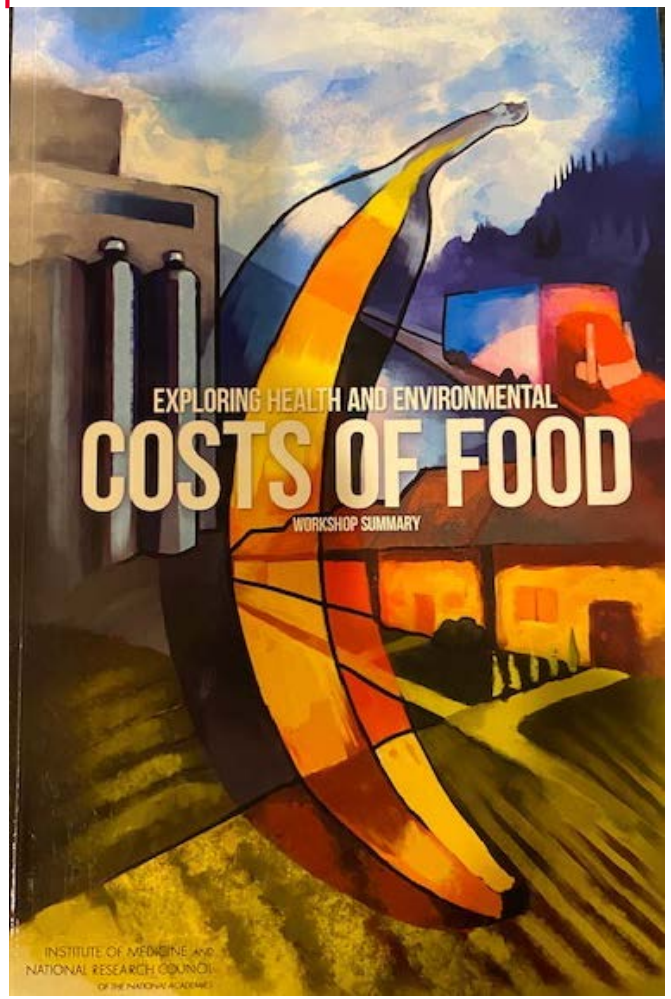
NEW EXPECTATIONS:
Agriculture and Food Systems

"Human Nutrition Research—The Committee directs ARS to provide to the Committee not later than 180 days after the enactment of this Act a report on the connection between how to advance science, policy, and practice for how healthier food enhances overall health, reduces obesity and related co-morbidity, and could lower health care costs."

NEW EXPECTATIONS
Environmental Footprint,
Agriculture and Food Systems

NEW EXPECTATIONS:
Environmental Resiliency, Agriculture and Food Systems

NEW EXPECTATIONS:
Economics, Agriculture and Food Systems

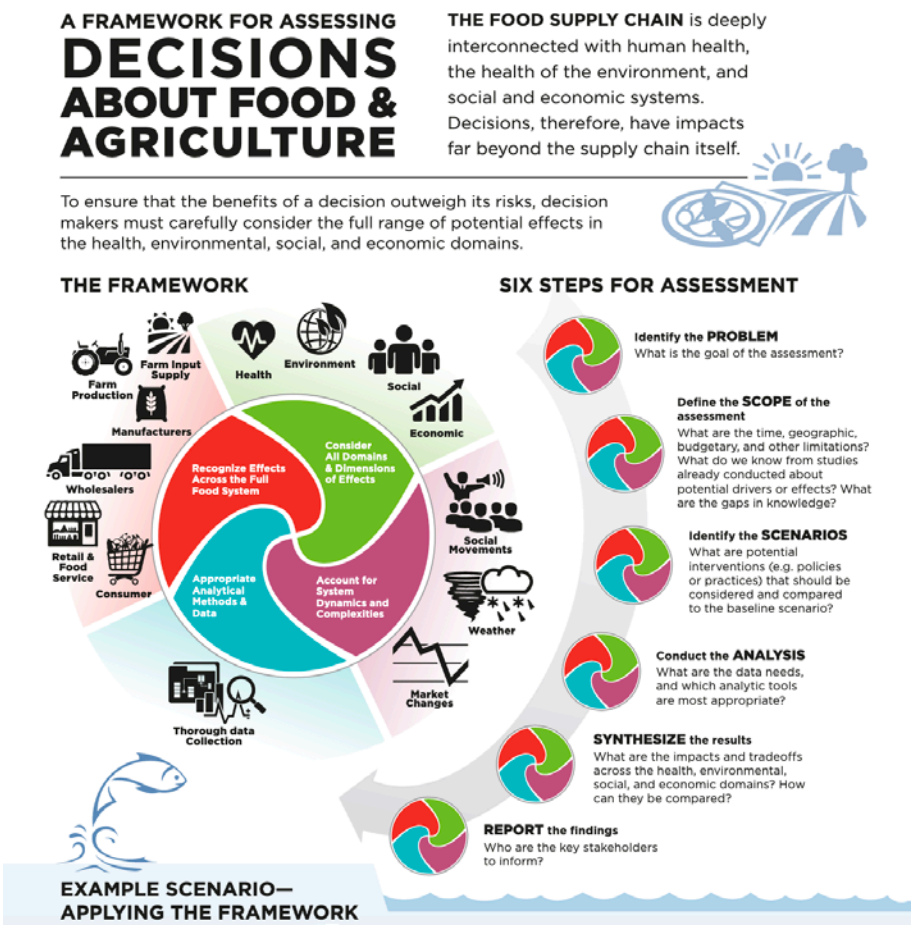


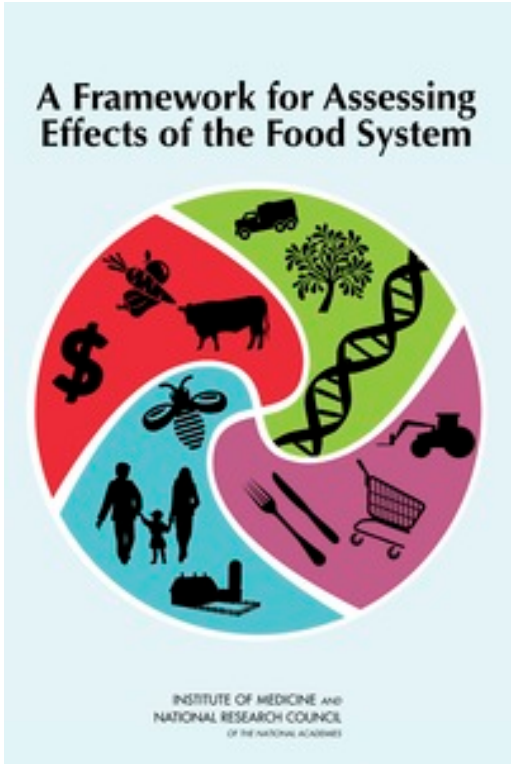
2012

Page 1 – Workshop summary:

"The US Food System provides many benefits, not the least of which is a safe, nutritious and consistent food supply. However, the same system creates significant environmental, public health, and other costs that generally are not recognized and not accounted for in the retail price of food"

Food, Agriculture and Health are Interconnected Systems





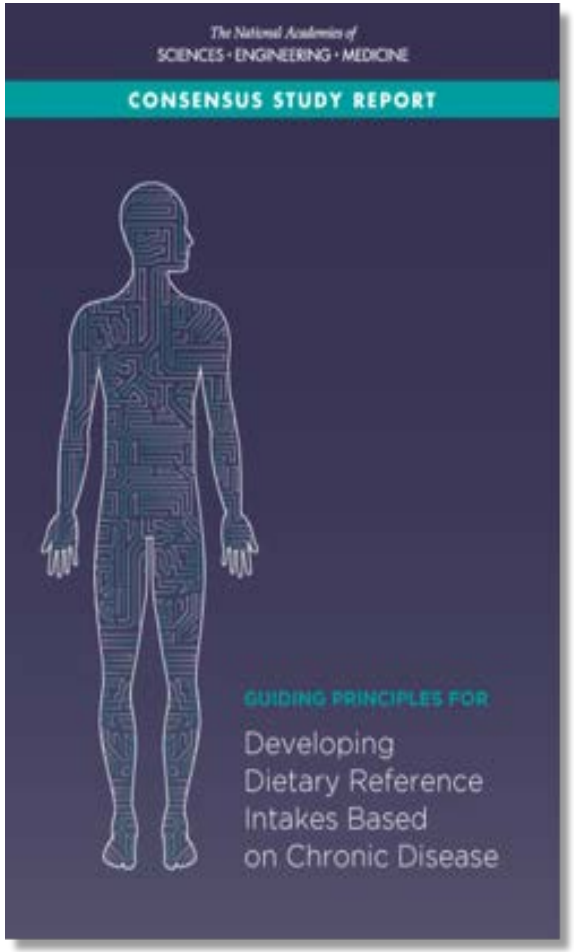
2015

NEW EXPECTATIONS:
Agriculture and Food Systems

The Mandate is Clear ….

The Pathway is Not

NEW EXPECTATIONS:
Health, Agriculture and Food Systems

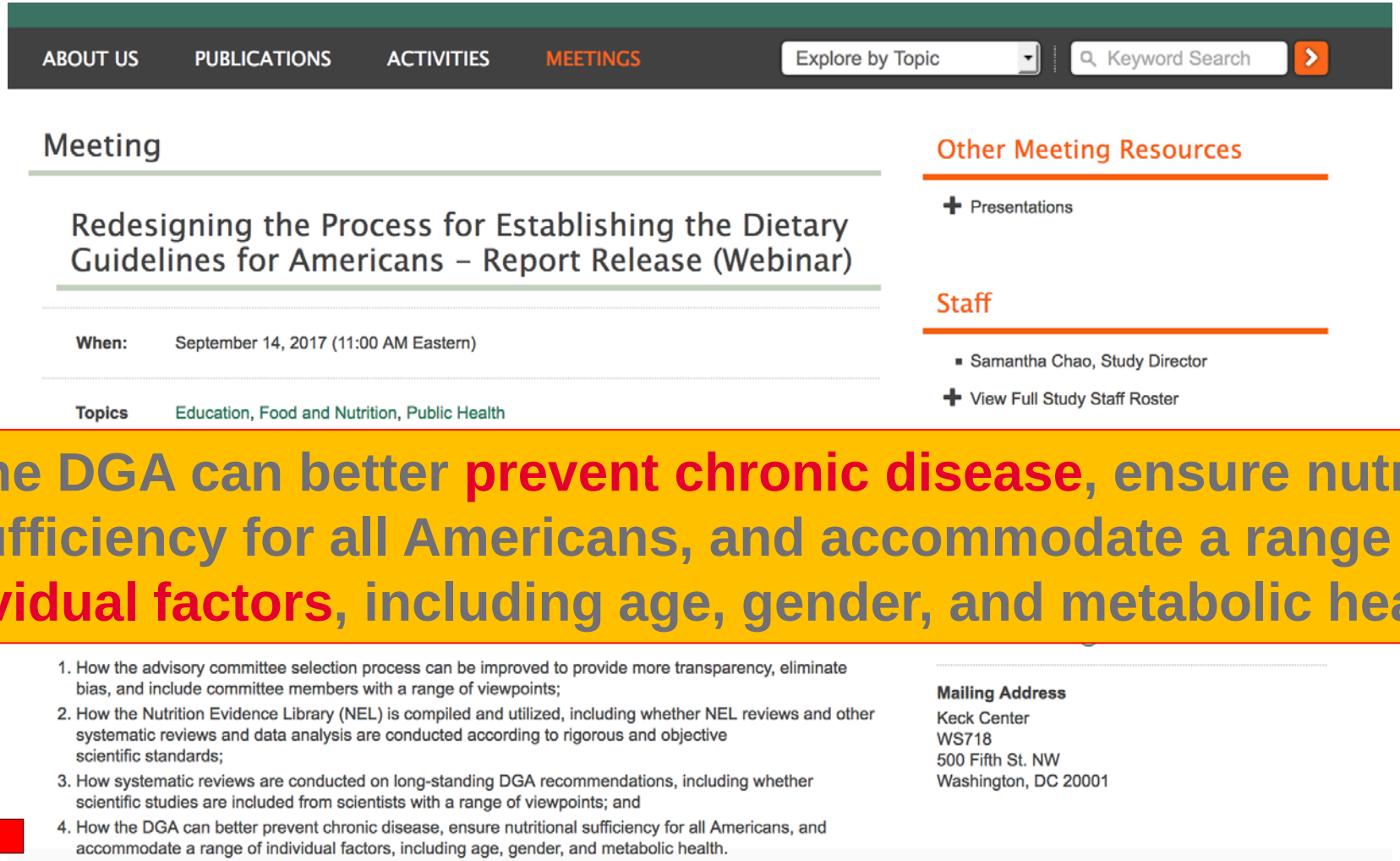


2017

- Few chronic diseases are affected by:
  - single nutrients
  - single pathways
- Consider systems/networks over pathways
- Establish system readouts as biomarkers (integrative biomarkers)
- Consider DRIs as ranges in lieu of point estimates
- Understand biomarkers of aging – system decay

NEW EXPECTATIONS:
Health, Agriculture and Food Systems

2017



ABOUT US PUBLICATIONS ACTIVITIES MEETINGS Explore by Topic Keyword Search

Meeting

Redesigning the Process for Establishing the Dietary Guidelines for Americans – Report Release (Webinar)

When: September 14, 2017 (11:00 AM Eastern)

Topics Education, Food and Nutrition, Public Health

Other Meeting Resources

+ Presentations

Staff

- Samantha Chao, Study Director

+ View Full Study Staff Roster

How the DGA can better prevent chronic disease, ensure nutritional sufficiency for all Americans, and accommodate a range of individual factors, including age, gender, and metabolic health.

1. How the advisory committee selection process can be improved to provide more transparency, eliminate bias, and include committee members with a range of viewpoints;
2. How the Nutrition Evidence Library (NEL) is compiled and utilized, including whether NEL reviews and other systematic reviews and data analysis are conducted according to rigorous and objective scientific standards;
3. How systematic reviews are conducted on long-standing DGA recommendations, including whether scientific studies are included from scientists with a range of viewpoints; and
4. How the DGA can better prevent chronic disease, ensure nutritional sufficiency for all Americans, and accommodate a range of individual factors, including age, gender, and metabolic health.

Mailing Address
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WS718
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Washington, DC 20001

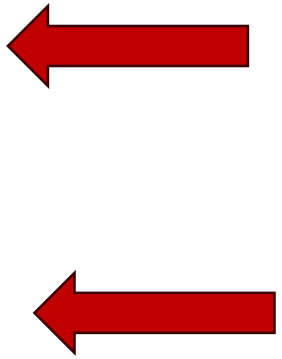
National Nutrition Research Roadmap 2016–2021
USA Interagency Committee on Human Nutrition Research

Question 1: How can we better understand and define eating patterns to improve and sustain health?
Question 1 Topic 1 (Q1T1): How do we enhance our understanding of the role of nutrition in health promotion and disease prevention and treatment?
Question 1 Topic 2 (Q1T2): How do we enhance our understanding of individual differences in nutritional status and variability in response to diet?
Question 1 Topic 3 (Q1T3): How do we enhance population-level food- and nutrition-related health monitoring systems and their integration with other data systems to increase our ability to evaluate change in nutritional and health status, as well as in the food supply, composition, and consumption?

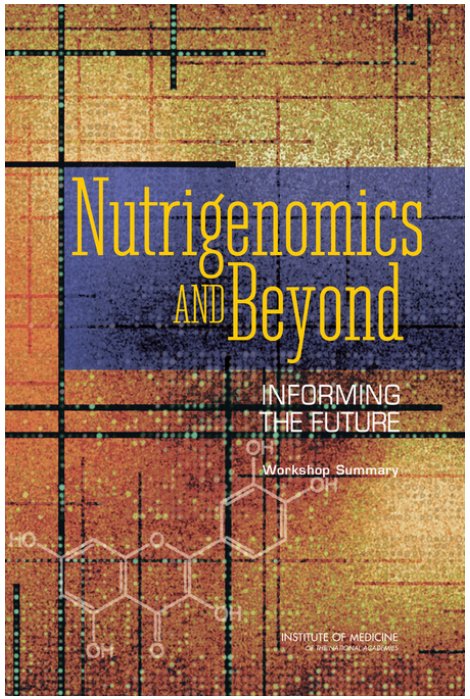
https://www.google.ch/?gfe_rd=cr&ei=Og8SWOLrLcHCaNn8gOAN#q=national+nutrition+roadmal

Dietary Requirements as Complex Traits

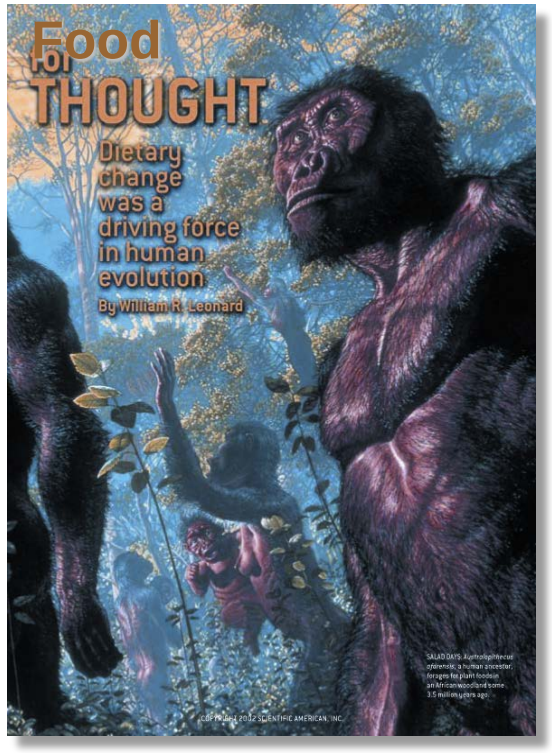
Physiological Processes	Modifiers and Sensitizers
Absorption	Disease
Catabolism	Epigenetics
Excretion	Food Matrix
Metabolism	Genetics
Stability	Nutrient-Nutrient Interactions
Transport	Pharmaceuticals
Bioactivation	Toxins
Energetic State	Age/Physiological Decay
Nutrient Storage	Microbiome/Pregnancy/Sex

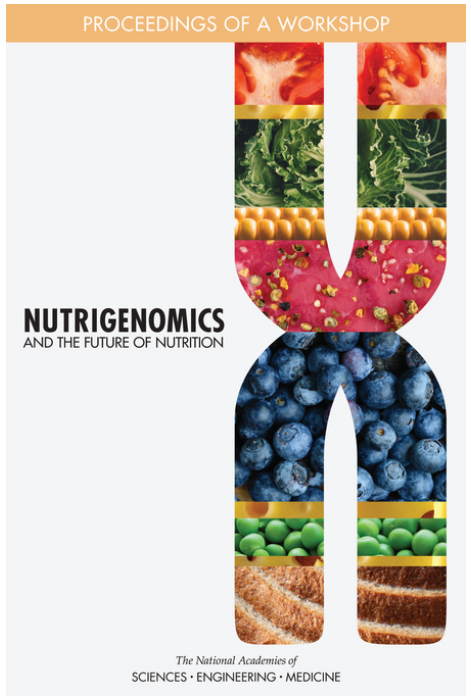


Genomics – Are we are all different?



2007



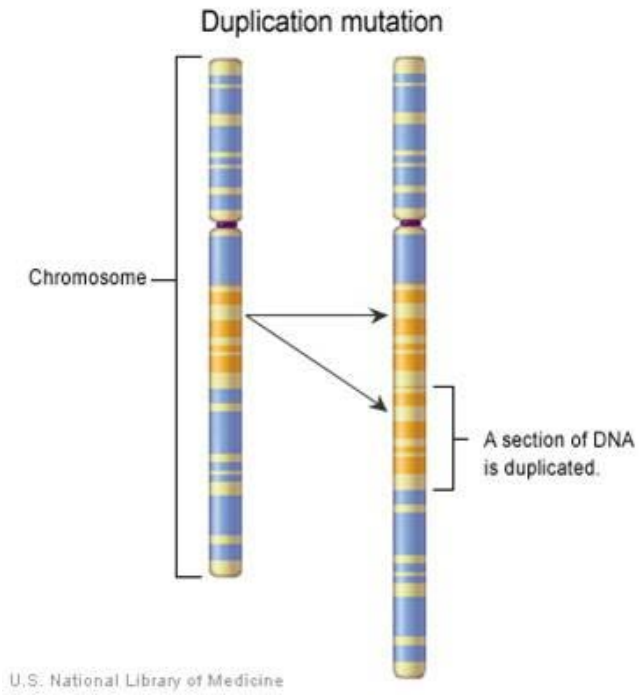


2018

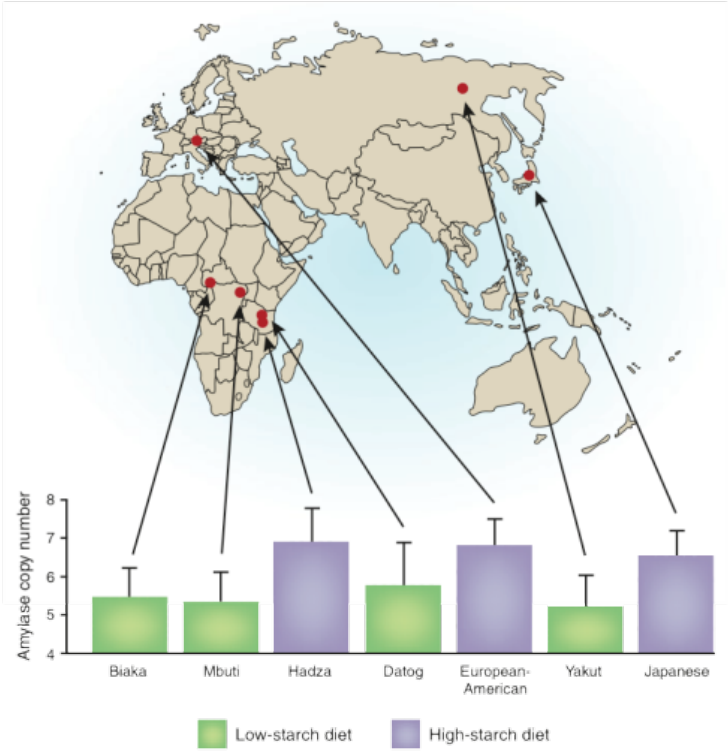
Scientific American November 13, 2002 William R. Leonard

Amylase CNVs expanded in agrarian human populations to improve starch digestion

Genotype

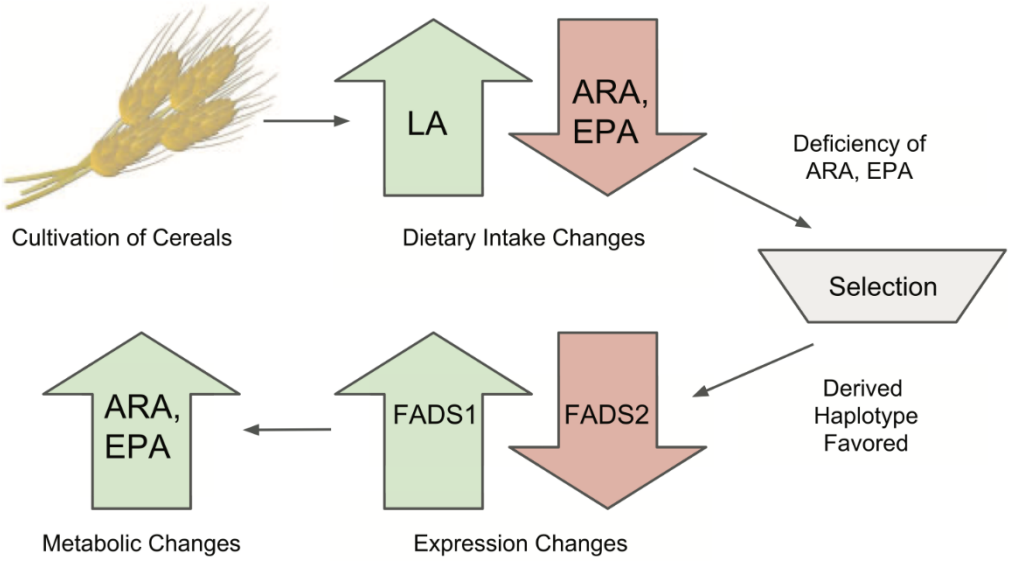


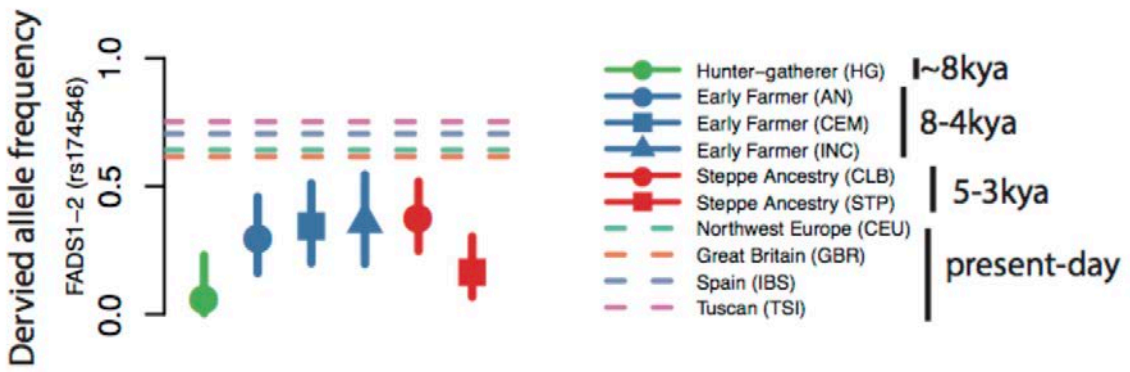
Location



BMC Evolutionary Biology 2010, 10:36

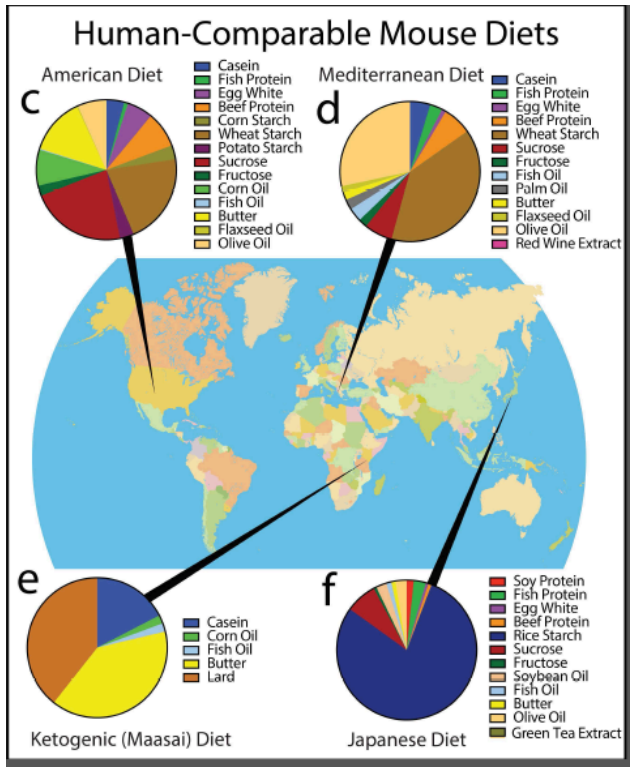
Agriculture-induced positive selection in fatty acid metabolism

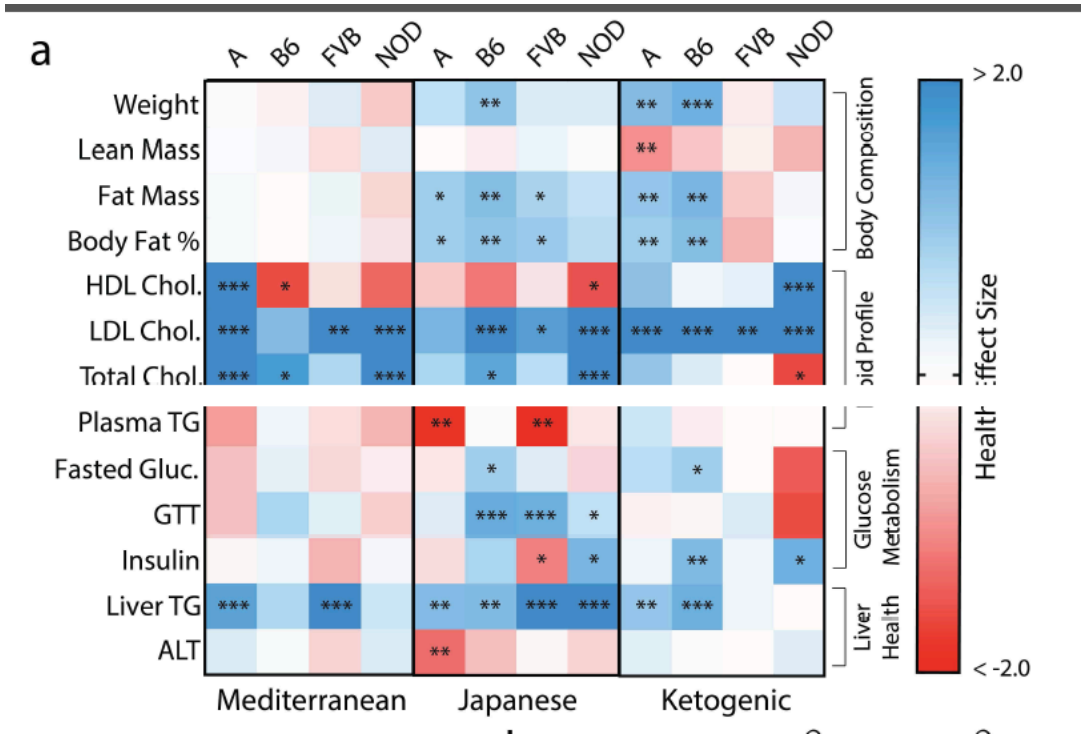




Mol Biol Evol 2017, 34: 1307-18

Improving Metabolic Health through Precision Dietetics in Mice

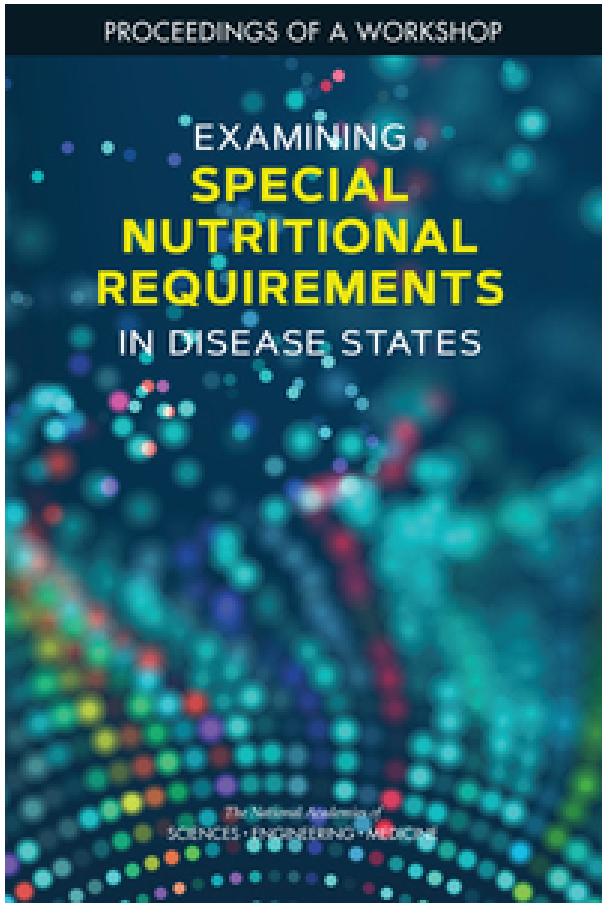




William T. Barrington[1,2], Phillip Wulfridge[3], Ann E. Wells[9], Carolina Mantilla Rojas[1], Selene Y.F. Howe[1], Amie Perry[4], Kunjie Hua[5], Michael A. Pellizzon[10], Kasper D. Hansen[3,6,7], Brynn H. Voy[9], Brian J. Bennett[5], Daniel Pomp[5], Andrew P. Feinberg[3], David W. Threadgill[1,4,8]*

Genetics: Early Online, published on November 20, 2017 as 10.1534/genetics.117.300536

Special Nutrient Needs:
Disease can modify nutrient requirements



2018

- As of 2014, 60% of adult Americans had a least one chronic condition, and 40% had more than one. *Rand, 2017*
- Reviewed evidence for special nutritional requirements in disease states and medical conditions that cannot be met with a normal diet
- The workshop explored how these requirements may apply to the management of chronic or acute conditions or diseases: *inborn errors of metabolism, burns or surgical trauma, cancer, inflammatory bowel disease, traumatic brain injury, and other non-communicable diseases or medical conditions.*

Disease influences whole-body nutrient status and/or specific tissue nutrient status

Disease-Related Etiology

- Inflammation
- Genetic predisposition
- Autoimmunity
- Mitochondrial dysfunction
- Pharmaceuticals
- Trauma

Physiological Impact on Nutrients & Function

- Gut absorption
- Brain/Nerve Barriers
- Degradation/turnover
- Excretion
- Metabolism
- Redistribution

Impact on Human Nutrition

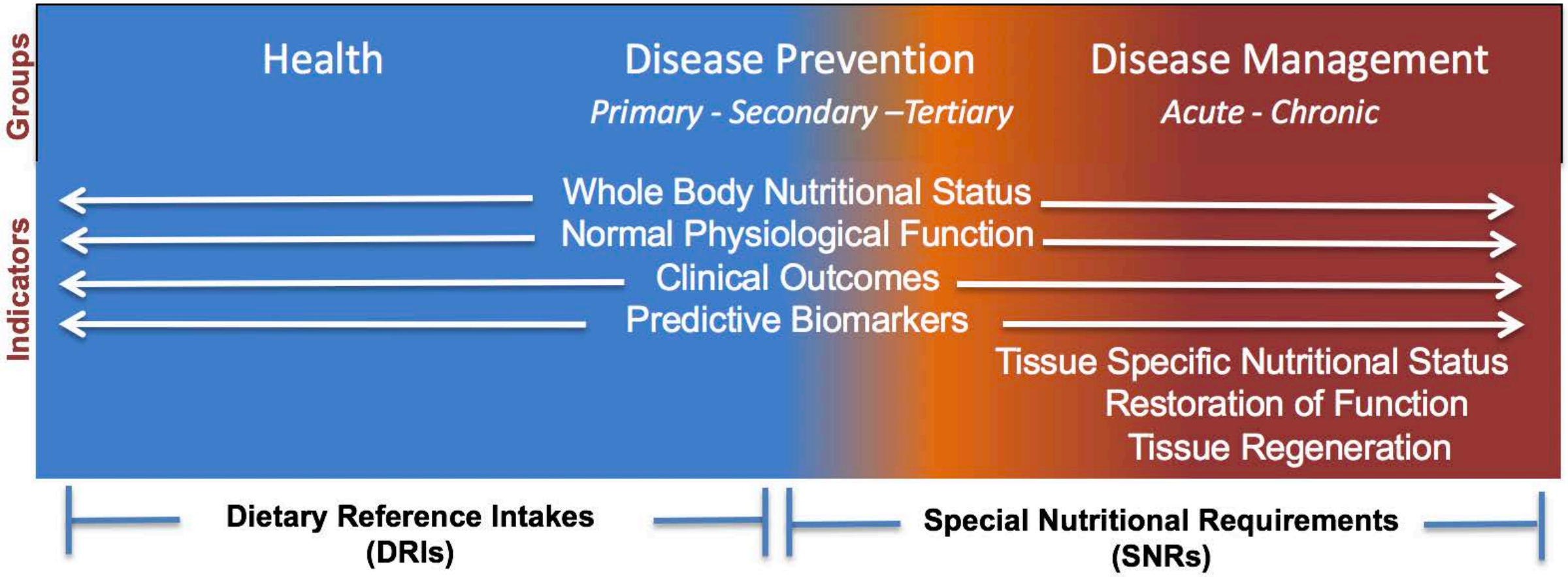
- Whole-body deficiencies
- Tissue-specific deficiencies
- Conditionally essential nutrients
- Nutrient toxicities

Impact on Biomarkers

- ***Function & Status***
- **Whole-body (serum)**
- **Tissue-specific (CSF, tissue)**
- ***Predictive Biomarkers***
- **Stem cells**

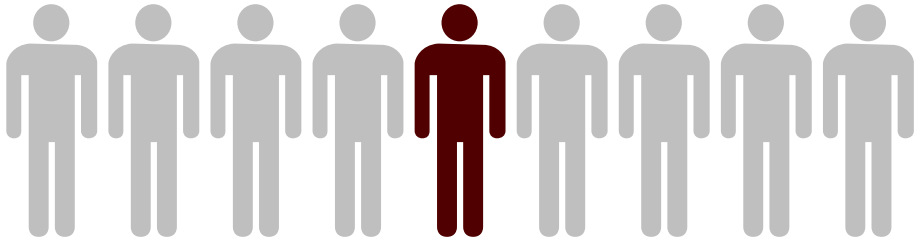
Inspired by: *Aust N Z J Med* **2**, 69-77 (1972).

Classifying and Evaluating Human Nutrient Needs in Disease



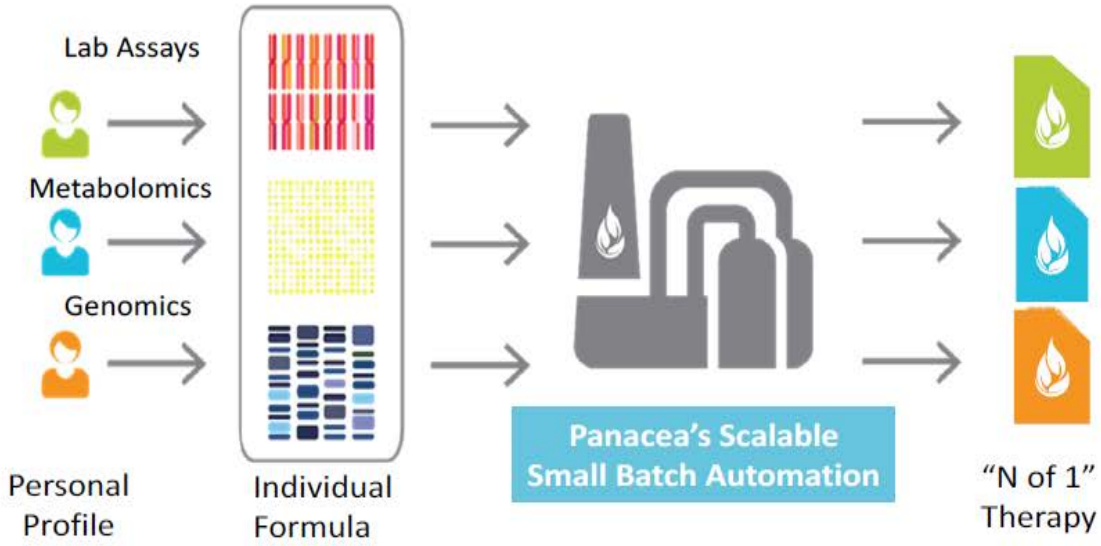
The Challenge of Food Systems and Nutrition

Food Systems
are Global

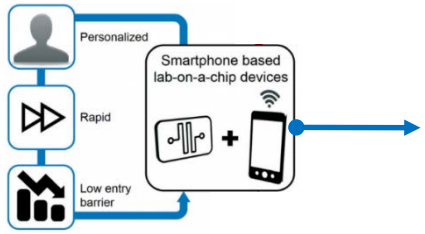


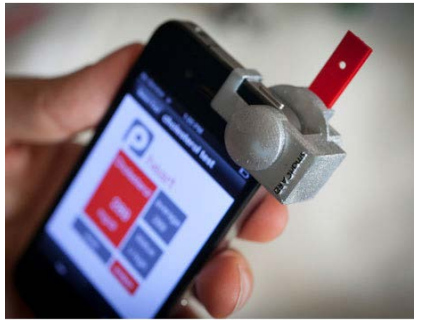
Nutrition is Individual

Precision / Personalized Nutrition: Real World Experiments and Becoming Scalable



Personalized Nutrition Manufacturing Platform

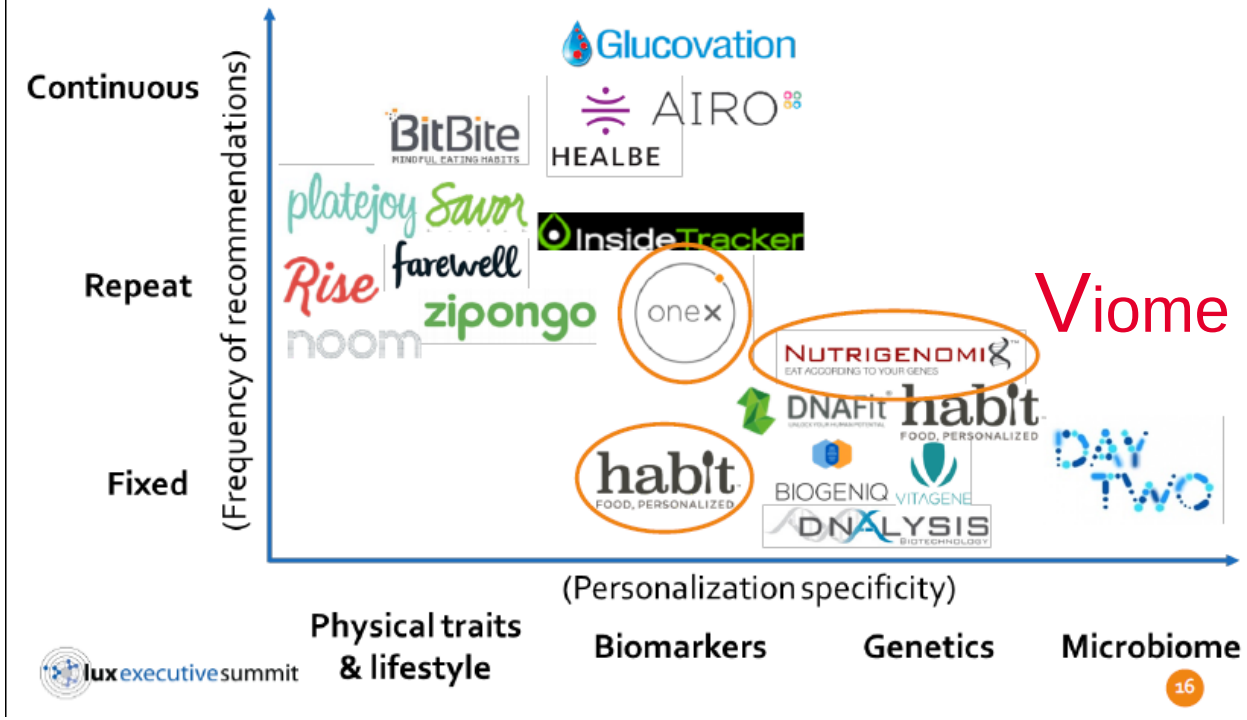




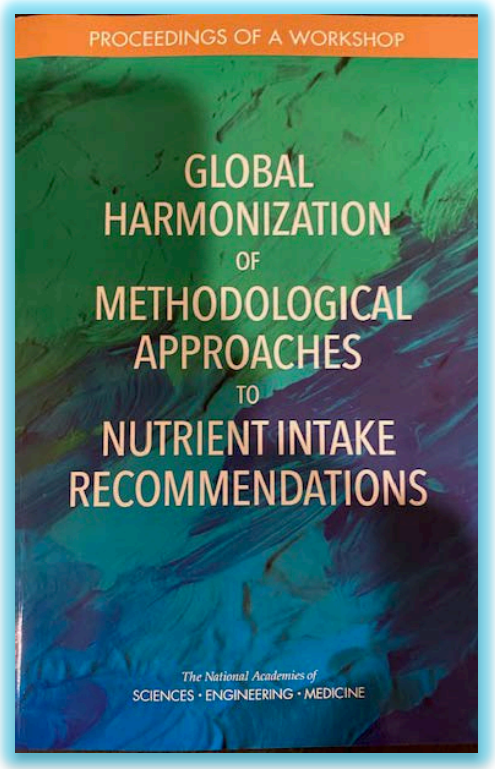
Lab on a Chip. http://doi.org/10.1039/c6lc00393a

Personalized nutrition solutions have used different approaches Address the “physiological and behavioral” aspects of “individuality”

Personalized nutrition solutions include many technologies offered at several levels of specificity



Harmonization:
Moving towards consensus

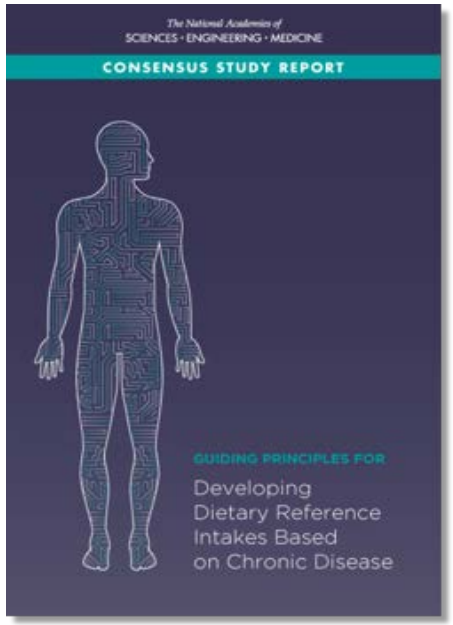


2018

- "the DRIs must be based on the best possible and *most up-to-date science* …. Despite the long and challenging road that led to the current DRIs, it must not finish in a dead end."
- "A harmonized model for setting nutrient standards could ensure a consistent approach, and collaboration on systematic reviews could ensure the same scientific *basis* for standards. Although agreement on the numeric values for the EARs and ULs would yield the greatest time and resource savings, this step should be undertaken only after there is *agreement on methodology*.

Suzanne P Murphy, Allison A Yates, Stephanie A Atkinson, Susan I Barr, and Johanna Dwyer. **History of Nutrition: The Long Road Leading to the Dietary Reference Intakes for the United States and Canada.** Adv Nutr. 2016 Jan; 7(1): 157–168.

NEW EXPECTATIONS:
Agriculture and Food Systems



2017

Page 144:

"The committee adopted the GRADE system as the reference point for the evidence reviews relating to NOFS-chronic disease considerations."

Page 81:

"Conduct of original systematic reviews will need to be transparent and follow state-of-the-art methods, such as the GRADE approach and the AHRQ …. approach."

2017

Nutrition and Public Trust

The American Journal of CLINICAL NUTRITION

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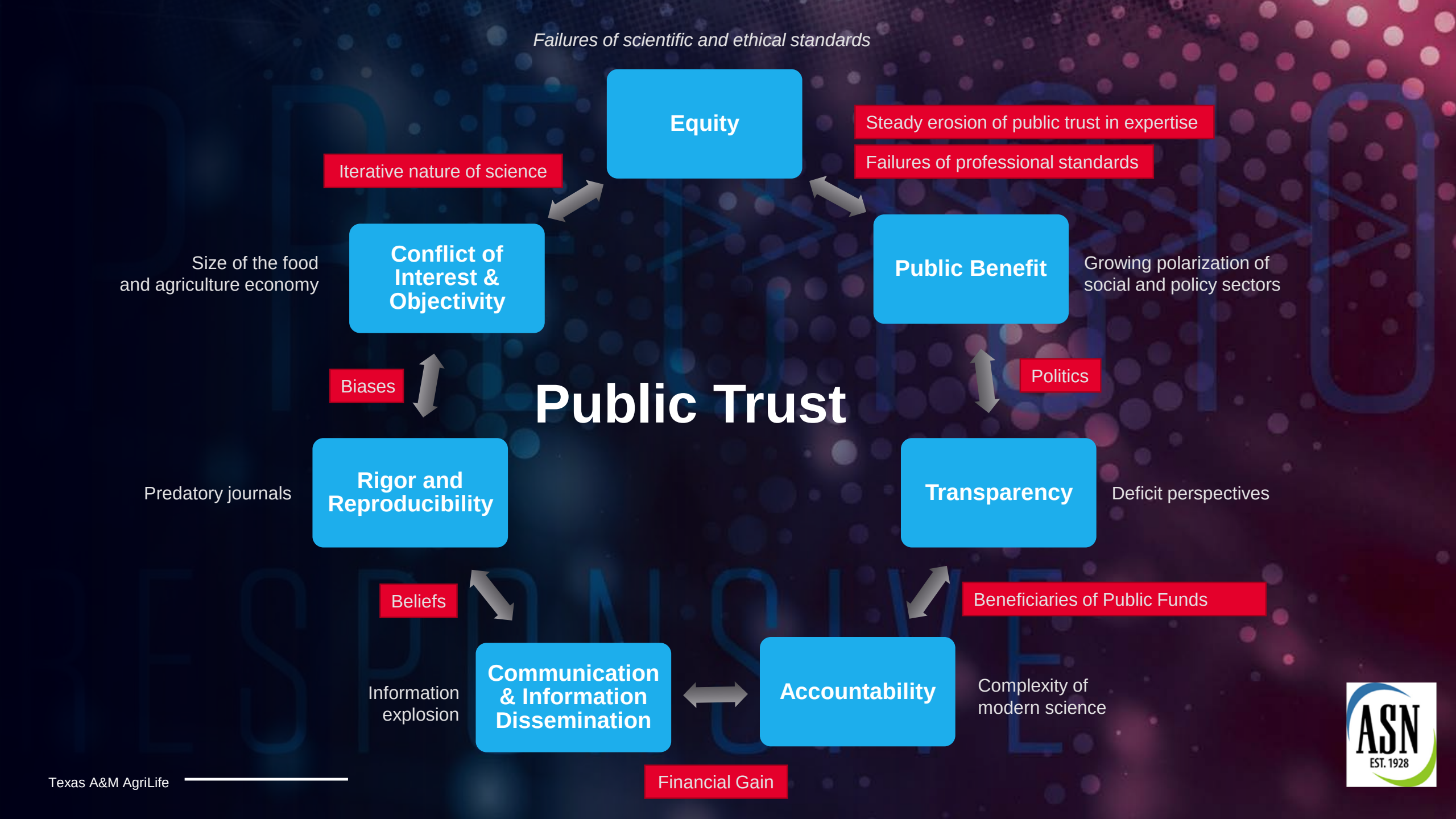
Volume 109, Issue 1
January 2019

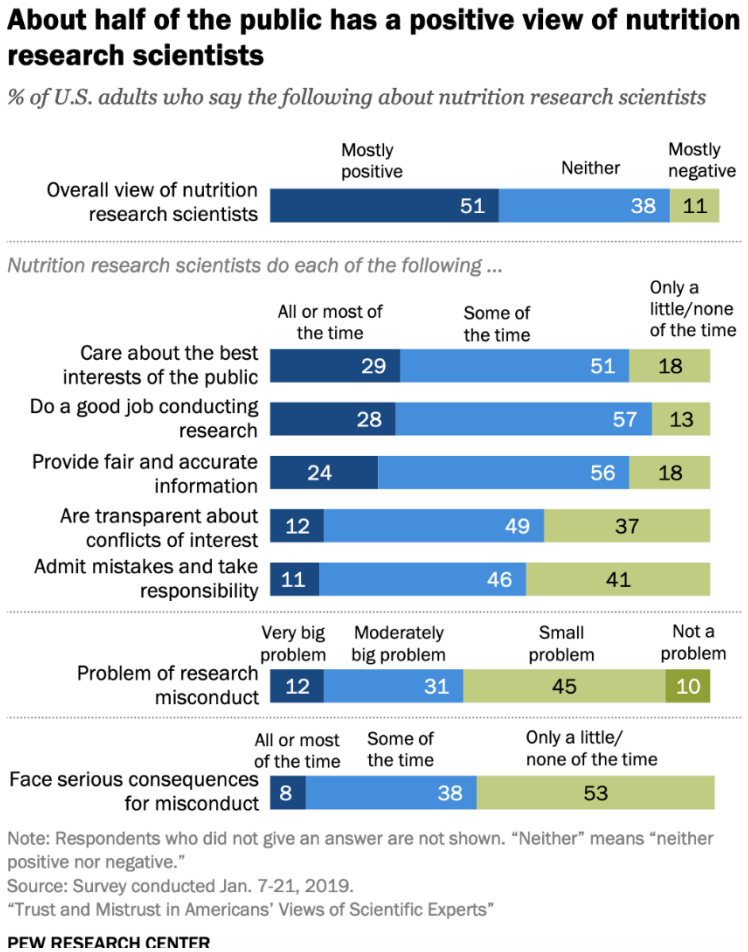
Best practices in nutrition science to earn and keep the public's trust FREE

Cutberto Garza, Patrick J Stover, Sarah D Ohlhorst, Martha S Field, Robert Steinbrook, Sylvia Rowe, Catherine Woteki, Eric Campbell

The American Journal of Clinical Nutrition, Volume 109, Issue 1, January 2019, Pages 225–243,
https://doi.org/10.1093/ajcn/nqy337
Published: 18 January 2019 **Article history**


Failures of scientific and ethical standards
Equity
Steady erosion of public trust in expertise
Failures of professional standards
Iterative nature of science
Conflict of Interest & Objectivity
Size of the food and agriculture economy
Public Benefit
Growing polarization of social and policy sectors
Biases
Politics
Public Trust
Rigor and Reproducibility
Predatory journals
Transparency
Deficit perspectives
Beliefs
Beneficiaries of Public Funds
Communication & Information Dissemination
Information explosion
Accountability
Complexity of modern science
Financial Gain

Nutrition and Public Trust



The Food and Nutrition Board
The need has never been greater

- Next generation data, analytics, devices, research methods
- Harmonization of approaches to evidence synthesis and standards of evidence
- Communication of benefit, Risk and Uncertainty to the Public
- Continue to drive "Systems" thinking across the Food Value Chain, and be a catalyst for solutions

https://www.pewresearch.org/science/2019/08/02/trust-and-mistrust-in-americans-views-of-scientific-experts/

Thank you!