# DRIS AND DGAS: MEETING NUTRIENT NEEDS IN A CHANGING ENVIRONMENT

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#SNEB2020: What Food Future?

## DISCLOSURES

- Director, Food and Nutrition Board, The National Academies of Sciences, Engineering, and Medicine
- No financial conflicts to declare
- Any views not attributed to reports of the National Research Council and Health and Medicine Division are those of my own and do not necessarily represent those of the National Academies of Sciences, Engineering, and Medicine.

## SESSION OBJECTIVES

The objectives of this session are to understand how the Dietary Reference Intakes and Dietary Guidelines for Americans interface with risk of chronic disease and the implications of a changing food system on meeting nutritional needs. The session will provide an overview of the:

- historical precedent for considering chronic disease in establishing nutrient intake recommendations;
- DRI Framework for establishing nutrient intake values; and
- intersection between nutrient requirements, dietary guidance, and the food system.

## Origin of the RDAs

- 1900 1945: PREVALENCE OF NUTRIENT DEFICIENCIES IN THE U.S.
  - 1906 to 1940: Pellagra accounted for approximately 100,000 deaths in the U.S.
  - WWII: 25% of military recruits had evidence of current of past malnutrition

### • 1941 – 1943: DEVELOPMENT OF THE RDAs

- Request from the National Defense Advisory Commission to the National Academy of Sciences to review nutrient requirements
- First RDAs published in 1943
  - Included energy, protein, iron, calcium, vitamins A and D, thiamin, riboflavin, niacin, and vitamin C

#### Without Thiamin in Diet Pigs Cease to Be Hoggish

#### See Front Cover

ACK of thiamin (vitamin B<sub>1</sub>) changes personality of pigs. Without thiamin they are no longer piggish. The United States Department of Agriculture says more and better pigs, capable of producing good meat, are needed to fill vacancies soon to exist in the defense market. sibly have human implications. It has been found, Mr. Ellis said, that contrary to what some biologists believe, thiamin is involved in the use of fat by the body. It is possible to get along with smaller amounts of fat if the amount of thiamin eaten is high. A high fat diet (28%) with 25 mcg. thiamin per kilogram of body weight, seems to be equal to a medium fat diet (12%) with 35 mcg. of thiamin, or a diet containing a minimum of fat (2%) if 40 mcg. of thiamin is taken.

Science News Letter, May 31, 1941



CONTRAST

The big pig had thiamin, the other pig had none. But both were born of the same mother at the same time. The small pig is fed a high fat diet, but deprived of thiamin. The other, three times as heavy, has a low-fat diet but with a high thiamin content in its ration.

## RECOMMENDED DIETARY ALLOWANCES 1943-1974

- The goal of the RDAs was to recommended intake levels for maintenance of good nutritional status for the general population.
- Allowances were established to maintain good nutrition in the *total population;* not to meet the needs of the *average individual*.
- To meet these goals, the RDAs included a margin of safety above the minimal requirement but *not* to account for disease states or frank deficiency disease.

## OUTCOMES OF THE RDAs: STANDARDIZED FOOD FORTIFICATION AND ENRICHMENT

1924 - VOLUNTARY ADDITION OF IODINE TO SALT

1933 - FORTIFICATION OF MILK WITH VITAMIN D

- Irradiation of milk or feeding cows irradiated yeast
- Later by addition of vitamin D concentrate to milk

1940 - COMMITTEE ON FOOD RECOMMENDED ADDITION OF THIAMIN, NIACIN, RIBOFLAVIN, AND IRON TO FLOUR (FDA STANDARD OF IDENTIFY FOR "ENRICHMENT" INTRODUCED IN 1941)

1940 - FDA DECISION TO NOT MAKE FORTIFICATION MANDATORY



## OUTCOMES OF THE RDAs: FOOD GUIDANCE SYSTEMS



1945



1980



2015

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## <u> 1943 - 1989</u>

Over the decades, as nutritional deficiencies receded from public health concern, risk of chronic disease began to emerge as a new public health problem.

## CHANGES IN THE LANDSCAPE OF NUTRITION AND HEALTH

- 1988 Surgeon General's Report on Nutrition and Health
- 1989 Diet and Health Report

"As problems of nutritional deficiency have diminished in the U.S., they have been replaced by problems of dietary imbalance and excess". U.S. Surgeon General C. Everett Coop, 1988

Prevalence<sup>+</sup> of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS



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## OBESITY IS A MAJOR RISK FACTOR IN MANY CHRONIC DISEASES

- Type 2 diabetes
- Hypertension
- Cardiovascular disease
- Cancer

Because chronic disease is long-term, even if obesity prevalence stabilizes or decreases in the near term, the risk of chronic disease will remain in the population at large.

# SHIFTING THE CONVERSATION ABOUT NUTRITIONAL HEALTH IN AMERICA

## **1990**→ Legislation

- National Nutrition Monitoring and Related Research Act (NNMRRA)
- Legislative mandate to ensure that federal dietary guidance is consistent with the Dietary Guidelines for Americans and is scientifically accurate

## 1994 Action

- How Should the RDAs be Revised?
- "We now understand not only that nutrients are essential for growth and development and health maintenance, but also that some play a role in the reduction of risk of chronic disease".

## DIETARY REFERENCE INTAKES: BEYOND THE RDAS

- Concept of a safe intake range
- Predicts a low probability of nutrient inadequacy or excess intake
- Defines reference points for nutrient and food component intakes that influence risk of chronic disease



Source: Institute of Medicine. 2002/2005. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. National Academies Press, Washington, DC. Reprinted with permission from National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C.

## CHRONIC DISEASE RISK AND THE DRI PROCESS

- THE FIRST DRI VALUES INCLUDED RECOMMENDATIONS FOR 35 MICRONUTRIENTS, ENERGY, CARBOHYDRATE, FIBER, FAT, FATTY ACIDS, PROTEIN, AND AMINO ACIDS.
  - —The paradigm included a mechanism for deriving reference values for nonessential functional dietary components, e.g. isoflavones, flavonoids, and carotenoids.
  - However, it was not always possible to derive an RDA for some nutrients and food substances
  - —In some cases, the UL was used to denote a level of risk for a health outcome; in other cases, no risk from high intakes was indicated.

## SHORTFALLS IN THE DRI MODEL

- Non-essential dietary components are not nutrients of adequacy, and thus do not fit the traditional DRI model, which is based on an intake distribution curve
- For food components and nutrients with potential chronic disease endpoints, the only DRI value that could be assigned was the "adequate intake" or AI
  - Cannot estimate the prevalence of adequate intakes for chronic disease risk on a population basis

# MODIFYING THE DRI PROCESS FOR CHRONIC DISEASE ENDPOINTS

- A National Academies expert panel undertook a review of options for ways to include chronic disease endpoints in future DRI reviews. Two conceptual challenges were identified:
  - -Evaluating dietary intake measures to establish a doseresponse or causal relationship with health outcomes
  - Identifying and measuring chronic disease outcomes, e.g. surrogate markers, intermediate endpoints, or biomarkers of long-term intake



## FINDINGS

- No single approach accurately measures dietary intake, thus each methodology must be assessed on its own merits
- Studies that measure qualified surrogate markers should be considered for establishing causal relationships, however, non-qualified intermediate markers could lead to serious misinterpretation by users of the DRIs.
- Advanced tools are needed in the systematic review component:
  - GRADE
    - An approach for grading certainty in associations between exposure and health outcome
    - Evidence is rated by outcome and study design
      - » At least a moderate rating for relevant evidence is needed to show a causal relationship.

## APPLICATION TO THE DRI PROCESS

- DRIs for Sodium and Potassium (NASEM, 2019)
  - —Committee was charged to assess and update DRIs for sodium and potassium and include consideration of:
    - Indicators of deficiency, inadequacy, and toxicity; and
    - Relevant chronic disease endpoints
  - Evidence provided included a commissioned AHRQ systematic review and report on Developing DRIs Based on Chronic Disease
  - -New DRI: Chronic Disease Risk Reduction (CDRR)
    - Replaces the UL (which establishes a ceiling for intake based on toxicity
    - Represents a risk reduction intake goal for lowering excessive intakes

# DRIs AND DGAs

### • DIETARY REFERENCE INTAKES

- Provide nutrient intake recommendations for planning and assessing diets for individuals as well as groups
- -Can determine prevalence of inadequate intakes for population groups
  - Identify nutrients of concern for the population

## • THE DIETARY GUIDELINES FOR AMERICANS

- -Food-based dietary guidance
- Grounded in nutrient requirements designed to meet the needs of the general population (DRIs)
  - Food pattern modeling
  - Shortfall nutrients
- Provides support toward the achievement of nutrient adequacy across age- and sex groups in a population
- -Serves as a foundation for food assistance policies and programs

## COMMON THEMES ACROSS DIETARY GUIDANCE POLICIES

- Limit saturated fat and sugar intake
- Increase consumption of fruits and vegetables
- Include adequate amounts of protein-rich foods, complex carbohydrates, and fiber
- Restrict sodium intake
- Limit alcohol
- Maintain a healthy body weight and engage in physical activity

USDA Economic Research Service Bulletin No. 166

- Compared loss-adjusted food availability data (as a proxy for food consumption) against the recommendations of the 2015-2020 Dietary Guidelines for Americans
- Estimated calorie and food group intake with food availability data



United States Department of Agriculture

Economia Research Service Economic Information Bulletin Number 166 January 2017 U.S. Trends in Food Availability and a Dietary Assessment of Loss-Adjusted Food Availability, 1970-2014

Jeanine Bentley



## COMPARISON OF CALORIE INTAKE BY FOOD GROUP: 1970 AND 2014

Caloric intake changes from 1970 to 2014:

- All grains
  - Up 28%
- Dairy
  - Down 10%
- Fruits and vegetables
  - Up 7%
- Added sugars
  - Up 10%
- Added fats and oils
  - Up 67%
- -Meat, eggs, and nuts
  - Up about 1%



Note: Loss-Adjusted Food Availability data serve as a proxy for food consumption. Data on added fats and oils and rice were unavailable after 2010. Added fats and oils and added sugars are added to foods during processing or preparation. They do not include naturally occurring fats and sugars in food (e.g., fats in meat or sugars in fruits). Source: USDA, Economic Research Service, Loss-Adjusted Food Availability data.

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## COMPARISON OF FOOD GROUP INTAKE WITH DGA RECOMMENDATIONS: 1970 AND 2017



'Based on a 2,000-calorie-per-day diet.

Loss-adjusted food availability data are proxies for consumption. Rice availability data were discontinued and thus are not included in the grains group. Source: USDA, Economic Research Service, Loss-Adjusted Food Availability Data and 2015-2020 Dietary Guidelines.

Available at: <u>https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=58334</u>

## CAN WE MEET THE DGA RECOMMENDATIONS?

- Market forces, including consumer demand, do not always support dietary
  practices that are consistent with public health nutrition recommendations.
  - Taste preferences and cost may be barriers to fruit and vegetable consumption.
- Income, wealth and equity impact food choices.
  - Food insecurity impacts a household's ability to purchase healthy foods.
- Environmental and food production challenges influence the availability of healthy foods.
  - Consumption guidelines for fish do not align with availability and potential environmental impacts of fish farming practices and over-fishing.

SOURCE: National Research Council 2015. A Framework for Assessing Effects of the Food System. Washington, DC: The National Academies Press. https://doi.org/10.17226/18846.

## HOW CAN THE PROCESS OF DEVELOPING DRIS KEEP PACE WITH CHANGES IN FOOD PRODUCTION TO MEET GAPS IN NUTRIENT NEEDS?

## • REVIEW OF DRI NUTRIENTS

-Macronutrients and energy

• What does the evidence say about the role of carbohydrates, protein, and fats in maintaining health and reducing risk of chronic disease?

## • DEVELOPING DIETARY GUIDANCE

- —Do the components of foods and food ingredients align with nutrient requirements?
- —Are food ingredients consistent with reducing risk of obesity and chronic disease?

## "THE FOOD SYSTEM IS WOVEN TOGETHER AS A SUPPLY CHAIN THAT OPERATES WITHIN BROADER ECONOMIC, BIOPHYSICAL, AND SOCIOPOLITICAL CONTEXTS".

SOURCE: NATIONAL RESEARCH COUNCIL 2015. A FRAMEWORK FOR ASSESSING EFFECTS OF THE FOOD SYSTEM. WASHINGTON, DC: THE NATIONAL ACADEMIES PRESS. HTTPS://DOI.ORG/10.17226/18846.

New Expectations of Food Systems and Nutrient and Dietary Recommendations

**SNEB 2020: Briggs Symposium** 

## A GRILIFE

## Patrick J. Stover, Ph.D.

Vice Chancellor, Texas A&M AgriLife Dean, Texas A&M College of Agriculture and Life Sciences Director, Texas A&M AgriLife Research

# Disclosures

AFFILIATION/FINANCIAL INTERESTS (prior 12 months)	ORGANIZATION
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Speakers Bureau:	None
Stock Shareholder:	TIAA

## **Greatest Challenges of Our Time**

# FOOD PEOPLE FOOD 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

Committee Reports #	Examples: oversight, "postal service"		Q
	MORE	OPTIONS ~	
ne = Committee Reports	> 1100 General > H. Rept. 116-107	EPrint Disubscribe 25h	are/Save: \$Give Feedbac
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Rept. 116-10	7 - AGRICULTURE, RUR	AL DEVELOPMENT, FOO	D AND DRUG
Rept. 116-10	07 - AGRICULTURE, RUR	AL DEVELOPMENT, FOO	D AND DRUG S BILL, 2020
Rept. 116-10 DMINISTRAT	07 - AGRICULTURE, RUR ION, AND RELATED AGE	AL DEVELOPMENT, FOO	D AND DRUG S BILL, 2020

"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 Foorprint,

Agriculture and Food Systems

**REGENERATIVE AG** 

FERTILIZER FOOTPRINT

## NEW EXPECTATIONS: Environmental Resiliency, Agriculture and Food Systems





# NEW EXPECTATIONS: Economics, Agriculture and Food Systems



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 <u>system creates</u> <u>significant environmental</u>, <u>public health</u>, <u>and other</u> <u>costs that generally are not recognized and not</u> <u>accounted for in the retail price of food</u>"

# Food, Agriculture and Health are Interconnected Systems

#### A FRAMEWORK FOR ASSESSING DECISIONS ABOUT FOOD & AGRICULTURE

THE FOOD SUPPLY CHAIN is deeply interconnected with human health, the health of the environment, and social and economic systems. Decisions, therefore, have impacts far beyond the supply chain itself.

To ensure that the benefits of a decision outweigh its risks, decision makers must carefully consider the full range of potential effects in the health, environmental, social, and economic domains.





2015

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# NEW EXPECTATIONS COVID-19 and Food System Vulnerabilities

#### Board on Agriculture and Natural Resources of the National Academies of Science, Engineering, and Medicine

A.G. Kawamura, former Secretary of the California Department of Food and Agriculture (2003-2010) Tom Vilsack, former United States Secretary of Agriculture (2009 - 2017)

- COVID-19 spotlighted production and distribution vulnerabilities; "system is not broken"; all-in-all performed well
- > Food and agriculture system was not as resilient as it should be to a national crisis
- > Had no food shortage but food/ag system couldn't effectively pivot to retail and other distribution due to dedicated processing and lack of storage on retail/food bank end
- > Resiliency and efficiency are not mutually exclusive; learn to pivot quicker
- > Need plans in place; scenario planning like FEMA and DoD

- > COVID-19 and climate are threats; country knew pandemic was possible but not prepared; climate change is coming, need to be prepared; gov needs to facilitate market to incentivize or directly fund climate change fighting management practices...
- > Vilsack spoke of exciting times in ag "will have foods designed for individual's DNA"







## NEW EXPECTATIONS Agriculture and Food Systems

## The Mandate is Clear....

## The Pathway is Not

0: What Food Future?

# NEW EXPECTATIONS: Health, Agriculture and Food Systems



- > 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

ABOUT US PUBLICA	ATIONS ACTIVITIES	MEETINGS	Explore by Topic	C. Keyword Search
Meeting			Ot	her Meeting Resources
				C. Martine
Redesigning Guidelines fo	the Process for E or Americans – Re	stablishing the D port Release (We	ietary binar)	Presentations
Redesigning Guidelines fo	the Process for E or Americans – Re	stablishing the D eport Release (We	ietary binar) Sta	Presentations

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.

> How the advisory committee selection process can be improved to provide more transparency, eliminate bias, and include committee members with a range of viewpoints;

- 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;
- 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 Keck Center WS718 500 Fifth St. NW Washington, DC 20001 2017

## **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	

#### #SNEB2020: What Food Future?

## 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 nutritionrelated 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

## Genomics – Are we all different?



2007





Scientific American November 13, 2002 William R. Leonard

# Amylase CNVs expanded in agrarian human populations to improve starch digestion



#### Genotype

## Biaka Mbuti Hadza Datog European-Yakut Jananese American High-starch diet Low-starch diet

Location

#### #SNEBB0200 What Flood Future?

# Agriculture-induced positive selection in fatty acid metabolism



# Improving Metabolic Health through Precision Diets in Mice





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

# 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

**<<<<<** 

- > Metabolisn
- > 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 Cells & Stem cells

Texas A&M AgriLife

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

# Classifying and Evaluating Human Nutrient Needs in Disease

Groups	Health	Disease Prevention Primary - Secondary – Tertia	Disease Management ry Acute - Chronic
Indicators		Whole Body Nutritional Sta Normal Physiological Funct Clinical Outcomes – Predictive Biomarkers	tus tion Tissue Specific Nutritional Status Restoration of Function Tissue Regeneration
	Dietary Reference Intak (DRIs)	es Spec	cial Nutritional Requirements (SNRs)

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# NIH 2020

# USDA



2020-2030 Strategic Plan for NIH Nutrition Research A Report of the NIH Nutrition Research Task Force



This Plan is organized around a central unifying vision of Precision Nutrition research. Progress in each of the four Strategic Goals, as well as the five Cross-Cutting Research Areas, are essential to achieve this vision.

USDA SCIENCE BLUEPRINT A ROADMAP FOR USDA SCIENCE FROM 2020 TO 2025

### **Food and Nutrition Translation**

USDA plays a pivotal role in providing Americans with safe, nutritious, and wholesome foods. This means supplying foods, both fresh and processed, that are of the highest quality and that provide adequate nutrition supporting the entire population life span. This task must address challenges to reduce foodborne illnesses; understand the drivers of poor diets and nutritional choices; provide better access to nutritious foods in low-income households; and reduce the overall cost of foods through more efficient processing, packaging, and repurposing to minimize food waste.

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## Precision / Personalized Nutrition: Real World Experiments and Becoming Scalable



#### **Personalized Nutrition Manufacturing Platform**





#### Texas A&M AgriLife

## #SNEB2020: What Food Future?

# Real World Experiments Combining Precision and Behavior

To find out if one thing actually causes another, carefully controlled experiments are needed. Experiments usually take place in a laboratory. However, to examine how people respond to things that happen in real life, in particular places at particular times, it can also be important to step outside the laboratory.

https://kids.frontiersin.org/article/10.3389/frym.2017.00013

# Address the "physiological and behavioral" aspects of "individuality"

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



#### #SNEB2020: What Food Future?

# Harmonization: Moving towards consensus

GLOBA HARMONIZATION METHODOLOGICA APPROACHES NUTRIENT INTAKE RECOMMENDATIONS SCIENCES . ENGINEERING . MEDICIN

2018

> "the DRIs must be based on the best possible and <u>most up-to-date science</u> .... Despite the long and challenging road that led to the current DRIs, it must not finish in a <u>dead end</u>."

> "A harmonized model for setting nutrient standards could ensure a <u>consistent approach</u>, and <u>collaboration on systematic reviews</u> 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 <u>agreement on methodology</u>.

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.** <u>Adv Nutr</u>. 2016 Jan; 7(1): 157–168.

# NEW EXPECTATIONS: Agriculture and Food Systems

#### Page 144:

The National Academics of SCIENCES - ENGINEERING - MEDICINE

CONSENSUS STUDY REPORT

Dietary Reference Intakes Based on Chronic Disease

2017

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-ofthe-art methods, such as the GRADE approach and the AHRQ .... approach."



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# Challenges: Dietary Recommendations for Chronic Disease Reduction

## **IDEAS AND OPINIONS**

#### **Annals of Internal Medicine**

## Dietary Assessment and Opportunities to Enhance Nutritional Epidemiology Evidence

**Ross L. Prentice, PhD** 

- > Systematic reviews of specific recommended dietary behaviors often conclude that <u>evidence</u> for chronic disease benefits is of low certainty and that any benefits are probably small including sodium, eggs, and red and processed meat
- > A substantial reliance on observational studies; infeasibility of long-term randomized controlled dietary intervention trials

Annals of Internal Medicine | Vol. 172 No. 5 | 3 March 2020 355

- Biggest impediment to reliable disease association information may be measurement error in dietary assessment
- > A great need exists for additional intake biomarkers to be developed, perhaps by using metabolomics, microbiomics, or other high-dimensional platforms.

## The Challenge of Food Systems and Nutrition



Food Systems are Global



Nutrition is Individual

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## Nutrition and Public Trust





Volume 109, Issue 1 January 2019

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

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



# Nutrition and Public Trust



About half of the public has a positive view of nutrition

#### **The Food and Nutrition Board**

Research Design, Evidence Synthesis and Communication in Diet and Chronic Disease Relationship

- > 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!