CHILDHOOD OBESITY TO SNAP
Opportunities and Challenges in Nutrition Research

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Determined nutrition research priority areas where findings will have strong impact on the prevention and treatment of major chronic diseases.
Nutrition Research Priorities - Rationale

To highlight areas of nutrition that urgently need future research

To advance the health and wellbeing of future global populations and economies

Relay the need and value of nutrition research
Why nutrition research matters...

• Saves lives

• Backbone of nutrition-related policy

• Healthcare savings, jobs, & revenue
Variability in Response to Diet & Food

**Personalized Nutrition**

Provides customized dietary recommendations for each individual’s needs.

1. Omics
2. Microbiome
3. Imprinting
4. Biological Networks
5. Tissue Specificity & Temporality
Variability in Response

![Graph showing variability in response to different LIPC genotypes. The graph plots Fat intake (percent of total energy) against Predicted HDL-C (mg/dL), with different genotypes represented by distinct symbols and colors. The genotypes CC, CT, and TT are marked on the graph.]
Nutrition Research on Microbiome

- Altering the microbiome to increase its’ cancer-fighting effects
- The effects of a whole grain diet on digestive health, inflammation and the immune system
- Vitamin K generated by microflora in the colon
- The interaction of gut microbiota in relation to metabolic processes elsewhere (e.g. brain)
Healthy Growth, Development, & Reproduction

Understanding how nutrition during critical, early periods of development, including pregnancy, impacts future health.

Epigenetics & Imprinting

Childhood obesity

Reproductive health
Maternal Obesity Promotes Obese Children

60% of U.S. women of childbearing age are overweight or obese

• Maternal obesity during pregnancy promotes obesity in offspring independent of genetics
  – Demonstrated by human and animal models
• To break this transgenerational cycle, we need to understand how it works
Obesity Denies Benefits of Breastfeeding

Nearly half of all overweight and obese women who desire to breastfeed FAIL

- Obese women may have higher body stores of progesterone, a fat-soluble hormone which inhibits milk production
- Use of mouse models to determine how hormones inhibit milk production and how to prevent this
Improving health through non-communicable disease prevention and weight maintenance.

Systems approach

Proper nutrition

Physical activity

Energy balance
Systems Approach

“Shape Up Somerville, Mass.”

- Multifaceted community-based environmental change campaign
- Effectively reduced weight gain in high-risk children
- Increased the community’s physical activity and healthful eating
- Fit For Life: reduces age-associated chronic disease

Medical Management

Slowing disease progression through nutrition with improved responses to therapy and survival rates.

- Disease initiation/ progression
- Minimize unfavorable impacts of both \( \uparrow \) and \( \downarrow \) nutrients
- Nutrition support for survival
- Response to therapy
Nutrient – Disease Relationships

- Folate - Depression
- Vitamin C/ Antioxidants - Eye Disease
- Vitamin D/ Calcium - Osteoporosis
- Fish Oils/ B Vitamins - Brain Function
- Fiber - Type 2 Diabetes
Minimize Unfavorable Impacts of Increased Nutrients

- **Folate Overdosing**: ↑ dementias in those with low B12 \(^1, 2\)
- **Vitamin E Overdosing**: ↑ prostate cancer risk, mortality \(^3, 4\)
- **Multivitamin Overdosing**: Antioxidants ↑ risk of all cause mortality \(^5\); ↑ risk of advanced and fatal prostate cancer \(^6\)

Negative effects of high folic acid

Neural tube defects affect 1,500 U.S. births each year

• Folate at 10X the recommended amount for pregnant women resulted in fetal loss, embryonic delays and heart defects in mice offspring
• Critical to determine if similar risk exists for pregnant women
Growth and Development of Pre-Term Infants

10% of U.S. infants are born prematurely.

- Pre-term infants who are unable to feed normally are commonly fed by orogastric tube.
- It is not known if nutrition provided intermittently (similar to meal feedings) or continuously (similar to in the womb) is best for their overall health.
5 Nutrition-related Behaviors

Understanding how the human brain influences food choice and nutrition-related behaviors.

Drivers of food choice

Brain function

Imprinting
How the food environment influences food choice and behavior

Novel foods and ingredients - biotechnology and nanotechnology

Nutrient-related public policies

Public-private partnerships
Nanotechnology

New prevention and therapies

Increased nutrition and bioavailability of nanoscale food ingredients

Biosensor to monitor blood glucose w/out finger prick

Nanoscale particles block cholesterol from entering the cell

Research on the Horizon: 2015

- The effects of maternal eating patterns on maternal feeding and child eating
- Does the gut microbiome change with age?
- Nutrition of school lunch vs. packed lunch
- Health differences between breast-fed and formula-fed infants
- Decision-making ability and weight control
Questions?

Read the report today!
www.nutrition.org/researchagenda