Committee to review the process to update the Dietary Guidelines for Americans

Systematic reviews for the Dietary Guidelines

MEETING 3
Open Session
January 10, 2017
TODAY’S TOPICS

- Topic Identification, Refinement, and Prioritization
  *Case Study: Dietary Patterns*

- Nutrition Evidence Library
  *Systematic Review Methodology*
  *Case Study: Dietary Patterns and Breast Cancer*

HMD committee to review the process to update the Dietary Guidelines for Americans
January 10, 2017
The process to update the *Dietary Guidelines* includes four primary steps

1. **USDA & HHS complete administrative tasks & appoint Dietary Guidelines Advisory Committee**
2. **Advisory committee reviews science & produces advisory report**
3. **USDA & HHS solicit & review comments on the advisory report from the public & Federal agencies**
4. **USDA & HHS update & release the *Dietary Guidelines***

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An important part of the advisory committee process is determination of the topics it will address in its report

- As noted in its charge, the advisory committee is asked to review the most recent edition of the *Dietary Guidelines* and determine topics for which new scientific evidence is likely to be available that may inform revisions to the current guidance or suggest new guidance.
- Advisory committee, through working groups and subcommittees, identifies, refines, and prioritizes topics of interest.
- Topics are deliberated with the full committee in public meetings.
- This process is open to public comment.

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2010 Dietary Guidelines included guidance on dietary patterns, and the 2015 Advisory Committee identified dietary patterns as a primary topic area.

**Work Group Scope**

**Primary Topic Areas:**
- Total diet/dietary patterns, nutrition-related lifestyle factors (physical activity, alcohol, etc.) and disease risk and health outcomes
- Clustering of dietary patterns and lifestyle risk factors; statistical optimization techniques

**2015 Dietary Guidelines Advisory Committee: Work Group 2**
- Assessment of dietary quality indices and dietary patterns (a priori and a posteriori); rates, trends, and variations by population subgroup and health outcomes of interest
- Total calories, physical activity, and energy balance

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Advisory committee then refined the exposure and outcomes of interest

**Exposure: Dietary patterns**

“The quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed.”

“Defined based on method of assessment of diet exposures (e.g., *a priori* pattern or dietary quality index, data-driven, or other method)”
Advisory committee then refined the exposure and outcomes of interest

**Health outcomes**

- Measures of body weight or obesity
- Risk of cardiovascular disease
- Risk of type 2 diabetes
- Incidence of metabolic syndrome
- Risk of breast, colorectal, prostate, lung, pancreatic, and gastric-esophageal cancer and total cancer mortality
- Neurological and psychological illnesses
- Bone health
- Risk of birth defects, infant birth weight, preterm delivery, and pregnancy complications
- Density, type, and diversity of the gut microbiome
Advisory committee prioritized its topics in relation to public health importance and the potential to inform food-based dietary guidance.

**Initial Topics Under Review**

- Dietary patterns and risk of:
  - Cardiovascular disease
  - Type 2 diabetes
  - Obesity
  - Cancer, specifically colorectal, breast, prostate, and lung cancer
  - Neurological and psychological illnesses
    - Alzheimer’s disease and depression

*Addressed using existing reports and NEL systematic reviews

Subcommittee 2: Dietary Patterns, Foods and Nutrients, and Health Outcomes

**Other Topics Under Consideration**

- Dietary patterns and other cancer outcomes
  - Total cancer mortality and gynecological, pancreatic, and gastro-esophageal cancer

- Dietary patterns during prenatal period and:
  - Infant birth weight and risk of pre-term birth, pregnancy complications, and birth defects

- Seafood intake and health outcomes

Subcommittee 2: Dietary Patterns, Foods and Nutrients, and Health Outcomes

**Initial Topics Under Review**

- Dietary patterns and:
  - Bone health (e.g., bone mineral density, bone mineral content, rickets, osteoporosis, and risk of fracture)

- Dietary patterns during preconception and risk of:
  - Birth defects

*Addressed using NEL systematic reviews

Subcommittee 2: Dietary Patterns, Foods and Nutrients, and Health Outcomes

**Emerging Topics**

- Dietary patterns and other mental health outcomes

- Microbiome diversity in humans and association with health outcomes

Subcommittee 2: Dietary Patterns, Foods and Nutrients, and Health Outcomes
Public comments were accepted throughout the advisory committee’s deliberations

“A total diet approach should be considered when addressing non-communicable disease such as obesity, rather than singling out any one nutrient or type of food.”
– Grocery Manufacturers Association; Comment ID #862

“[We] encourage the DGAC to provide recommendations based on healthful dietary patterns supported by the scientific literature.”
– American Society for Nutrition; Comment ID #153

“Americans may benefit from alternative dietary patterns such as a carbohydrate managed approach.”
– Atkins Nutritionals, Inc; Comment ID #4

“Please include more recommendations on a whole-food-plant-based diet. Numerous research studies show that this diet reduces the risk of diabetes, heart disease, and cancer.”
– “Mom”; Comment ID #242

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Advisory committee developed questions for each topic and determined the approach it would use to answer each question.

**Nutrition Evidence Library systematic reviews**
- What is the relationship between dietary patterns and risk of breast cancer?

**Existing systematic reviews, meta-analyses, or reports**
- What is the relationship between dietary patterns and risk of cardiovascular disease?

**Food pattern modeling analyses**
- Can healthy eating patterns for those who want to follow a Mediterranean-style diet be developed?

**Data analyses**
- To what extent does the U.S. population consume a dietary pattern that aligns closely with the Healthy Eating Index?

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USDA Nutrition Evidence Library: Systematic Reviews for the Dietary Guidelines

Julie E. Obbagy, PhD, RD

USDA Center for Nutrition Policy & Promotion

Meeting #3 | January 10, 2017

The National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division: Committee to Review the Process to Update the Dietary Guidelines for Americans
Background on the Nutrition Evidence Library (NEL)

NEL Case Study: Dietary Patterns and Breast Cancer
http://www.nel.gov/conclusion.cfm?conclusion_statement_id=250431
The Advisory Committee makes all substantive decisions; NEL staff ensure the process adheres to the established methods.
Step 1: Topic Identification and Question Development

The DGAC develops systematic review questions and analytic frameworks

Analytical Framework: Dietary Patterns and Cancer

- **Target Population**
  - Children and adults (2y+), healthy and at risk for chronic disease
  - Literature will be examined by age group, sex, race/ethnicity, and geographic location as appropriate. Age/lifestyle groups of interest include children, adolescents, adults, including pregnant, lactating, and peri-menopausal women, and older adults

- **Intervention/Exposure**
  - Adherence to a dietary pattern (e.g., a priori patterns (indices/scores), data driven patterns (factor or cluster analysis), reduced rank regression, or patterns derived from other methods (DASH, vegetarian))

- **Comparator**
  - Different levels of adherence to a dietary pattern; Adherence to a different dietary pattern

- **Endpoint Health Outcomes**
  - Incidence of breast cancer
  - Incidence of colorectal cancer
  - Incidence of prostate cancer
  - Incidence of lung cancer

- **Systematic Review Questions:**
  - What is the relationship between dietary patterns and risk of breast cancer?
  - What is the relationship between dietary patterns and risk of colorectal cancer?
  - What is the relationship between dietary patterns and risk of prostate cancer?
  - What is the relationship between dietary patterns and risk of lung cancer?

Key Definitions:
- **Dietary patterns**: The quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed.

Potential Confounders:
- Total energy intake
- BMI
- Sex
- Age
- Smoking
- Alcohol intake
- Physical activity
- SES
- Race/ethnicity
- Family history
- Genetics
- ERT
- Ox screening
Step 2: Literature search, screening, and selection

The DGAC selects inclusion/exclusion criteria to ensure a relevant and appropriate body of evidence is identified.

NEL Librarians develop and implement a literature search strategy; DGAC reviews and approves.

Two NEL Analysts independently screen titles, abstracts, and full texts of all articles.

The DGAC approves the final list of included and excluded articles.
Step 2: Literature search, screening, and selection

The DGAC selected inclusion/exclusion criteria to identify relevant and appropriate evidence to examine dietary patterns and risk of breast cancer

- Study design
  - Randomized or non-randomized controlled trial
  - Prospective cohort study
  - Nested case-control study

- Human subjects
  - ≥ 2y of age
  - Healthy or at elevated chronic disease risk
  - Countries of high and very high human development

- Interventions with dropout rate of <20%; Differential dropout rate <15%

- Dietary pattern(s) (i.e., foods and beverages) were described

- Published in English in a peer-reviewed journal from Jan 2000 to Jan 2014
Step 2: Literature search, screening, and selection

NEL Librarians developed and implemented a literature search strategy that was reviewed and approved by the DGAC

PubMed

Date(s) Searched: January 2014.

Search Terms:

(“diet quality” OR dietary pattern* OR diet pattern* OR eating pattern* OR food pattern* OR eating habit* OR dietary habit* OR food habit* OR dietary profile* OR food profile* OR diet profile* OR eating profile* OR dietary guideline* OR dietary recommendation* OR food intake pattern* OR dietary intake pattern* OR diet pattern* OR eating style*) OR


(“Guideline Adherence”[Mesh] AND (diet OR food OR eating OR eat OR dietary OR feeding OR nutrition OR nutrient*)) OR (adherence AND (nutrient* OR nutrition OR diet OR dietary OR food OR eat OR eating) AND (guideline* OR guidance OR recommendation*)) OR
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The DGAC approved the final list of included and excluded articles.
Step 3: Data extraction and risk of bias assessment

The DGAC:
- Provides input on what data to extract
- Reviews extracted data and NEL BAT responses for accuracy, completeness, and consistency

Key data is extracted from each article:
- Study design
- Duration
- Sample size
- Location
- Description of subjects
- Interventions/exposures
- Outcomes measured
- Confounders
- Results
- Limitations
- Funding source
- Etc......

Risk of bias is assessed using the NEL Bias Assessment Tool:
- Selection Bias
- Performance Bias
- Detection Bias
- Attrition Bias
## Step 3: Data extraction and risk of bias assessment

<table>
<thead>
<tr>
<th>Article</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Location</th>
<th>Age</th>
<th>Gender</th>
<th>Race/Ethnicity</th>
<th>SES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckland, 2013</td>
<td>PCS/EPIC</td>
<td>Initial N = 367,903, Final N = 335,062</td>
<td>Europe (Denmark; France; Germany; Greece; Holland; Italy; Norway; UK; Spain)</td>
<td>50.8y (SD=9.8) (35-70y)</td>
<td>100% female</td>
<td>NR</td>
<td>Education: Secondary and above (67.7%)</td>
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### Summary of Findings

A higher adherence to the MD was associated with a lower risk of breast cancer in postmenopausal women, and this association is potentially greater for ER-IPR- tumors. There was no association between MD and breast cancer in premenopausal women.

### Limitations

NEL BAT Limitations: Inclusion criteria and recruitment methods differed depending site; Dietary intake was only assessed at baseline.

Other Limitations: Residual confounding; Different centers adopted different dietary questionnaire; Same weight was given for each food component (assuming they have equivalent effects on health) for calculating arMED score.
Step 4: Evidence description and synthesis

The DGAC compares, contrasts, and combines evidence from multiple studies.

- Data from study 1
- Data from study 2
- Data from study 3

- Similarities and differences
- Factors impacting the relationships
- Overarching Themes
- Research gaps and limitations
Key Findings

- This systematic review includes 26 articles, 25 prospective cohort studies and 1 cross-sectional study, assessing the relationship between dietary patterns and risk of breast cancer.
- The studies used multiple approaches to assess dietary patterns and cancer risk, including scores to assess dietary patterns, direct comparisons on the basis of animal product consumption and one dietary pattern.
- This moderate body of evidence encompassed a large diversity in methodological approaches, making comparison across studies challenging. Despite this variability, significant relationships between dietary patterns and breast cancer risk were observed in high-risk and low-risk groups of women:
  - Because a variety of different methodologies were employed to assess dietary patterns, while similar in many respects, were composed of different components, making it difficult to determine which patterns had the greatest impact on breast cancer risk.
  - The relationship between dietary patterns and breast cancer risk is complex and includes postmenopausal women, but additional research is needed to confirm these findings.
  - Certain histopathologic and molecular phenotypes of breast cancer are associated with differences in dietary patterns, but this has not yet been explored sufficiently. For example, estrogen or progesterone receptor status of breast cancer is informative, but no conclusions can be drawn at this time.
  - More research is needed to explore other factors that may influence dietary patterns during various stages of life and breast cancer risk, such as anthropometrics (BMI), weight change over adulthood, physical activity, sedentary behavior, and reproductive history, including age of menarche, age of menopause, parity and breastfeeding.

Table 1. Indices and scores used to assess the relationship between dietary patterns and breast cancer risk

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<tr>
<td>Vegetables</td>
<td>Vegetables (median=1, &lt;median=0)</td>
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<tr>
<td>Legumes</td>
<td>Legumes (median=1, &lt;median=0)</td>
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<td>Legumes (median=1, &lt;median=0)</td>
</tr>
<tr>
<td>Fruits and/or Nuts</td>
<td>Fruits &amp; Nuts (median=1, &lt;median=0)</td>
<td>Fruits &amp; Nuts (median=1, &lt;median=0)</td>
<td>Fruits &amp; Nuts (median=1, &lt;median=0)</td>
<td>Fruits &amp; Nuts (median=1, &lt;median=0)</td>
<td>Fruits &amp; Nuts (median=1, &lt;median=0)</td>
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<tr>
<td>Cereals and/or Whole Grains</td>
<td>Cereals (median=1, &lt;median=0)</td>
<td>Whole grains (median=1, &lt;median=0)</td>
<td>Cereals (median=1, &lt;median=0)</td>
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United States Department of Agriculture
Center for Nutrition Policy and Promotion

www.NEL.gov
Step 5: Conclusion statements and evidence grading

The DGAC drafts a conclusion statement and determines a grade using predefined criteria.

**Conclusion Statement**
A brief summary statement that answers the systematic review question.

**Grading Criteria**
Internal Validity, Adequacy, Consistency, Impact, Generalizability

**Grades**
- Strong
- Moderate
- Limited
- Grade Not Assignable
Systematic Review Question: What is the relationship between dietary patterns and risk of breast cancer?

Conclusion Statement:
Moderate evidence indicates that dietary patterns rich in vegetables, fruit and whole grains, and lower in animal products and refined carbohydrate, are associated with reduced risk of postmenopausal breast cancer. The data regarding this dietary pattern and premenopausal breast cancer risk point in the same direction, but the evidence is limited due to fewer studies.

Grade:
Moderate: Postmenopausal breast cancer risk
Limited: Premenopausal breast cancer risk
Step 6: Identification of research recommendations

The DGAC identifies research recommendations based on research gaps and limitations that arise during the review process.

**Research Recommendations**

In order to better assess the relationship between dietary patterns and risk of developing breast cancer, additional research is needed to:

- Improve and validate novel epidemiologic tools for the accurate assessment of dietary patterns over the life course, including the use of biomarkers.
- Improve methodologic approaches for defining different dietary patterns such that patterns can be more consistently identified, scored and compared across studies.
- Establish cohort studies that start earlier in life in order to capture dietary patterns contributing to risk of breast cancer risk later in life. It is particularly important to consider key phases of the life cycle relevant to breast cancer, including childhood and menarche, adolescence and periods of mammary gland development and growth, periods of reproduction and lactation and subsequent years prior to cancer development.
- Assess associations of dietary patterns by subtypes of breast cancer defined by histopathologic outcomes, tumor hormone receptor status, molecular genotypes, gene expression patterns and other biological characteristics that influence the tumor behavior, for example, by tumor hormone receptor status and other relevant phenotypic characteristics (i.e., HER2 status).
- Examine how anthropometrics, physical activity and sedentary behaviors modify the relationship between dietary patterns and risk of breast cancer.
- Examine the impact of SES, and ethnic/racial groups in regards to dietary patterns and breast cancer.
For additional information visit

www.NEL.gov

Dietary Patterns and Breast Cancer:

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