

2015 DGAC • MEETING 3  
March 14, 2014

## Subcommittee 2:

### Dietary Patterns, Foods and Nutrients, and Health Outcomes

Anna Maria Siega-Riz  
Cheryl Anderson  
Tom Brenna  
Steven Clinton  
Frank Hu  
Marian Neuhouser  
Rafael Pérez Escamilla

Alice H. Lichtenstein

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## Scope

- To examine the relationship between dietary patterns, foods, and nutrients, *and* preventable diet-related diseases, obesity, and mortality
  - Primary focus is to consider foods and nutrients in the context of dietary patterns
  - Will consider targeted questions on specific foods or nutrients, as needed

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## Key Topic Areas

- Dietary patterns and:
  - Cardiovascular disease\*
  - Type 2 diabetes\*
  - Body weight and obesity\*
  - Cancer\*
  - Neurological and psychological illnesses
  - Pregnancy outcomes
  - Bone health

- Foods and nutrients
  - Sodium\*
  - Alcohol
  - Cholesterol

\* Topics to be discussed today

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## Invited Experts and Consultants

**Invited Experts**  
Individuals invited by the SC, usually on a one time basis, to provide their expertise to inform the SC's work. Invited experts do not participate in decisions at the SC level.

**Consultant SC Members**  
Individuals sought by the SC to participate in SC discussions and decisions on an ongoing basis but are not members of the full DGAC. Like DGAC members, consultants complete training and have been reviewed and cleared through a formal process within the Federal government.

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## Experts & Consultants

Invited Experts

- Robert H. Eckel, MD, *University of Colorado*
- Donna H. Ryan, MD, *Pennington Biomedical Research Center*
- Connie M. Weaver, PhD, *Purdue University*
- Steven Abrams, MD, *Baylor College of Medicine*
- Lorraine Gunzerath, PhD, MBA, *NIH/National Institute on Alcohol Abuse and Alcoholism*

Consultant SC Members  
None

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## Dietary Patterns and CVD, BW, & T2D

- What is the relationship between dietary patterns and risk of
  - a) cardiovascular disease
  - b) measures of body weight
  - c) type 2 diabetes?

Presenter from SC#2  
Frank Hu, Harvard University

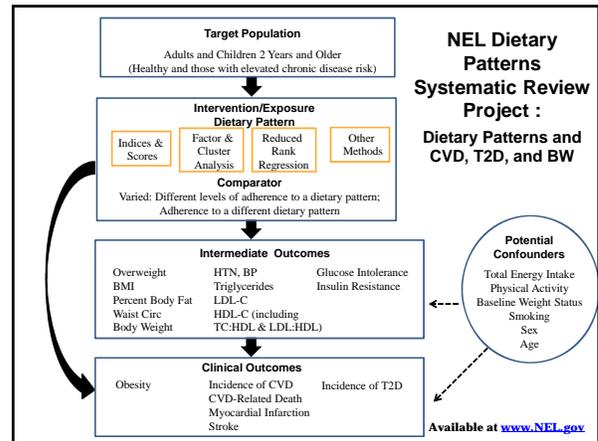
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## Dietary Patterns and CVD Review of the Evidence

- NEL Dietary Patterns Systematic Review Project (available at [www.NEL.gov](http://www.NEL.gov))
- 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk (Eckel et al., 2013, *Circulation* and *Journal of the American College of Cardiology*)

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## Dietary Patterns and CVD Overarching Finding from NEL Dietary Patterns Project

Outcome	Dietary Pattern Methodology	Number of Studies by Research Design	
		RCT	Cohort
Risk of Cardiovascular Disease	Index/Score	3	52
	Factor/Cluster	0	22
	Reduced Rank Regression	0	4
	Other Methods	14	6
Body Weight and Risk of Obesity	Index/Score	2	12
	Factor/Cluster	0	11
	Reduced Rank Regression	0	6
	Other Methods	4	3
Risk of Type 2 Diabetes	Index/Score	2	9
	Factor/Cluster	0	15
	Reduced Rank Regression	0	3
	Other Methods	7	1

Total included: 176

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## Dietary Patterns and CVD Overarching Finding from NEL Dietary Patterns Project

- Strongest evidence:
  - PCs examining dietary patterns using indices/scores (including indices for Mediterranean-style, dietary guidelines-related, and DASH diets)
  - RCTs of the DASH diet
- Less consistent evidence among studies using factor or cluster analysis
- Insufficient evidence in studies using reduced rank regression

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## Dietary Patterns and CVD Overarching Finding from NEL Dietary Patterns Project

- In most studies
  - regular consumption of nuts and legumes
  - moderate consumption of alcohol
 were also shown to be beneficial.
- Additionally, research that included specific nutrients indicated that patterns that were
  - low in saturated fat, cholesterol, and sodium
  - and rich in fiber and potassium
 may be beneficial for reducing CVD risk.

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## Dietary Patterns and CVD Overarching Finding from NEL Dietary Patterns Project

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## Dietary Patterns and CVD

### Recommendation from ACC/AHA Guidelines

- Advise adults who would benefit from LDL-C or BP lowering to consume a dietary pattern that
  - **emphasizes intake of vegetables, fruits, and whole grains;**
  - **includes low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils and nuts; and**
  - **limits intake of sweets, sugar-sweetened beverages and red meats.**
    - Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus).
    - Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.
- Strength of evidence: Strong IA

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## Dietary Patterns and Body Weight

### Review of the Evidence

- NEL Dietary Patterns Systematic Review Project (available at [www.NEL.gov](http://www.NEL.gov))
- 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults (Jensen et al., 2013, *Circulation, Obesity, and Journal of the American College of Cardiology*)

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## Dietary Patterns and Body Weight

### Conclusions from NEL Systematic Review Project

- There is moderate evidence that, in adults, increased adherence to dietary patterns scoring
  - **high in fruits, vegetables, whole grains, legumes, unsaturated oils, and fish;**
  - **low in total meat, saturated fat, cholesterol, sugar-sweetened foods and drinks and sodium; and**
  - **moderate in dairy products and alcohol**
 is associated with more favorable outcomes related to body weight or risk of obesity, with some reports of variation based on gender, race or body weight status.
 Index/Score

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## Dietary Patterns and Body Weight

### Conclusions from NEL Systematic Review Project

- There is moderate evidence that adherence to a dietary pattern that
  - **emphasizes vegetables, fruits, and whole grains**
 is associated with modest benefits in preventing weight gain or promoting weight loss in adults.
 Other Methods

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## Dietary Patterns and Body Weight

### Conclusions from NEL Systematic Review Project

- Limited and inconsistent evidence from epidemiological studies examining dietary patterns derived using factor or cluster analysis in adults that consumption of a dietary pattern characterized by
  - **intake of vegetables, fruits, whole grains and reduced-fat dairy products**
  - **as opposed to red meat, processed meats, sugar-sweetened foods and drinks, and refined grains**
 tends to be associated with more favorable body weight status over time.
 Factor or Cluster Analysis
- Insufficient evidence in studies using reduced rank regression

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## Dietary Patterns and Body Weight

### Recommendation from AHA/ACC/TOS Guidelines

- Prescribe a diet to achieve reduced calorie intake for obese or overweight individuals who would benefit from weight loss, as part of a comprehensive lifestyle intervention. Any one of the following methods can be used to reduce food and calorie intake:
  - a. Prescribe 1,200–1,500 kcal/day for women and 1,500–1,800 kcal/day for men (kcal levels are usually adjusted for the individual's body weight);
  - b. Prescribe a 500 kcal/day or 750 kcal/day energy deficit; or
  - c. Prescribe one of the evidence-based diets that restricts certain food types (such as high-carbohydrate foods, low-fiber foods or high-fat foods) in order to create an energy deficit by reduced food intake.
- Strength of evidence: A (Strong)

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### Dietary Patterns and Body Weight Recommendation from AHA/ACC/TOS Guidelines

- Prescribe a calorie restricted diet, for obese and overweight individuals who would benefit from weight loss,
  - based on the patient's preferences and health status and
  - preferably refer to a nutrition professional for counseling.
- A variety of dietary approaches can produce weight loss in overweight and obese adults.

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### Dietary Patterns and Type 2 Diabetes Review of the Evidence

- NEL Dietary Patterns Systematic Review Project (available at [www.NEL.gov](http://www.NEL.gov))
- The bodies of evidence examining the relationship between dietary patterns and risk of type 2 diabetes were limited or insufficient.

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### Dietary Patterns and CVD, BW, & T2D Next Steps

- Conduct searches to identify systematic reviews/meta-analyses published since the searches were completed for the existing reviews
- Continue review of the evidence

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### Dietary Patterns and CVD, BW, & T2D

- What is the relationship between dietary patterns and risk of
  - a) cardiovascular disease
  - b) measures of body weight
  - c) type 2 diabetes?

Discussion

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### Dietary Patterns and Cancer

What is the relationship between dietary patterns and risk of cancer?

Approach for answering question:  
NEL Systematic Review

Presenter from SC#2  
Steven Clinton, The Ohio State University

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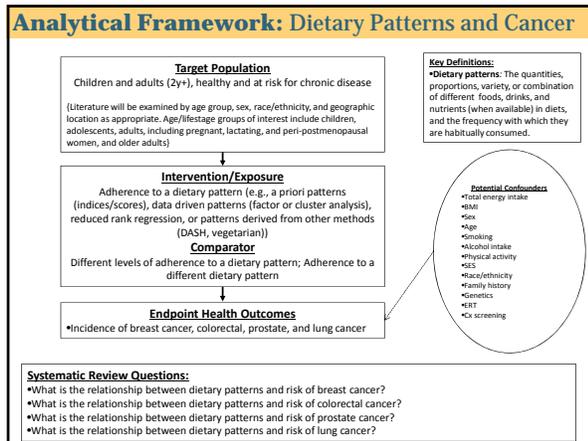
### Dietary Patterns and Cancer Approach

- "Cancer" represents over 100 histopathologic types, most with multiple genetic/biologic subtypes that will exhibit unique etiologic risk factors.
- Strategy: Emphasize the 4 cancers that account for over 50% of all cancer in Americans.
- Strategy: Focus initially upon "dietary patterns" with support from expert reviews and emerging data on individual components.

Estimated New Cases*	
Male	Female
Prostate 238,590 (28%)	Breast 232,340 (29%)
Lung & bronchus 118,080 (14%)	Lung & bronchus 110,110 (14%)
Colon & rectum 73,680 (9%)	Colon & rectum 69,140 (9%)
Urinary bladder 54,610 (6%)	Uterine corpus 49,560 (6%)
Melanoma of the skin 45,060 (5%)	Thyroid 45,310 (6%)
Kidney & renal pelvis 40,430 (5%)	Non-Hodgkin lymphoma 32,140 (4%)
Non-Hodgkin lymphoma 37,600 (4%)	Melanoma of the skin 31,630 (4%)
Oral cavity & pharynx 29,620 (3%)	Kidney & renal pelvis 24,720 (3%)
Leukemia 27,880 (3%)	Pancreas 22,480 (3%)
Pancreas 22,740 (3%)	Ovary 22,240 (3%)
All sites 854,790 (100%)	All sites 805,500 (100%)

American Cancer Society: Facts and Figures

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### Dietary Patterns and Cancer Literature Search: Inclusion/Exclusion Criteria

**Date Range:**  
• Published between January 2000 and January 2014 (in English in a peer-reviewed journal)

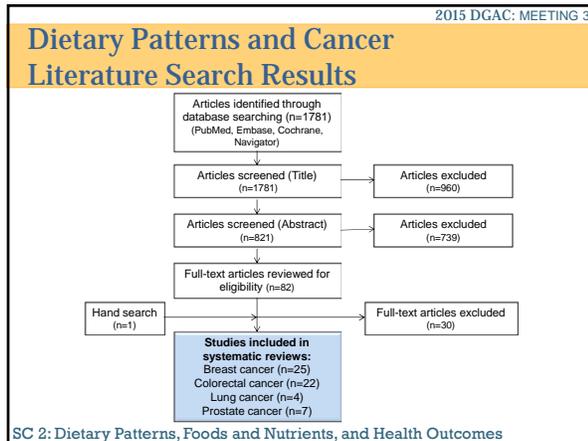
**Study Design:**  
• Randomized or non-randomized controlled trial, prospective cohort study, or a nested case-control study

**Study Subjects:**  
• Children, adolescents, and adults aged 2 years+  
• From countries with high or very high human development (per the 2012 Human Development Index)  
• Healthy or at elevated chronic disease risk (studies with subjects who were diagnosed with disease were excluded)

**Intervention/Exposure:**  
• Dietary patterns (e.g., indices/scores, factor or cluster analysis, reduced rank regression, and other methods)  
• Description of the dietary pattern (i.e., foods and beverages) consumed was provided

**Outcome:**  
• Incidence of colorectal, breast, prostate, or lung cancer

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### Dietary Patterns and Prostate Cancer Description of the Evidence

Seven studies were included in this review:

- **Study Design:** 7 prospective cohort studies (from 6 cohorts)
- **Location:** US (4), Australia, Sweden, UK
- **Risk of Bias:** Relatively low, 2/24 - 9/24
- **Subjects:** Generally healthy adult men (~40-60 y) without a previous diagnosis of prostate cancer
- **Sample Size:** 1,044 to 293,464 subjects
- **Prostate Cancer Cases:** 133 to 23,453 cases
- **Follow-up:** 7.6y to 23.2y

Dietary patterns examined:

- 3 studies used indices/scores
- 3 studies used factor analysis
- 1 study derived patterns based on animal product consumption

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### Dietary Patterns and Prostate Cancer Draft Conclusion Statement

- Limited evidence exist from a small number of studies with a wide variation in methodology.

Grade: **TBD**

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### Dietary Patterns and Lung Cancer Description of the Evidence

Four studies were included in this systematic review:

- **Study Design:** 3 prospective cohorts, 1 nested case-cohort
- **Location:** US, UK, Italy, the Netherlands
- **Risk of Bias:** Relatively low, 4/24 - 9/24
- **Subjects:** Generally healthy adults without a previous diagnosis of cancer; one study enrolled current and former heavy smokers
- **Sample Size:** 3,918 to 52,706 subjects
- **Lung Cancer Cases:** 117 to 1,425 cases
- **Follow-up:** 5.7y to 9.5y

Dietary patterns examine:

- Two studies used indices/scores
- One study used factor analysis
- One study derived patterns based on animal product consumption

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## Dietary Patterns and Lung Cancer

### Draft Conclusion Statement

- Limited evidence exists from a small number of studies with a wide variation in methodology.

Grade: **TBD**

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## Dietary Patterns and Breast Cancer

### Description of the Evidence

25 studies were included in this review:

- Study Design:** 1 RCT, 24 prospective cohort studies (from 15 cohorts)
- Location:** Australia, France, Germany, Greece, Italy, Norway, the Netherlands, Singapore, Sweden, UK, US Europe (multi-center)
- Risk of Bias:** Relatively low, 0/24 - 9/24
- Subjects:** Generally healthy adult women (~30-62 y) without a previous diagnosis of breast cancer
- Sample Size:** 1,598 to 335,062 subjects
- Breast Cancer Cases:** 137 to 10,225 cases
- Follow-up:** 6y to 26y

Dietary patterns examined:

- 8 studies used indices/scores
- 13 studies used factor/cluster analysis
- 2 studies used reduced rank regression
- 2 studies derived patterns based on animal product consumption
- 1 study tested a low-fat dietary pattern

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## Dietary Patterns and Colorectal Cancer

### Description of the Evidence

22 studies were included in this review:

- Study Design:** 1 RCT, 21 prospective cohort studies (from 11 cohorts)
- Location:** US, Denmark, Italy, Finland, France, Germany, Greece, Japan, Netherlands, Norway, Singapore, Spain, Sweden, and UK
- Risk of Bias:** Relatively low, 0/24 - 9/24
- Subjects:** Generally healthy adult men and women without a previous cancer diagnosis
- Sample Size:** 4,295 to 506,488 subjects
- Colorectal Cancer Cases:** 133 to 7,676 cases
- Follow-up:** 4.5y to 26y

Dietary patterns examined:

- 9 studies used indices/scores
- 10 studies used factor/cluster analysis
- 1 study used reduced rank regression
- 1 study derived patterns based on animal product consumption
- 1 study tested a low-fat dietary pattern

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## Dietary Patterns and Breast and Colorectal Cancer

Evidence is under review.

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## Dietary Patterns and Cancer

What is the relationship between dietary patterns and risk of cancer (colorectal, breast, prostate, and lung)?

**Discussion**

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## Sodium

**Questions:**

- What is the relationship between dietary sodium intake and blood pressure?
- What is the relationship between dietary sodium intake and cardiovascular disease outcomes?

**Approach for answering questions:**  
Existing reports

Presenter from SC#2  
Cheryl Anderson, University of California, San Diego

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### Sodium: Existing Reports

- 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk (Eckel et al., 2013, *Circulation and Journal of the American College of Cardiology*)
- IOM Report on Sodium Intake in Populations: Assessment of Evidence (available at [www.iom.edu](http://www.iom.edu))
- IOM Report on Population Strategies to Reduce Sodium Intake (available at [www.iom.edu](http://www.iom.edu))
- Dietary reference intakes for water, potassium, sodium, chloride, and sulfate (available at [www.iom.edu](http://www.iom.edu))
- Scanned literature from Jan 2013 to present

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### Sodium: Guidelines from AHA/ACC Report

**Advise adults who would benefit from blood pressure lowering to:**

- Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils, and nuts; and limits intake of sweets, sugar-sweetened beverages, and red meats.
  - Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus).
  - Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.

**NHLBI Grade: A (strong); ACC/AHA COR: I, LOE: A**

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### Sodium: Guidelines from AHA/ACC Report

**Advise adults who would benefit from blood pressure lowering to:**

- Lower sodium intake

**NHLBI Grade: A (strong); ACC/AHA COR: I, LOE: A**

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### Sodium: Guidelines from AHA/ACC Report

**Advise adults who would benefit from blood pressure lowering to:**

- Consume no more than 2,400 mg/day of sodium;
- Further reduction of sodium intake to 1,500 mg/d can result in even greater reduction in BP; and
- **Even without achieving these goals, reducing sodium intake by at least 1,000 mg/day lowers BP.**

**NHLBI Grade: B (moderate); ACC/AHA COR: IIa, LOE: B**

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### Sodium: Guidelines from AHA/ACC Report

**Advise adults who would benefit from blood pressure lowering to:**

- Combine the DASH dietary pattern with lower sodium intake.

**NHLBI Grade: A (strong); ACC/AHA COR: I, LOE: A**

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### Sodium Working Group: Considerations

- Use of recommendations from existing reports
- Healthy dietary pattern
- Identify achievable, affordable, practical strategies consistent with an ecological model

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## Sodium

1. What is the relationship between dietary sodium intake and blood pressure?
2. What is the relationship between dietary sodium intake and cardiovascular disease outcomes?

Discussion

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## Next Steps: Topics to Address

- Dietary patterns and other cancer outcomes
- Dietary patterns and neurological and psychological illnesses
- Dietary patterns during preconception and birth defects
- Dietary patterns and bone health
- Cholesterol
- Alcohol

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## Discussion

<h3>Subcommittee 2:</h3> <p>Dietary Patterns, Foods and Nutrients, and Health Outcomes</p>	<p><b>Anna Maria Siega-Riz</b> Cheryl Anderson Tom Brenna Steven Clinton Frank Hu Marian Neuhouser Rafael Pérez Escamilla</p> <p>Alice H. Lichtenstein</p>
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