

Subcommittee 2:

Dietary Patterns,
Foods and Nutrients,
and Health Outcomes

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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
 - Considering targeted questions on specific foods or nutrients, as needed

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.

Experts & Consultants

Invited Experts (March to July 2014)

None

Consultant SC Members

None

Questions Addressed Today

- Dietary patterns and:
 - Cardiovascular disease (Frank Hu)
 - Body weight/obesity (Frank Hu)
 - Type 2 diabetes (Frank Hu)
 - Cancer (Steven Clinton)

Dietary Patterns and CVD, BW, & T2D

What is the relationship between dietary patterns and (1) risk of cardiovascular disease, (2) measures of body weight/obesity, and (3) risk of type 2 diabetes?

Approach for answering question:

Existing reports, including published systematic reviews and meta-analyses

Frank Hu

Dietary Patterns and CVD

Dietary Patterns and CVD

Review of the Evidence

- NEL Dietary Patterns Systematic Review Report
- 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk
- Six systematic reviews/meta-analyses published in peer-reviewed literature from 2008 to present

Dietary Patterns and CVD

Review of the Evidence

- In total, 142 articles were considered in these reports, of which 35 were included in two or more reviews
 - NEL Dietary Patterns Report
 - Predominantly prospective cohort studies
 - 2013 AHA/ACC Guideline
 - Randomized controlled trials in adults
 - Systematic reviews/meta-analyses
 - Specifically examined Mediterranean, DASH, or vegetarian-style dietary patterns

Dietary Patterns and CVD

Draft Conclusion Statement

The committee concurs with the conclusions of the NEL Dietary Patterns Systematic Review and AHA/ACC Guideline that strong and consistent evidence demonstrates that dietary patterns associated with decreased risk of CVD are characterized by:

- Regular consumption of fruits, vegetables, whole grains, low-fat dairy, and fish, and are low in red and processed meat, refined grains, and sugar-sweetened foods and drinks.
- Regular consumption of nuts and legumes and moderate consumption of alcohol also are shown to be beneficial in most studies.
- Additionally, research that includes specific nutrients in their description of dietary patterns indicate that patterns that are low in saturated fat, cholesterol, and sodium and rich in fiber, potassium, and unsaturated fats are beneficial for reducing cardiovascular disease risk.

DGAC Grade: Strong

Dietary Patterns and CVD

Draft Implications

- Multiple dietary patterns can achieve these food and nutrient profiles and are beneficial for cardiovascular health, and they can be tailored to individuals' need and food and cultural preferences.
- Individuals are encouraged to consume dietary patterns that:
 - emphasize vegetables, fruits, whole grains, legumes, and nuts;
 - include low-fat dairy products, poultry, fish, non-tropical vegetable oils; and
 - limit sodium, saturated fat, refined grains, sugar-sweetened foods and beverages, and red and processed meats.

Dietary Patterns and Body Weight

Dietary Patterns and Body Weight

Review of the Evidence

- NEL Dietary Patterns Systematic Review Project
- 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults
- Two systematic reviews/meta-analyses published in peer-reviewed literature from 2008 to present

Dietary Patterns and Body Weight

Review of the Evidence

- In total, 81 articles were considered in these reports, of which 3 were included in two or more reviews
 - NEL Dietary Patterns Report
 - Predominantly prospective cohort studies
 - 2013 AHA/ACC/TOS Guideline
 - Randomized controlled trials in adults
 - Systematic reviews/meta-analyses
 - Provided further evidence related to a Mediterranean-style dietary pattern

Dietary Patterns and Body Weight

Draft Conclusion Statements

- The DGAC concurs with the NEL Dietary Patterns Systematic Review that moderate evidence suggests favorable outcomes related to healthy body weight (including lower BMI, waist circumference, or percent body fat) or risk of obesity with dietary patterns that are:
 - high in fruits, vegetables, and whole grains;
 - include fish and legumes;
 - moderate in dairy products, particularly low-fat dairy, and alcohol; and
 - low in meats, particularly red and processed meats.

Nutrients that are components of the dietary patterns associated with these favorable outcomes included high intakes of unsaturated fats and low intakes of saturated fats, cholesterol, and sodium. (DGAC Grade: Moderate)

Continued...

Dietary Patterns and Body Weight

Draft Conclusion Statements

- The committee concurs with the 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity that strong evidence demonstrates that, preferably as part of a comprehensive lifestyle intervention, overweight and obese adults can achieve weight loss through a variety of dietary patterns that reduce food and calories and achieve an energy deficit. (DGAC Grade: Strong)

Dietary Patterns and Body Weight

Draft Implications

- To achieve and maintain a healthy body weight, individuals are encouraged to consume dietary patterns that are:
 - high in fruits, vegetables, and whole grains;
 - include fish and legumes;
 - moderate in dairy products, particularly low-fat dairy, and alcohol; and
 - low in meats, particularly red and processed meats.
- Among overweight and obese individuals, an energy deficit is necessary to achieve weight loss. This can be achieved through a variety of evidence-based dietary patterns and approaches.
- Strategies should be based on the individual's preferences and health status and preferably include referral to a nutrition professional for counseling.

Dietary Patterns and Type 2 Diabetes

Dietary Patterns and T2D

Review of the Evidence

- NEL Dietary Patterns Systematic Review Project
- One meta-analysis published in peer-reviewed literature from 2008 to present

Dietary Patterns and T2D

Review of the Evidence

- In total, 39 articles were considered in these reports, of which 13 were included in both reviews
- Studies were predominantly prospective cohort studies

Dietary Patterns and T2D

Draft Conclusion Statement

- Moderate evidence suggests that dietary patterns
 - rich in fruits, vegetables, and whole grains; and
 - low in red and processed meats, high-fat dairy, refined grains, and sweets/sugar-sweetened beverages

reduce the risk of developing type 2 diabetes.

(DGAC Grade: Moderate)

- Evidence is lacking for the pediatric population.

Dietary Patterns and T2D

Draft Implications

- To reduce the risk of developing type 2 diabetes, individuals are encouraged to consume dietary patterns that are:
 - rich in fruits, vegetables, and whole grains; and
 - low in red and processed meats, high-fat dairy, refined grains, and sweets/sugar-sweetened beverages.

Dietary Patterns and CVD, BW, & T2D

What is the relationship between dietary patterns and (1) risk of cardiovascular disease, (2) measures of body weight/obesity, and (3) risk of type 2 diabetes?

Discussion

Topic Team:

Frank Hu, Anna Maria Siega-Riz, Barbara Millen,
and Cheryl Anderson

Dietary Patterns and Cancer

What are the relationships between dietary patterns and the risk of the most common cancers?

(breast, colon/rectal, prostate, and lung)

NEL Systematic Reviews

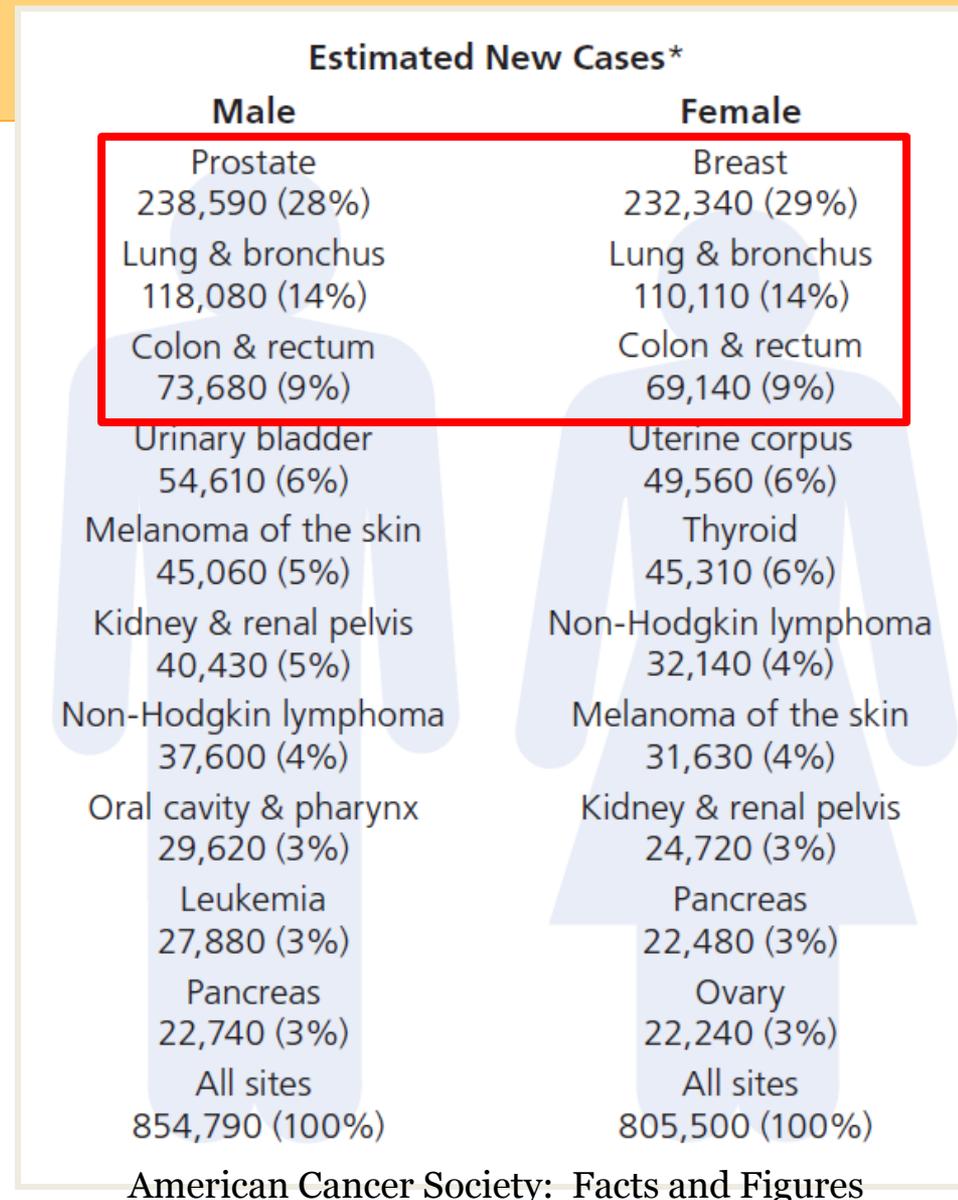
Steven K. Clinton

Selection of target cancers: Strategy

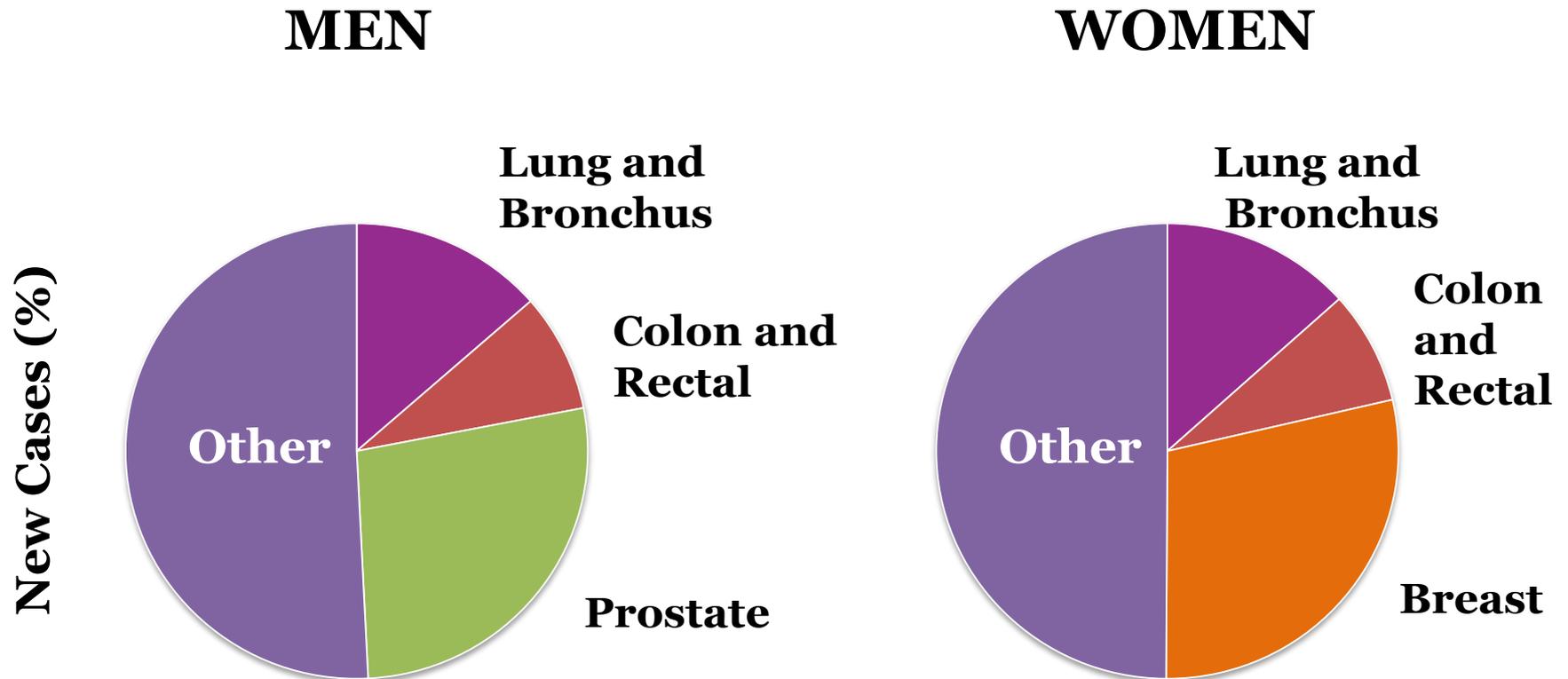
- Focus our efforts upon “dietary patterns”
- Use expert reviews and emerging data on individual foods and nutrients
- Focus on cancers with the greatest public health impact
- A scientific literature is accumulating regarding dietary patterns

Dietary Patterns and Cancer

- “Cancer” represents more than 100 histopathologic types, most with multiple genetic/biologic subtypes that will exhibit unique etiologic risk factors.
- 4 cancers that account for 50% of all cancer in Americans.



2014 Estimated New Cancer Cases (Am. Cancer Soc.)



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/lifestage groups of interest include children, adolescents, adults, including pregnant, lactating, and peri-postmenopausal women, and older adults}

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.

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

Potential Confounders

- Total energy intake
- BMI
- Sex
- Age
- Smoking
- Alcohol intake
- Physical activity
- SES
- Race/ethnicity
- Family history
- Genetics
- ERT
- Cx screening

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?

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, or had been previously diagnosed with the cancer of interest were excluded)

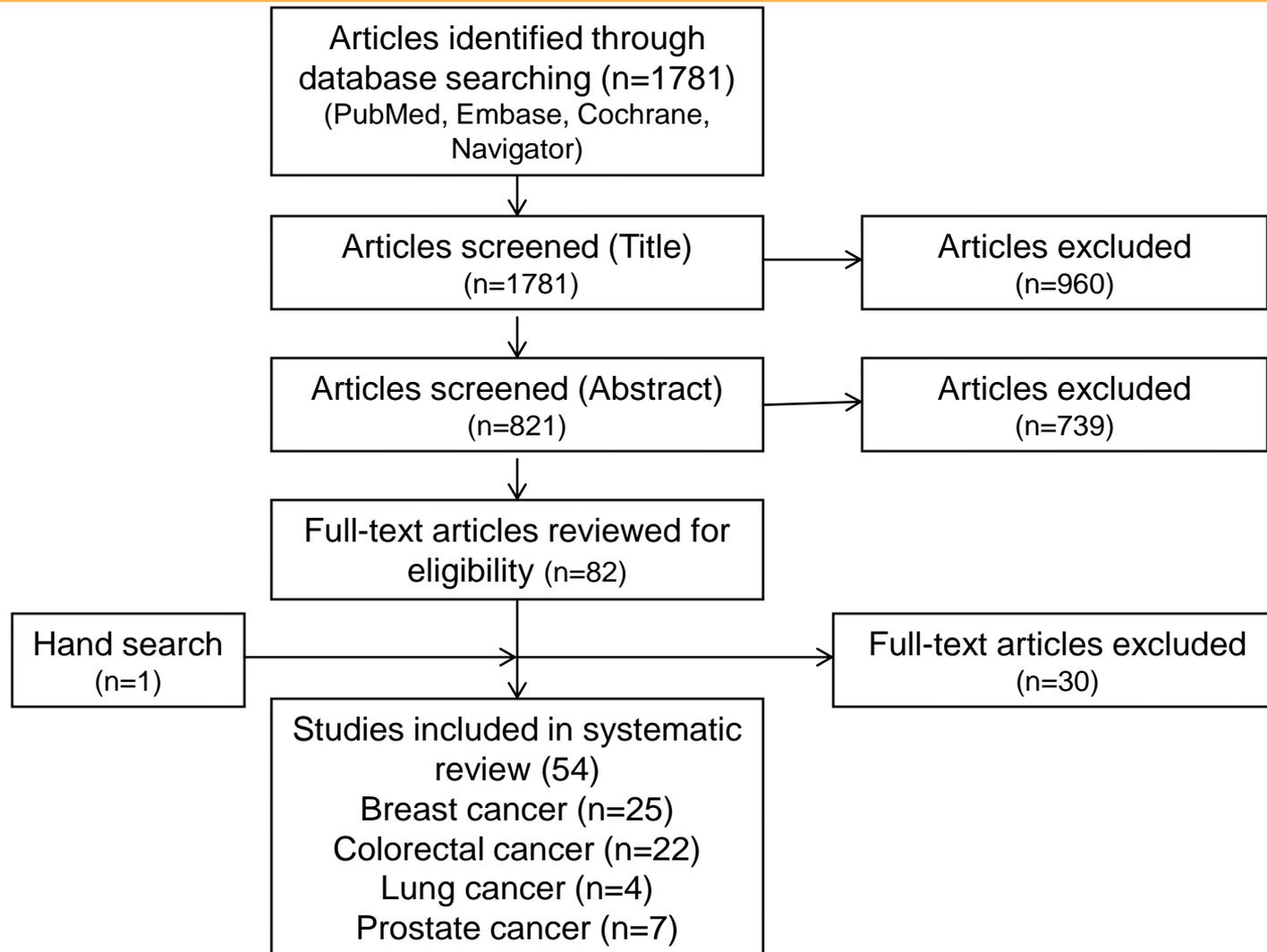
Intervention/Exposure:

- Dietary patterns (indices/scores, factor or cluster analysis, reduced rank regression, and other methods)
- The dietary patterns were clearly defined by the foods and beverages consumed

Outcome:

- Incidence of breast, colorectal, prostate, or lung cancer

Dietary Patterns and Cancer Literature Search Results



Dietary Patterns and Cancer

General Comments

- Despite the expanding number of available studies regarding dietary patterns and cancer risk, the portfolio of quality studies remains modest and employs a wide range of methodology in study design, dietary pattern assessment, and statistical approaches.
- Additional research to develop standardized and validated methodology followed by application to prospective cohort studies is recommended.

Dietary Patterns and Cancer

General Comments

- Although most cohort studies make extensive efforts to include participants across a wide range of race/ethnic groups and across the socio-economic continuum, there are groups for which the association between dietary patterns and cancer risk cannot be reliably assessed.
- Research is needed to detect whether there are differences in association by race/ethnicity, body habitus (including lifetime weight gain patterns), acculturation status, and socio-economic status.

Dietary Patterns and Breast Cancer

Dietary Patterns and Breast Cancer

Description of Evidence

- This systematic review includes 25 prospective cohort studies and one RCT that used multiple approaches to assess dietary patterns and cancer risk:
 - 8 studies used indices/scores to assess dietary patterns
 - 13 studies used factor or principal components analysis
 - 2 studies used reduced rank regression
 - 2 studies made comparisons on the basis of animal product consumption
 - 1 study tested a low-fat dietary pattern

Dietary Patterns and Breast Cancer

Key Findings

- A variety of methods were used to assess or determine dietary patterns, making comparisons among studies challenging.
- 17 of the 25 studies found significant relationships between dietary patterns and breast cancer risk.
- Dietary patterns characterized as rich in fruits, vegetables, and whole grains; and low in some animal products and refined carbohydrate are associated with reduced risk.

Dietary Patterns and Breast Cancer

Key Findings

- The impact of dietary patterns on risk may vary by specific groups of women
 - Menopausal status
 - The evidence supporting a relationship between dietary patterns and breast cancer risk is more abundant and consistent for postmenopausal breast cancer
 - More research is needed
 - Histopathologic and molecular phenotypes
 - Limited studies to date suggest that estrogen or progesterone receptor status of breast cancers may define subgroups with unique dietary risk profiles
 - More research is needed

Dietary Patterns and Breast Cancer

Key Findings

- The relationship between dietary patterns during various stages of life (youth, adolescence, reproductive years, post-menopausal) and subsequent breast cancer risk is uncertain and more research is needed.
- The relationship between dietary patterns and breast cancer may be affected by multiple other variables hypothesized to influence risk. The potential interactions between dietary patterns and anthropometrics, BMI, physical activity, sedentary behavior, and reproductive history (ages of menarche, age of menopause, parity, breast feeding, use of endocrine agents) requires additional research.

Dietary Patterns and Breast Cancer

Draft Conclusion Statement

- Moderate evidence suggests that dietary patterns
 - rich in fruits, vegetables, and whole grains; and
 - low in some animal products and refined carbohydrateare associated with reduced risk of post-menopausal breast cancer.
- The data regarding this dietary pattern and pre-menopausal breast cancer risk points in the same direction but the evidence is limited due to fewer studies.
- **DGAC Grade:**
 - Moderate for postmenopausal breast cancer risk
 - Limited for premenopausal breast cancer risk

Dietary Patterns and Colorectal Cancer

Dietary Patterns and Colorectal Cancer

Description of Evidence

- The systematic review includes 21 prospective cohort studies and one RCT that employed diverse methods to assess dietary patterns:
 - 9 articles used indices/scores to assess dietary patterns
 - 10 articles used data-driven methods
 - 3 used other approaches
- The dietary patterns examined in this systematic review were defined differently, making comparisons between articles difficult.

Dietary Patterns and Colorectal Cancer

Key Findings

- Some protective dietary patterns emerged in this body of evidence.
- Patterns emphasizing fruits, vegetables, fish/seafood, legumes, low-fat dairy, and whole grains were generally associated with reduced risk of colorectal cancer.
- Patterns higher in red/processed meats, potatoes/French fries, and sodas/sweets were generally associated with increased colorectal cancer risk

Dietary Patterns and Colorectal Cancer

Key Findings

- The relationship between dietary pattern and colorectal cancer risk often varied by gender and cancer location.
 - Results based on gender analysis were mixed.
 - Dietary patterns may be more strongly associated with cancer development in distal regions of the colon/rectum.
 - More research is needed.
- The relationship between dietary patterns and colon cancer may be affected by multiple other variables hypothesized to influence risk.
 - The potential interactions between dietary patterns and anthropometrics, BMI, physical activity, sedentary behavior, and weight gain during various stages of life requires additional research.

Dietary Patterns and Colorectal Cancer

Draft Conclusion Statement

- Moderate evidence suggests an inverse association between colorectal cancer risk and dietary patterns that are:
 - high in fruits, vegetables, legumes, whole grains, lean meats/seafood, low-fat dairy,
 - moderate in alcohol, and
 - low in red and/or processed meats, saturated fat, and sodas/sweets.
- In contrast, greater colorectal cancer risk is associated with diets that are:
 - high in red/processed meats, French fries/potatoes, and sources of sugars (i.e., sodas, sweets, and dessert foods).
- **DGAC Grade: Moderate**

Dietary Patterns and Prostate Cancer

Dietary Patterns and Prostate Cancer

Description of Evidence

- This systematic review includes 7 prospective cohort studies (from 6 different cohorts) that used different methods to assess dietary patterns:
 - 3 studies used index-scores to assess dietary patterns
 - 3 studies used factor analysis
 - 1 study made comparisons on the basis of animal product consumption.

Dietary Patterns and Prostate Cancer

Description of Evidence

- The majority of the studies did not detect significant or consistent relationships between dietary patterns and risk of prostate cancer.
- Prostate cancer epidemiology is complex
 - variation in screening and diagnostic approaches in populations
 - heterogeneous disease with poorly defined subtypes
 - improved definition of clinically significant prostate cancer is needed
- Studies used a range of different approaches to assess or determine dietary patterns in populations with variable screening patterns and were typically limited to dietary exposure late in life. Thus, the results were inconclusive regarding risk for clinically significant prostate cancer.

Dietary Patterns and Prostate Cancer

Draft Conclusion Statement

- No conclusion can be drawn regarding the relationship between dietary patterns and the risk of prostate cancer.
- This is due to limited evidence from a small number of studies with wide variation in study design, dietary assessment methodology, and cancer outcome ascertainment.
- **DGAC Grade: Grade Not Assignable**

Dietary Patterns and Lung Cancer

Dietary Patterns and Lung Cancer

Description of Evidence

- This systematic review includes 3 prospective cohort studies and 1 nested case-cohort study that used different methods to assess dietary patterns:
 - 2 studies used an index-score to measure adherence to a dietary pattern
 - 1 study derived dietary patterns using principal components analysis
 - 1 study based dietary patterns on participants reporting animal product intake.
- With only four relevant studies that used different approaches to assess or determine dietary patterns, there is limited evidence available to examine the relationship between dietary patterns and risk of lung cancer.

Dietary Patterns and Lung Cancer

Description of Evidence

- Based upon a small number of articles with diverse methodology, the evidence suggests a lower risk associated with diets containing more frequent servings of vegetables, fruits, fish, lean meats, grains/cereals, legumes, and low-fat milk.
- The relationship between dietary patterns and lung cancer may be affected by multiple other variables hypothesized to influence risk.
 - The potential interactions between dietary patterns and smoking status (age, duration, frequency, tobacco type) needs additional research.
 - The timing of dietary patterns and risk relative to tobacco exposure (during or post-cessation) needs additional research.

Dietary Patterns and Lung Cancer

Draft Conclusion Statement

- Evidence from a small number of articles suggests a lower risk of lung cancer associated with diets containing more frequent servings of vegetables, fruits, fish, lean meats, grains/cereals, legumes, and low-fat milk.
- Despite reported modest significant reductions in risk, definitive conclusions cannot be established at this time due to the small number of articles, as well as wide variation in study design, dietary assessment, and case ascertainment.
- **DGAC Grade:** Limited

Specific Foods and Nutrients and Cancer

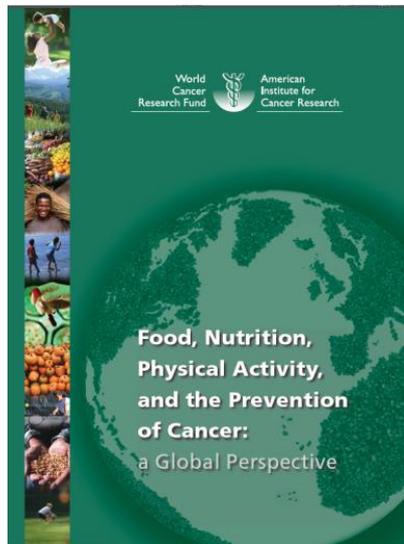
Foods and Nutrients and Cancer

Description of Evidence

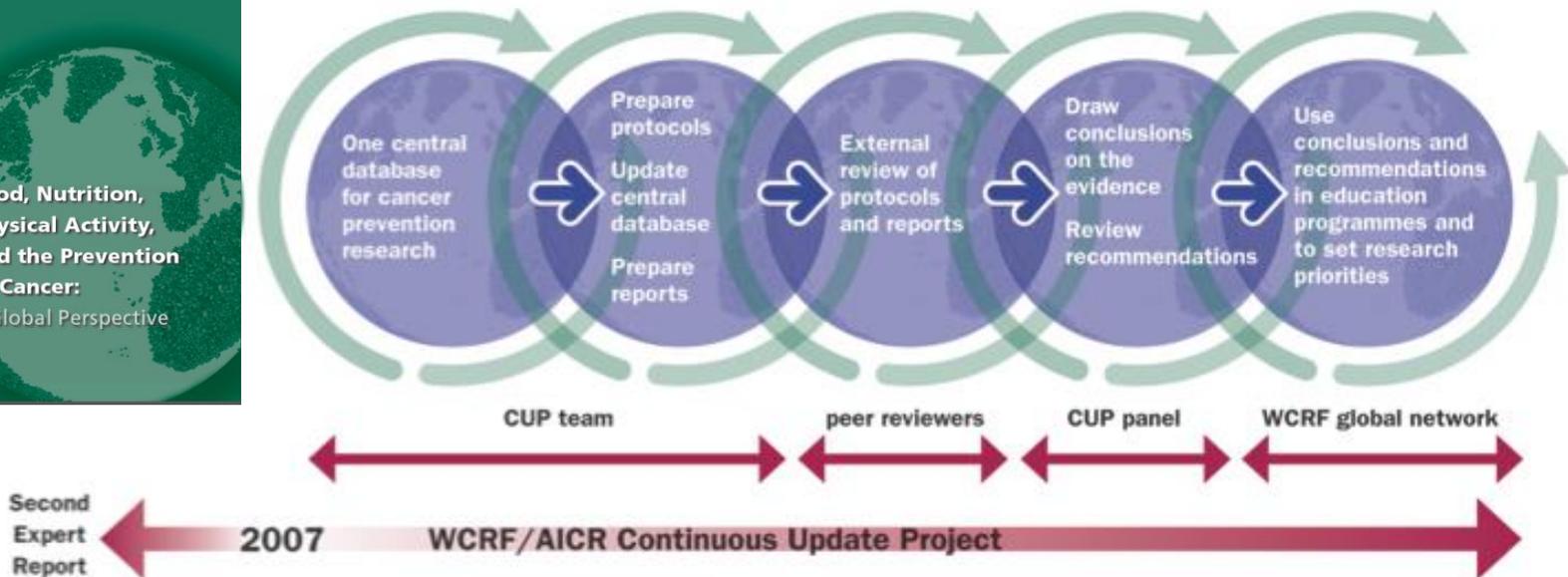
- Use available and pending reports
 - World Cancer Research Fund / American Institute for Cancer Research
 - World Health Organization / International Agency for Research on Cancer
 - Institute of Medicine, National Academy of Sciences, Dietary Reference Intakes

Foods and Nutrients and Cancer Description of Evidence

- World Cancer Research Fund / American Institute for Cancer Research (WCRF / AICR)
 - Second Expert Report (2007)
 - Continuous Update Project (2008-2014)



The Continuous Update Project - process



The WCRF / AICR Continuous Update Program (CUP)

2010: Breast Cancer

2011: Colorectal Cancer

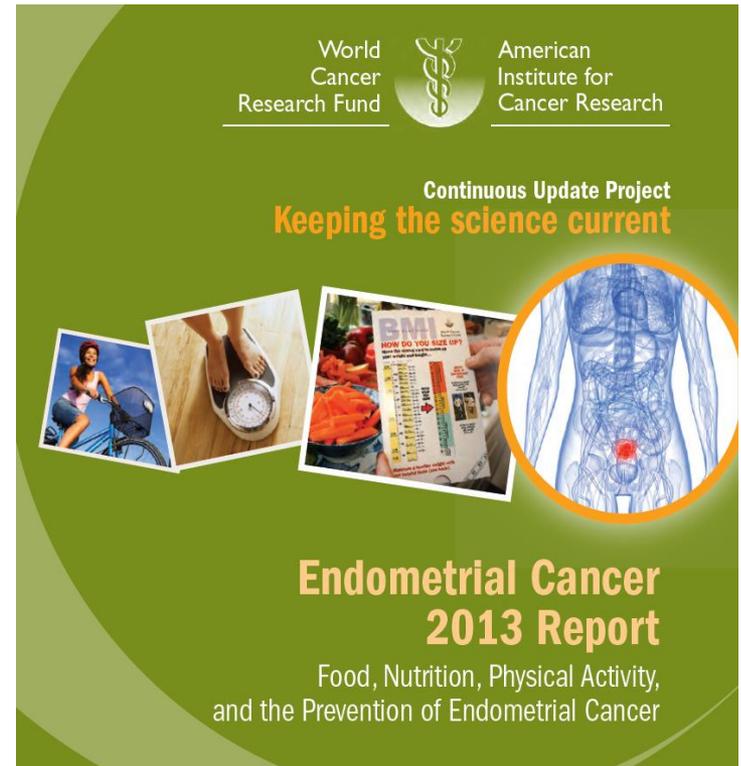
2012: Pancreatic Cancer

2013: Endometrial Cancer

2014: Ovarian Cancer

Pending 2014:

Survivors, Prostate, Liver, Biliary, Kidney.



Foods and Nutrients and Cancer Conclusion Statement

Conclusion:

To be determined
Fall 2014

DGAC Grade:

To be determined
Fall 2014

Dietary Patterns and Cancer Implications

To be determined based upon integration of conclusions from reviews of evidence:

- Dietary patterns
- Foods and nutrients

Dietary Patterns and Cancer

What are the relationships between dietary patterns and the risk of the most common cancers?

(breast, colorectal, prostate, and lung)

Discussion

Topic Team:

Steven Clinton, Marian Neuhouser,
and Rafael Pérez-Escamilla

Next Steps

- Dietary patterns
 - Birth defects
 - Neurological and psychological illnesses
 - Bone health
- Look across the dietary patterns evidence and describe common elements of the diet associated with health
- Sodium
- Saturated fat
- Added sugars
- Alcohol
- Microbiome

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