2020 Dietary Guidelines Advisory Committee: Dietary Fats and Seafood Subcommittees

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Status of Questions

Draft Conclusion:

- **Seafood** during pregnancy/lactation and neurocognitive development (ADD/ADHD; ASD)
  - Developmental domains portion is still being synthesized

Implementing the plan:

- **Seafood** during childhood/adolescence and neurocognitive development
- **Seafood** during childhood/adolescence and cardiovascular disease
- **Dietary fats** and all-cause mortality

Developing the plan:

- **Dietary fats** and cardiovascular disease
- **Dietary fats** and neurocognitive development/health
- **Dietary fats** and cancer

All protocols discussed in this presentation are available at DietaryGuidelines.gov
What is the relationship between types of dietary fat consumed and risk of cardiovascular disease?

Will build upon the 2015 Dietary Guideline Advisory Committee review, which considered:

- Studies only in adults
- Evidence dating back to 1960s
- Evidence on saturated fat and macronutrient replacement

2020 NESR Systematic Review date range:

- Children and adolescents: 1990 to present
- Adults: 2010 to present
What is the relationship between seafood consumption during pregnancy/lactation and neurocognitive development of the infant?

Approach to Answer Question: NESR Systematic Review
Cross-cutting Discussion

- Joint meeting with Pregnancy and Lactation and Birth to 24 Months subcommittees
  - Feedback on protocols
  - Discussion of evidence
- External neurocognitive experts
  - Feedback on assessment tools
Key Definitions

- **Seafood** – Marine animals that live in the sea and in freshwater lakes and rivers. Seafood includes fish (e.g., salmon, tuna, trout, tilapia) and shellfish (e.g., shrimp, crabs, oysters) (Source: 2015-2020 DGA)
**Systematic review question:** What is the relationship between seafood consumption during pregnancy and lactation and neurocognitive development in infants?

<table>
<thead>
<tr>
<th>Intervention/exposure vs Comparator</th>
<th>Endpoint outcomes</th>
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<tbody>
<tr>
<td>Seafood consumption (type, source, amounts, frequency, and/or timing of exposure)</td>
<td>Developmental domains, examined via milestone achievement and/or scales/indices, including Cognitive, Language/communication, Movement/physical, Social-emotional</td>
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<td>Academic performance</td>
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<td>Attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD)</td>
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<td></td>
<td>Anxiety</td>
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<td>Depression</td>
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<td>Autism spectrum disorder (ASD)</td>
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**Population:** Women during pregnancy and/or lactation; healthy and/or at risk for chronic disease

**Key Confounders:** Child sex, Child age, Maternal age, Race/ethnicity, Socioeconomic status, Alcohol intake, Non-fish dietary exposure to n-3 polyunsaturated fatty acids (PUFAs), Smoking, Maternal anthropometrics, Child's birth weight, Gestational age, Parental education, Parity

**Outcome Specific Key Confounders:** ADD, ADHD, Anxiety, ASD, Depression: Family history of neurocognitive disorders.

**Other factors to be considered:** Key nutrients in seafood (e.g., n-3 PUFAs, iodine, selenium, iron, fish protein, vitamin D); Environmental chemicals (e.g., mercury, persistent organic pollutants, and polychlorinated biphenyls); Blood and human milk biomarkers of seafood intake (e.g., n-3 PUFA, and environmental pollutants), mother (e.g., venous/umbilical cord, placenta, red blood cell) and child (e.g., arterial/umbilical cord) EPA, DHA, iron, iodine, selenium, protein, vitamin D; infant feeding mode
Inclusion and Exclusion Criteria

• **Standard criteria used for:**
  • Study Design
  • Publication Status
  • Date of Publication (January 2000 – present)
  • Language of Publication
  • Country
  • Health status of participants
## Inclusion and Exclusion Criteria (Continued)

<table>
<thead>
<tr>
<th>Category</th>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
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<tbody>
<tr>
<td>Intervention/exposure</td>
<td>- Seafood consumption measured prior to outcome assessment</td>
<td>- No measure of seafood consumption (i.e., studies that only examined biomarkers for consumption)</td>
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<tr>
<td></td>
<td>o Type (e.g., salmon, tuna bass)</td>
<td>- Omega-3 supplement studies which do not evaluate seafood consumption</td>
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<td>o Source (e.g., sea fresh water, farmed, wild)</td>
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<td></td>
<td>o Amount/frequency of intake</td>
<td>- Studies evaluating infant formula with added DHA and/or EPA</td>
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<td>o Timing of exposure (e.g., age at intake)</td>
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<td></td>
<td>- Dietary intake (e.g., from food frequency questionnaires, dietary recall, fish/seafood screeners) may be validated with biomarkers for PUFA or MeHg, but not substituted.</td>
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<tr>
<td>Comparator</td>
<td>- Different types, sources, amounts, frequency, and/or timing of exposure of seafood consumption</td>
<td>- No comparator</td>
</tr>
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</table>

**Seafood during pregnancy/lactation and neurocognitive development**

**2020 Dietary Guidelines Advisory Committee: Meeting 3**
This search addressed two systematic review questions related to seafood consumption and neurocognitive outcome.

- ADD/ADHD: 4 studies
- ASD: 3 studies

Seafood during pregnancy/lactation and neurocognitive development
2020 Dietary Guidelines Advisory Committee: Meeting 3
No evidence is available to draw a conclusion about the relationship between maternal seafood intake during pregnancy and lactation and academic performance, anxiety, and depression in children.

Grade not assignable: Academic performance, anxiety, depression
No evidence is available to draw a conclusion about the relationship between maternal seafood intake during lactation and neurocognitive development in children.

Grade not assignable: Seafood during lactation
Description of the Evidence for ADD/ADHD: 4 Prospective Cohort Studies

Sample Characteristics

- Country: 3 UK, 1 USA
- Sample size: N=217-6580
- Predominantly maternal age >20y, white, middle-high SES

Exposure

- Total seafood; 1 study also assessed oily fish intake
- Timing of intake:
  - 1st trimester only, 3rd trimester only, throughout pregnancy
  - No studies assessed maternal seafood intake during lactation

Outcome

- 4 studies assessed ADD/ADHD-like traits or behaviors (ages 4-13y)
- No studies looked at clinical diagnosis of ADD or ADHD

Seafood during pregnancy/lactation and neurocognitive development
2020 Dietary Guidelines Advisory Committee: Meeting 3
Summary of the Evidence Synthesis: ADD/ADHD-like behaviors or traits

- Four prospective cohort studies examined the relationship between maternal seafood intake during pregnancy and ADD and ADHD-like traits or behaviors in children ages 4 to 13 years.
  - Two studies provide evidence of a protective association between maternal seafood intake (total or oily fish intake) during pregnancy and ADD and ADHD-like traits or behaviors in 8 and 9 years of age.
  - Two larger studies from a single cohort used a more rigorous dietary assessment method and found no association between maternal seafood intake during pregnancy and hyperactivity in children 4 to 13 years of age.
Insufficient evidence is available to draw a conclusion about the relationship between seafood consumption during pregnancy and attention deficit disorder (ADD)-like or attention-deficit/hyperactivity disorder (ADHD)-like traits or behaviors.

Grade not assignable: ADD/ADHD-like traits or behaviors
Summary of the Evidence Synthesis:
Clinical diagnosis of ADD or ADHD

• No studies reported clinical diagnosis of ADD or ADHD.
No evidence is available to draw a conclusion about the relationship between seafood consumption during pregnancy and clinical diagnosis of attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).

Grade not assignable: Clinical diagnosis of ADD/ADHD
Description of the Evidence for ASD: 3 Prospective Cohort Studies

Sample Characteristics
- Country: 1 Netherlands, 1 Spain, 1 UK
- Sample size: N=1200-8000
- Maternal age ~31y, Predominantly white, middle-high SES

Exposure
- Seafood or fish
  - 2 studies examined: Oily fish, white fish, large fatty fish, small fatty fish, lean fish, and/or shellfish separately
- Timing of intake:
  - 1st trimester only, early or late pregnancy, throughout pregnancy
  - No studies assessed maternal seafood intake during lactation

Outcome
- Three studies assessed ASD-like traits or behaviors (ages 3-9 years)
- One study assessed clinical diagnosis of ASD by 11 years
Summary of the Evidence Synthesis: ASD diagnosis

• One prospective cohort study examined the relationship between maternal seafood intake during pregnancy and clinical diagnosis of ASD by 11 years and found no association with either oily fish, white fish, or shellfish.
Summary of the Evidence Synthesis: ASD-like traits or behaviors

• Three prospective cohort studies examined the relationship between maternal seafood intake during pregnancy and ASD-like traits or behaviors in children ages 3 to 9 years.
  • One study, conducted in a population with high seafood intake (~18 oz/wk) in Spain, found a protective association between total seafood and fatty fish intake during pregnancy and ASD-like traits or behaviors at 5 years of age.
  • Two other studies, conducted in European populations with a more moderate seafood intake during pregnancy, found no association between seafood intake during pregnancy and ASD-like traits or behaviors in children ages 3 to 9 years.
Insufficient evidence is available to draw a conclusion about the relationship between \textit{seafood consumption} during pregnancy and autism spectrum disorder (\textit{ASD})-like traits or behaviors or clinical diagnosis of \textit{ASD}.

\textbf{Grade not assignable: ASD}
Next Steps

1. Complete Evidence Portfolios & Conclusion Statements
   • **Seafood** during pregnancy and neurocognitive development (Developmental Domains)
   • **Seafood** during childhood/adolescence and neurocognitive development

2. Complete Screening & Extract Data
   • **Seafood** during childhood/adolescence and cardiovascular disease
   • **Dietary fats** and all-cause mortality

3. Begin Screening
   • **Dietary fats** and cardiovascular disease
   • **Dietary fats** and cancer
   • **Dietary fats** and neurocognitive development/health
## 2020 Dietary Guidelines Advisory Committee: Dietary Fats and Seafood

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- Linda Van Horn
- Regan Bailey
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