Ongoing activities in Risk-Benefit Assessment of Foods in Europe

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Outline

• Why estimate the Risk-Benefit balance of foods?
• What has been done before
• Major challenges and opportunities
• Current developments in RBA
• Perspectives
Why Risk-Benefit Assessment?

• Conflicting messages about food and health
• Incomplete (and uncertain) evidence
• Consumer: food choices?
• Health and food authorities
  – Support in risk management and consumer recommendations?
Why Risk-Benefit Assessment?

- **Decision-support tool** that assesses the combined beneficial and adverse health effects of foods in one integrated methodology
- **Nutrition, toxicology, microbiology, chemistry and human epidemiology**
- **Inform food safety policies or provide dietary advice based** – preventing food-associated diseases and promoting wellbeing of consumers
What has been done before?

- Inter-disciplinary projects
- Case studies
- Focused on one food or component
Remaining challenges and opportunities

- Focus on single **foods** – impact of **diets**
- **Variability** between individuals
- Adherence to **dietary advice**
- Risks and benefits **beyond health**
Remaining challenges and opportunities

- Focus on single **foods** – impact of **diets**
  - Overall beneficial effect of fish consumption
  - Increase consumption of fish – decrease of?
Remaining challenges and opportunities

• Focus on single foods – impact of diets
• Variability between individuals
• Adherence to dietary advice

More adults in the Nordic region have an unhealthy diet. (...) While Nordic children are better than adults at eating according to the official recommendations, social inequality related to diet has increased significantly among children.
Remaining challenges and opportunities

- Focus on single **foods** – impact of **diets**
- **Variability** between individuals
- Adherence to **dietary advice**
- Risks and benefits **beyond health**
Remaining challenges and opportunities

Challenges

- Focus on single **foods** – impact of **diets**
- **Variability** between individuals
- Adherence to **dietary advice**
- Risks and benefits **beyond health**

Opportunities

- Assessing impact of **substitution of foods**
- Individual/sub-group assessment
- Towards **personalized** nutrition and public health
- Integrating **sustainability** and **economy**

New data sources

Evolving methodologies
Current developments in RBA

• National RBA groups and projects

• Method development
  – Uncertainty and variability
  – Burden of disease of chemical hazards, risk assessment approach

• Health impact of substitution of foods

• Optimized personalized dietary recommendations
  – Foods, diets, preferences, non-health indicators

• International collaboration, exchange and capacity building
National RBA groups and projects

- Denmark
- France
- Sweden
- Italy
- Norway
- Portugal
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Géraldine Boué

Development of an integrative methodology of risk-benefit assessment in food considering its chemical, microbiological and nutritional components (J.M. Membré, J.P. Antignac (Laberca), S. Guillou)

On July the 4th, 2017, Géraldine Boué presented her research work:

Abstract

The objective of the present PhD project was to develop a conceptual and methodological framework to assess quantitatively the overall impact of food on human health, including microbiological, chemical and nutritional...
National RBA groups and projects

- Denmark
- France
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- Italy
- Norway
- Portugal

Article

Risks and Benefits of Increased Nut Consumption: Cardiovascular Health Benefits Outweigh the Burden of Carcinogenic Effects Attributed to Aflatoxin B1 Exposure

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The health of two people

During pregnancy many women start to think about their eating habits. Previously you have only needed to think about yourself.

Plan wisely and use leftovers

A simple way of improving the environment is to...
National RBA groups and projects

- Denmark
- France
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- Italy
- Norway
- Portugal
National RBA groups and projects

- Denmark
- France
- Sweden
- Italy
- **Norway**
- Portugal

VKM carries out risk assessments for the Norwegian Food Safety Authority and the Norwegian Environment Agency. Read more about VKM.
National RBA groups and projects

- Denmark
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Current developments in RBA

• National RBA groups and projects

• Method development
  – **Uncertainty** and **variability**
  – **Burden of disease of chemical hazards**

• Health impact of **substitution of foods**

• Optimized **personalized dietary recommendations**
  – Foods, diets, preferences, non-health indicators

• **International collaboration**, exchange and capacity building

Risk-Benefit Assessment

1. Identification of adverse effect(s)
2. Identification of beneficial effect(s)
3. Characterisation of adverse effect(s) (dose-response)
4. Exposure assessment
5. Characterisation of risk(s)
6. Integration of risk(s) and benefit(s)
7. Characterisation of beneficial effect(s) (dose-response)
8. Exposure assessment
9. Integration of benefit(s)

**Burden of disease**
Estimating the BoD chemical contaminants in foods

Polycyclic aromatic hydrocarbons (PAH):
carcinogenic contaminant formed during heat processed of foods

Barbecued meats

• What's the health impact?
• How much is too much?
• Does it vary between individuals?
Estimating the BoD chemical contaminants in foods

- To estimate the **burden of disease of PAHs** at the population level and sub-groups
- To estimate the **lifetime frequency of barbecuing** needed to reach an exposure of PAHs considered a **health concern**

Jakobsen et al., 2017
Estimating the BoD chemical contaminants in foods – PAHs in barbecued meat

Jakobsen et al., 2017
Quantifying the health effects of adherence to dietary guidelines - focus on substitution

Substitution?

- Fish vs meat
- Vegetables/pulses vs meat
- Whole grain vs refined carbohydrates
- Fruit vs. sugar/sweets
- Vegetable oils vs butter
Quantifying the health effects of adherence to dietary guidelines - focus on substitution

Substitution?

- Fish vs meat
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Quantifying the health effects of adherence to dietary guidelines - focus on substitution

- What is the overall health impact of replacing red and processed meat with fish in the diet of the Danish adult population (to reach an intake of 350 g of fish/week)?

<table>
<thead>
<tr>
<th>Age 15-75</th>
<th>Current intake (g/day)</th>
<th>Recommended (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>s.d.</td>
</tr>
<tr>
<td>Fish</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Meat (red+proc)</td>
<td>111</td>
<td>67</td>
</tr>
</tbody>
</table>

Thomsen et al., 2018
Quantifying the health effects of adherence to dietary guidelines - focus on substitution

Contaminants (e.g. dioxins, mercury)

Nutrients/health effects (e.g. EPA/DHA)
Quantifying the health effects of adherence to dietary guidelines - focus on substitution

Total DALY difference per 10,000

- Scenario 4: Tuna
- Scenario 3: Lean fish
- Scenario 2: Fatty fish
- Scenario 1: Fish preferences

Thomsen et al., 2018
Optimizing individual food consumption patterns in Denmark

Official dietary guidelines:

• 350 g fish/week, of which 200 g should be fatty fish

Population’s average fish intake:

• 222 g fish/week (120g fatty fish)

Standard deviation:

• 228 g/week
Optimizing individual food consumption patterns in Denmark

• To propose individual-specific, realistic and achievable fish intakes, meeting recommendations for nutrients and contaminants

  - 'Individual-specific': body weight and current intake
  - 'Realistic' and 'achievable': intake as close as possible to individual current intake

Persson et al., 2018
Optimizing individual food consumption patterns in Denmark

Feasible regions

**Women** (~70Kg)

**Men** (~85Kg)
Including sustainability

- *Towards a healthy, sustainable and safe dietary pattern*

- *Integral policy required, in which safety, health and sustainability are taken into account*

- Facts and figures about the *safety, health and ecological sustainability of diets* in the Netherlands

- Analysis of the dilemmas and opportunities for an *integrated food policy*
Addressing challenges

Overall conclusions:

• Develop, re-open case-studies
• Harmonize data bases
• International collaboration
International collaboration

International Network on Risk-Benefit Assessment of Foods

Terms of Reference

Background

Risk-Benefit Assessment of foods has developed over the last decades as an interdisciplinary tool for decision-support in the area of food and health. While substantial progress has been made in terms of method development and data integration, several challenges remain and various research groups work in parallel to improve methods and expand the discipline’s application.

The International Network on Risk-Benefit Assessment of Foods (RBA Network) provides a forum for sharing information and technical developments on the design and implementation of risk-benefit
International Workshop on Food Risk-Benefit Assessment – 21 & 23 May

INSA International Workshop on Food Risk-Benefit Assessment under the International project RiskBenefit4EU. 21 & 23 May 2018. Portugal

The risk-benefit assessment of foods is a valuable tool to estimate the overall impact of food on health, in order to underpin evidence-based...
Why does this matter?
Scientific, public health and socio-economic impact

- **Food authorities**
  - Inform policies to reduce health and economic burden of food-associated diseases

- **Industry**
  - Provide evidence for agri-food industry (innovation of food products/-ingredients, functional foods)

- **Consumers**
  - Support better and healthier food choices

- **Science**
  - Method development and dissemination
Risk-Benefit assessment at DTU

Making use of DK’s rich data banks

• Surveillance data
• Food contamination databases
• Dietary survey
• Toxicological data
• Health registries