Building capacity in risk-benefit assessment of foods: lessons learned from the RB4EU Project

Disclaimer

• This study was developed under the “RiskBenefit4EU – Partnering to strengthen the risk-benefit assessment within EU using a holistic approach” funded by EFSA Partnering Grants (Grant Agreement Number – GA/EFSA/AFSCO/2017/01 – GA02)

• This study only reflects the authors’ view and EFSA is not responsible for any use that may be made of the information it contains
Introduction

Papers published in Pubmed about “Food + Health” (in title and/or abstract)

Number of publications with «Food + Health»

- NUTRITION
- TOXICOLOGY
- MICROBIOLOGY
Introduction

• Our DIET, our FOODS consumed and all of their COMPONENTS... can contain at the same time different:

Nutrients
Microorganisms
Chemicals contaminants

Risk-Benefit Assessment (RBA):
Scientific evaluation of known or potential adverse/beneficial health effects resulting from human exposure to specified agents in food
Introduction

Adapted from (Boué et al. 2015)
Introduction

Within multidisciplinary team project

- Different languages
- Different scopes
- Different approaches

In terms of science

- Lack of biological knowledge
- Lack of multiple expertise
- Lack of data

- Lack of shared method

(Assunção et al. 2019)
(Eneroth et al. 2017)
(Nauta et al. 2018)
(Pires et al. 2018)
Outline

• Presentation of the RiskBenefit4EU project
• Activities organized
• Lessons learned
• Conclusions
Presentation of the RiskBenefit4EU project
Why Risk-benefit assessment in Portugal?

- Only risk-benefit questions related with fish and seafood consumption were addressed.
- Mainly dedicated to the nutritional and chemical components (not microbiology).
- Just few included probabilistic approaches and common health metrics.
- Within EU, risk-benefit assessment methodologies are far from being well established.

Portugal remained as a country that needed technical and scientific support to develop and implement RBA.
The RiskBenefit4EU project

- Project funded by EFSA under Partnering Grants (GP/EFSA/AFSCO/2017/01)

Knowledge transfer in Risk-Benefit Assessment
Objectives of the RiskBenefit4EU project

Gather, develop and harmonize approaches for risk-benefit problem-formulation and -solving

• Specific objectives:

1) to capacitate recipient partners on food RBA (risk-benefit assessment)
2) to develop RBA tools that can estimate the overall health effects of foods, food ingredients and diets
3) to develop a harmonized framework for RBA that can be applied to data from different countries
4) to validate the generated framework through the application to a case study
5) to disseminate and promote the harmonized framework to potential EU users
Case study of the RiskBenefit4EU project

- **Objective**: Apply the theory and develop tools with a case study on cereal-based foods in Portugal
- **Context**: young children are eating cereals that are not intended to be eaten by that subgroup
  
  Food = Infant cereals / breakfast cereals
  
  Population = young children (6 months - 3 years old) in Portugal

What would be the health impact of replacing the consumption of Breakfast Cereals by Infant Cereals (and the opposite) compared with the current situation in Portugal by children 6 months - 3 years old?
Data of the RiskBenefit4EU project

Microbiological contaminants

Chemical contaminants
(Mycotoxins)

Consumption data:
information on food consumption
The RiskBenefit4EU project

Capacity building triangle on risk-benefit assessment of foods (RBA)

(Assunção et al. 2019)
Activities organized
Main activities

- **Training**
  (where project partners will transfer and exchange knowledge)

  - 2 trainings organized
    - International Workshop on Food Risk-Benefit Assessment

- **Research**
  (framework development and its application to a case study)

  - **RBA case study**

- **Dissemination and promotion activities**
  (through web-site dissemination, publications and international conference organization)

  - Website, Publications and conferences
    - [https://riskbenefit4eu.wordpress.com/](https://riskbenefit4eu.wordpress.com/)
Capacity building activities

• Training activities
  • 2 Trainings (2017/2018), Lisbon, INSA
    ✓ 1 week in May 2017
    ✓ 1 week in October 2018
  • Framework development & validation with a case-study
  • Short-term scientific missions of 1 week
    ✓ 1 week in February 2019 at INRA
    ✓ 1 week in March 2019 at DTU
Trainings organisation and content

TRAINING 1 ➔ Be able to perform a qualitative Risk-Benefit Assessment (RBA)

- Brainstorming sessions on concepts (Assunção et al. 2019)

<table>
<thead>
<tr>
<th>Key terms and definitions agreed among team members of the RB4EU project.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard</strong></td>
<td>A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect upon exposure.</td>
</tr>
<tr>
<td><strong>Health effect</strong></td>
<td>A change in morphology in the human body, or physiology, growth, development, reproduction or life span of humans that results in a change of human health status.</td>
</tr>
<tr>
<td><strong>Adverse health effect</strong></td>
<td>Implies that the health effect reduces quality of life or causes a loss of life.</td>
</tr>
<tr>
<td><strong>Beneficial health effect</strong></td>
<td>Implies that the health effect increases quality of life, prevents a reduction in quality of life, or prevents loss of life (often equivalent to the prevention of an adverse health effect).</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>A function of the probability of an adverse health effect and the severity of that effect, consequential to exposure to a hazard in food or consumption of a food or diet.</td>
</tr>
<tr>
<td><strong>Benefit</strong></td>
<td>A function of the probability of a beneficial health effect and the consequences of that effect and/or the probability of a reduction of an adverse health effect, consequential to exposure to a compound in food or consumption of a food or diet.</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td>A state of complete physical, mental, emotional? and social well-being and not merely the absence of disease or infirmity.</td>
</tr>
<tr>
<td><strong>Health impact</strong></td>
<td>The magnitude of the overall difference in health status due to a change in exposure to a food compound or consumption of a food or diet, which may be expressed in a composite health metric, but can also be a combination of metrics.</td>
</tr>
</tbody>
</table>

27/09/2019
Trainings organisation and content

TRAINING 1 ➔ Be able to perform a qualitative Risk-Benefit Assessment (RBA)

- Brainstorming sessions on concepts
- Background informations: RA in toxicology, nutrition and microbiology, Variability, uncertainty, deterministic and probabilistic approaches
- RBA Stepwise approach
  - Problem and scenarios definition
  - Health effects identification and selection
  - Individual assessment of risks and benefits
  - Health impact quantification
  - Scenarios comparison
Trainings organisation and content

TRAINING 2 → Application of RBA concepts to the project case study

- Analysis of RBA Examples (RBA papers)
- Definition of a RBA Protocol
- Working groups on the case study
The RBA case study protocol

• Developed during a mobility at EFSA, inspired from the Prometheus project

• Define a plan, as usually done for experimentation

• Investment to facilitate and organize the case study performance
The RBA case study protocol

Risk-Benefit Assessment Needed

1st-PLAN

Question 1

Question 2

Question 3

Question n

... 

2nd-DO

Carry out the RBA
The RBA case study protocol
Lessons learned
Lesson #1: Build a shared language within the team

Fields of expertise of the team

- Agronomy Engineer
- Chemical Engineering
- Clinical Analysis and Public Health
- Food Industry Technology
- Nutrition and Food Technology
- Biology
- Veterinary Medicine

Brainstorming session to define: hazard, health effect, adverse health effect, beneficial health effect, risk, benefit, health and health impact
Lesson #2: Learn basis used in RBA (to all participants)

To create a common scientific culture and understanding of all individual fields of research and methods used in RBA.
Lesson #3: Become familiar with stepwise RBA approach

- Explanation of all different key steps
- Illustrated with RBA case studies/examples already published

(Assunção et al., 2019) (Boué, 2017)
Lesson #4: Initiate a case study performed by the team

- Use all individuals expertise in a concrete RBA case study
- Practice with the definition of a specific RBA public health question
- Definition of a RBA case study protocol to organize the work in interconnected working groups
Lesson #5: Build a team including

- Experienced researchers in RBA
- Experts eager to perform the RBA case study

- Avoid starting from scratch
- Build on previous work
- Share and improve a harmonized Risk-Benefit approach at the international scale
Paper in Trends in Food Science & Technology

Review

Building capacity in risk-benefit assessment of foods: Lessons learned from the RB4EU project

Ricardo Assunção, Paula Alvito, Roberto Brazão, Paulo Carmona, Paulo Fernandes, Lea S. Jakobsen, Carla Lopes, Carla Martins, Jeanne-Marie Membré, Sarogini Monteiro, Pedro Nabais, Sofie T. Thomsen, Duarte Torres, Silvia Viegas, Sara M. Pires, Géraldine Boué

*Food and Nutrition Department, National Institute of Health Dr. Ricardo Jorge (INSA), Portugal
**CESAM, Centre for Environmental and Marine Studies, University of Aveiro, Portugal
***Economic and Food Safety Authority (ASAE), Portugal
****Division for Diet, Disease Prevention and Toxicology, The National Food Institute, Technical University of Denmark, Denmark
*****EPIC – Institute of Public Health, University of Porto, Portugal
******Department of Public Health and Forensic Sciences and Medical Education, Epidemiology Unit, University of Porto, Portugal
*******National School of Public Health, NOVA University of Lisbon, Portugal
********SECAILM, INRA, Oniris, Université Bretagne Loire, France
*********Faculty of Nutrition and Food Sciences, University of Porto, Portugal
CONCLUSIONS
Within multidisciplinary team project

- **Different languages**
  - Find a common one

- **Different objectives:**
  - define it together

- **Different approaches**
  - Understand

- Continue to be inspired by the Risk Assessment area
- Fed from past and current RBA development (EFSA colloquiums, BRAFO project, case studies...)
- Build and share a common Risk-Benefit culture
References


