General introduction into risk-benefit of food and nutrition

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RISK ANALYSIS: FUNCTIONAL AND INSTITUTIONAL SEPARATION

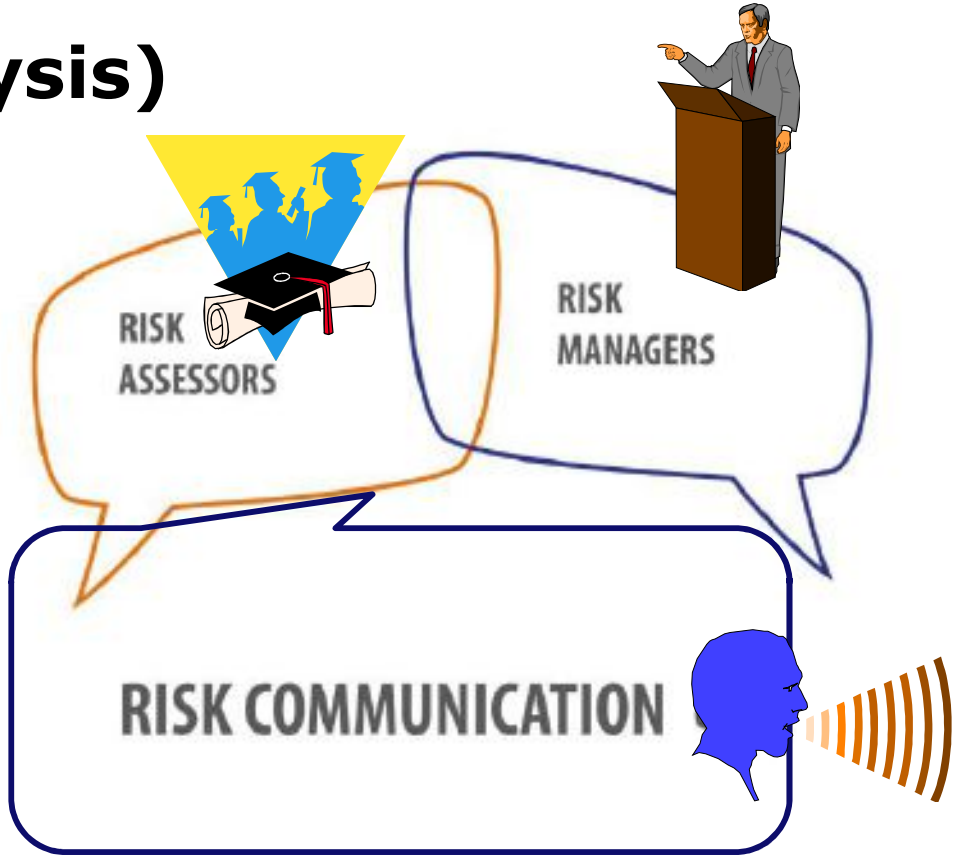
- **Risk Assessment**

(scientific advice and analysis)

- **Risk Management**

(regulation and control)

- **Risk Communication**



Risk-Benefit: same separation between assessment, management and communication

"LIFE WOULD BE PRETTY DULL WITHOUT RISK"

"voluntary risk taking and its pleasures"*

- **Three dominant discourses:**

1. **Self improvement**
2. **Emotional engagement**
3. **Control**

*Lupton & Tulloch, Health, Risk and Society, 4 [2002] 113-124

"LIFE WOULD BE PRETTY DULL WITHOUT RISK"

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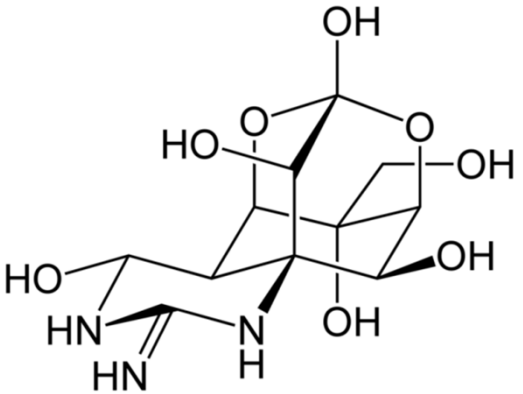


Pufferfish (fugu)

Gall bladder: tetrodotoxin

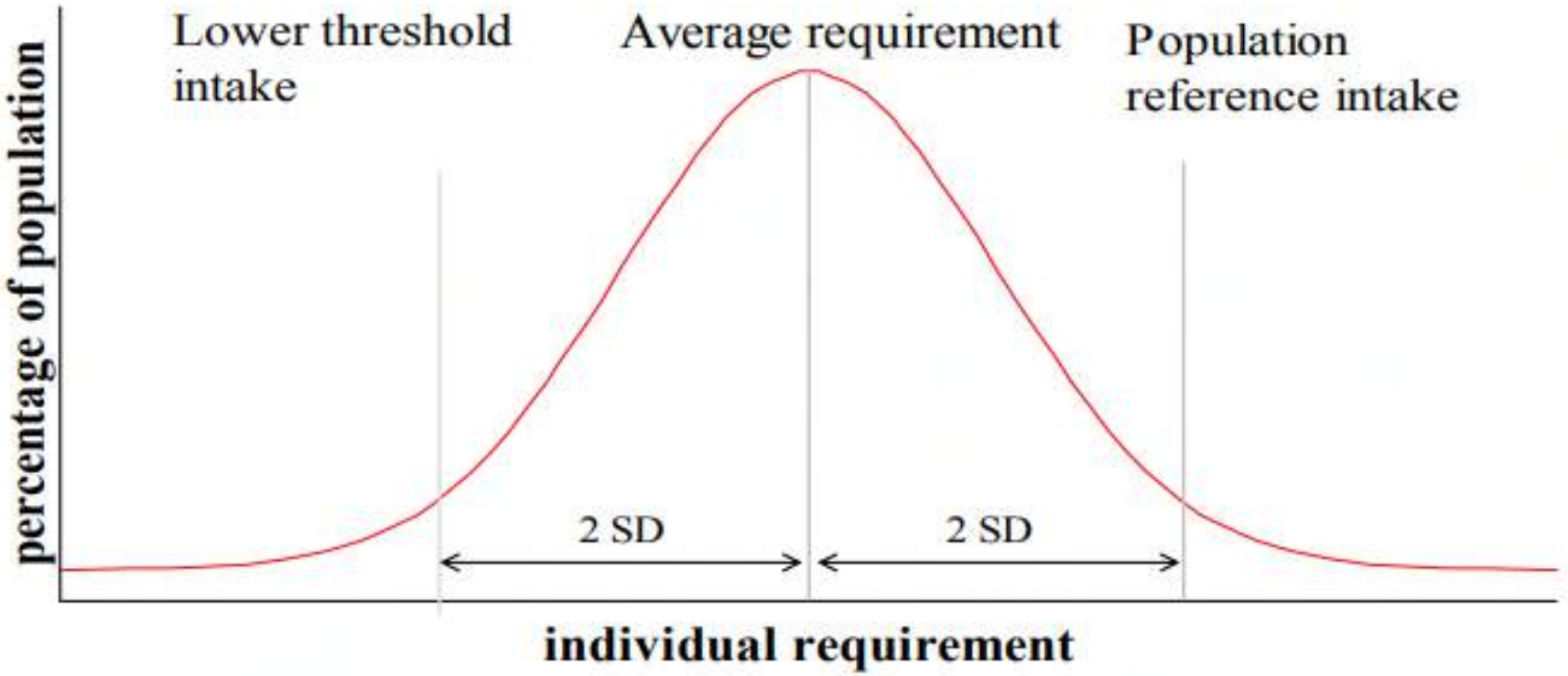
(neurotoxin)

Emerging risk: *Vibrio spp* in Northern Waters and detection of tetrodotoxin in European bivalves (UK, NL, BE) → EFSA 2017 Opinion

CHEMICALS IN FOOD

- Contaminants
- Additives
- Pesticides
- ….
- Natural toxins
- Non-nutrients
- Macronutrients
- Micronutrients
- ….

DIETARY REFERENCE VALUES



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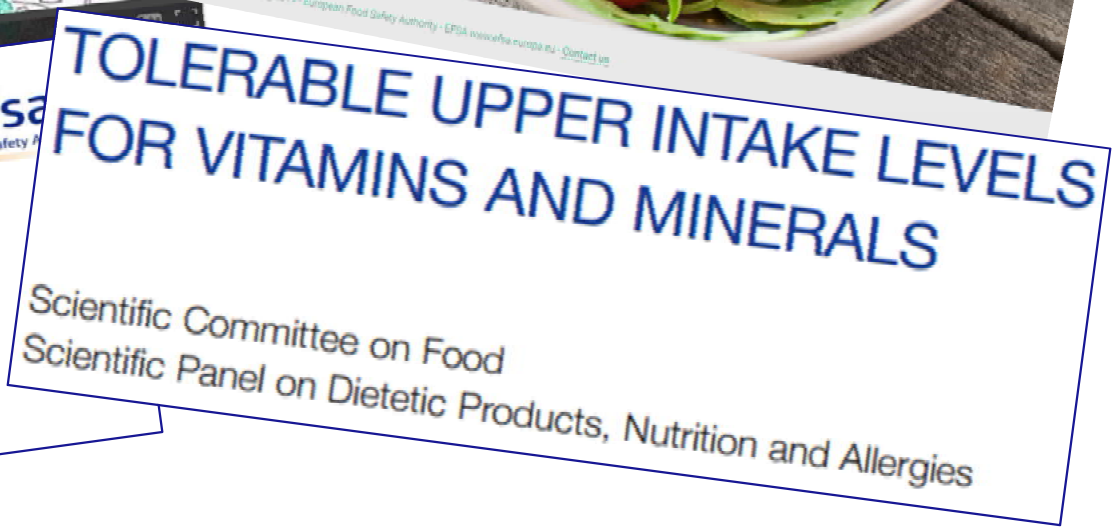
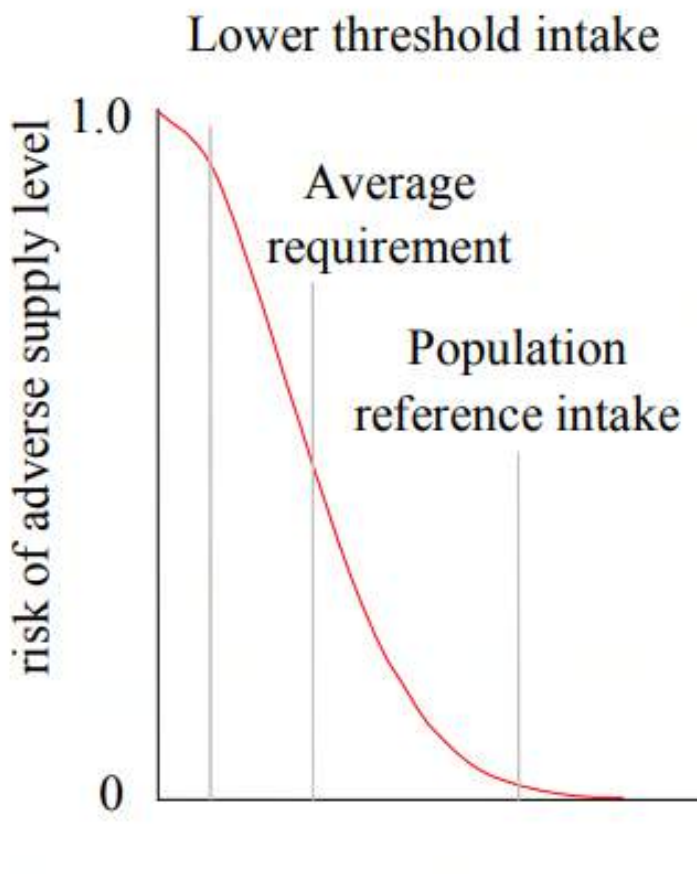
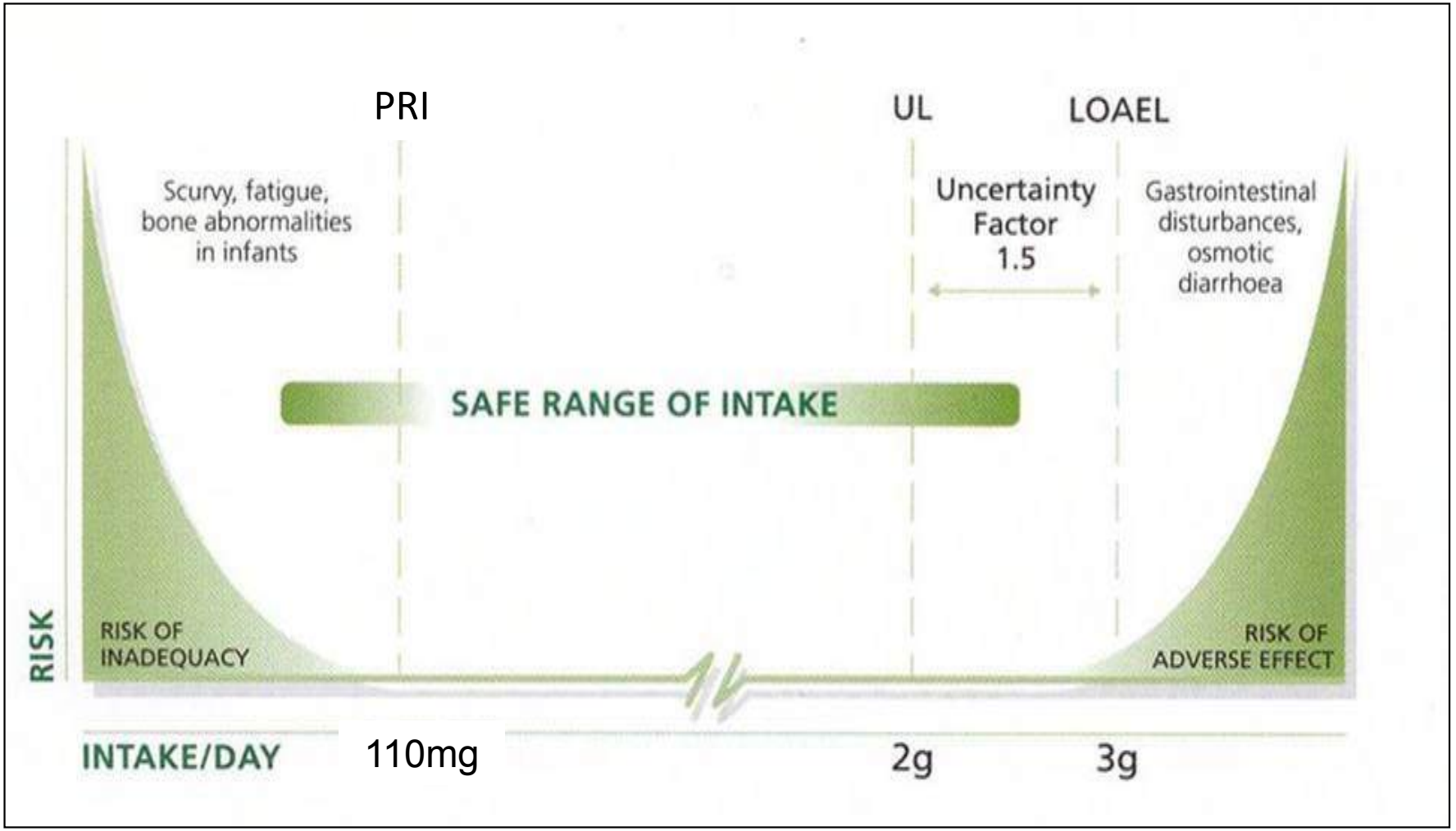


TOLERABLE UPPER INTAKE LEVELS

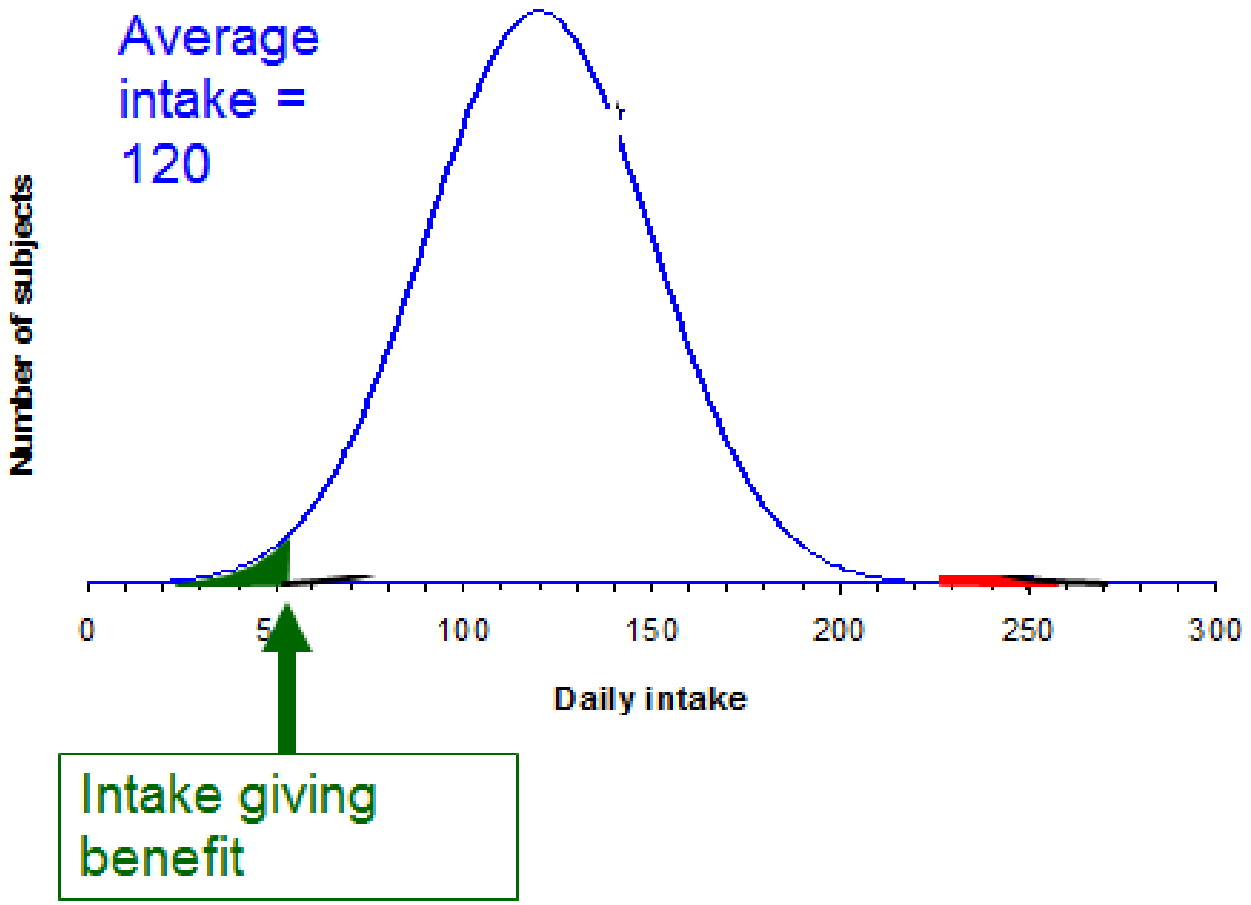


Example: vit C

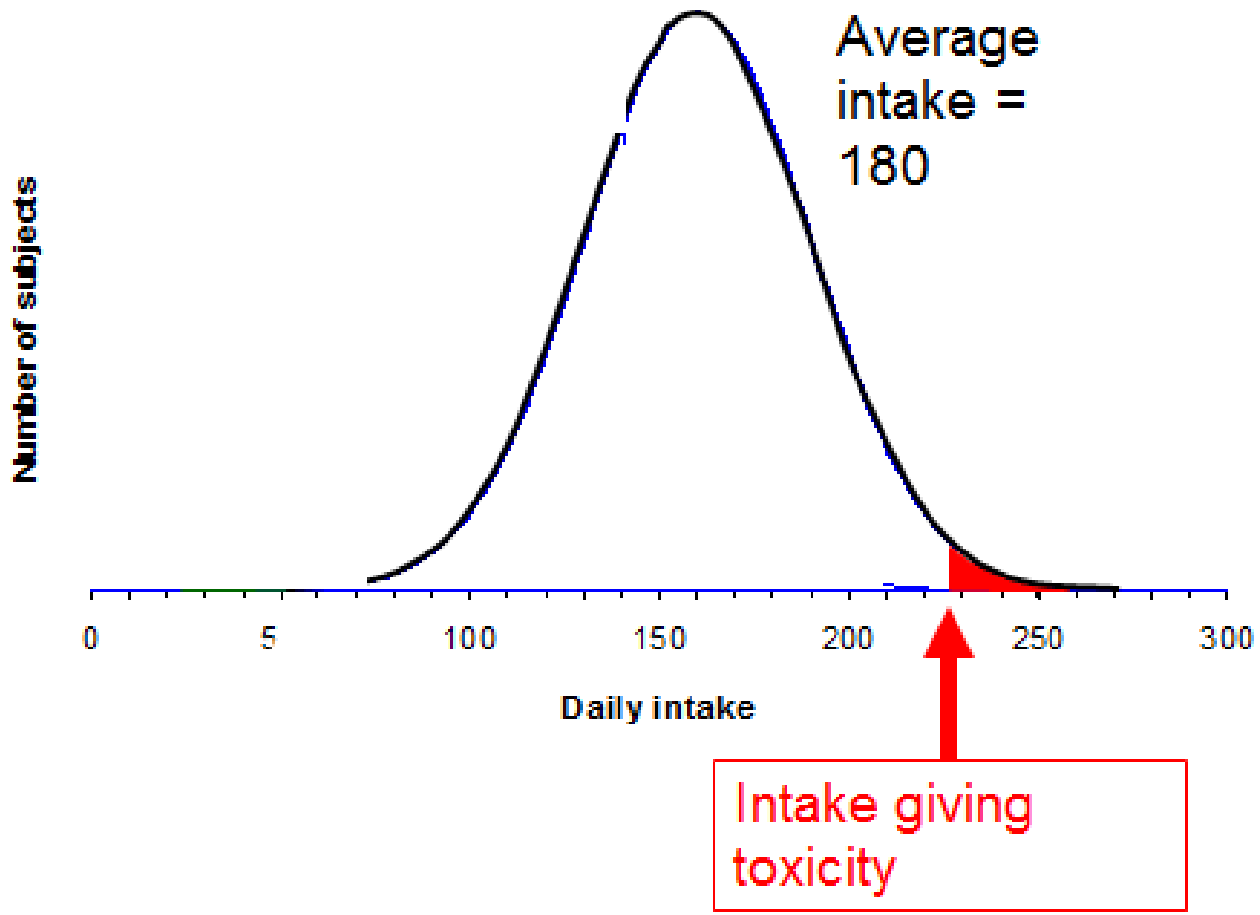


Source: ERNA

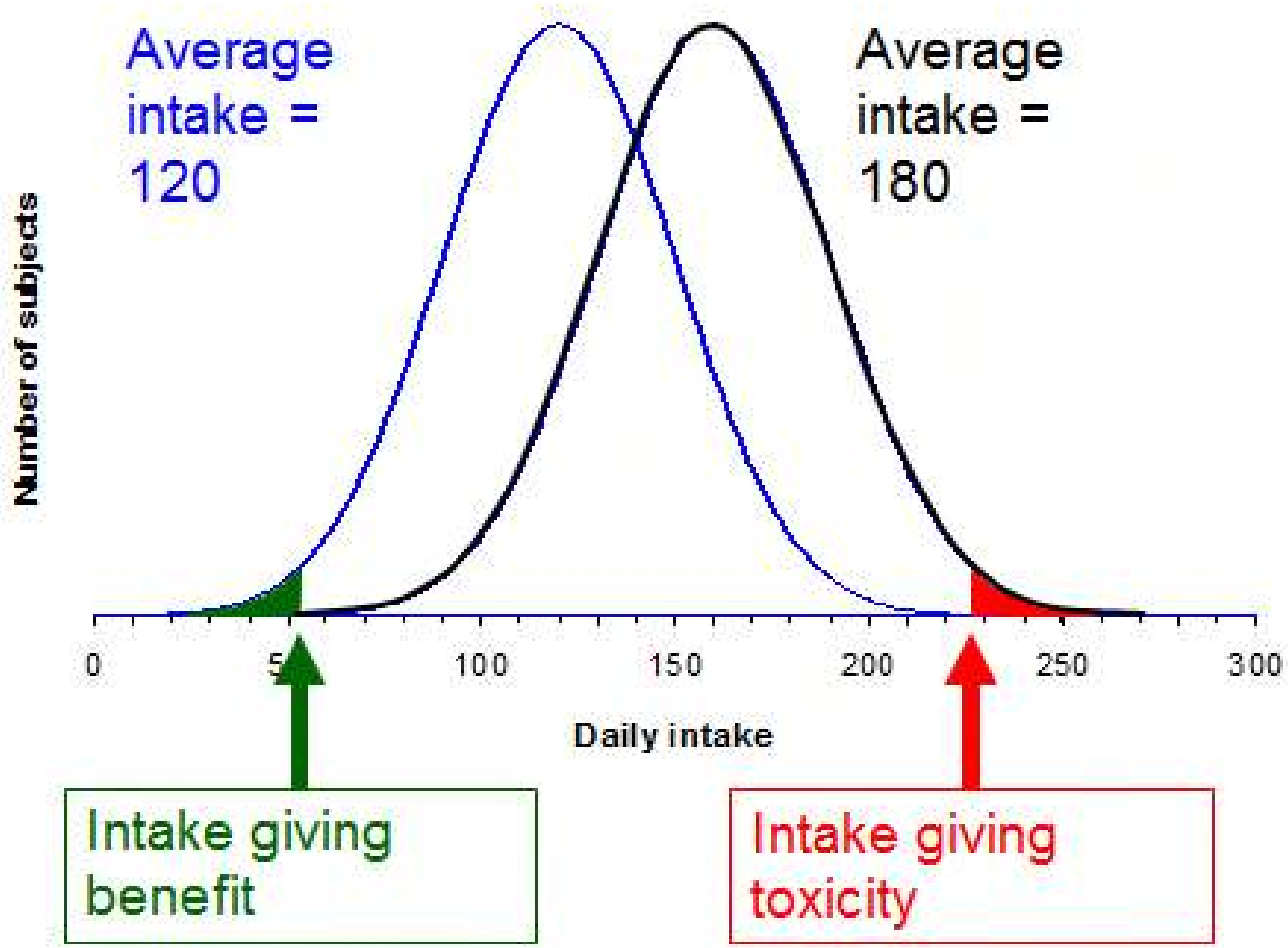
Population distribution *versus* intake



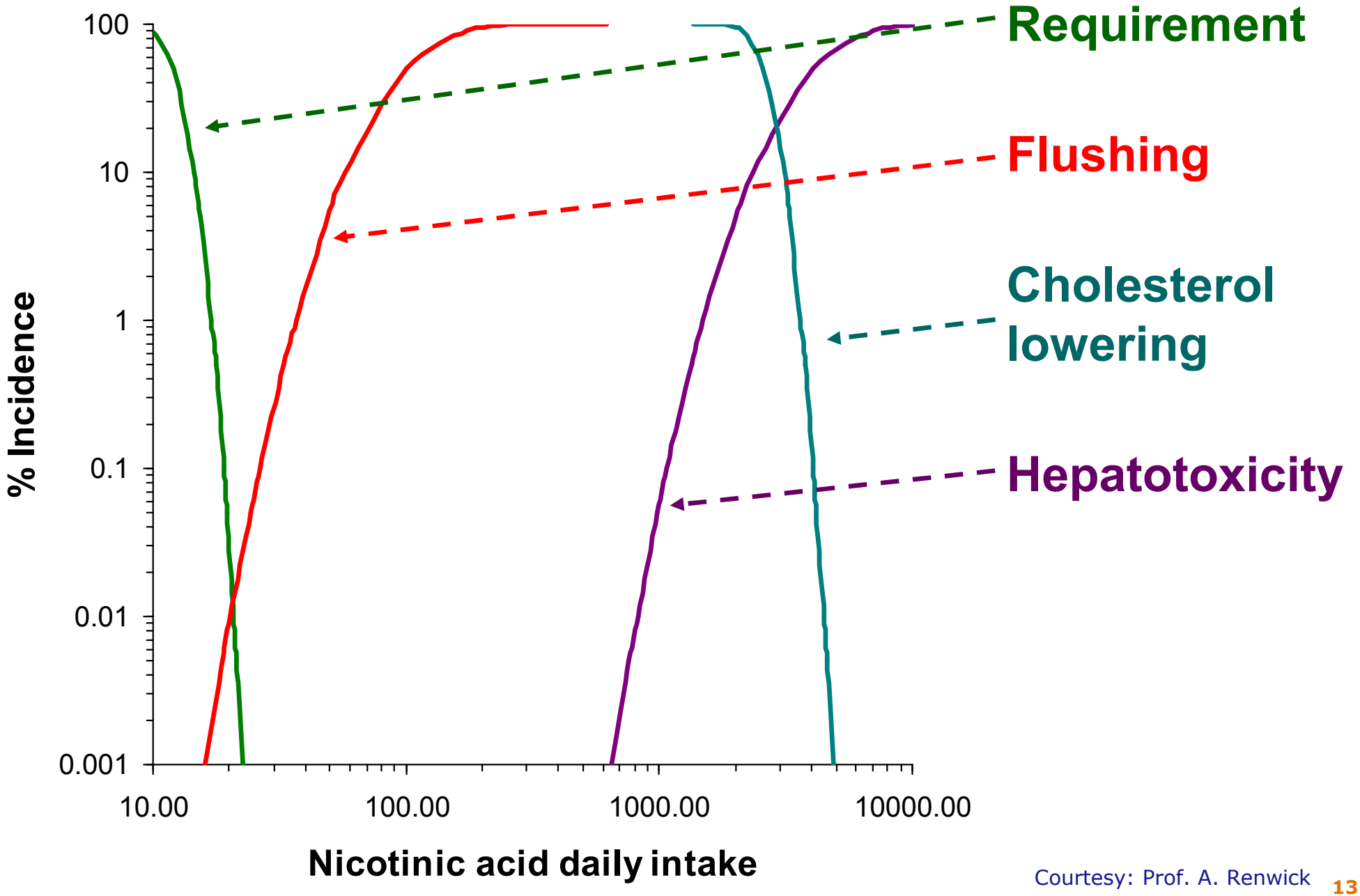
Population distribution *versus* intake



Population distribution *versus* intake



RISK-BENEFIT – NICOTINIC ACID



Courtesy: Prof. A. Renwick

FOLIC ACID FORTIFICATION OF FLOUR

Available online at www.sciencedirect.com
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Food and Chemical Toxicology 46 (2008) 893–909
Food and Chemical Toxicology
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Integrated risk–benefit analyses: Method development with folic acid as example

Jeljer Hoekstra *, Janneke Verkaik-Kloosterman, Cathy Rompelberg, Henk van Kranen, Marco Zeilmaker, Hans Verhagen, Nynke de Jong

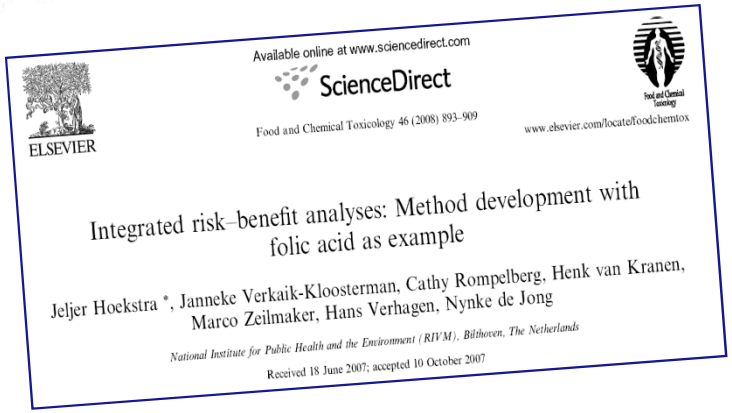
National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

Received 18 June 2007; accepted 10 October 2007

- Neural Tube Defects (benefit)
- Masking B12-deficiency (risk)
- Colorectal Cancer (benefit and risk)
- Folate deficiency (benefit)

Public health effects of fortification at 70 µg per 100 g of flour

	Incidence (#)
Neural tube defects	- 83
B_{12} deficiency	53
Colorectal Cancer	- 405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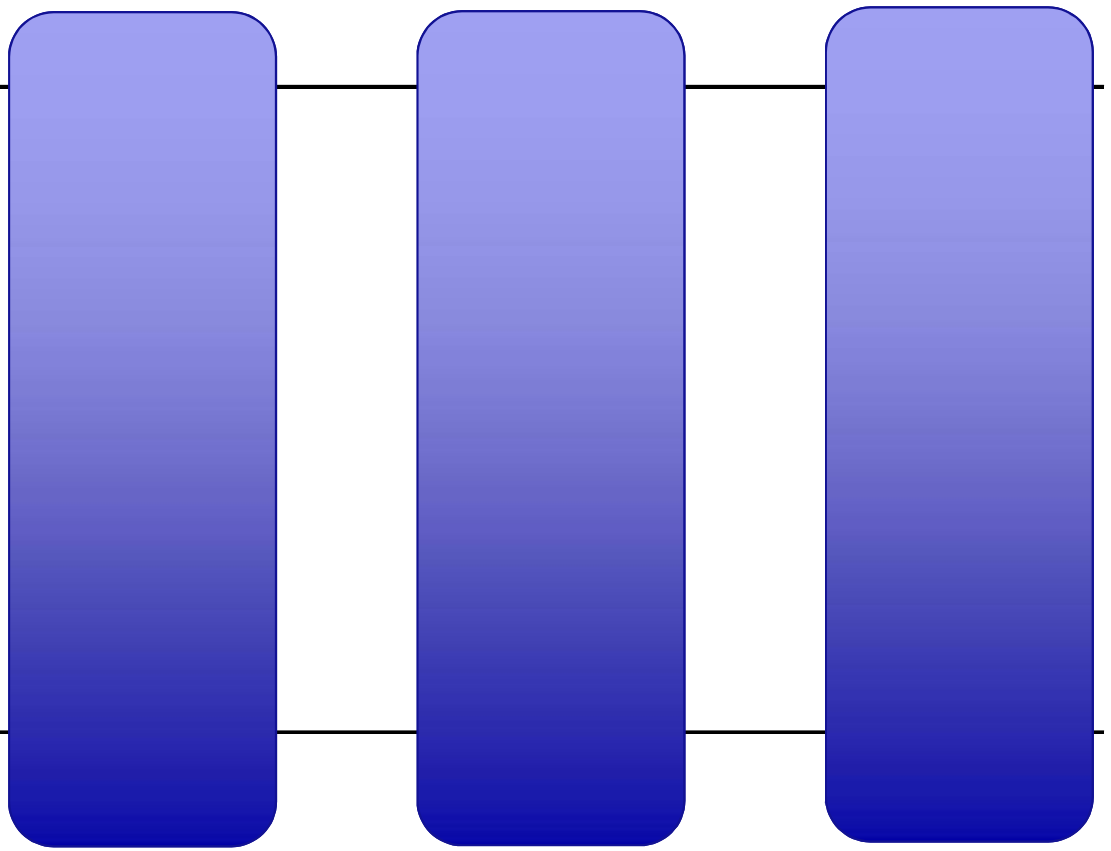
FOLIC ACID FORTIFICATION OF FLOUR

Public health burden (DALYs)

	70 µg
NTD	5474
B12	-53
CRC	2217
Total	7662



FOLIC ACID FORTIFICATION OF FLOUR

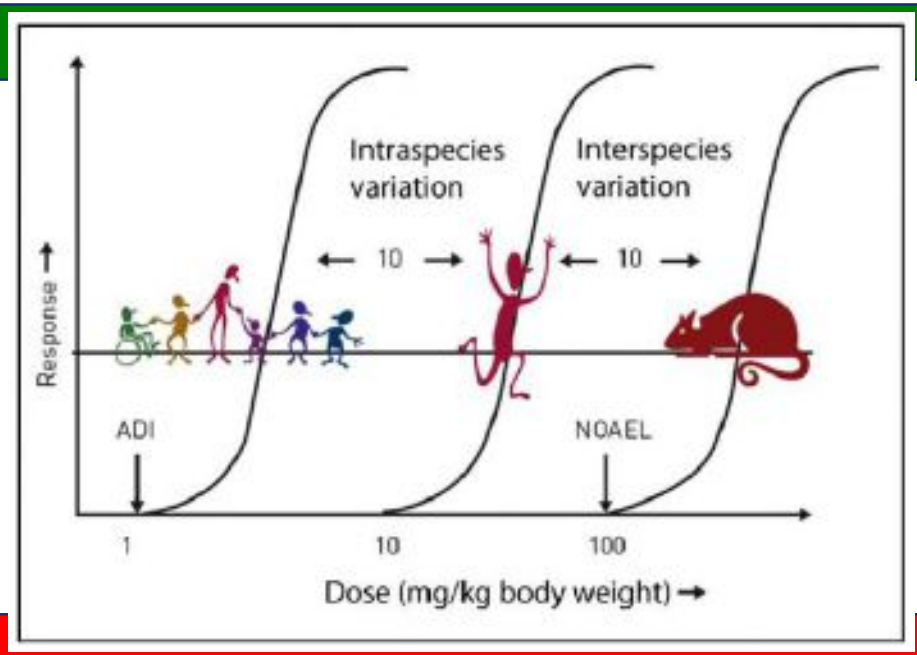
Public health burden (DALYs)

	70 µg	140 µg	280 µg	420 µg
NTD	5474	7710	9812	10855
B12	-53	-76	-120	-165
CRC	2217	4146	167	-21740
Total	7662	11812	9899	-11006

PARADIGM SHIFT

Nutrition / epidemiology: effective dose levels

(minimum effective dose ….to elicit an effect)

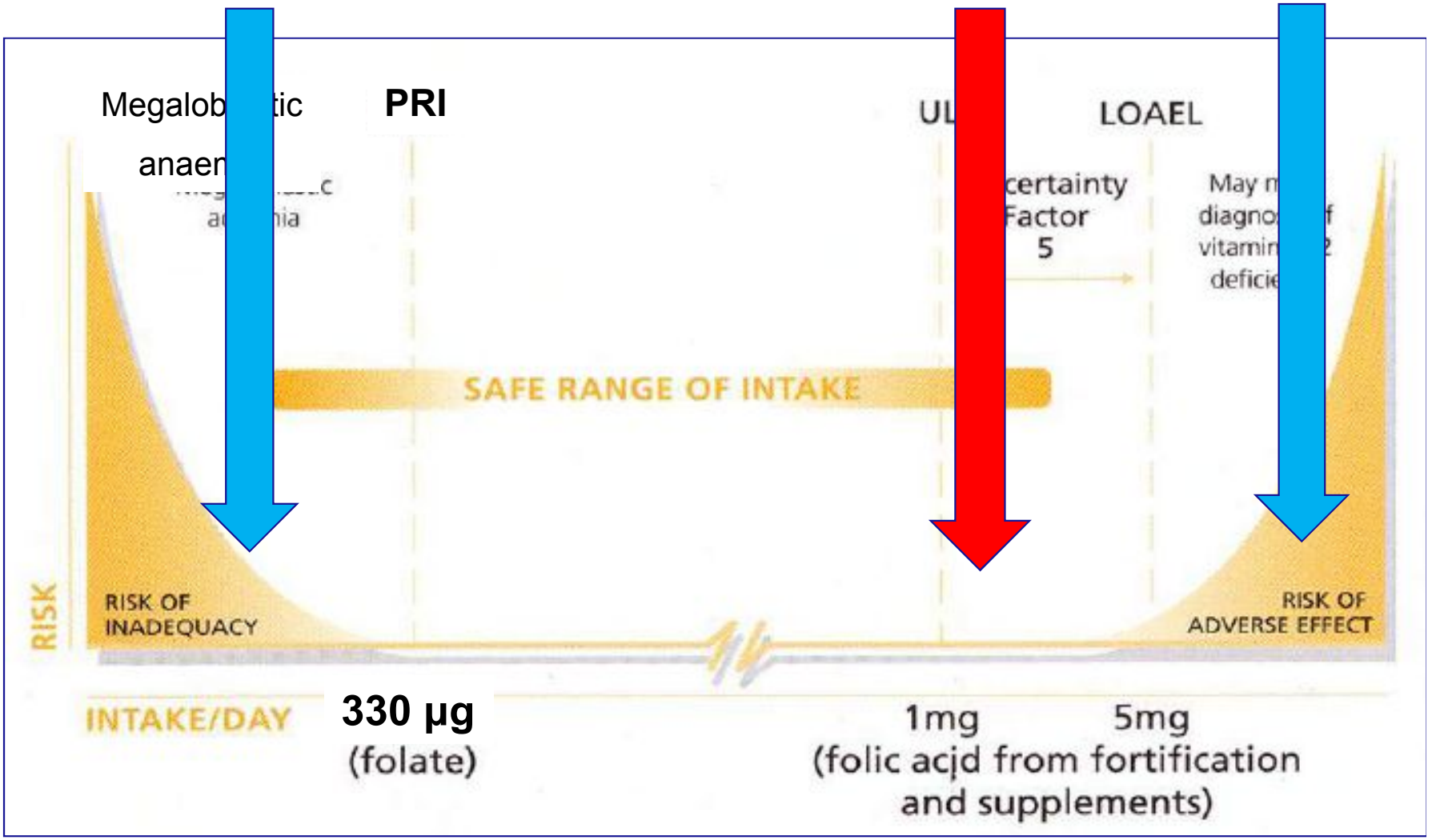


Toxicology: ineffective (= safe) dose levels

(point of departure/reference point = no effect / safety factor)

RISK-BENEFIT ASSESMENT

Compare effects with effects



Beneris

QALIBRA

efsa
European Food Safety Authority

BRAFO

Best Practises for Risk - Benefit Analysis of Foods (BEPRARIBEAN)

BENEFIT-RISK ANALYSIS
Safe FOOD Era

Best Practises for Risk - Benefit Analysis of Foods (BEPRARIBEAN)

Risk not accepted

Food and nutrition

Risk accepted

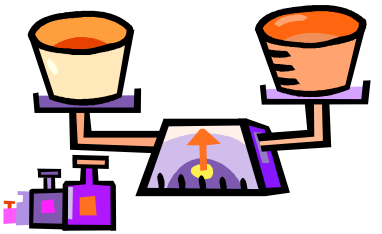
Medicine

Risk a neccesity

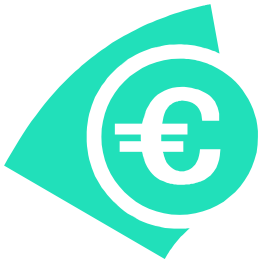
Economics and Marketing-Finance

Risk – Benefit characteristics

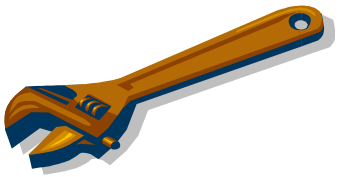
1. Problem formulation: at least 2 scenario's



2. A common currency to describe the health impacts



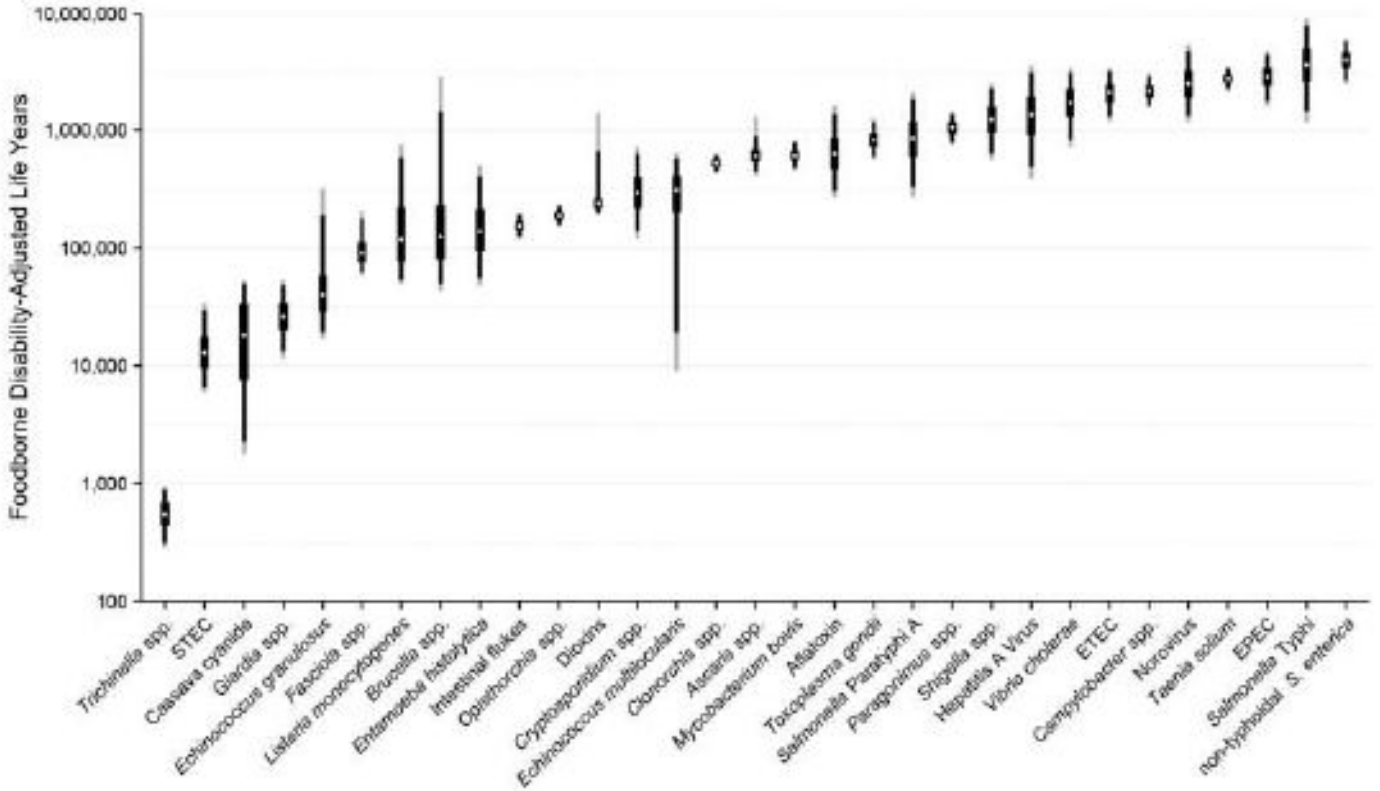
3. Tiered approach



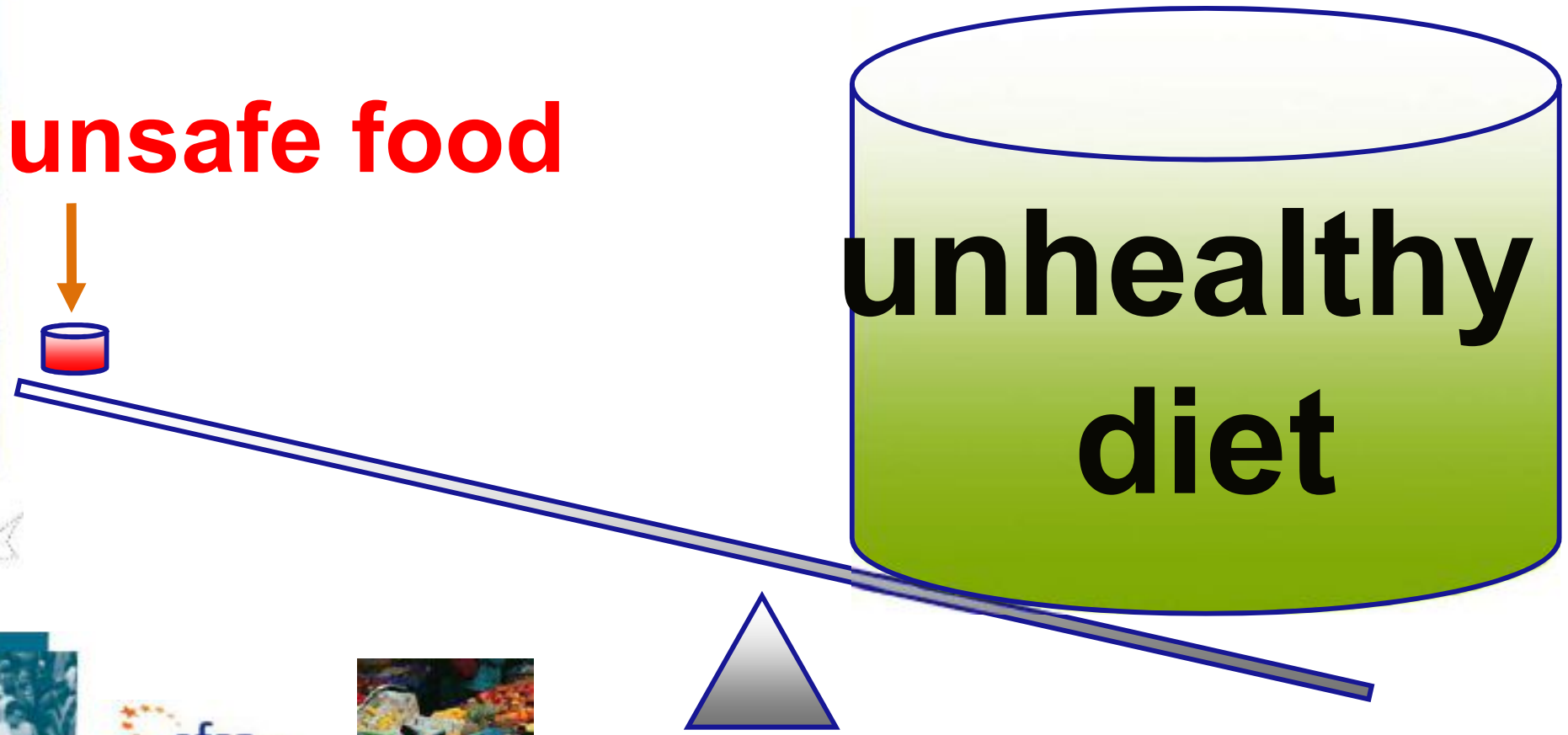
RISK-BENEFIT & RISK RANKING & RISK-RISK

RISK-BENEFIT & RISK RANKING & RISK-RISK

Ranking of foodborne hazards-global DALYs



RISK-BENEFIT & RISK RANKING & RISK-RISK



2004/2006

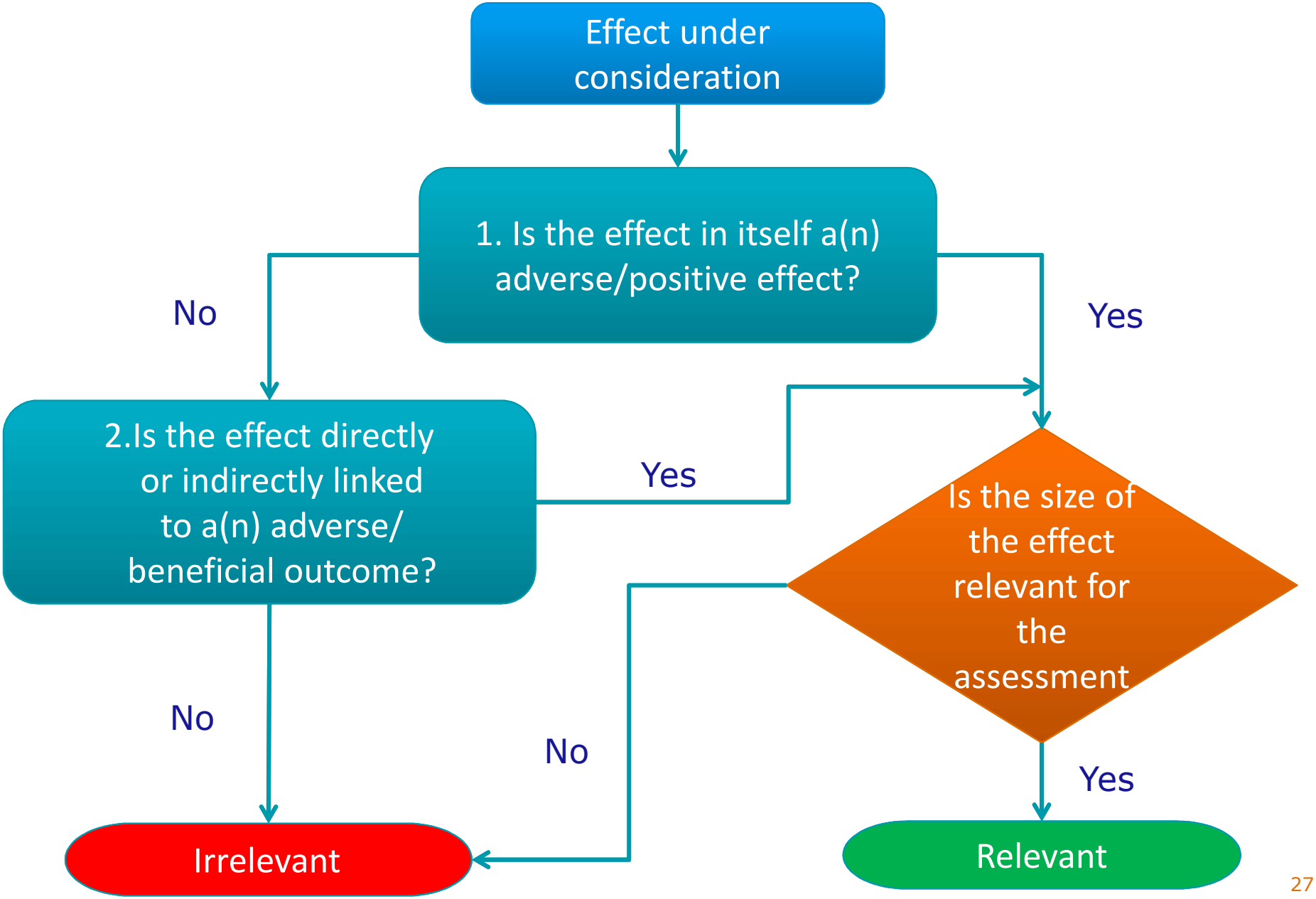
RISK-BENEFIT & RISK RANKING & RISK-RISK

Comparing health loss and potential health gain by healthy diet and unsafe food in the Netherlands

Factor	DALY's / year	Deaths / year	Cases / year
Diet composition #	245,000	13,000	ca. 40,000
Bodyweight	215,000	7,000	ca. 40,000
Healthy diet	> 350,000		
Micro-organisms	1,000-4,000	20-200	300-750 x10^3
Allergens	ca. 1,000	< 1	ca. 32,000
Chemicals	500-1,000	100-200	200-300
Food safety	2,500-6,000		

dietary composition (5 factors)

BIOLOGICAL RELEVANCE



WEIGHT OF EVIDENCE APPROACH

Three basic steps of weight of evidence assessment

Integrate the evidence

Weigh the evidence

Assemble the evidence

WEIGHT OF EVIDENCE CONCLUSION

Assess consistency across lines of evidence

Assess the relevance and reliability of each line of evidence

LINES OF EVIDENCE

Identify, filter and organise the evidence

Includes preliminary consideration of relevance and reliability

AVAILABLE INFORMATION

UNCERTAINTY IN RISK ASSESSMENT

Uncertainty? Don’t scientists know everything?

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: dd mmmm yyyy
PUBLISHED: dd mmmm yyyy
AMENDED: dd mmmm yyyy
doi:10.2903/j.efsa.20YY.NNNN

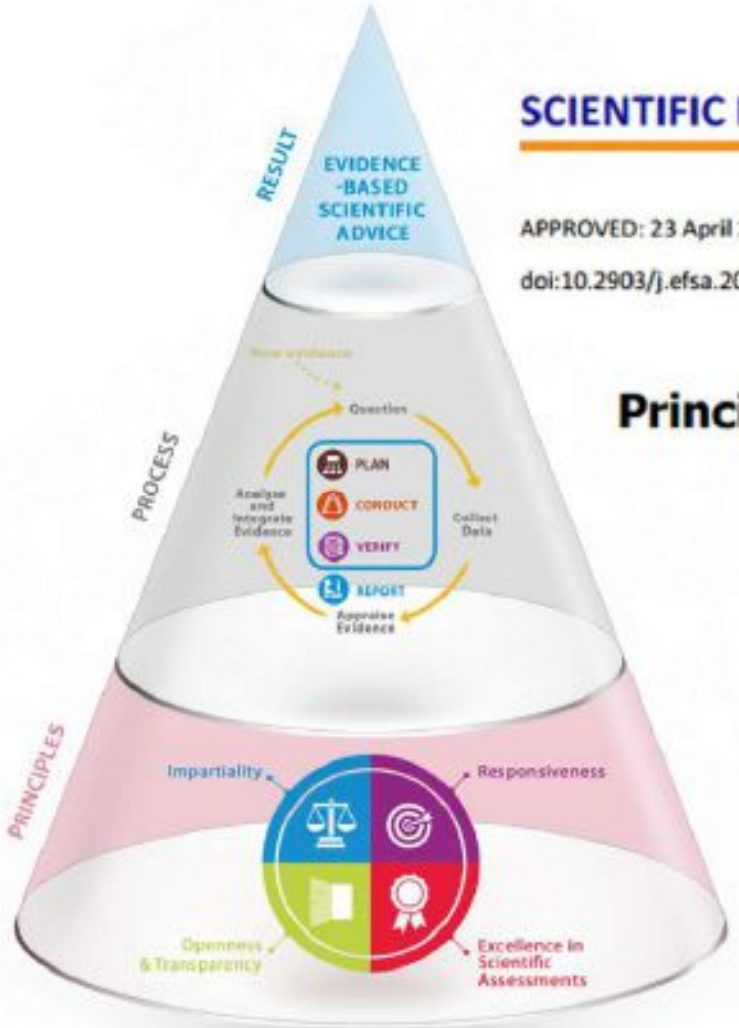
Guidance on Uncertainty in EFSA Scientific Assessment

EFSA Scientific Committee[1, 2]

European Food Safety Authority (EFSA), Parma, Italy

PROMETHEUS

PROmoting METHods for Evidence Use in Scientific assessments



SCIENTIFIC REPORT

EFSA Journal

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doi:10.2903/j.efsa.2015.4121

Principles and process for dealing with data and evidence in scientific assessments

European Food Safety Authority (EFSA)

“Life would be pretty dull ..... without risk - benefit”

Thank you ☺