

Risicobeoordeling door EFSA

Bijdrage en verantwoordelijkheden
van een wetenschappelijk Panel

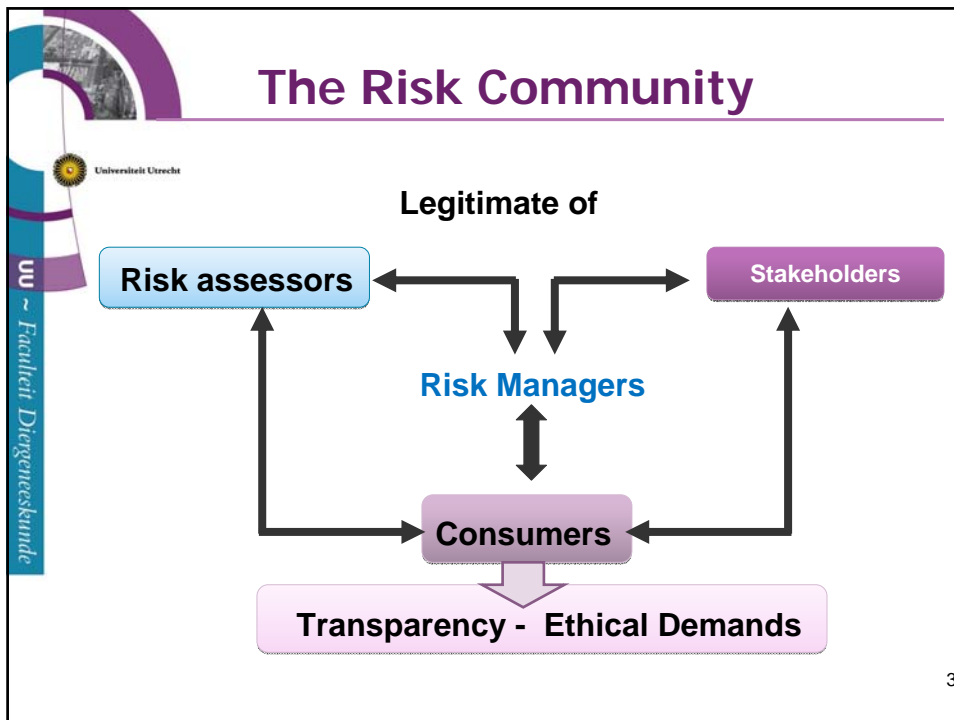
CONTAM

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Risicobeoordeling



How to speak the same language?
Definitions and Terms of Reference

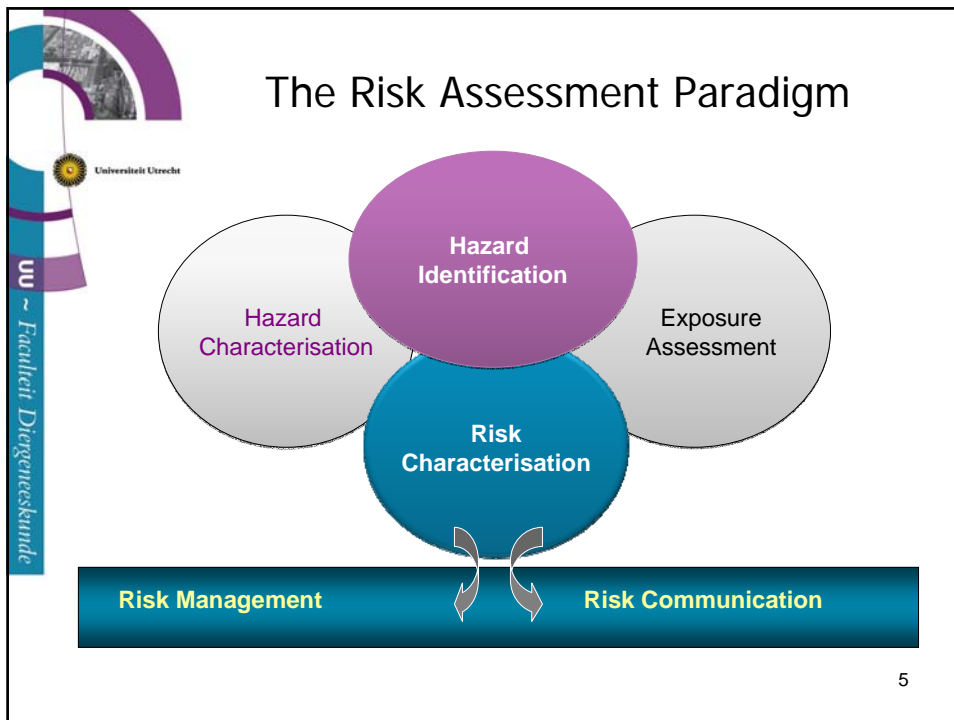


Different scenario's

<p>Intentially used production aids</p> <p>Premarketing approval</p> <p>Standardized toxicological testing OECD protocols (validated protocols)</p> <p>Risk management objectives</p> <p>RISK AVOIDANCE</p>	<p>Contaminants</p> <p>Heavy metals Natural toxins Pollutants</p> <p>Non-standardized testing (NTP testing)</p> <p>Risk management</p> <p>RISK REDUCTION: taking into account the entire food basket</p>
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Precautionary Principle

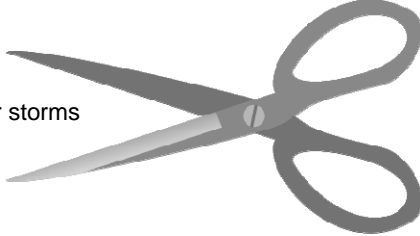
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Hazard Identification

The identification of a risk source capable of causing adverse effects

Can be anything : from thunder storms
– to household scissors



Identification of the type and nature of adverse health effects:

in vitro toxicological studies

Human studies

structure-activity modeling

Animal-based toxicological studies

Hazard Characterization

The quantitative or semi-quantitative evaluation of the nature of the adverse health effects to humans, animals, or the environment following exposure to a risk source(s)



Hazard characterization requires a dose – response assessment

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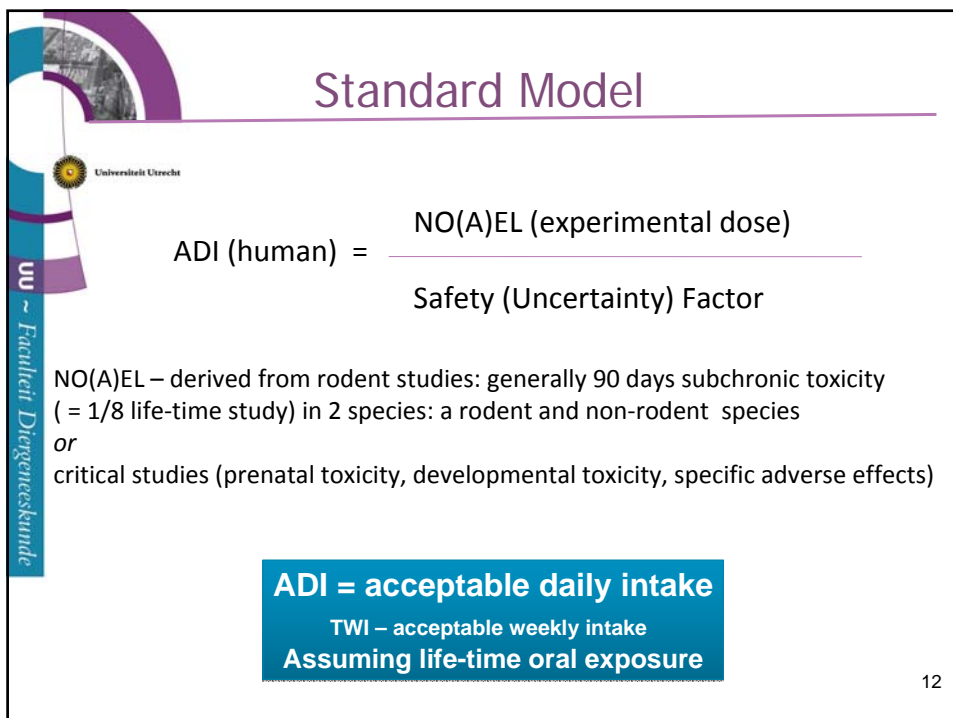
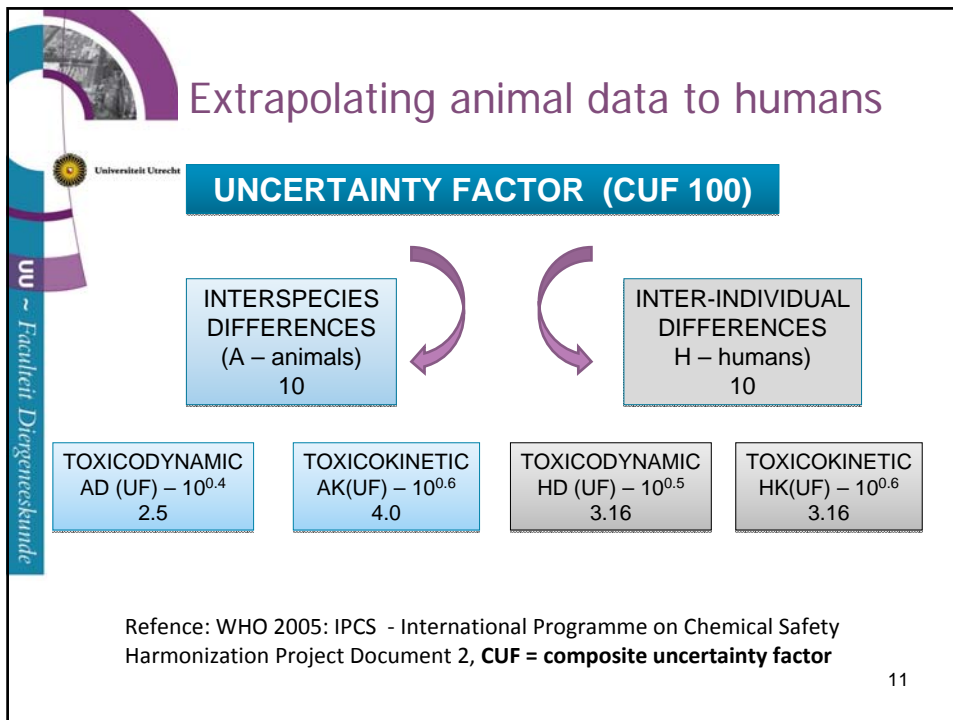
Dose-Response Assessment

The determination of the relationship between the magnitude of exposure to risk source(s) [DOSE] and the magnitude or frequency and/or severity of associated adverse effects [RESPONSE]



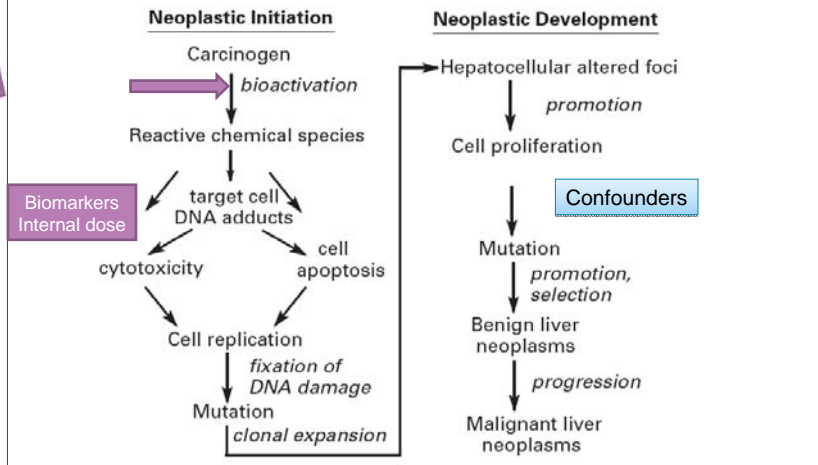
Analysis of the dose-response curve

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Carcinogenic compounds

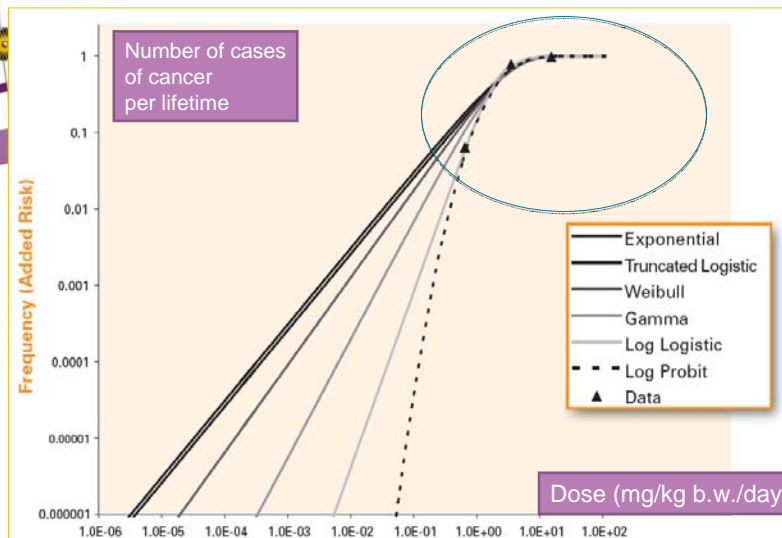
Process of Chemical Carcinogenesis by DNA-reactive Carcinogens



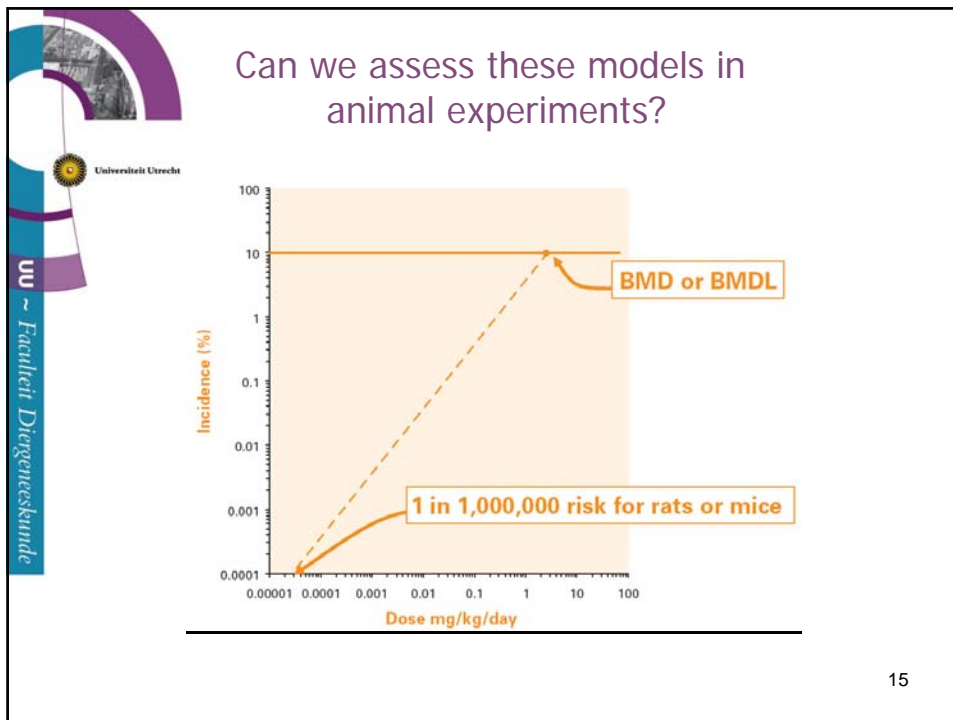
Genotoxic carcinogens

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From acute to chronic – from high to low doses: Mathematical models



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- ## Conclusions
- Stochastic model suggest a threshold also for genotoxic carcinogens
 - Mathematical models seem to overestimate the risk (selection of critical data sets)
 - Very large (cost-intensive) animal experiments would be needed to simulate human cancer incidence (dynamic and kinetic variability)
- Pragmatic approaches?
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A pragmatic approach

Identification of high-risk substances: ranking of priorities

Margin of Exposure (M O E)

**Difference between Human Exposure-Dose
and
Dose of Comparison from Animal
Experiments**

$$\text{MOE} = \frac{\text{Dose producing tumors in animals}}{\text{Human exposure dose}}$$

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Remaining challenges

Conservative (dose-dependent) endpoints:

Organ damage:

Liver toxicity
Renal toxicity
Cardiotoxicity
Neurotoxicity
Dermal toxicity e.a.

Systemic effects:

Reproductive toxicity
Embryotoxicity

Genotoxicity & Carcinogenicity

Emerging Endpoints

- Window of exposure
- Endocrine disruption (trans-generational toxicity)
- Neuro-endocrine mechanisms
- Immunomodulators
- Allergenicity of small molecule
- Neuro-developmental toxicity (cognitive dysfunctions)

Identification of relevant toxicological endpoints

Exposure Assessment

The quantitative or semi-quantitative evaluation of the likely exposure of man (and/or the animal, the environment) to risk sources from one or more media.



It is not the concentration of a contaminant in a given food that is of concern – it is the quantity that is consumed!

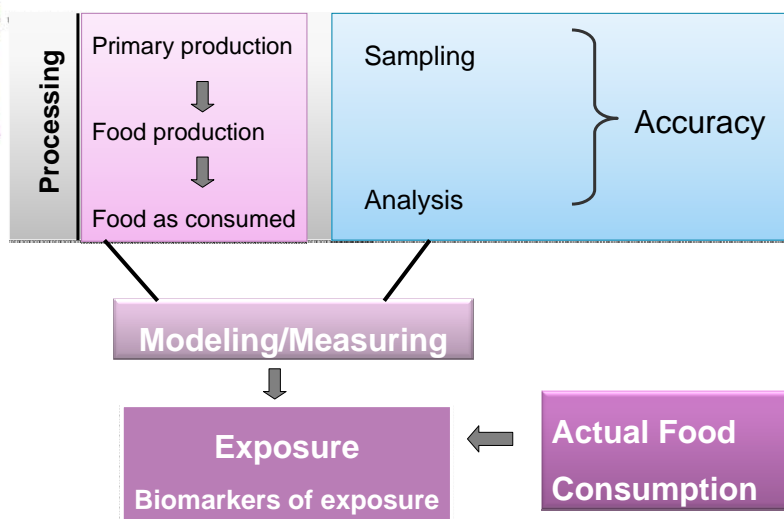
Magnitude - frequency - duration - route - extent

External dose (concentration in food) → internal dose at target (PK-PD)

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Chemical & Microbiological Contaminants

Exposure Assessment



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In the real world.....

Exposure Assessment

Processing

Food package
300g meat
1-1.5 l milk
100 g eggs
etc..

**Non-realistic
food basket**

Food
Consumption

Food consumption concise data bank

Provide a realistic insight into food consumption patterns in different member states

Identify high consumers (probably at risk)

Monitor changes in food consumption habits



Food Consumption Data Banks: realistic;
taking into account changes in consumption patterns
European harmonization ?

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The final outcome

The quantitative or semi-quantitative estimate,
including attendant uncertainties,
of the probability of occurrence and severity
of adverse effect(s) in a given population under
defined exposure conditions
based on
hazard identification,
hazard characterization and
exposure assessment.

Risk Characterization
Basis for Risk Management Objectives



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Major achievements

- Progression from qualitative to (semi)quantitative risk assessment
- Inclusion of realistic food consumption data (identification of populations at risk)
- Stratified approach (uncertainty analysis → transparency)

Remaining challenges

- New (technological & natural) contaminants
- Assessment of emerging toxicological endpoints
- Assessment of un-common mechanisms of toxicity





Food Hazards

Risk perception by consumers

(Risk communication)

Calories
Consumption patterns
Obesity



Contamination of raw materials

Additives
Flavours
Processing agents
Processing by-products

Science has to acknowledge its limits:
The ethics of uncertainty (Tannert et al., EMBO J. 2007)

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