



Expert Models for Decision Makers™

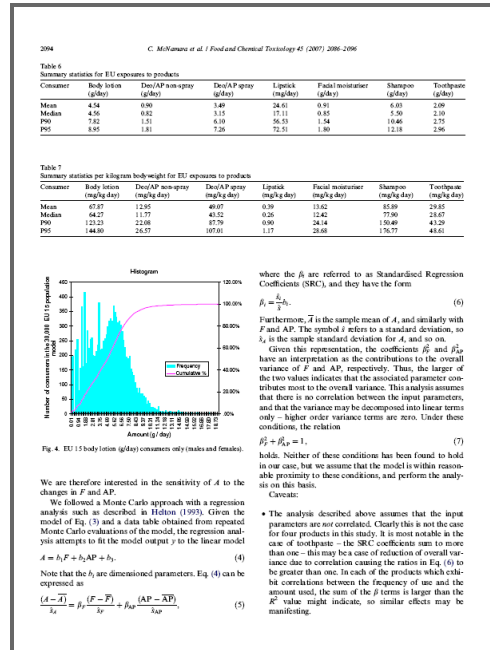
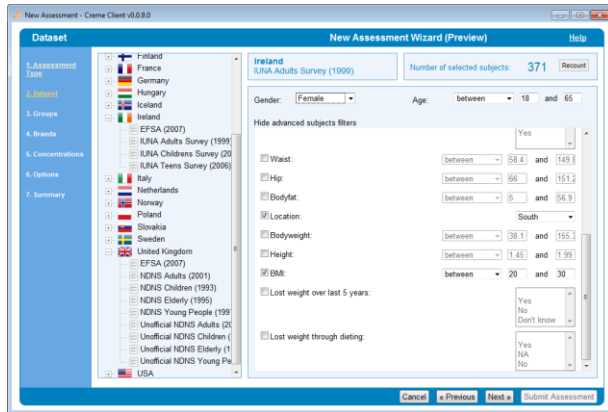
Principles of Risk Assessment for Food Additives

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Dubai International Food Safety Conference 2014

Creme Global



High Performance
Cloud Software

Technical Services
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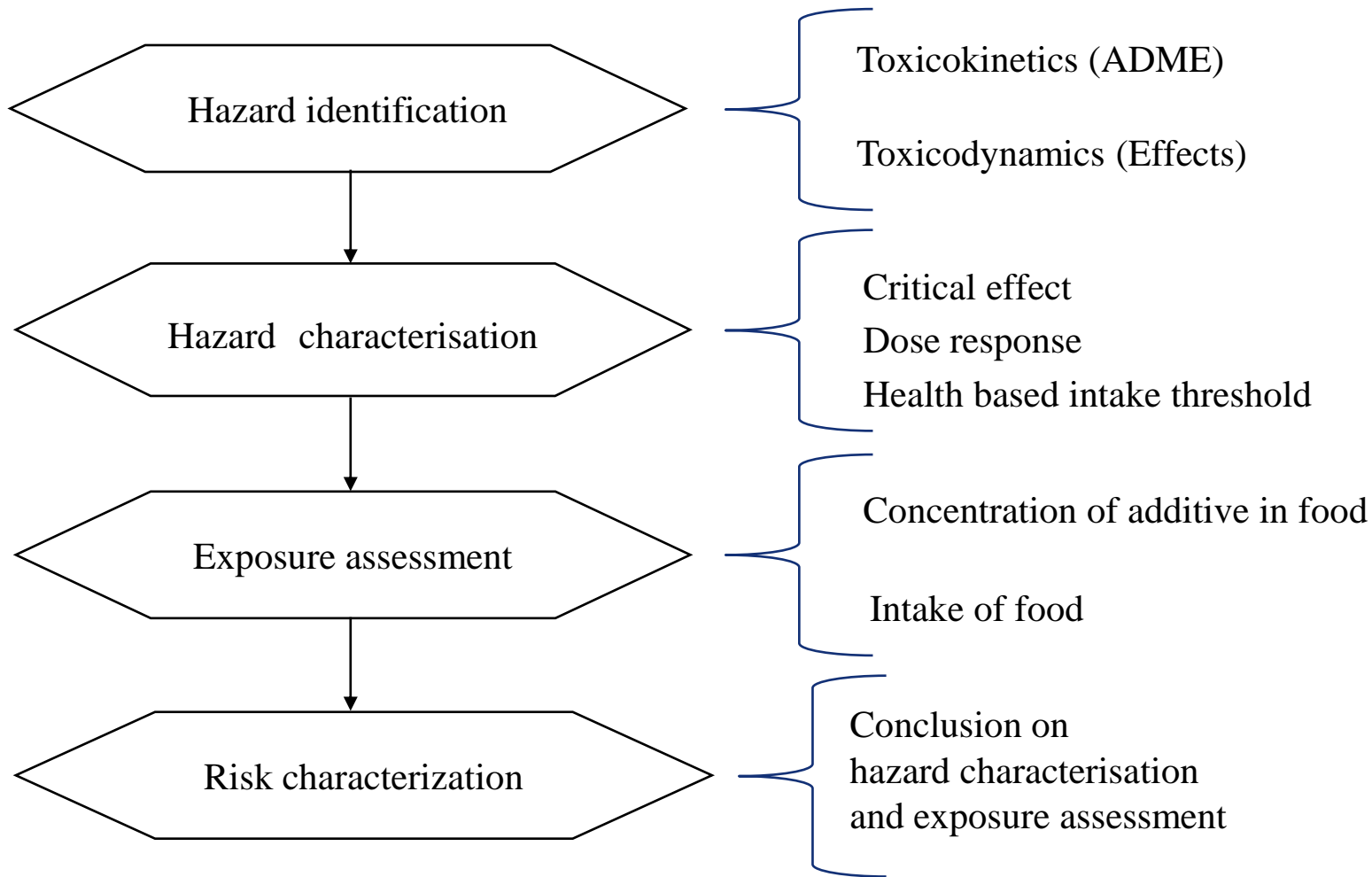
Risk Analysis



Risk Analysis



Risk Assessment for Additives



Hazard, Exposure and Risk

Hazard

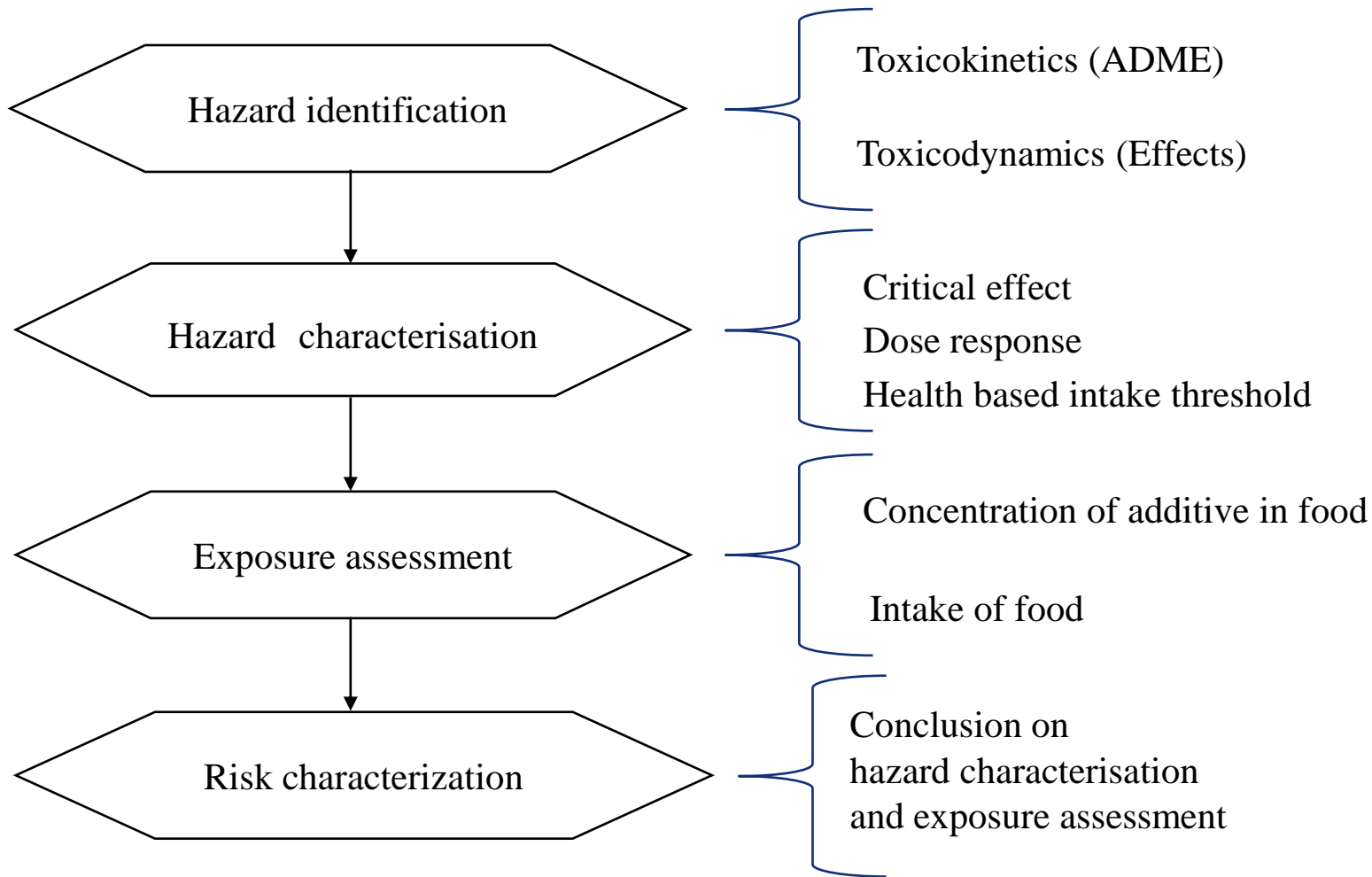
- The inherent property of an additive having the potential to cause adverse effects in a consumer(s) exposed to the additive.

Risk

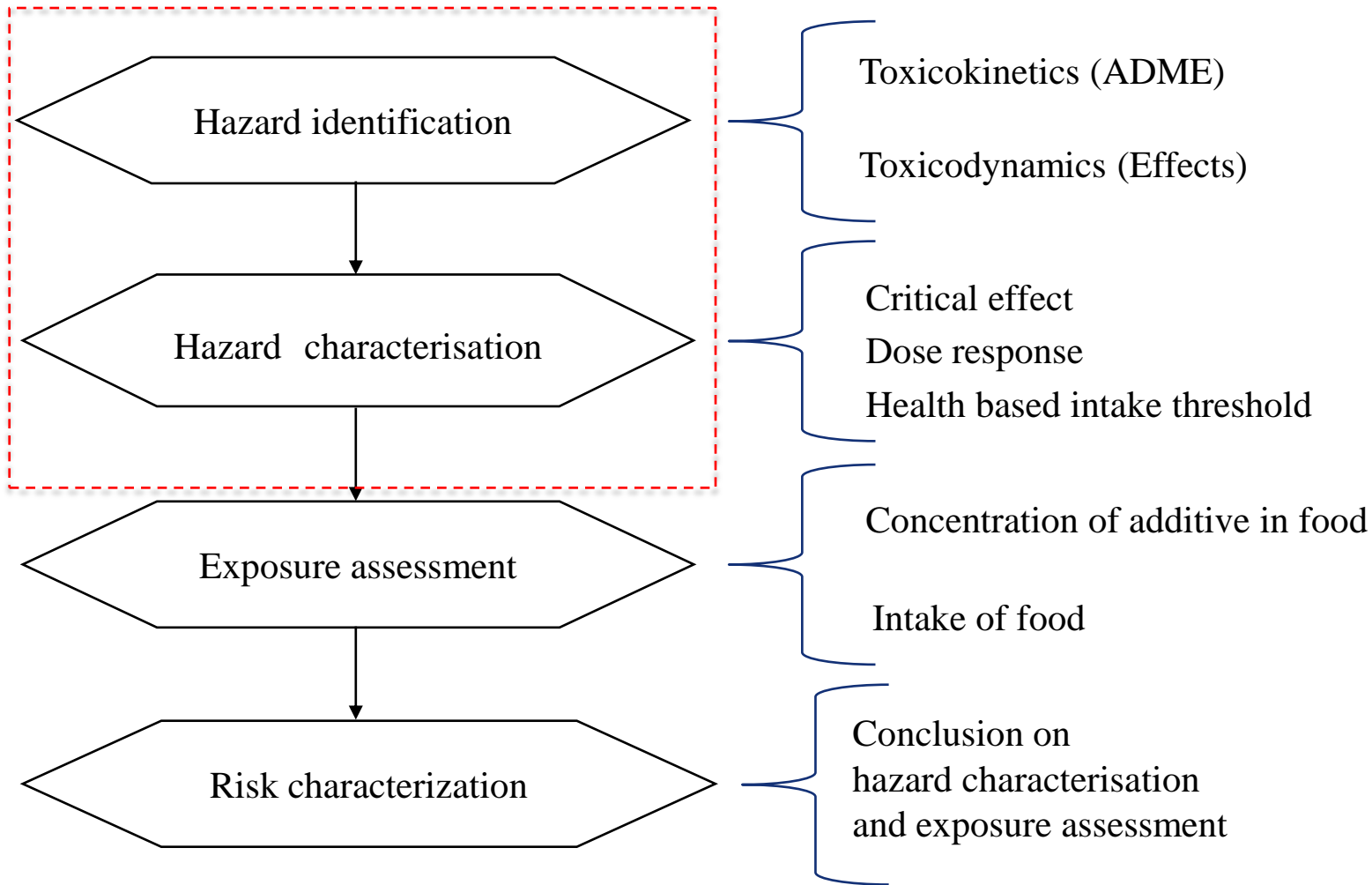
- The probability of an adverse effect in a consumer(s) due to exposure to a food additive.



Risk Assessment for Additives



Risk Assessment for Additives



Hazard for Food Additives



Critical Effect

- The adverse effect(s) which occur at the lowest dose (mg/kg bw/day) tested.

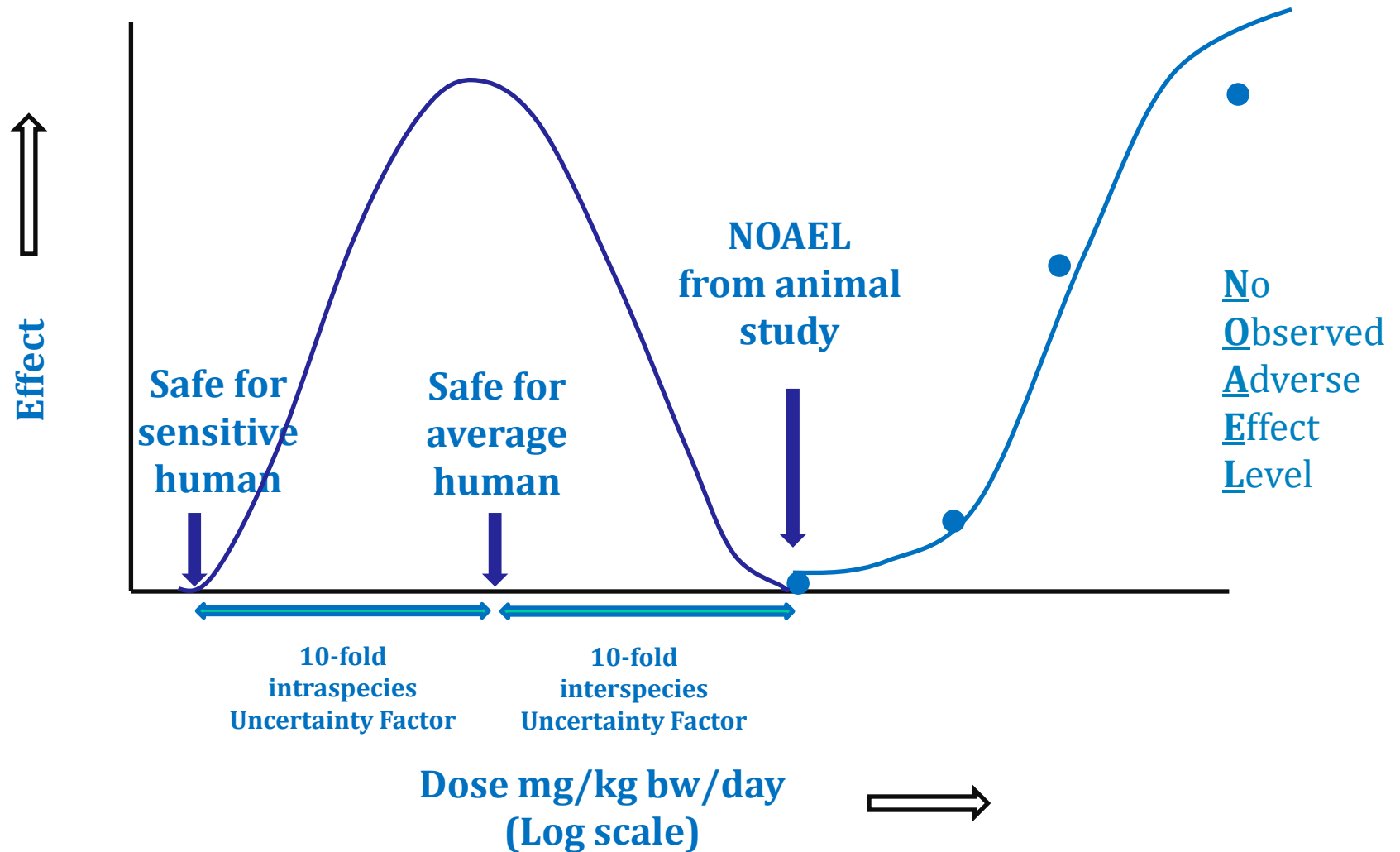
Identification

- Human data (epidemiology)
- Animal studies
- *In silico*

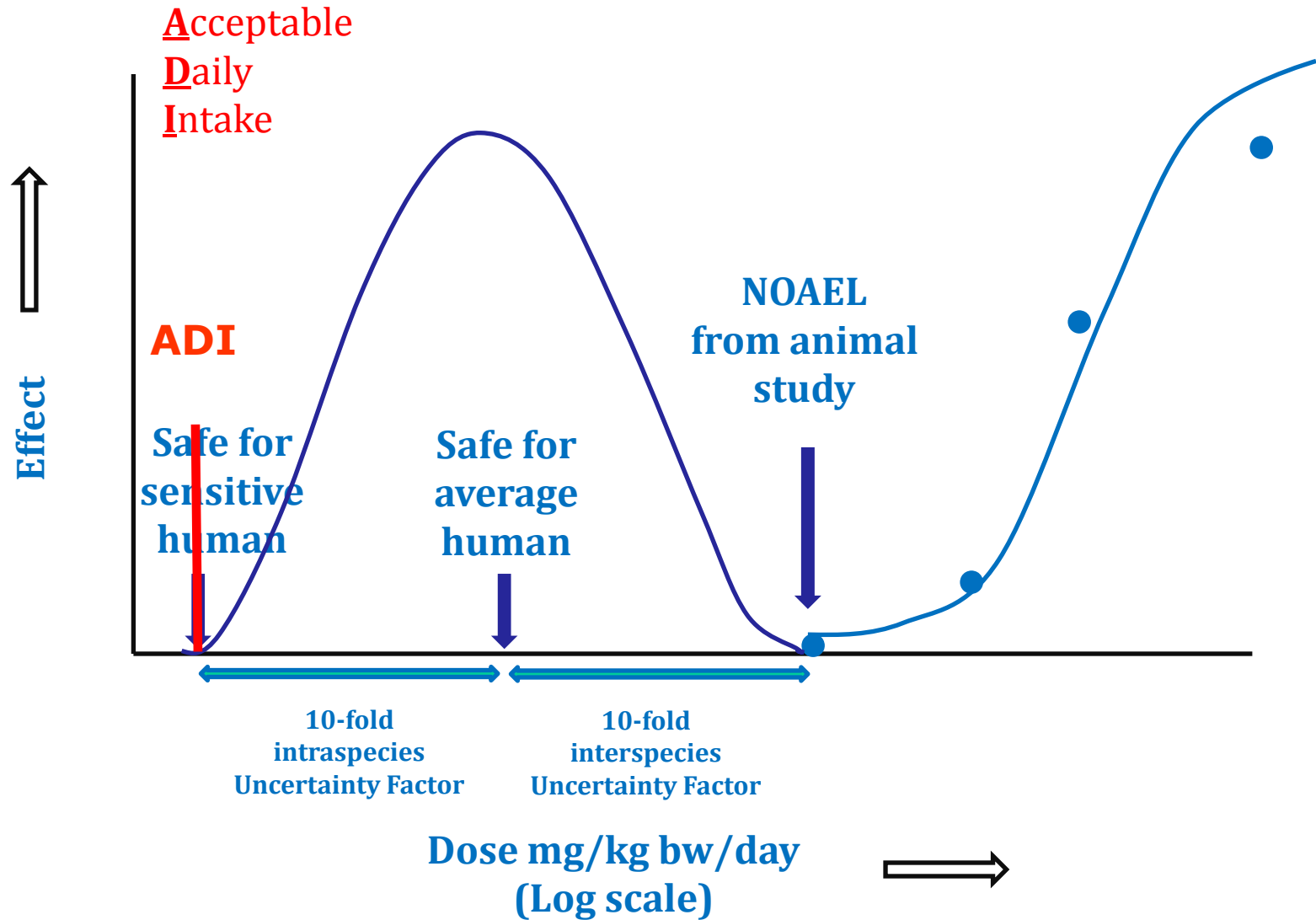
Hazard Characterisation

- The dose response relationship of the critical effect(s) is used to set health based threshold

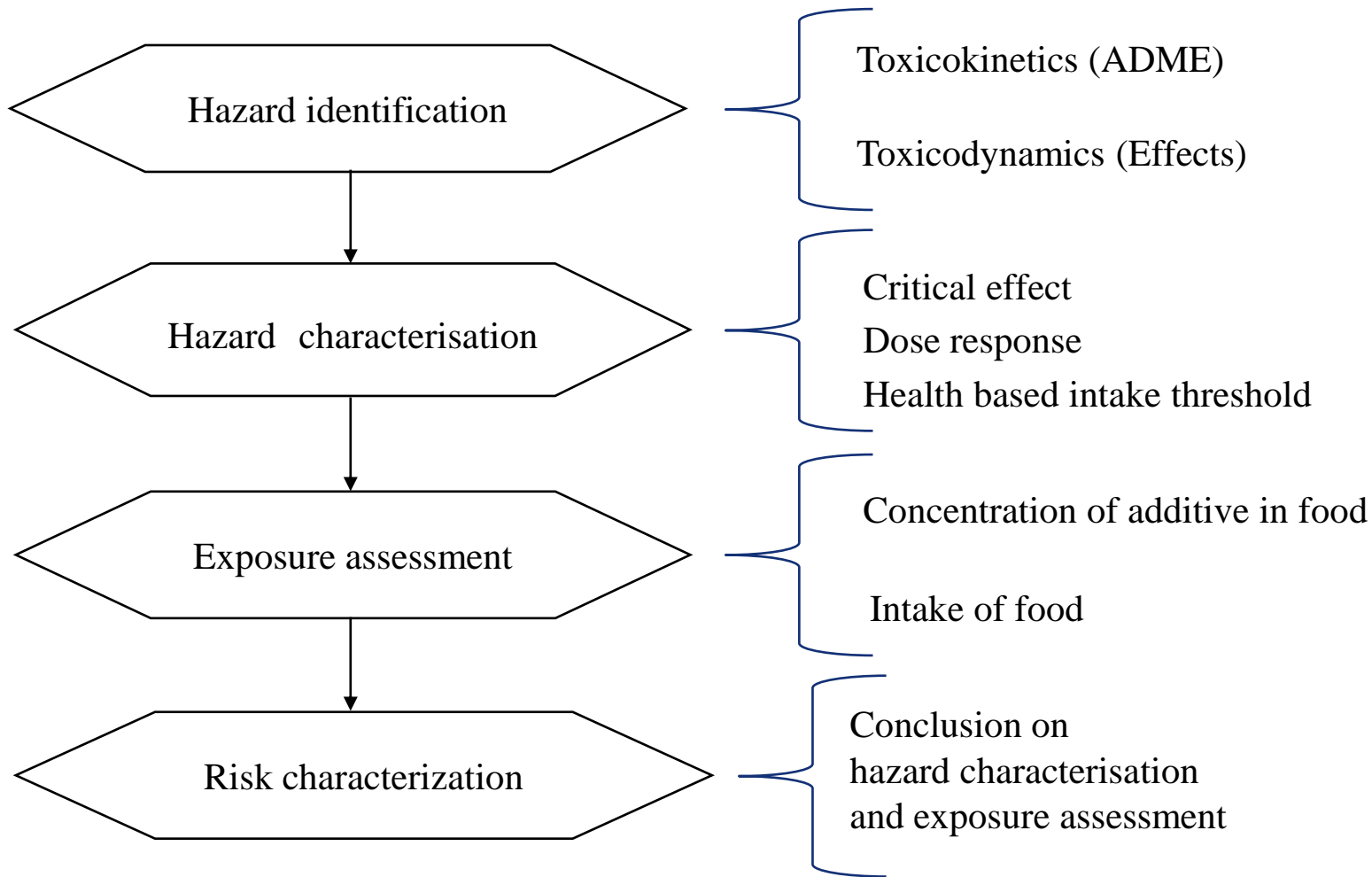
NOAEL & ADI



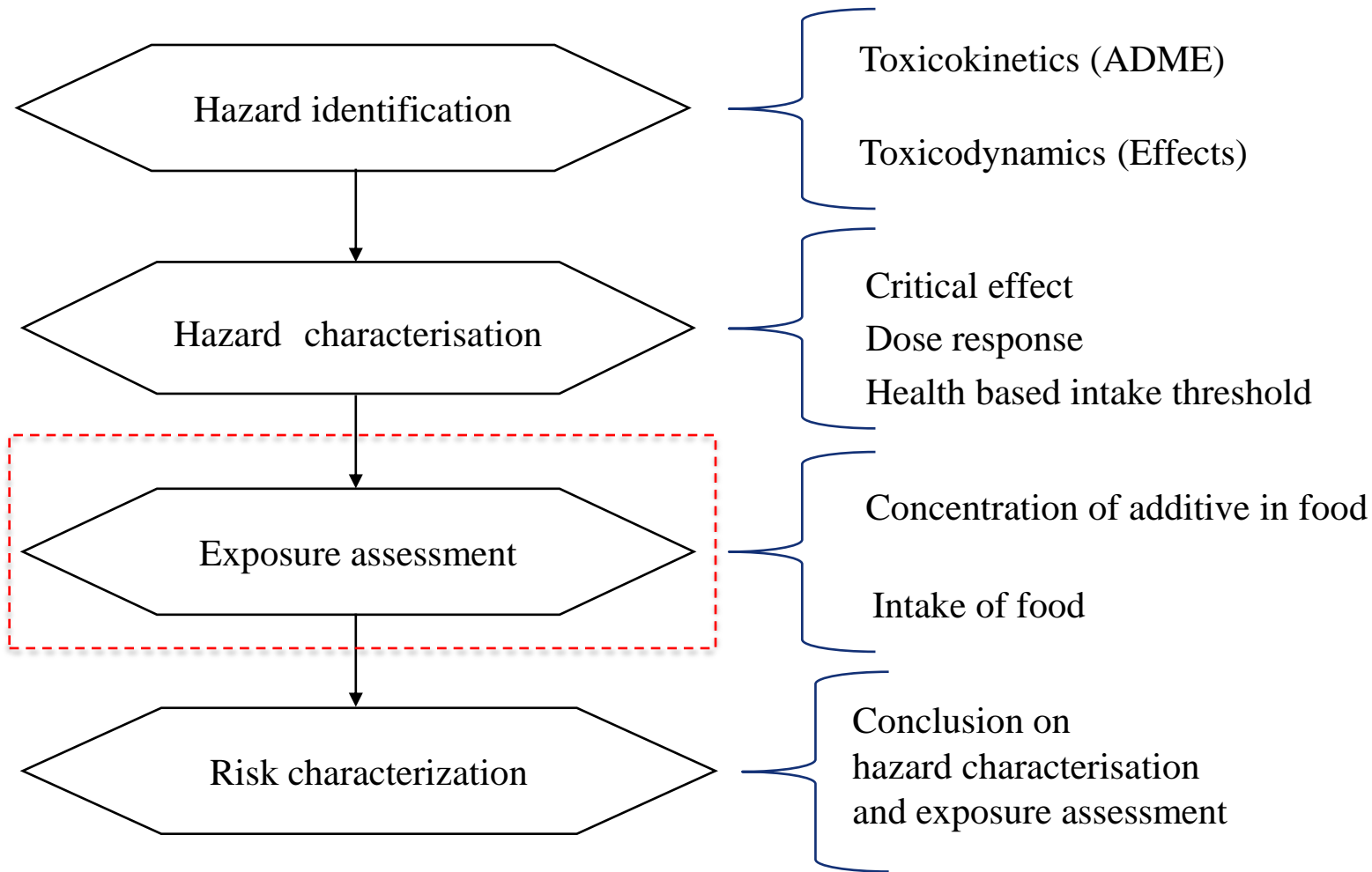
NOAEL & ADI



Risk Assessment for Additives

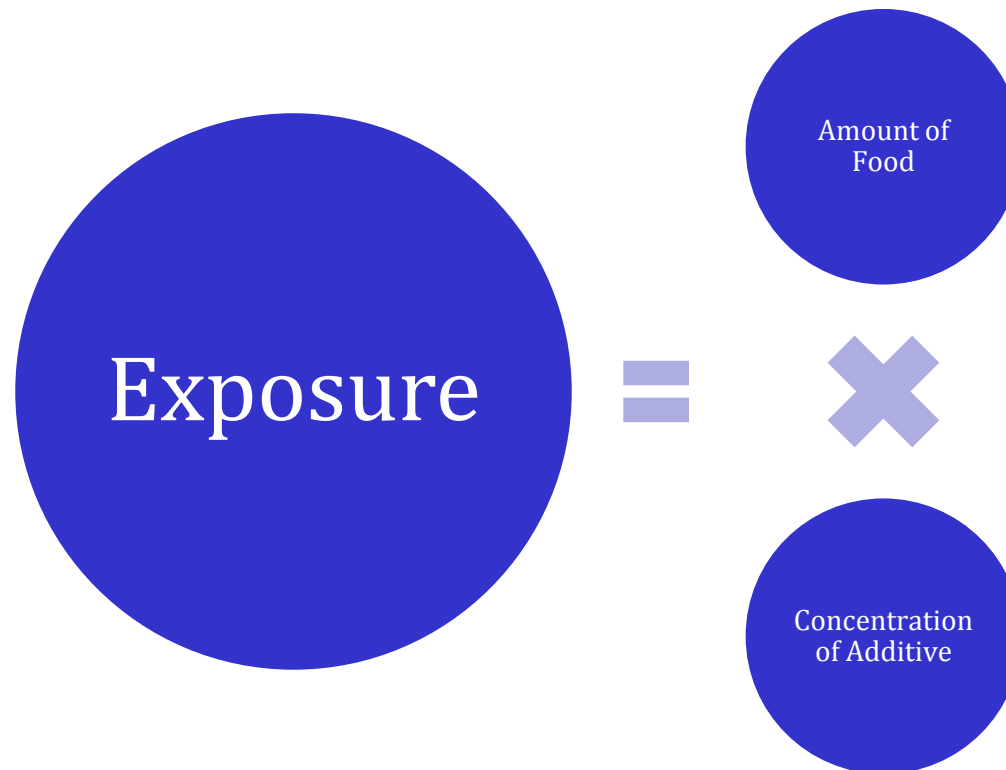


Risk Assessment for Additives



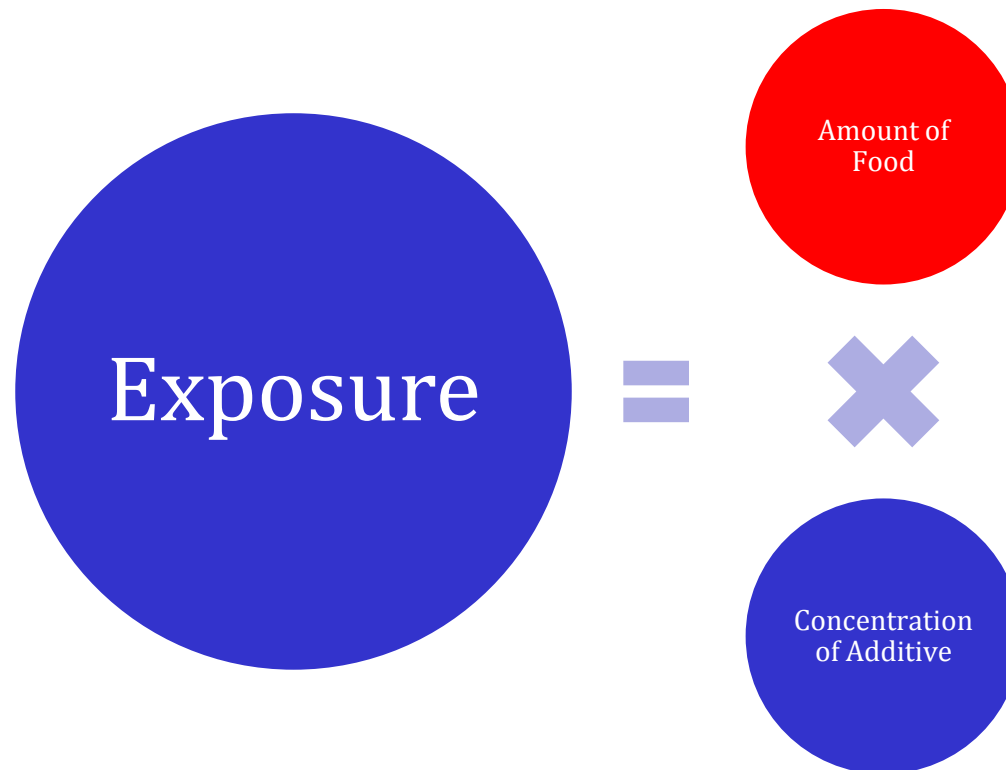
Exposure Assessment

- Additive Exposure:
 - The intake of the additive of interest in a population of consumers



Exposure Assessment

- Additive Exposure:
 - The intake of the additive of interest in a population of consumers



Food Consumption Data

Food Consumption Surveys

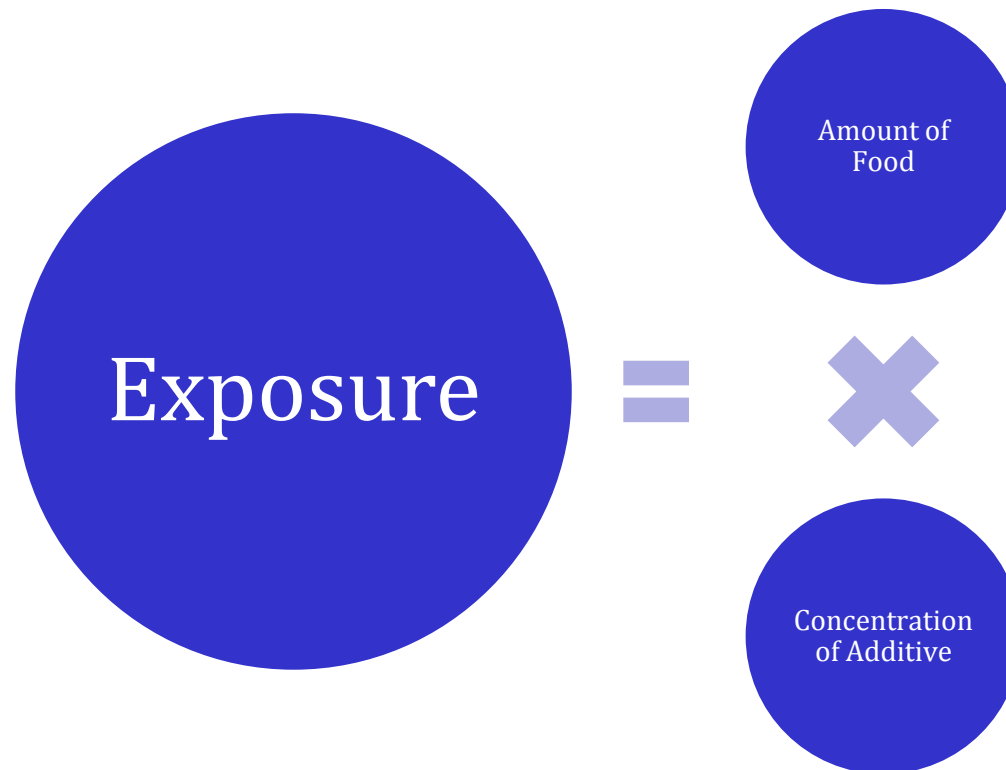
- Nationally representative survey of food consumption
- Typically survey 1,000+ consumers for one or more days
- All food consumption events recorded, including amount of food and food type
- Body weights, genders and age also recorded

Food Frequency Questionnaires

- Self-reported estimates of food intake frequency

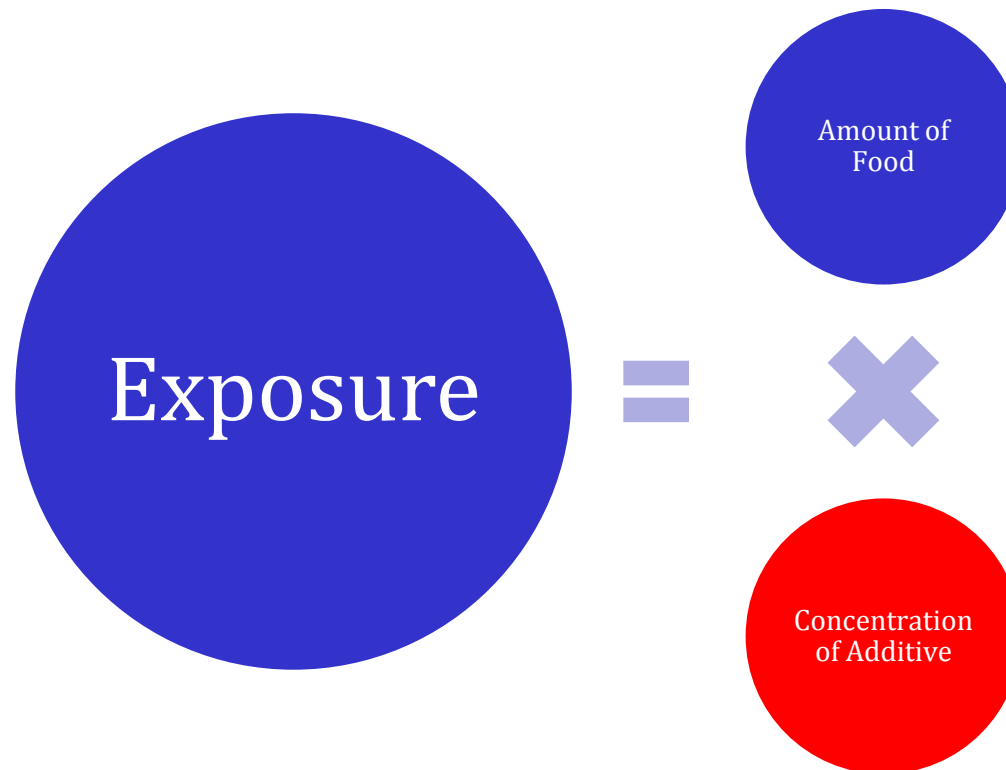
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Exposure Assessment

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 - The intake of the additive of interest in a population of consumers



Additive Concentration Data



Regulatory Data:

- Maximum Permitted Levels (MPLs) per food group
- Measured concentrations

Industry data:

- Actual use levels
- Typical/average use levels
- Market shares
- Probability of occurrence

Aggregate Exposure

- The total exposure to an additive from all foods consumed in the diet

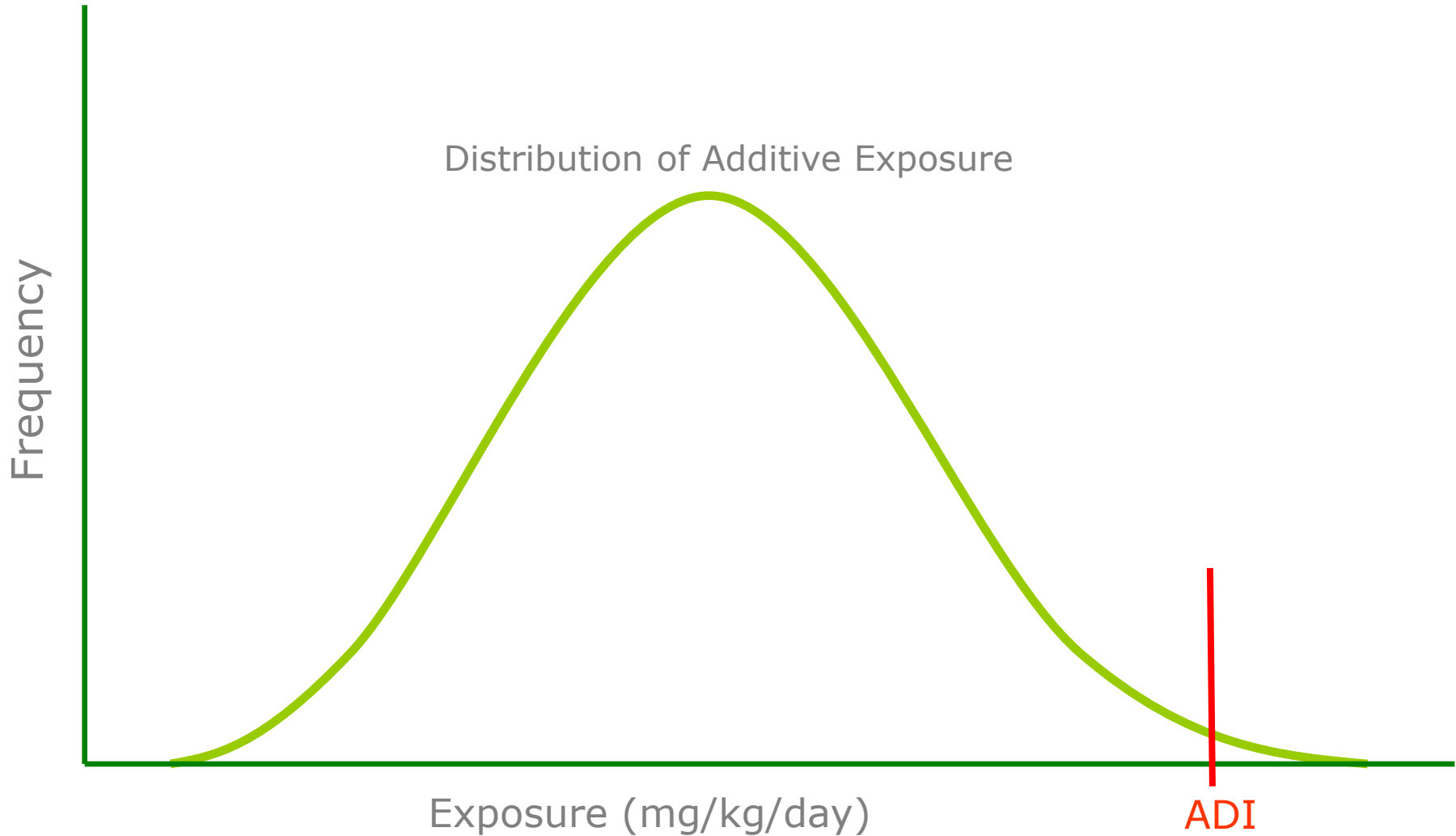
$$\text{Exposure} = \sum_{\substack{\text{Foodquanta} \\ \text{consumed}}} [\text{Food Amount}] \times [\text{Concentration of Additive}]$$

- Food Consumption:
 - Variable within a population
- Additive Concentrations:
 - Vary within and between foods

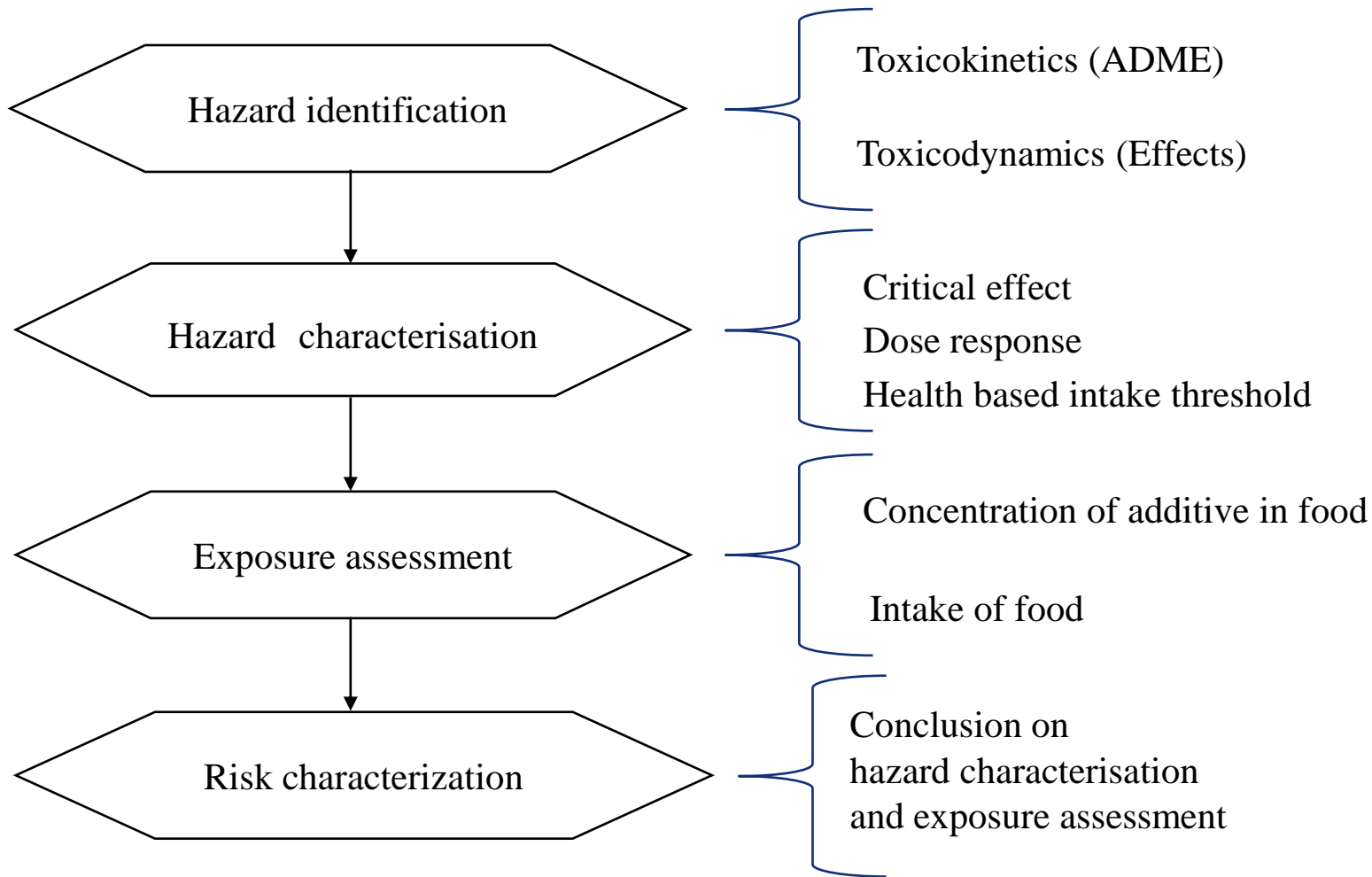
Aggregate Exposure

- Exposure in a population is *variable*, and can be described as a statistical distribution
- The exposure distribution is in turn described by statistics, e.g.:
 - Mean
 - Standard deviation
 - Percentiles
- For risk assessment, upper percentiles most relevant, e.g. P95

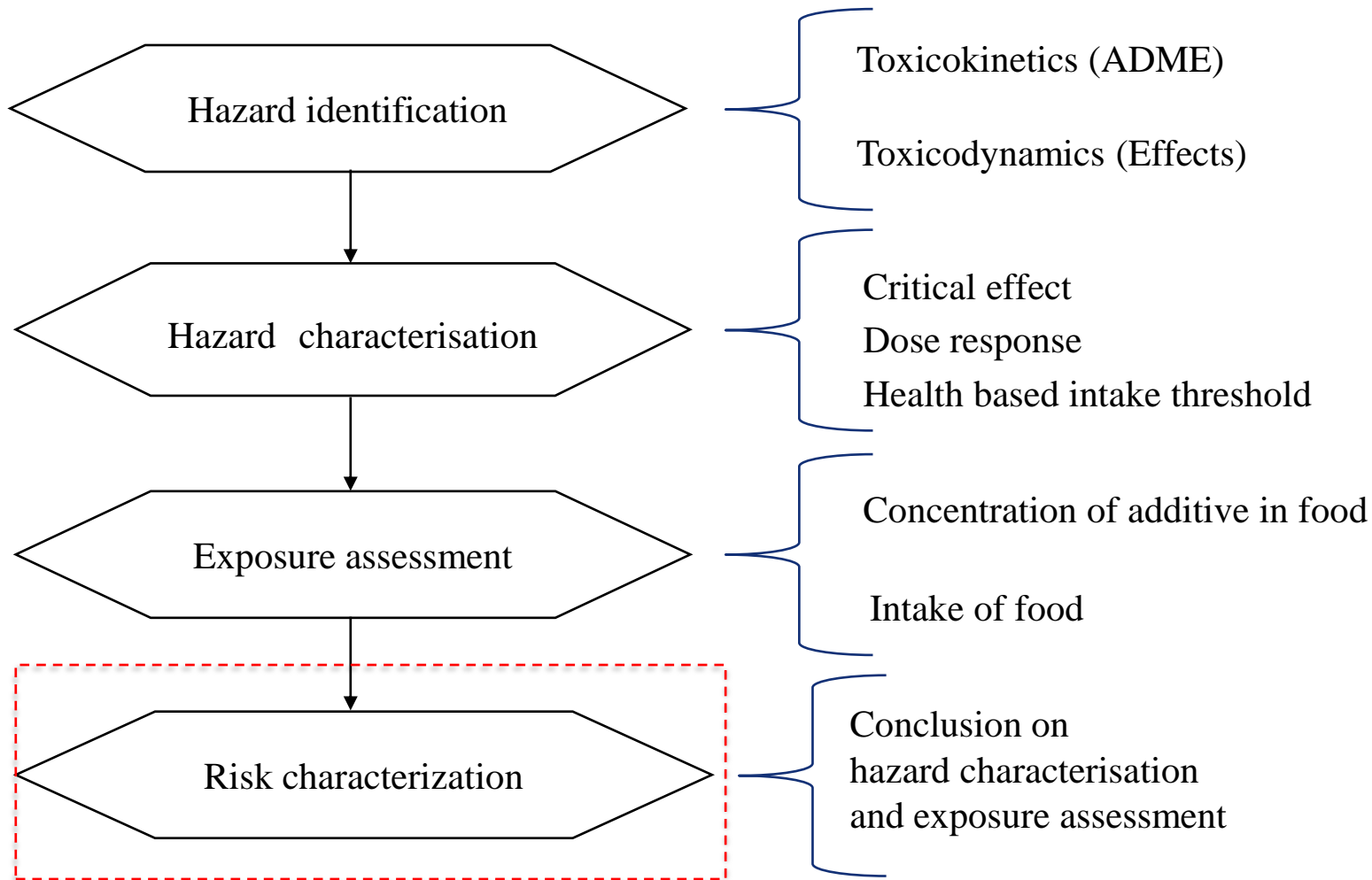
Exposure Assessment



Risk Assessment for Additives



Risk Assessment for Additives



Risk Characterisation

Loosely:

- Risk = Hazard x Exposure

More Formally:

- Risk characterisation is the conclusion on the risk associated with an additive in light of the hazard characterisation and exposure assessment.

Uncertainty Analysis

Uncertainties:

- Inputs, data, techniques or models that give rise to uncertainty in a risk assessment
- Distinct from *variability*

Uncertainties should be:

- Captured, qualified and/or quantified
- Have their impact on the final conclusion assessed
- Should be communicated along with the results of a risk assessment

Additive Risk Assessment



1. Determine acceptable daily intake for the additive
2. Quantify the exposure in the population
3. Assess exposure vs ADI and characterise risk



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Thank you

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