



How can the requirements of exposure assessment be realised by different categorisation systems

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Prologue

A wise man once asked:

What is

“an approximate food consumption”
multiplied by
“an approximate food composition”?

Answer: One of the basic ingredients in the “main course” risk assessment - the exposure assessment



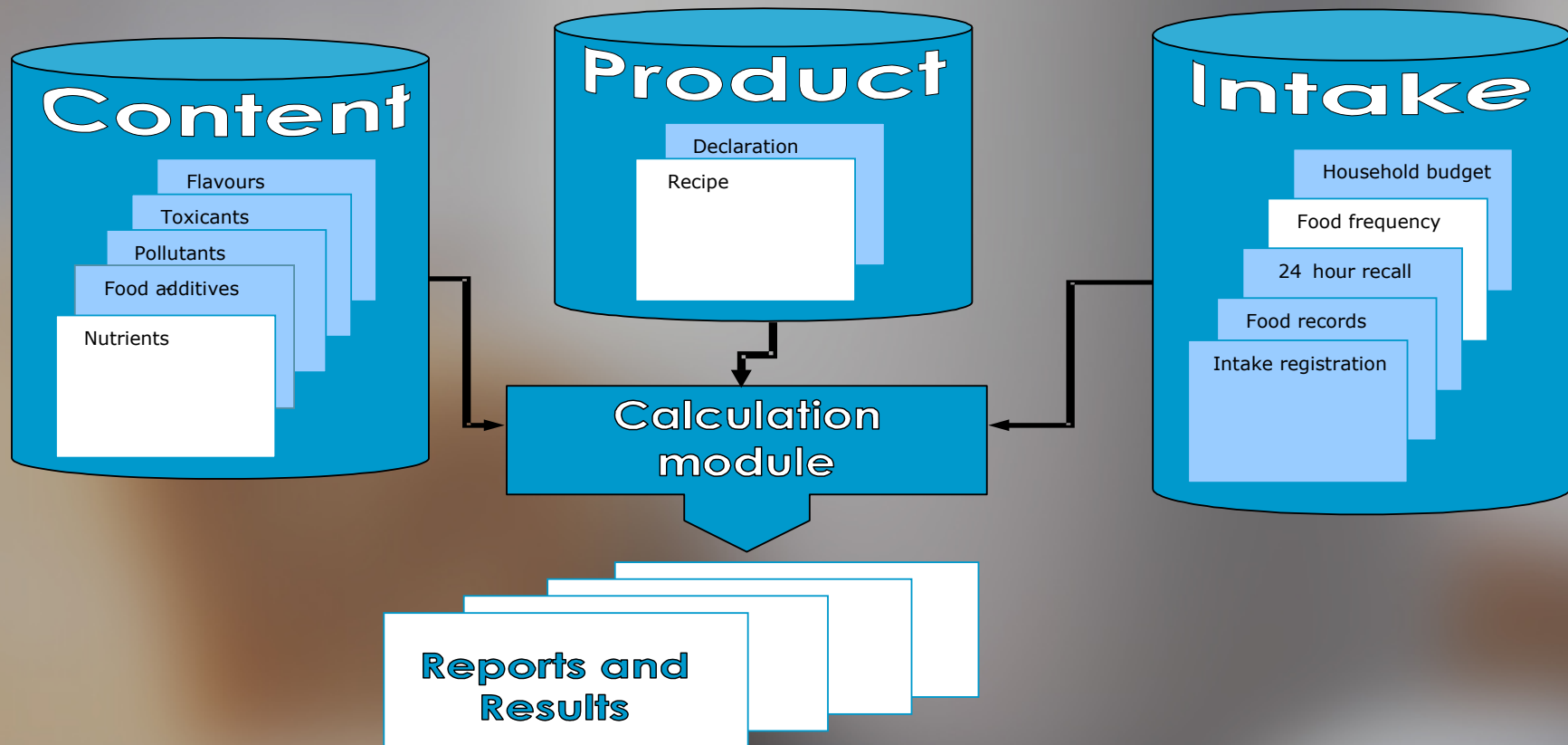
Intake and Exposure Estimation

The main components:

- **Food Consumption Surveys**
Which foods have been eaten ?
- **Food classifications**
How do we group foods together ?
- **Food Composition Databases**
What do the foods contain ?
- **Ingredient definitions (recipes)**
How are the foods combined ?



General Intake Estimation System



Courtesy: Tue Christensen, Danish Food Institute



Food Consumption Surveys

- **Individual Surveys**
Foods as eaten, population intake distributions, non-consumers
- **Household Budget Surveys**
Food availability, population/household mean intakes, DAFNE
- **Food Balance Sheets**
Commodities available, population mean intakes



European Food Consumption Survey Method EFCOSUM Conclusions - Food Consumption Data

Available food consumption data:

- Regrettable lack of internationally comparable data
- Guidelines to make food consumption data more comparable
- Out of 23 countries, 15 (of these, 10 present MS) can provide data that can be made “reasonably” comparable

From: *European Journal of Clinical Nutrition*, Volume 56, Supplement 2, May 2002



EFCOSUM Conclusions

Food Consumption Data

New food consumption data:

- 24h recall selected as the best and most cost-effective method
- A set of dietary health indicators were defined
- ***A common food classification is needed (European Food Groups)***



Food Classification Systems

Food classification systems are food level and purpose specific:

- Classification, what is the purpose?
- What do we want to classify?
Foods eaten, ingredients, commodities, components by food group, pre-packed foods, or ...?
- Common/specific - detailed/simple?
Common Nomenclature/PRODCOM/..., GS1 Global Product Classification (GPC), EuroFIR Food Classification, Eurocode 2 (Eurofoods), European Food Grouping (EFCOSUM), Codex ...



Food Classification Systems

Specific international food classification systems

- Food additives (CIAA, Codex Alimentarius GSFA)
- Pesticides (Codex Classification of Foods and Feeds, CCPR)
- Contaminants (Codex Classification for Contaminants and Toxins, GSC)
- Common Nomenclature, PROCOME, WTO, ...
- Global Product Classification (GS1 GPC, GSDN Food and Beverage Extension)
- European Food Groups (Cost Action 99/EFCOSUM) and EFSA Main Food Groups
- Food Composition Databases (EuroFIR classification)
- ...

and many, many different national food classifications



Food Classification Systems

At which level ?

Survey Type	<i>Foods as eaten/prepared</i>	<i>Foods as ingredients/purchased/raw</i>	<i>Foods as commodities</i>
Individual	X	X*	X**
Household Budget Survey		X	X**
Food Balance Sheets			X

* obtained by disaggregating food intake into ingredient
 ** obtained by disaggregating ingredients into commodities



European Food Grouping

The impact of reporting level

EFG g/day	Intake level	Ingr. level	EFG g/day	Intake level	Ingr. level
Bread and rolls	142	162	Fruits and fruit products excl. juices	108	113
Breakfast cereals	34	14	Fruit juices	156	73
Flour	-	21	Non-alcoholic beverages	587	734
Pasta	17	8	Coffee, tea, cocoa powder	815	815
Bakery products	39	1	Beer	187	187
Rice and other c.p.	15	7	Wine	60	60
Sugar	3	22	Other alcoholic beverages	5	5
Sugar products excl. chocolate	16	1	Red meat and meat products	89	111
Chocolate	7	7	Poultry and poultry products	14	17
Vegetable oils	-	4	Offals and offal products	1	1
Margarine and lipids of mixed origin	16	33	Fish and seafood	22	21
Butter and animal fats	6	8	Eggs and egg products	15	19
Nuts and nut products	2	2	Milk	276	314
Pulses and pulse products	4	8	Cheese	22	31
Vegetables excl. potatoes	80	99	Other milk products	55	71
Starchy roots and potatoes	110	119	Miscellaneous foods	190	5



Food Classification Systems

by food level

- Intake level (food as eaten)
 - mostly only specific national food classifications for consumption surveys (DK, SE, UK, etc.)
- Ingredient level (pre-packed foods, foods as purchased, raw foods)
 - EuroFIR food classification for foods in food composition databases
 - CIAA Food Categorization System/Codex Food Categorization System for food additives (Codex GSFA)
 - European Food Grouping (Cost Action 99/EFCOSUM)
 - Eurocode2
 - Global Product Classification (GS1 GPC, GSDN Food and Beverage Extension)
 - ...



Food Classification Systems

by food level (2)

- Commodity level (foods in trade)
 - Harmonized Commodity Description and Coding System (WTO)
 - Codex Classification of Foods and Animal Feeds (Codex CCPR)
 - Codex General Standard for Contaminants and Toxins in Foods (CCFAC)
 - Food Balance Sheets “Presumptive diet”
 - other classifications of commodities (PROCOME, etc.)



Food Classification Systems

Characteristics

- Food classification systems are purpose specific (reflect specific characteristics, e.g. from legislation) and must exist in parallel
- A food (and food group) can exist on all food levels, but the characteristics of the food change from level to level
- Food classification systems are food level specific (for exposure assessment, a classification system cannot cover several food levels at the same time)
- Food classification systems are related, but not necessarily (i.e. almost never) compatible

Source: Ireland and Møller, 2000, Ireland et al, 2001, etc.



Exposure assessment

The other side – the chemical components

The classification system must reflect the level at which the components are determined (analysed):

■ Some examples

Pesticides

MRLs are established for raw agricultural commodities (or case-by-case) – edible as well as inedible parts (Codex Alimentarius, Vol. 2, Rome 1993)

Contaminants and Toxins

MLs and GLs are established on products as “they move in trade” – preferably only edible part analysed (Codex Stan 193)



Exposure assessment

The other side – the chemical components (3)

■ Some more examples

Food Additives

The GSFA food category system applies to all foodstuffs (Codex Stan 192-1995).

Nutrients

In general, analysed at ingredient level. European Food Groups defined at *raw ingredient level* (Ireland et al., 2002).



Food Description Systems

LanguaL (Lingua Alimentaria) includes important food classifications in parallel in LanguaL Facet A, and provides related terms for the different classifications combined in LanguaL

- [-] A. PRODUCT TYPE [A0361]
 - [-] FOOD ADDITIVES [A0323]
 - [+] CODEX ALIMENTARIUS, FUNCTIONAL CLASSES [A0351]
 - [+] FOOD ADDITIVE CLASSIFICATION, EUROPEAN COMMUNITY [A0324]
 - [-] PRODUCT TYPE, CODEX ALIMENTARIUS [A0352]
 - [+] CLASSIFICATION OF FOOD AND FEED COMMODITIES (CODEX ALIMENTARIUS) [A0643]
 - [+] FOOD CLASSIFICATION FOR FOOD ADDITIVES (CODEX ALIMENTARIUS) [A0355]
 - [-] **PRODUCT TYPE, EUROPEAN UNION [A0356]**
 - [+] CIAA FOOD CLASSIFICATION FOR FOOD ADDITIVES [A0357]
 - [+] EUROCODE 2 FOOD CLASSIFICATION [A0642]
 - [+] EUROFIR FOOD CLASSIFICATION [A0777]
 - [+] EUROPEAN FOOD GROUPS (EFG) [A0690]
 - PRODUCT TYPE, NOT KNOWN [A0001]
 - PRODUCT TYPE, OTHER [A0004]
 - [+] PRODUCT TYPE, USA [A0289]
- [-] B. FOOD SOURCE [B1564]

GS1 Global Product Classification and EFSA Main Food Categories are proposed for inclusion in LanguaL in next edition (LanguaL 2008).

- [-] A. PRODUCT TYPE [A0361]
- [-] B. FOOD SOURCE [B1564]
 - [-] ALGAE, BACTERIA OR FUNGUS USED AS FOOD SOURCE [B1215]
 - [-] ANIMAL USED AS FOOD SOURCE [B1297]
 - [-] AMPHIBIAN [B1624]
 - [-] FISH OR LOWER WATER ANIMAL [B1021]
 - [-] AQUATIC ANIMAL [B1142]
 - [-] COELENTERATE [B2409]
 - [-] ECHINODERM [B2115]
 - [-] SEA CUCUMBER [B2433]
 - [-] SEA URCHIN [B2107]
 - [-] STARFISH [B2108]
 - [-] FISH [B1222]
 - [-] SHELLFISH OR CRUSTACEAN [B1059]
 - [-] INSECT [B1220]
 - [-] MEAT ANIMAL [MAMMAL] [B1134]
 - [-] POULTRY OR GAME BIRD [B1563]
 - [-] REPTILE [B1625]
 - [-] CHEMICAL FOOD SOURCE [B1041]
 - [-] FOOD SOURCE NOT KNOWN [B0001]
 - [-] LIQUID AS FOOD SOURCE [B2974]
 - [-] PLANT USED AS FOOD SOURCE [B1347]
 - [-] FRUIT-PRODUCING PLANT [B1140]
 - [-] GRAIN OR SEED-PRODUCING PLANT [B1047]
 - [-] PLANT ACCORDING TO FAMILY [B3357]
 - [-] PLANT FOR MEDICINAL USE [B3359]
 - [-] PLANT USED AS FODDER [B3358]
 - [-] PLANT USED FOR PRODUCING EXTRACT OR CONCENTRATE [B1013]
 - [-] SPICE OR FLAVOR-PRODUCING PLANT [B1179]
 - [-] VEGETABLE-PRODUCING PLANT [B1579]
 - [-] CHINABERRY [B2157]
 - [-] CHUFA [B2159]
 - [-] FEATHER COCKSCOMB [B2158]
 - [-] GROUNDSEL [B2160]
 - [-] KRADON [B2461]
 - [-] VEGETABLE-PRODUCING PLANT, ABOVE-GROUND PARTS USED [B1140]
 - [-] FERN [B2453]
 - [-] FLORET USED AS VEGETABLE [B1036]
 - [-] FRUIT USED AS VEGETABLE [B1006]
 - [-] AFRICAN HORNED CUCUMBER [B2842]
 - [-] AVOCADO [B1470]
 - [-] CAPE GOOSEBERRY [B1684]
 - [-] CHAYOTE [B1730]
 - [-] CHINESE LANTERN [B2955]
 - [-] **CUCUMBER [B1404]**
 - [-] EGGPLANT [B1458]
 - [-] GROUND CHERRY [B2519]
 - [-] HORSE RADISH TREE [B1748]
 - [-] JAPAN PEPPER [B2306]
 - [-] OKRA [B1241]
 - [-] OLIVE [B1299]
 - [-] PEPPER, BLACK OR WHITE [B2255]
 - [-] PEPPER, GREEN OR RED [B1250]
 - [-] SQUASH, GOURD OR PUMPKIN [B2091]
 - [-] TOMATO [B1276]
 - [-] USA VEGETABLE [B1140]

Description

Indexed Food Data Set [7] Right-Click Grid for Menu

DK 2005
USDA SR8
DK Test
USDA SR18
BASIS Processed foods
DK Test 2
DK Test 3

Foods in Data Set [1477] Right-Click Grid for Menu

FID	OK	R	Original food name	English name
0001	*		Abrikos, tørret	Apricot, dried
1146	*		Abrikosmarmelade	Marmalade, ap
0002	*		Agurk, rå	Cucumber, raw
0688	*		Agurk, syltet	Gherkin, pickle
0689	*		Agurk, syltet, uden tilsat suk	Gherkin, pickle
0004	*		Ananas, konserver	Pineapple, can
0003	*		Ananas, rå	Pineapple, raw
0833	*		Ananasjuice, konserver	Pineapple juice
0648	*		Ananaskirsebær, kapstikkelt	Cape goosebe
1037	*		And, brystkød, rå	Duck, breast, f
0006	*		And, kød og skind, rå	Duck, flesh an
0007	*		And, kød, rå	Duck, flesh on
0454	*		Ansjos, marineret, konserver	Anchovy, pickl

LanguaL Descriptors for Selected Food [1] Right-Click Grid for Menu

A0152	VEGETABLE OR VEGETABLE PRODUCT (U.S.)
B1404	CUCUMBER
C0140	FRUIT OR BERRY, PEEL PRESENT, CORE, PIT
E0150	WHOLE, NATURAL SHAPE
F0003	NOT HEAT-TREATED
G0003	COOKING METHOD NOT APPLICABLE
H0003	NO TREATMENT APPLIED
J0001	PRESERVATION METHOD NOT KNOWN
K0003	NO PACKING MEDIUM USED
M0001	CONTAINER OR WRAPPING NOT KNOWN
N0001	FOOD CONTACT SURFACE NOT KNOWN
P0024	HUMAN FOOD, NO AGE SPECIFICATION

B1404

Term Active

CUCUMBER

Related terms

Synonyms

cucumis sativus

Scope Note Classification

Additional information + Add tag

<SCIFAM>Cucurbitaceae
 <SCINAM>Cucumis sativus L. ssp. sativus [BASIS]
 <GRIN>12580
 <MANSFELD>3698



Conclusions

- **For intake and exposure estimations, it is extremely important that you know your data there are so many pitfalls and most of them are not visible**
 - **be clear about the level of reported analysed/imputed composition data as well as the level of reported consumption data**
 - **the levels must correspond or it must be possible to convert from one level to another (e.g. via recipes)**
 - **food classifications (as consumed, ingredient, or commodity level) must correspond to the chosen level of reporting.**
- **In general, food classification systems are “use driven”, and even though classes in two systems have the same name, their definitions are most likely different ...**