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The use of chemical occurrence and concentration data in exposure assessments of additive intakes in the diets of Irish children as part of a pan-European chemical exposure surveillance system

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Effective risk assessment strategies are necessary when monitoring the presence of chemicals in contemporary food supplies, an essential step in these strategies being exposure assessments. Exposure assessments require a certain level of data: (1) concentration levels of the chemical substance, and (2) total intake of foods that contain the chemical⁽¹⁾. Concentration levels can be actual or reflect maximum permitted levels (MPL's) as per the relevant legislation. In the absence of actual occurrence data, it must be assumed that if an additive can legally be present in a food, it always will be. The use of chemical occurrence and concentration data refines exposure assessments to that particular chemical e.g. a food additive.

FACET⁽²⁾ is a 7th Framework EU funded project aiming to create a food chemical exposure surveillance system, with data from 8 EU countries (including Ireland). An element of this project is obtaining additive occurrence data. A number of target food-groups were developed (*n*12) and target additives identified for deeper analysis (*n*32), with specified typologies of foods purchased per food-group to investigate additive occurrence. A second element of this project is the collection of additive concentration data per food-group. Concentration ranges were developed using minimum and maximum concentration values collected from a number of food industries and manufacturers via a member of the FACET project.

Using both the additive occurrence and concentration data collected through FACET, four exposure models were developed. (1) assuming 100% additive occurrence per food-group with the MPL, (2) assuming 100% additive occurrence per food-group with true additive concentration data, (3) additive occurrence data with the MPL, and (4), additive occurrence data with true additive concentration data. Dietary data from The National Children's Food Consumption Survey (NCFS) (2003–2004)⁽³⁾ was utilised with the four exposure models for this research to examine exposure levels of Irish children to three of the target additives. The aim of this study is to highlight the usefulness of incorporating both occurrence and concentration data into an exposure assessment to refine results, thus increasing accuracy.

	Quinoline Yellow ADI (0–0.5)		Sunset Yellow ADI (0–1.0)		Ponceau 4R ADI (0–0.7)	
	Mean (sd)	P97.5	Mean (sd)	P97.5	Mean (sd)	P97.5
Model 1	2.14 (3.44)	4.71	1.51 (2.52)	3.55	1.50 (2.50)	3.54
Model 2	0.49 (0.86)	1.16	0.34 (0.59)	0.90	0.62 (1.11)	1.60
Model 3	0.03 (0.11)	0.22	0.02 (0.08)	0.15	0.008 (0.03)	0.081
Model 4	0.010 (0.04)	0.095	0.009 (0.03)	0.068	0.001 (0.001)	0.023

sd: Standard Deviation. ADI: Acceptable Daily Intakes (mg/kg/bw).
P97.5 + : 97.5th percentile.

Exposure results were above Acceptable Daily Intakes (ADI) for the most conservative model (model 1), but fell below ADI's for the remaining three models, highlighting the use of chemical occurrence and concentration data in refining exposure analyses and increasing accuracy.

- Spanjersberg MQI, Kruijzinga AG, Rennen MAJ *et al.* (2007) Risk assessment and food allergy: the probabilistic model applied to allergens. *Food and Toxicology* **45**, 49.
- FACET (Flavourings, Additives and Contact Materials Exposure Task), EU 7th Framework Project, Project No. 211686. <http://www.ucd.ie/facet/>
- Irish Universities Nutrition Alliance (2004) The National Children's Food Survey. http://www.iuna.net/doc/bg_ncfs.pdf