

## Chemical Risk ranking in infant foods: the case of infant formula

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### INTRODUCTION

Chemical contamination can occur at every stage of food production. As a partner in the Horizon 2020 SAFFI project, the aim of our project is to prioritise the chemical contaminants present in infant food products based on the level of concern they generate. Based on available scientific data and the results of the iTDS, a list of relevant chemicals has been established from several families of contaminants. Furthermore, we established a methodology that allowed us to quantitatively rank the substances of concern.

### METHODOLOGY

The aim of this approach is to rank all of the chemical hazards present in one food item. We first identified all of the substances potentially present in infant formula according to the iTDS results and conducted a review of the literature. Then three scores were attributed to each hazard: a severity score based on the effect selected to establish the toxicological reference point or the HBGV, a contribution score based on the percentage contribution of the selected food item to the total exposure to the substance and a 'health based guidance value' (HBGV) score based on the ratio of exposure over HBGV. The final score was obtained by multiplying the three scores together. We then tested this approach on some food items using data from the French infant Total Diet study.

### RESULTS

Around 80 relevant chemical hazards or groups of hazards were identified for the SAFFI project. For the 1-4-month age class, infant formula was an important contributor for 25 chemicals hazards with a percentage contribution ranging from 9 % to 99 %. Of these 25 hazards, two were associated with threshold and non-threshold effects: acrylamide and furan. These two process-induced compounds have two toxicological reference points for neoplastic (carcinogenicity) and non-neoplastic (neurotoxicity and liver toxicity) effects. The effect considered in the final score was the one with the highest score. The hazards with the highest final score were inorganic arsenic, acrylamide, PCDD/F and DL-PCBs, furan and lead. PCDD/F and lead had a severity score of six due to their effects on reproduction and

neurodevelopment, respectively. Inorganic arsenic, acrylamide and furan had a severity score of 10 due to their genotoxicity. Furan is ranked at the top despite its small contribution score (2).

## DISCUSSION

A quantitative approach was developed and used to rank several substances found in one food item based on the contribution of the food item to the total exposure and the severity of the effects, and considering the exposure against the health based guidance value. The approach is easy to process but requires the percentage contribution to the total exposure, which is not always available in chemical risk assessment. Another strength of this approach is that it allows us to consider all of the chemicals present in one food item while other methods use food pairs. Acute toxicity was not taken into account as most of the adverse effects of the chemical hazards present in infant formula have a probability of occurring after repeat exposure via food consumption. In order to conduct this approach, a toxicological reference point and the critical effect are also required to enable use of the decision tree. As it is important for risk managers to use risk-based approaches when considering chemicals for annual control programs, this method could be used as a tool for risk management. Ultimately, the objective is to set a similar approach for microbiological hazards and then to combine the results of both approaches.