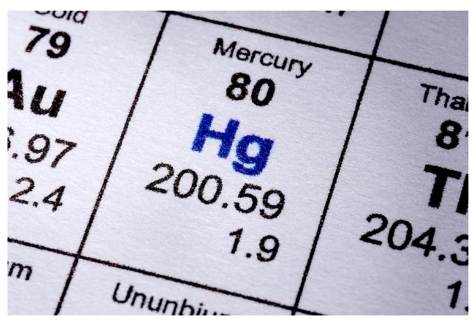
MERCURY CONTENT IN FOODS - A CONTRIBUTION TO FOOD RISK ASSESSMENT

Susana Santiago**, Mariana Santos, Maria Antónia Calhau
Food and Nutrition Department, National Health Institute Doutor Ricardo Jorge, I.P
Av. Padre Cruz, 1649-016 Lisbon, Portugal
***susana.santiago@insa.min-saude.pt**

INTRODUCTION



Contaminant exposure assessment can be performed by combining food consumption data or, in the absence of this information, consumption estimates and plausible scenarios with contaminant concentration levels, according to different approaches: deterministic or probabilistic. To estimate dietary exposure accurately, it is essential to analyse foods as consumed for the presence and levels of chemical substances [1].
Mercury is a metal that is released into the environment from both natural and anthropogenic sources. Once released, mercury undergoes a series of complex transformations mercury (Hg^0), (ii) inorganic mercury (mercurous (Hg_2^{2+}) and mercuric cations (Hg^{2+})) and (iii) organic mercury. Methylmercury is by far the most common form of organic mercury in the food chain.

PURPOSE

The European Food Safety Authority (EFSA) has established Tolerable Weekly Intakes (TWIs), or 'safe levels', intended to protect consumers from adverse health effects posed by the possible presence of the main forms of mercury found in food: methylmercury and inorganic mercury.
On this basis, Member States, research institutions, academia and any other stakeholders are invited to submit occurrence data on these contaminants. Following these Member States are recommended, with the active involvement of feed and food business operators, to perform monitoring and to submit available data on contaminants in food/feed to EFSA [1].

MATERIAL AND METHODS

Figure 1 – Direct Mercury Analyser DMA 80 (Milestone Inc.; CT, USA).

In this study 117 different samples from 10 food groups according to the FoodEx Level 1, a pan-European food classification system, were analyse to determine the amount of total mercury.

The samples were collected from October 2013 to May 2015. Determination was carried in compliance with ISO standard 17025.

Total mercury (Hg) was determined in a Direct Mercury Analyser DMA 80 (Milestone Inc.; CT, USA), according to United States Environmental Protection Agency test method 7473 (USEPA, 2007) [2]. We obtained different limits of quantification, according matrices, in a range 0.5 µg/Kg (grapes and fruit salad) to 13.8 µg/Kg (popcorn). Analytical quality control was achieved using certified reference material NIST 1566b oyster tissue and BCR 151 skim milk powder.

RESULTS

Table 1 – Total mercury content in food samples (µg/Kg).

Food group	LOQ (range)	Samples (n)	Samples < LOQ
composite dishes	1,0-1,3	4	3
eggs and products	1,4	1	1
fish and seafood	1,1-8,4	31	0
fruit and products	0,5-1,8	32	32
juices and nectars	2,4-4,9	2	2
grains	0,9-14	21	21
pulses and nuts	0,8-1,4	8	8
meat and products	1,2-2,0	11	11
milk and products	1,2-1,9	6	6
starchy roots	1,2	1	1

n – number of samples analysed LOQ - Limit of quantification

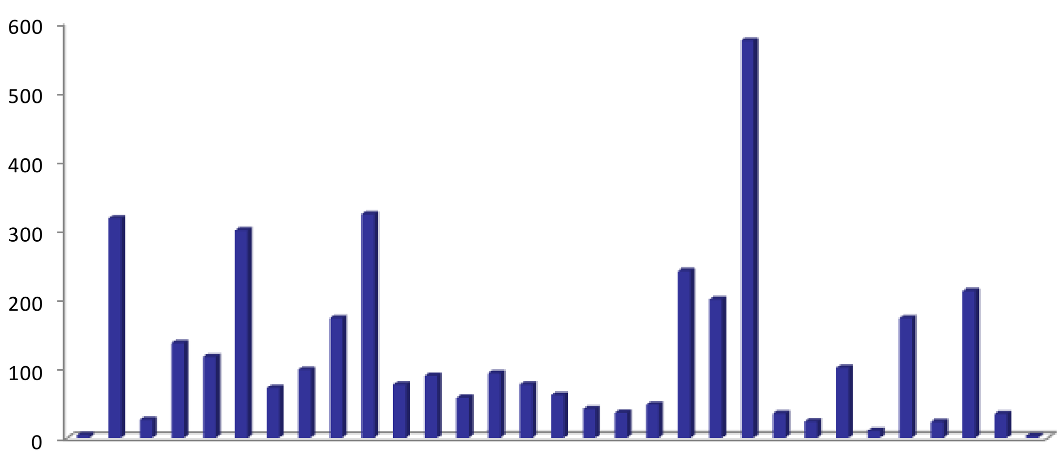


Figure 2 – Total mercury content in fish and other seafood group (µg/Kg).

DISCUSSION

More than 72 % of the results were below the limit of quantification (LOQ). However, 27.4% of the results revealed measurable concentration of mercury. Fish and other seafood and a composite food containing fish had the highest values of total mercury (between 2.9 and 574 µg/Kg of sample) in comparison to all other food categories.
Analysis of this data indicated that the average intake of mercury from fish and seafood products can be near the tolerable weekly intakes established by JECFA (1,6 µg/kg body weight).

CONCLUSION

This study provide baseline information on the analytical data on the chemical substances of interest to performed, a dietary exposure assessment to determine whether this substance pose a risk to the public health, i.e. whether intakes exceed the toxicological limits.

5th MoniQA International Conference I 16-18 September 2015 I Porto

References: [1] EFSA, FAO, & WHO. 2011. Towards a harmonised Total Diet Study approach: a guidance document. EFSA J. 9:2450 [2] JOINT GUIDANCE OF EFSA, FAO AND WHO - Towards a harmonised Total Diet Study approach: a guidance document, EFSA Journal 2011; 9(11):2450. Available online: http://www.tds-exposure.eu/ [3] USEPA (2007) Method 7473 - Mercury in solids and solutions by thermal decomposition, amalgamation, and atomic absorption spectrophotometry.