Heavy metals in seafood: Satisfactory results of interlaboratory comparison

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Fifty-seven laboratories from 29 countries volunteered to put their measuring competence to the test. Each laboratory received a sample without knowing the levels of heavy metals present, and was asked to measure and report the values back to the JRC.

The good results should enhance consumers' confidence, as maximum levels of lead, cadmium and total mercury in seafood are regulated by EU law and it has been proven that most participants are able to correctly measure them. In addition, this comparison has highlighted other issues, such as the apparent dependency of the measurements of inorganic arsenic on the type of food tested.

Excessive intake of heavy metals may lead to a decline in mental, cognitive and physical health. A particular concern is potential developmental defects in children exposed in utero. From a toxicological point of view, the chemical form in which the metal is ingested plays a significant role. For example, methylmercury is much more toxic than inorganic mercury compounds, whilst inorganic arsenic is more toxic than the organic species of arsenic.

The interlaboratory comparison

The interlaboratory comparison was organised in support of the European Co-operation for Accreditation (EA), the Asia Pacific Laboratory Accreditation Cooperation (APLAC) and the national

reference laboratories associated to the European Union Reference Laboratory for Heavy Metals in Feed and Food.

Participants were asked to report both the measured value of each heavy metal in question in the sample and the uncertainties associated with those measurements. The results were scored according to international standards .

The outcome of the exercise was generally positive. All of the 57 laboratories that registered reported results. The share of satisfactory scores ranged between 80% and 96% (Table 1 in pdf link). Participants tended to underestimate the content of total arsenic, and to a lesser extent total cadmium. The distribution of the participating laboratories by country is shown in Figure 2 in pdf link.

Contrary to a previous exercise (IMEP-107 on total and inorganic arsenic in rice), the values reported for inorganic arsenic showed a large spread. Interestingly, this indicates that the matrix (in this case, seafood), has a major influence on the analytical determination of inorganic arsenic. This is a crucial consideration for legislators, because specifying single maximum level of arsenic in food would appear to be unfeasible.

Legislative situation

In Europe, maximum levels for lead, cadmium and total mercury in food are laid down in legislation , varying from 0.5 to 1.0 mg. per kg. for different seafood. No maximum level exists for the methylmercury form of mercury, as its measurement requires specific analytical equipment not routinely present in testing laboratories. However, methylmercury is the main source of human intake of mercury in fish and fishery products, and is important due to its high toxicity compared to inorganic mercury.

No maximum levels for arsenic have been laid down in European legislation either, due to a lack of information about reliable analytical methods for determining inorganic arsenic in different food commodities, and measurement values of inorganic arsenic are generally believed to be method-dependent.

The interlaboratory comparison was, therefore, extended to include methylmercury and inorganic arsenic, in order to investigate the issues that laboratories encounter in measuring these substances.

More information: Interlaboratory comparison report: "IMEP-30: Total arsenic, cadmium, lead, and mercury, as well as methylmercury and inorganic arsenic in seafood": irmm.jrc.ec.europa.eu/news/Doc …s/IMEP_30_report.pdf

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