Total diet study: metals and other elements

Area of research interest: Chemical hazards in food and feed
Study duration: 2014-02-02
Project code: FS102081

Background

The key principle of a Total Diet Study (TDS) is that it is representative of the whole diet. It is different from many surveys in that foods are prepared as if for consumption (rather than being analysed as sold), before being pooled into groups prior to analysis.

This analysis of metals and other elements forms part of an FSA-commissioned TDS.

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Research Approach

The TDS included 26 metals and other elements, measured across 28 food groups and their composite food categories. The food groups included a broad range of foods typical of the UK diet in 2014. Food is a major contributor to overall exposure, although other exposure routes may also be significant e.g. drinking water and occupational exposure.

The FSA previously commissioned a TDS survey in 2006. The 2014 TDS considered an additional 8 food groups and 19 food categories to give a more refined analysis of the foods making up the UK diet.

The food items comprising the various food categories were prepared and cooked for consumption, according to specified instructions agreed between the FSA and the analytical laboratory Fera (York).

The prepared samples were analysed for the following metals and elements: aluminium, antimony, total arsenic, inorganic arsenic, barium, bismuth, cadmium, chromium, copper, germanium, indium, iodine, lead, manganese, mercury, molybdenum, nickel, palladium, platinum, rhodium, ruthenium, selenium, strontium, thallium, tin and zinc.
Brand names are not reported in this survey as TDS samples are composites of foods of different types which come from a variety of sources.

Exposure assessments have been undertaken for various age classes with the 2014 TDS results. These comprised: toddlers and young children (1.5 to 3 years), young people (4 to 10 years), (11 to 18 years) and adults (19 years and above). Unlike the previous 2006 survey the over 64 years (free living and institutional) age class was not calculated because the consumption data was taken from the National Diet and Nutrition Survey Rolling Programme which did not include this group.

Results

The Committee on Toxicity (COT) is in the process of considering the toxicity of chemicals in the diet of infants (0 to 12 months) and young children (1 to 5 years) to support the review conducted by the Scientific Advisory Committee on Nutrition (SACN) of Government recommendations on complementary and young child feeding.

The COT has used the dietary exposure data from the 2014 TDS survey of metals and other elements to inform its deliberations. A summary of the key points from the survey findings follows:

The dietary exposure levels for lead for the toddlers and young children age group did not pose a risk to health. However, when considering total lead exposure from all sources such as the important contribution from soil and dust, there may be a small risk to health for this age group, although this exposure route is outside the scope of the survey.

For some individuals of the toddlers and young children age group there could be a small risk to health from dietary exposure to inorganic arsenic. The FSA has published advice on the consumption of rice drinks. There are maximum levels set in legislation on the levels of inorganic arsenic allowed in rice and rice products in the EU. Stricter levels are set for foods intended for young children.

Some of the cadmium dietary exposures calculated for the toddlers and young children age group exceeded the EFSA TWI of 2.5 µg/kg bw for cadmium. However, this level was set in the context of 50 years of bioaccumulation of cadmium in the body and dietary exposure to cadmium can be expected to decrease for the older age groups.

Dietary exposures for the remaining elements analysed in the study did not pose a health concern. The COT evaluation of manganese remains to be completed and will be published on the COT website in due course. It should not be assumed that dietary exposure to manganese is necessarily of concern to health.

The results from this survey have been used to calculate updated exposures to the various metals and elements from the UK diet. These contaminants are present in the environment and will be present in foods at low levels. Where feasible, action can be taken to ensure that levels are as low as reasonably achievable in food.

Efforts to reduce levels of lead, cadmium and inorganic arsenic in food are continuing with maximum regulatory levels established for key foods.

Research report
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EXCEL
View Metals exposure data as Excel(Open in a new window) (46.78 KB)
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