National Measurement System

Food with thought – Evaluating food enrichment for consumer safety

The importance of the mineral selenium to human health has become increasingly recognised in recent years, and studies suggest that fortified foods can offer potential health benefits. However, there is a fine balance between toxic and beneficial effects of selenium. LGC researchers are using their expertise in selenium analysis to develop a range of reference materials to ensure food and supplement manufacturers can verify the composition and safety of their products.

LGC *Setting standards in analytical science*

The Requirement

It is essential that the correct amount and species (chemical form) of selenium is present in order for fortified food products and supplements to be safe for human consumption. The decline in the importation of naturally selenium-rich wheat flour from Canada and the United States and its replacement by locally grown wheat (which is naturally low in selenium), is reported to have contributed to the substantial reduction of selenium in the European diet. The production of selenium-enriched foods and supplements offers an effective route to increase our selenium intake. However, the uptake and metabolism of selenium by the human body is dependent on the chemical species and there is a fine line between beneficial levels and toxic levels. One such species is selenomethionine, a common natural food source of selenium, so it is essential that this, and other selenium species, can be characterised reliably.

However the accurate measurement of total selenium in food and food supplements presents analytical challenges due to the complex nature of food samples. Furthermore, selenium speciation analysis presents additional challenges due to the low levels of each specific selenium species and the molecular complexity of such samples.

The Solution

LGC's measurement research team for inorganic mass spectrometry have a leading reputation in speciation analysis and have extensive experience in the accurate measurement and characterisation of selenium and selenium species in complex matrices.

In order to help supplement and food manufacturers ensure accurate characterisation of their food products and supplements, LGC has developed and characterised a range of speciated reference materials and standards to assist method validation and quality control.

Produced under accreditation to ISO Guide 34 for the production of reference materials, researchers have developed an isotopically enriched selenomethionine reference material (LGC 7330) which provides an assessed value for the abundance for the selenium isotope, ^{76}Se, and can be used in the validation of reference methods.

In addition, also under ISO Guide 34, a matrix selenium-enriched wheat flour reference material, certified for selenium and selenomethionine content (ERM BC210a), has been developed to enable accurate assessment of the selenium content of food enriched with selenium.

These two reference materials will support the food industry through the provision of tools to enable the accurate assessment of the selenium content of products that have been enriched with selenium. For consumers this will provide confidence that foods and supplements contain beneficial levels of relevant selenium species.

Impact

Dr Cathal Connolly, Senior Applications Chemist from Alltech, who was seconded to LGC to gain in-depth knowledge on selenium speciation methodology in food, commented:

> *"The availability of low concentration certified reference materials with specified levels of certain selenium species is a very welcome development. These reference materials offered by LGC will be of great interest to many research groups working in this area."*

Experience in selenium speciation has enabled measurement capabilities developed through LGC's role as the UK's designated National Measurement Institute for chemical and bioanalytical measurement to be developed into a unique service to provide support to food manufacturers in the form of contract research, product characterisation, training and quality assurance.

Heidi Goenaga-Infante, LGC's Principal Scientist for inorganic mass spectrometry said:

> *"Our extensive experience in selenium speciation enables us to offer effective tools for the development and validation of analytical methods required to optimise the quality of selenium enriched products."*

Reference materials are commercially available through LGC Standards, a division of LGC that is a dedicated supplier of reference materials and standards to a wide range of industrial sectors.

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