Developments of methods for the analysis of antioxidants in a range of foods

Area of research interest: Chemical hazards in food and feed
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Background

Antioxidants are permitted in a limited range of foods, and at well-defined levels as laid down by the Miscellaneous Food Additives Regulations 1995 (as amended). An antioxidant is a substance that is used to delay, retard or prevent the development in food of rancidity or other flavour deterioration due to oxidation. Antioxidants are added to foods to prevent deterioration of the food by atmospheric oxidation. This is particularly important in oils and fats, and in foods containing oils and fats, to prevent rancidity developing on storage. There is a need for accurate methods for the measurement of these antioxidants in foods both for regulatory enforcement and for monitoring of the intake of additives by the population.

Research Approach

There are reliable methods for the determination of antioxidants in edible oils and fats, but these are not immediately applicable to other foods. Extraction of the antioxidant or mixture of antioxidants from some foods is not straightforward as the antioxidant may be encapsulated or bound within the food matrix. Furthermore, some methods of liberating antioxidants may actually lead to their destruction or loss. In this project, the antioxidants will be extracted from foods by several methods including steam distillation and the extracts analysed by an established technique such as IUPAC 2.642. The best method will be optimised for each food type and the final protocol validated by collaborative trial. In addition to the use of traditional wet chemistry techniques for the extraction of antioxidants from foods, the project aims to trial the novel technique of developing molecular imprinted polymers (MIPS) against some of the antioxidants under consideration.

Results

A method was developed that gave satisfactory results. Because of the nature of antioxidants which are destroyed easily, the method developed used gentle extraction procedures without heating. Other precautions such as cooling in ice and displacing oxygen with nitrogen gas were used to minimise losses. One other laboratory used the method developed at Leatherhead Food International (LFI), in full, to analyse the samples sent to them. Their results were not similar to the results obtained at LFI, and so the developed method may not be suitable for use in other laboratories without further refinement. Results from the molecular imprinted polymer studies showed that the molecularly imprinted polymers (MIP) bound the antioxidants to a small extent, but not enough to be of use in preparing clean extracts from a food sample.

Research report

England, Northern Ireland and Wales

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