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Innovative technique to detect harmful food contaminants

Researchers at the University Institute of Pesticides and Waters (IUPA) at the Universitat Jaume I de Castellón (UJI) have developed an innovative technique for the detection and quantification of potentially harmful contaminants in food samples, for use mainly with foods of marine origin. It allows monitoring of levels of toxic compounds like brominated flame retardants in such as tunafish and prawns, which is of vital importance in food safety.

Brominated flame retardants (BFRs) are compounds widely used in a variety of products, such as televisions, smartphones, furniture and plastic products in general, to reduce their flammability. They are toxic compounds harmful to human health and present in many foodstuffs, especially those of marine origin, released into the sea by the factories that produce them.

UJI researcher, Carlos Sales. explains: “The pollutants enter the marine environment, where they are ingested by fish and shellfish. Being lipophillic substances, they cannot be excreted and are stored in the fats, meaning that when we eat a piece of tunafish, for instance, we are also ingesting these compounds, which then, similarly unexcreted, remain in our bodies too. They have even been detected in breast milk at low concentrations, for example. While concentrations remain low, they pose no immediate health risk, but in high doses they become toxic and can lead to health issues including cancer, endocrine disruption and neurological disorders, making their monitoring in food vital”.

Ensuring that ensure that these compounds do not exceed acceptable limits in foodstuffs is therefore essential. Indeed, the European Union has carried out a series of actions to limit or prohibit the use of many such compounds.
It is in this context that IUPA researchers, led by Dr. Félix Hernández, have developed an innovative technique that optimises the monitoring of these compounds in food and environmental samples. The system uses atmospheric-pressure chemical ionization (APCI) to detect these emerging pollutants more effectively than previous techniques. The new technique is more sensitive, with detection thresholds between 10 and 50 times lower and improved selectivity, making it much more accurate.s.

According to Sales: “The detection of BFRs and other persistent organic pollutants (POPs) has traditionally been carried out using electron ionization (EI) to fragment the molecules and charge the ions so that they can be detected. However, this technique can sometimes generate identical ions for different compounds, limiting its selectivity. At the same time, with the electron impact technique, it is almost never possible to see the whole molecule, similarly resulting in the same fragment appearing for compounds with different numbers of bromine atoms. With the APCI method, instead of directly ionizing the molecules, we charge a gas (nitrogen), which collides with the molecules we want to see, leaving them ionized. In other words, the molecule is charged through collision, rather than by direct electrical discharge, meaning that it does break; this is what we mean when we talk about soft ionization. It is a more sensitive and selective technique because, if we have the whole molecule, we can more confidently ascertain whether there are contaminants in the sample and at what levels”.
The implementation of this innovative technique has considerable implications for food safety, allowing us to detect potentially harmful concentrations in foodstuffs, in which case they would be recalled, as well as in order to ensure that the standards established by the European Union are being respected.

An additional benefit of this technique is that it would bring costs down: being more sensitive and selective, it uses just half the materials needed for traditional techniques and analyses pollutants at much lower concentrations.
This methodology developed by the IUPA is part of the research line led by Dr. Tania Portolés, researcher at the Universitat Jaume I with over ten years’ experience in APCI. This method had already been used in pesticides, dioxins and other pollutants, leading to improved sensitivity and detection, and its application is now being expanded to new compounds.

http://ruvid.org/ri-world/innovative-technique-to-detect-harmful-food-contaminants/

Full bibliographic information

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