

Alternative methods proposed to detect pesticides and antibiotics in water and natural food

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Water or food of natural origins (from plants or animals) that we consume on a daily basis can contain unwanted 'supplies' for our organism, such as pesticides or antibiotics. A doctoral thesis carried out by Jorge Juan Soto Chinchilla, from the Department of Analytical Chemistry at the [University of Granada \(Universidad de Granada\)](http://www.ugr.es), and directed by professors Ana María García Campaña and Laura Gámiz Gracia, proposes new analysis methods for the detection of pesticide residue (carbamates) and antibiotic residue (sulfonamides) in water, plant foods and food of animal origin (milk and meats from varied sources). These new methods constitute a routine analysis alternative to the analysis used until now.

Research forms part of several projects financed by the Spanish National Institute for Agrarian and Alimentary Research (INIA) and the Ministry of Education and Science, in collaboration with the company Puleva Biotech.

The main goal of the work "New analytical methodologies, under quality criteria, for the determination of pharmaceutical residues in waters and food", carried out by the research group "Quality in Food, Environmental and Clinical Analytical Chemistry (FQM-302)", has been to develop new methods to detect residues in food of these contaminants below the Maximum Residue Levels (MRL) established by the European Union, in order to guarantee the quality of the product and permit its distribution and consumption. Researchers point out, regarding water, that "the interest caused by control of residue levels of pesticides, which can be found in water as a result of treatment of crops with such compounds, is widely known. "However, concern on detecting pharmaceutical residue, specifically antibiotic, is quite recent. The presence of these contaminants in fresh waters can cause a certain bacterial resistance or allergic reactions in the consuming population.

Innovative techniques

In order to achieve this, the study carried out by the UGR used techniques that have not been much explored in these fields. Cathodoluminescence detection (CL) connected to Flow Injection Analysis (FIA) and High Performance Liquid Chromatography (HPCL), or Capillary Electrophoresis (CE) with UV/Vis detection using an online preconcentration technique in the capillary itself, or detection via Mass Spectrometry (MS). MS can also unequivocally identify the analysed compounds. Research has been specifically based on carbamates, a widely used pesticide family, and on sulfonamides, a group of wide-spectrum antibiotics commonly used in medicine and veterinary science.

Researchers point out that methods developed in this work could be applied in the future to routine analysis for this kind of residue control in plant foods and foods of animal origin, in Quality and Alimentary Safety laboratories, or in the detection of such contaminants in waters of varied sources. "These methods definitely constitute interesting alternatives to the already established and less sensitive methods which imply a greater consumption of organic solvents and generate more contaminant residues," the author of the thesis points out.

FQM-302 research group has been working on the proposal of methods of detecting contaminant residues in foods and in the environment for several years. Currently work is being carried out in different doctoral theses which looks at the study of other pesticide families and their degradation products, as well as the study of other antibiotics such as quinolones and beta-lactams using the methods mentioned above.

Reference: Dr. Jorge Juan Soto Chinchilla, Dr. Ana M^a García Campaña and Dr. Laura Gámiz Gracia. Department of Analytical Chemistry. Phone numbers: +34 958 248 594 – +34 958 243 326. jorgejsotoc@hotmail.com; amgarcia@ugr.es; lgamiz@ugr.es. Web: <http://www.ugr.es/local/fqm302>