

Preface

Analytical techniques based on the antigen-antibody interaction – immunochemical techniques – originated at the end of the fifties, when the first immunoassay for the hormone insulin was described (1). Since then, immunoassays (IAs) have become increasingly important, expanding their fields of application. In the sixties, IAs were mainly directed to the analysis of proteic macromolecules relevant for biomedical diagnosis, such as hormones or enzymes. In the seventies, the advances in the experimental production of antibodies allowed the extension of IAs to more simple analytes. Organic molecules of clinical interest (metabolites or drugs) were still the preferred target analytes. However, the potential application of IAs in the analysis of contaminants in agriculture, food, and environment started to become evident (2,3). The parallel development of the hybridoma technology, with the subsequent possibility of producing monoclonal antibodies (4), afforded a more rigorous standardisation of IAs and contributed to new assay designs. In the last two decades, the number of IAs developed for the analysis of compounds of agrochemical and/or environmental relevance, such as pesticides, has experienced a spectacular increase. Scientists throughout the world are active in this research field, and as a consequence many scientific papers are currently being published in specialised journals, reporting the production of new antibodies for new analytes and proposing new assay formats and applications.

There are many explanations of this impressive increase of the interest in IAs for food and environmental applications. Some of them are:

1) Agrochemicals are inherently toxic for living beings, including humans, although they are necessary to maintain the levels of agricultural production required by the demand of increasing population. Unfortunately, they are not always used in accordance with appropriate safety controls, and, therefore, there is an international concern about the harmful effects of these compounds on the public health and on the environment.

2) Local and/or international regulations are more and more restrictive to the concentration levels of agrochemicals allowed in food production and in the environment. Hence, there is a constant demand for more sensitive analytical methods that could accurately determine the violative presence of these compounds.

3) Conventional techniques (mainly chromatographic) for the analysis of agrochemicals often become too sophisticated, time-consuming, and expensive, when adapted to achieve the required sensitivity. On the contrary, immunoanalytical techniques are directly based on one of the most sensitive natural interactions, and can be performed in a simple and rapid way with a high sample throughput and minimum investment and cost of reagents.

4) One of the most reputed advantages of immunochemical techniques is their specificity. Provided that the appropriate antibodies are available, IAs should be able to specifically detect and quantify the target analyte in very complex mixtures, where many other related or unrelated compounds can be present.

5) Immunochemical techniques are usually performed in aqueous solutions, thus avoiding the environmental problems derived from the use of organic solvents required by chromatographic techniques.

6) These techniques are compatible with semiconductor microelectronic technology. They can be fully automatised for laboratory and field-portable applications. In the latter respect they are the best choice for semi-quantitative screening.

7) A lot of commercial companies operating in the field of analytical chemistry already include immunoassays in their catalogues, as complementary or alternative tools to conventional methods. The analytical performance attributed to immunochemical methods is already being demonstrated in many practical applications, where IAs compete favourably with chromatographic techniques. This fact is leading to their progressively broader acceptance, not only by analysts involved in the quality control of food and the environment, but also by regulatory authorities in many developed countries.

This special issue of the journal *Food Technology and Biotechnology* (FTB) published in two Parts (A and B) on Immunochemical Techniques and Methods contains reviews together with some original scientific papers. Our intention was to give a representative cross-section of the field, showing particular experimental approaches and solutions to different (or occasionally not so different) problems or applications. The authors from some of the most relevant research groups in the world in this field were invited to contribute in this special issue. The majority of them are from the European laboratories, but there is also a very important participation of prominent groups from USA and Canada. The Guest co-Editors and the Editorial Board of FTB appreciate very much, indeed, the efforts of all the authors and referees who kindly contributed to make this special issue possible.

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