

LAB-ON-CHIP MICRO-ELISA FOR THE SMART MICRO-SENSING BASED DETECTION OF MYCOTOXINS, ALLERGENS AND GLUTEN IN FOODS

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Food safety is a top-flight issue. Being able to accurately assess the presence of contaminants, residues, pathogens, and allergens in foods, is crucial. In addition, there is a constant research for new performing analytical rapid methods. Both mycotoxins and food allergens can be easily directly detected by immunochemistry-based methods (ELISA), as well as by chromatographic or mass-based analytical approaches. The development of 'smart' analytical approaches based on the use of micro- and nano-sensors is continuously growing worldwide, particularly permitting their use at-line and sometimes, on-line.

In this communication, a new device based on a microfluidic disposable card (lab-on-a-chip, LOC) called EliChip) and a small portable correlated instrument are described, showing their performance in comparison with traditional methods. This LOC-based approach can give quantitative analysis in a few minutes, reducing time and permitting to work at line. A high sensitivity can be reached using antibodies as conventional probes. Some examples of applications – obtained from the 'Food Digital Monitoring Project' (a Regione Piemonte/EU funded project under the European Fund for Regional Development, POR-FESR) are showed, discussing advantage and critical points.

The method has been tested for mycotoxins and allergens, such as aflatoxin B1, ochratoxin A, lysozyme and gliadin (gluten), in different food matrices. We showed that the sensitivity is comparable to that obtained using classical ELISA methods. Finally, the EliChip method was experimentally coupled with a novel semi-automatic extractor for gliadin (gluten), working with a modified AOAC extraction method, evaluating its usefulness as well as the potential reduction of the time of the analysis. All these findings confirm the usefulness of this analytical approach leading to an easy detection of mycotoxins and allergens and opening new perspectives for at-line monitoring of contamination increasing safety.