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The future of analytical chemistry in foodomics

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Key words: omics; food proteomics; food peptidomics; food chemistry; food digestion; milk proteins; mass spectrometry.

Abstract

The field of food analytical chemistry has greatly evolved over the last years, moving from the descriptive view of raw food composition into the modern instrumental approaches known as the foodomics. The development and optimization of these integrated approaches, based on the use of high resolution techniques for tracing the chemical fingerprint of a food, is arriving to define molecular parameters for the qualification, authentication, and safety of the products. With these new tools, omics are solving some of the new issues of food quality and traceability, including the development of analytical methods to ensure the origin of food, as well as the discovery of biomarkers to identify potential food safety problems. Here we review the main methods used in foodomics from its birth until now, highlighting the use of high throughput instrumentation. This includes the computational problems they generate, but also the significant prospects for development of knowledge that are able to open in important areas such as food technology and biotechnology.

Highlights

- Foodomics approaches, able to assign a chemical fingerprint of a food, are arriving to define molecular parameters for the qualification, authentication and safety of the products.

- Foodomics is addreesing new issues of food quality and traceability, to ensure the origin of food as well as to identify potential food safety problems.

- High throughput instrumental data handling is providing deeper knowledge in important research areas such as food technology and nutrition, and food-related diseases.

Introduction

Figure yourself at night in an open place, far from city lights, contemplating the starry sky. In addition to a number of lonely lights, the background will appear as a white cascade of stars, undistinguishable one from another, just as impalpable wadding or a tiny milk fall. So the sky appeared to the ancient Greeks at night, who thus called the white background the Milky Way. Only after many centuries the innovation of the Galilei's telescope in XVII century resolved the MilkyWay in star clusters, and only in the last century the modern telescopes distinguished the single brightest stars. Almost incredibly, the instruments available today allow us to detect even the presence of planets turning around the far stars, starting to disclose the fine structure of the most distant star systems.

For food, it is exactly the same. To remain in a 'milky' environment, the way analytical chemists, technologists and nutritionists regard to qualitative and quantitative composition of

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