

Chromatography and Foodomics: The Perfect Pairing

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Chromatography plays a crucial role in a huge number of areas and applications. In this work, we will show how chromatography is helping to the development of a new scientific discipline as Foodomics, through a case study focused on food by-products valorisation and colon cancer.

The valorisation of food industry by-products is an emerging trend in food science that has shown to be a valuable alternative to extract natural compounds with added value and demonstrated bioactivity from food wastes, which are usually discarded or employed as animal feed. Most of the reported studies in literature about tropical fruits are focused on the fruit itself, whereas the identification of bioactive substances of by-products from tropical fruits is still scarce or has not been done yet. Considering the potential of tropical fruits by-products as promising source of bioactive phytochemicals, a complete valorization strategy based on green Foodomics is presented in this work, investigating *Physalis peruviana* L. calyces, *Mangifera indica* L. seeds kernels and *Passiflora mollissima* seeds. The results include pressurized liquid extraction (PLE) of the bioactive compounds, followed by a comprehensive analysis of the compounds extracted by LC and GC coupled to quadrupole time-of-flight tandem mass spectrometry (Q-TOF-MS/MS), applying integrated identification approaches for the confident identification and structural elucidation of phytochemicals. The bioactivity of the extracts was investigated using in vitro assays against human colon cancer cells and their action mechanisms explored through metabolomic and transcriptomic approaches. Moreover, the low toxicity of the most active extract was also confirmed. The proposed strategy can be implemented for the complete characterization of preparations with health-promoting effects, intended to be used as functional foods or nutraceuticals, and in traditional medicine.