Concurrent Session 12

Adsortive recovery of health-beneficial compounds from apple juice

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Background - Numerous epidemiological studies have revealed a positive correlation between a diet rich in fruits and vegetables and a decreased incidence of certain degenerative diseases. Therefore, research interest has been focused on plant secondary metabolites, such as polyphenolics and carotenoids, which have been shown to exert certain health-beneficial effects. There is a need to find commercially appropriate means to isolate and concentrate these compounds as ingredients for functional or enriched foods.

Objective - The objective of this study was to systematically investigate the effect of various parameters on the adsorption and desorption behaviour of monomeric and polymeric phenolic compounds using a food grade polymeric adsorption resin.

Design - Batch adsorption experiments on a laboratory scale were conducted with fixed amounts of a diluted apple juice concentrate and weighed portions of a methacrylic resin under continuous stirring in a nitrogen atmosphere. The juice was allowed to be in contact with the resin until saturation conditions were achieved. Accelerated Solvent Extraction (ASE) technology was applied to study the elution efficiency of different solvents using resin which had been saturated with apple polyphenolics.

Outcomes - Although commonly applied in industrial processes there is still a lack of experimental data to predict performance thus making these processes empirical in nature. In contrast to previous findings on the adsorption behaviour of isolated flavonoids1 a lower pH value improved the adsorption efficiency. Moreover, a decrease in temperature and a higher feed concentration and juice : resin ratio increased the amount of phenolics bound to the resin. For the recovery of the compounds, the temperature during the elution step was the most important parameter besides the solvent composition.

Conclusions - The present study allows the development of efficient and cost-effective industrial processes that can also be applied to other matrices in order to fractionate and concentrate phenolic compounds for the production of tailor-made plant extract ingredients.

References

Does oleocanthal, a pungent principal in olive oil, contribute to the health benefits of a Mediterranean diet?

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Background - Premium olive oils are characterized by a distinctive pungency that is unusual because it is sensed in the pharynx or throat but not the mouth. While attending a Molecular Gastronomy conference in Sicily1, one of the authors (GKB) noted the restricted throat irritation is remarkably similar to that elicited by the non-steroidal, anti-inflammatory drug (NSAID) ibuprofen.2

Objective - To determine if the perceptual similarity between olive oil and ibuprofen might be accompanied by similarities in pharmacological activity.

Design - A collaboration combining chemical separation, chemical identification, synthesis, sensory evaluation, and inflammation marker techniques.

Outcomes - We isolated, synthesized, and then determined the absolute stereogenicity of the irritant (-)-deacetoxyligstroside aglycone, which we term oleocanthal (oleo = oil; canth = sting; al=aldehyde). Sensory and chemical evaluation of 10 commercially available olive oils revealed a strong positive relationship between throat irritation intensity and oleocanthal concentration. Cyclooxygenase and lipoxygenase assays conducted with synthetic (-)-oleocanthal demonstrated that, as predicted, it is a natural NSAID with an anti-inflammatory profile and potency strikingly similar to that of ibuprofen.

Conclusions - Oleocanthal may play a significant role in the well-known health benefits associated with a diet high in olive oil. These findings also provide evidence that perceptual similarities between a novel compound and a pharmaceutical agent may predict similar pharmacological properties. Published: Nature 2005; 437: 45-46

References