

Editorial



Nutrition Chemistry in Switzerland

How to provide enough energy and nutrition to all humans on earth? The nutrition part of this major burning question of our society has not only a quantitative, but also a qualitative aspect. Improving the grade of human nutrition (food) contributes considerably to the health-related quality of life. Moreover, it has surely an impact on the increase of the average human lifespan during recent decades, which is mainly based on the enormous achievements in life sciences, in particular in the medicinal and pharmaceutical area. In the International Year of Chemistry, it is worth mentioning that many important discoveries in those fields were made with participation of Swiss scientists and institutions.

This special issue of CHIMIA delivers an insight into current activities of nutrition research by a collection of original research papers and review-type contributions in which a broad variety of chemical sciences is involved. The very high sensitivity of modern analytical methods not only ensures the quality of food products regarding the content of macro- and micronutrients responsible for smooth operation of metabolic processes, as well as the contamination by toxins. It is also applied to the identification of new active ingredients and the elucidation of the role and action of bioactive compounds in complex mixtures. Beside the focus on known compounds such as nutraceuticals, phytochemicals, vitamins, flavors, and proteins, new developments are directed towards studying synergetic effects, developing personalized nutrition, improving health and wellness, and evaluating the potential of other chemical entities for nutraceutical or pharmaceutical applications like chemotherapy. The elaboration of efficient procedures for (bio-) chemical transformations as the basis for large-scale production of food and feed (animal nutrition) products is another topic.

In the first paper, **Julie Schappler et al.** from the Universities of Geneva and Lausanne report on the development of powerful analytical techniques. The simultaneous determination of cations and anions by CE-MS was applied to the analysis of powdered milk for triazines (melamine and its by-products). **Serge Rezzi and colleagues** from the Nestlé Research Center in Lausanne present their outlook on how food products can be specifically optimized for individual needs by using results from nutritional metabolomics. As one example for a metabolic response of organisms to nutritional ingredients, the authors depict an NMR-MS based study which provides evidence that a daily consumption of dark chocolate during a certain period is sufficient to modify the stress metabolism of free living and healthy human subjects.

Jean-Luc Wolfender et al. (University of Geneva) summarize the trends in the development of highly sensitive methods for chemical and biological profiling. Product identification and phytochemical investigations of complex biological matrices like plant extracts from a metabolomics viewpoint are possible by using UHPLC-TOF-MS and microflow NMR methods on a microgram level. **Christian Starkenmann et al.** from Corporate R&D Division of Firmenich SA, Geneva, exemplify their search for innovative flavors to be used as mouth refreshing products, saltiness and sweetness enhancers, and compounds contributing to the taste of delicate foods. Sensory analysis using human tasting panels of purified compounds isolated from natural sources is a key analytical tool in this research. The potential of bioactive food components for medicinal applications is explained by **Melanie M. Erzinger and Shana J. Sturla** from ETH Zürich. The efficacy of chemotherapy by bioreductive anticancer drugs might be enhanced by specific food–drug interactions based on the upregulation of enzymes. **Karl Gademann** from the University of Basel discusses the isolation, structural characterization and chemical and biological studies of biologically active compounds from cyanobacteria with respect to potential nutraceutical or pharmaceutical applications. In the closing contribution from **our group of chemical research** at DSM Nutritional Products, examples of industrially applied processes performed on scales of up to thousands of tonnes per year are highlighted.

Overall, the examples presented in this special issue demonstrate how nutrition research in Switzerland is helping to improve the quality of daily life. Future activities concern the optimized use of high-quality products in human and animal nutrition, the further elucidation of chemical and biochemical processes and interactions in living organisms, and the application of bioactive nutritional compounds to the prevention and treatment of diseases.

Thomas Netscher
DSM Nutritional Products, Basel
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