



Seminar

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Natural product analysis: trends, challenges and pitfalls in an “omics” world

Technological progress, novel application fields and the increasing interest to utilize natural “green” products in medicine, cosmetics and health related nutrition (nutraceuticals and functional food) mean a permanent driver of change in phytochemical sciences. Tightening regulatory requirements force producers and scientists to thoroughly characterize extracts, fractions or whole plant parts containing bioactive principles identified by newest pharmacological test systems. The immense diversity of secondary metabolite structure classes and the necessity to handle a broad variety of matrices ranging from plant parts to processed food or biofluids imposes an increasing demand on instrumental analysis methods. The requirements for selectivity and sensitivity are met by the application of latest technologies ranging from hyphenated instrument setups including multi-stage mass spectrometry to NMR spectroscopy combined with multivariate data analysis. In a modern world of limited resources and the desire to minimize the ecological footprint of any undertaking, faster and / or “green” analysis implies an additional challenge for the modern analytical phytochemist. A “green” revolution in separation sciences has definitively been triggered by technological advances in supercritical fluid analysis (SFC), which allows to complement or even replace organic solvent driven HPLC approaches in well researched classical phytochemical applications such as targeted metabolite profiling of *Gentiana* sp. NMR spectroscopy, on the other hand, well known to any phytochemist as structure elucidation tool and often used as pattern recognition method in -omics applications, matured to a quantitative method (qNMR) – with comparable quality to laborious HPLC analysis as exemplified for *Silybum marianum*. If however secondary metabolites, identified as active principles, must be selectively tracked in plants, processed food matrices or biofluids in a targeted manner, LC-MS/MS, is still the key technology. For example, it facilitates the quantification of lactotripeptides, a compound class associated with cardioprotective effects, in milk products including yogurt from the Alto Adige region or can be used to control the distribution of biological pest control agents by monitoring their secondary metabolites, e.g. destruxins excreted by the fungus *Metarhizium anisopliae*. If the effect of natural products is to be investigated in a system biology approach, targeted selective methodologies must be replaced by pattern recognition driven analytical platforms. Both in the ongoing VASCAGE project, dedicated to unravelling the mechanism of vascular aging, and in a project dedicated to characterizing resistant *Centaurium* cultivars, LC-MS/MS or NMR based approaches are utilized to deepen the knowledge on the metabolite profile of the target organisms – plants and man.

Room 6302 – Palazzo della ricerca e della conoscenza

September 26th, 2019 – 11:00-12:00



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