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Chapter 10

Concluding remarks and prospective

Since long ago, plants have been used as the primary source of food, timber, fuel, and medicine, among other purposes. The ability of plants to produce different kinds of complex compounds makes them a very special, and one of the most important sources for developing new drugs. Currently, plant extracts and plant-derived components are being used as herbal remedies against different diseases in different parts of the world. Chronic inflammation is linked to numerous human diseases and a serious health problem around the world, so scientists are trying to find cures for inflammatory diseases. Increasing number of evidences suggest that modulation of inflammatory response by natural phytochemicals plays an important role in the prevention, mitigation, and treatment of many chronic inflammatory diseases.

The work described in this thesis shows the application of NMR spectroscopy integrated with multivariate data analysis for metabolic profiling and to find active ingredients from the crude extracts of different plants. The supervised multivariate data analysis methods like partial least square (PLS) and orthogonal partial least square (OPLS) analysis to study the correlations of metabolic profile of the extracts with their bioactivities. Mostly phenolic compounds were identified by using this approach. Recently, lot of attention has been given to a class of secondary metabolites which are extensively present in a wide range of food plants: the flavonoids, for which many different biological activities have been reported. Epidemiological studies suggest that a high intake of vegetables and fruits are associated with lower risk of chronic diseases. However, the mechanism of action and the components involved in this effect have not been identified clearly. The antiinflammatory actions of flavonoids in-vitro or in cellular models involve the inhibition of the synthesis and activities of different pro-inflammatory mediators such as eicosanoids, cytokines, adhesion molecules and C-reactive protein. Molecular activities of flavonoids include inhibition of transcription factors such as NF-kB and activating protein-1 (AP-1). However, the impact of in-vitro studies on flavonoids are limited due to the non-physiological concentrations utilized (5-100µM). In addition, it has been observed in the human studies that flavonoid absorption in the gastrointestinal tract is only between 1 and 5% of the ingested food. Moreover, in-vivo flavonoids are extensively metabolized to molecules with different chemical structures and activities compared with the ones originally present in the food. Human studies investigating the effect of flavonoids on markers of inflammation are insufficient, and are mainly focused on flavonoid-rich food.
but not on pure molecules. Most of the studies lack assessment of flavonoid absorption or fail to associate an effect on inflammation with a change in circulating levels of flavonoids. Human clinical trials on pure flavonoid molecules are needed to clarify if flavonoids represent key molecules involved in the antiinflammatory properties of food plants. In this study, we tested several reference compounds from active extracts. Compounds like curcumin, quercetin, kaempferol, myricetin and eugenol were highly active in in-vitro studies but none of them showed activity in in-vivo except curcumine. The activity might be due to the combination of certain compounds (synergism) or unidentified compounds present in the extracts. Further studies are needed to confirm this. With the emergence of new analytical tools and techniques with lot more precision, accuracy and sensitivity we can deeply look inside plant metabolome and find active ingredient from them. Furthermore, proteomics, transcriptomics and genomics data is necessary to determine their mechanism of action.