



University of Naples Federico II
Department of Pharmacy
International PhD course in
Nutraceuticals, Functional Foods and Human Health



Bioactive compounds from herbal sources for therapeutic applications in metabolic syndrome and associated disorders

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Metabolic syndrome is a complex of disorders that includes insulin resistance, hypertension, dyslipidemia and obesity, which significantly increase the risk of developing type 2 diabetes, cardiovascular disease and other chronic diseases. When the preventive approach, based on a healthy lifestyle, proves insufficient, the treatment of metabolic syndrome requires the use of pharmacotherapy, often associated with significant side effects. The search for active secondary metabolites from medicinal plants represents a promising field for the development of new therapeutic solutions that can contribute to the treatment of metabolic disorders. Phytochemical research is focusing on sustainable approaches for the isolation and analysis of these compounds, using “green” techniques that reduce the use of toxic solvents and improve extraction efficiency, promoting an environmentally friendly approach.

The proposed research is in continuity with our previous activities aimed at the study of botanicals with activity on dysmetabolism, already isolated and characterized within our laboratories. We have recently conducted studies on *Achillea wilhelmsii* (1) and on several species of the genus *Centaurea* (2,3), identifying several compounds capable of modulating specific molecular targets implicated in metabolic disorders, including glucose uptake and cholesterol synthesis. The proposed project adopts a multidisciplinary approach that integrates bio-guided separation of plant extracts, advanced spectroscopic analyses and the evaluation of the activity of the isolated metabolites on biochemical pathways involved in dysmetabolism and related inflammatory processes. The aim is to generate small chemical libraries to be used in structure-activity relationship (SAR) studies. The isolated compounds will be tested both on already known molecular targets and on innovative targets of interest for the treatment of the main comorbidities associated with diabetes, such as PTP1B, AR, PPAR, FXR and TGR5.

The research will be conducted in collaboration with academic and industrial partners (Indena), with whom the research group already maintains a consolidated scientific cooperation.

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