XXXLX cycle

Tutor: Prof Armando Ialenti; co-Tutor: Prof. Pasquale Maffia

Role of inflammation in cardiovascular diseases: exploring the effect of nutraceuticals

Cardiovascular diseases (CVD) are one of the leading causes of morbidity and mortality worldwide. In recent years, numerous scientific evidences have confirmed the crucial role of the immune system, through both innate and adaptive mechanisms, in these pathologies, making it a promising research target for early identification of pathogenic signs, as well as for the diagnosis, monitoring, and treatment of CVD. Despite the availability of pharmacological treatments to reduce the progression of cardiovascular diseases, they are often insufficient for some patients, particularly those at very high risk. In any case, the best approach remains the prevention of such diseases, and in this regard, numerous evidences suggest that natural products, including nutraceuticals, could enhance the effectiveness of these therapies and reduce cardiovascular risk.

On this basis, the present project aims to gain a deeper understanding of the molecular and cellular pathways involved in the inflammatory processes underlying pathologies such as atherosclerosis and heart failure. A better understanding of the inflammatory processes involved in cardiovascular diseases could therefore facilitate the identification of new therapeutic targets for the prevention and/or treatment of these pathologies.

The study of inflammatory processes related to these pathologies will include both in vitro and in vivo approaches, employing cutting-edge technologies. Specifically, the following will be employed:

-both simple (monocultures) and complex (bi- and three-dimensional cultures) cell lines to establish models useful for understanding the genetic, biochemical, and molecular determinants underlying the etiopathogenesis and progression of diseases.

-ad hoc animal models, both traditional and transgenic, with the latter representing a valuable approach for understanding complex pathophysiological phenomena and validating new therapeutic targets.

-imaging techniques, flow cytometry analysis, differential gene expression analysis through single-cell RNA sequencing, and proteomic analysis.

-databases and bioinformatic and statistical approaches (R package).

This study addresses the needs of the Travel Project and is capable of contributing to the achievement of the objectives set forth in this project.