

Cristiano Negro  
cristiano.negro@unipr.it

University of Parma  
Tutor: Prof. Pedro Mena

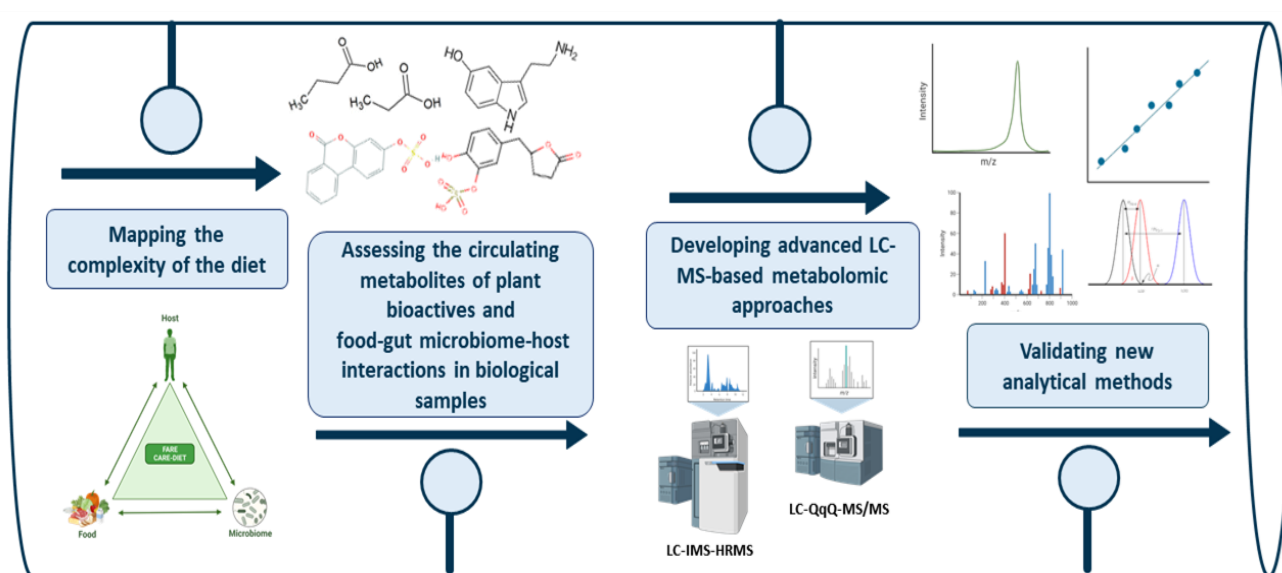
# Mapping the complexity of the diet: circulating metabolites of plant bioactives and food-gut microbiome-host interactions

## Overview

**Plant bioactives** may play a role in the promotion of **cardiometabolic health**. The **heterogeneity** in the **metabolism** and **individual response** to the consumption of these phytochemicals is a significant obstacle when deciphering their potential to prevent **cardiometabolic diseases**. A **holistic approach** is needed to better understand individual cardiometabolic responses to the consumption of **plant bioactives**, as well as the specific role of the **diet-gut microbiome-host interplay** in driving preventive effects associated with plant bioactive **metabolites** and other **dietary components**. [1-6]

## Aim of the project

This PhD thesis aims at **developing and validating new analytical methods** to **map the complexity of the interaction** among different **dietary components**, the **gut microbiome**, and **host physiology**. For this purpose, **circulating metabolites** of **plant bioactives** and those derived from **food-gut microbiome-host interactions** will be studied in **biological samples** of population groups, using advanced **LC-MS-based metabolomic approaches**.



1. Kolodziejczyk et al. (2019) Nat Rev Microbiol, 17:742.;
2. Barabási et al. (2020) Nat Food, 1:33.;
3. Descamps et al. (2019) EBioMedicine, 44:747.;
4. Man et al. (2020) Nutrients, 12:1.;
5. Vernocchi et al. (2020) Int J Mol Sci, 21:3688.;
6. Peluzio et al. (2021) Trends Food Sci Technol, 108:11.

## PhD Thesis Objectives and Milestones

The assessment of the **bioavailability and exposure to (poly)phenolic metabolites, terpenoids and food-gut microbiome-host derived metabolites**, in human **urine, plasma and fecal** samples will be explored. For method validation, the **Analytical Procedures and Methods Validation for Drugs and Biologics FDA-guidance** will be used. Also, for **data acquisition and method validation**, an advanced UPLC-MS-based targeted metabolomic pipeline will be used, that includes a **UPLC-IMS-HRMS mass spectrometer** for the **identification** and a **UPLC-TQS-MS/MS mass spectrometer** for the **quantification** of the compounds.

This PhD thesis project can be subdivided into the following **milestones**:

Activity	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
<b>A1) Development and validation of (poly)phenol metabolites method</b>																									
1) Literature research		█	█																						
2) Method development					█	█	█																		
3) Method validation							█																		
<b>A2) Development and validation of terpenoids method</b>																									
1) Literature research								█	█																
2) Method development										█	█	█	█												
3) Method validation																									
<b>A3) Development and validation of food-gut microbiome-host method</b>																									
1) Literature research																									
2) Method development																									
3) Method validation																									
<b>A4) Assessment of multiple phytochemicals bioavailability and exposure in biological samples</b>																									
<b>A5) Thesis and Paper Preparation</b>																									