

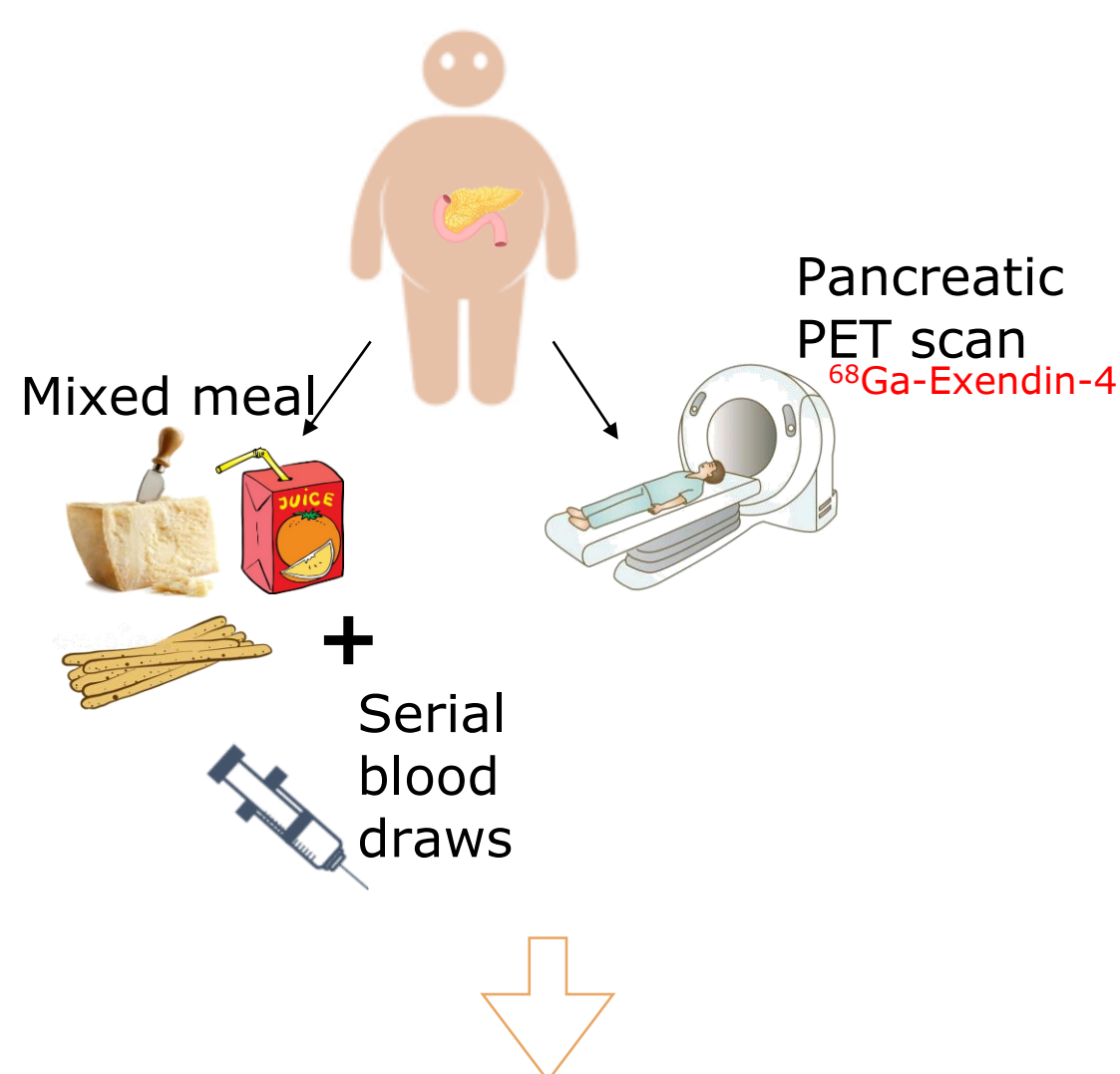
The research group of **Endocrinology, Diabetology and Metabolic Diseases** combines clinical and translational research skills in the **endocrine-metabolic field**. The Unit consists of an **outpatient clinic core** dedicated to the screening and evaluation of subjects to be recruited in the research protocols, by a **clinical trial unit** and by a **bench laboratory core**.

The main research fields include:

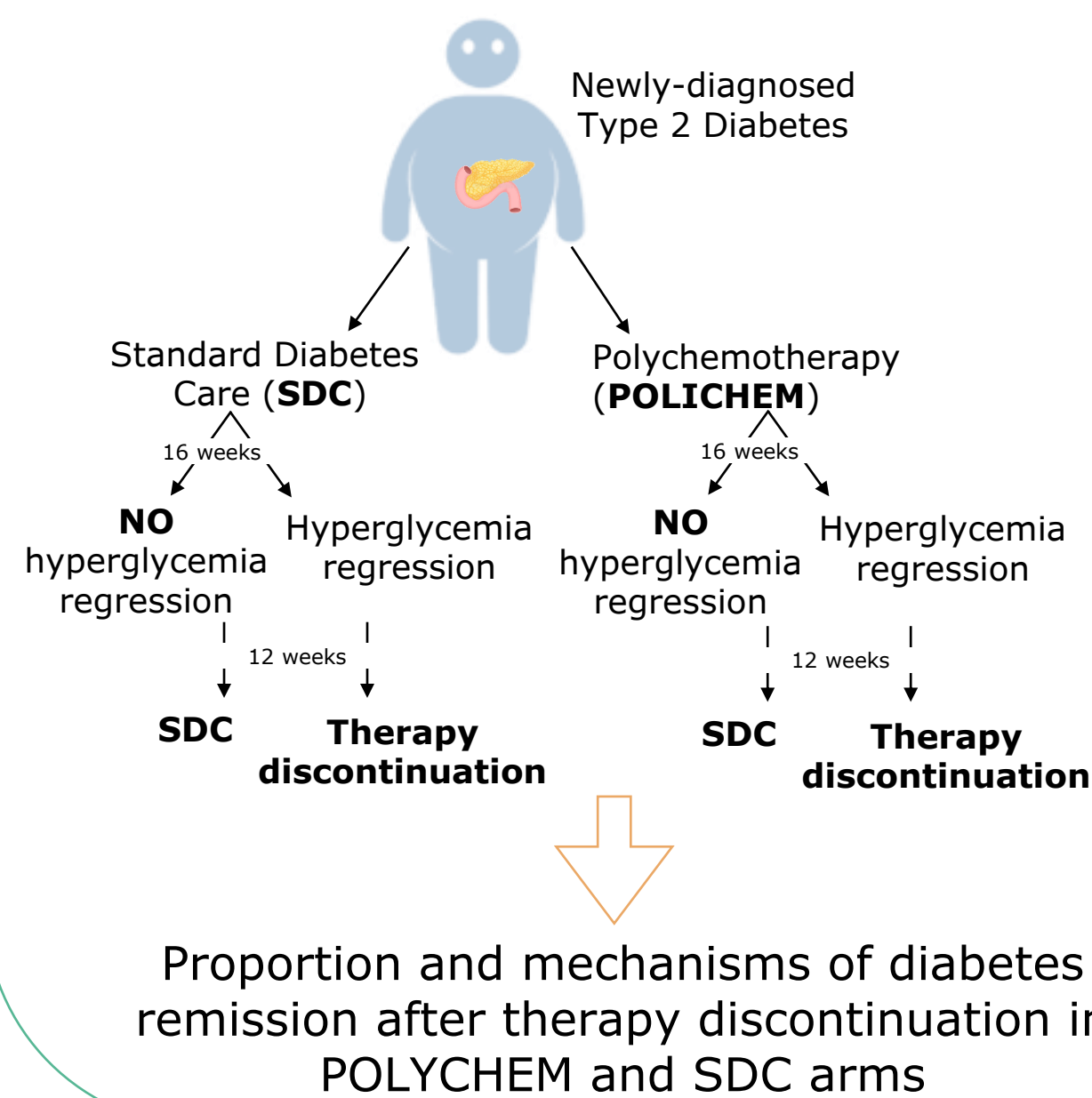
1. The assessment and regulation of pancreatic **β-cell functional mass**, which is altered early in the natural history of metabolic diseases, with special attention to diabetes mellitus. Its assessment is key to better define the risk of disease progression and to set up a tailored therapy. Our researches are mainly focused in studying how β-cell functional mass can be preserved or improved by adequate nutritional and/or pharmacological treatments. This has long been hampered by the limited access to pancreatic islets in humans. Furthermore, we have developed techniques to assess the separate contribution of β-cell mass and function to functional mass, both *in vitro* and, most notably, *in vivo*.
2. The **pathophysiological basis of cardiometabolic risk**. Metabolic alterations, e.g. insulin resistance, inflammation, hyperglycemia and dyslipidemia, herald the subsequent development of cardiovascular diseases (cardiometabolic risk). We routinely assess blood biomarkers of endothelial damage and inflammation, transcriptomic and functional profiles of circulating lymphomonocytes, number and function of circulating endothelial progenitor cells, regulation of human primary macrophages *in vitro*. Different cardiometabolic phenotypes can be identified. In these models, we also investigate the impact of different cardiometabolic *noxae* along with the possible benefits due to lifestyle and pharmacological interventions.

### RESEARCH LINE 1 - β-cell function Study design

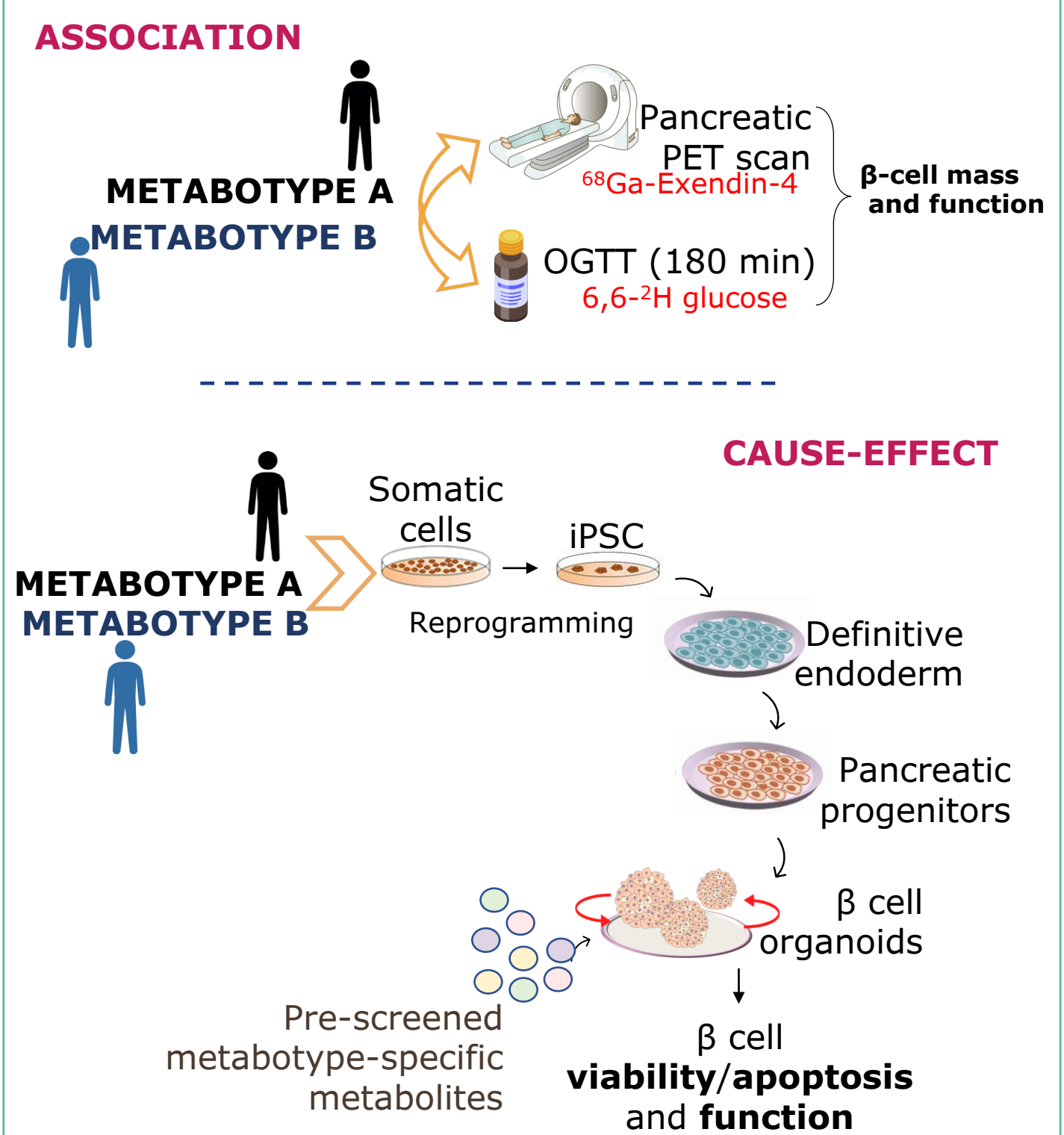
#### STUDY 1 - Assessment of pancreatic beta cell mass and function with the aid of positron emission tomography imaging in human diabetes mellitus (Application FIL UNIPR - 2019)



#### STUDY 2 - Polychemotherapy to induce remission of newly diagnosed type 2 diabetes: a proof-of-concept study of efficacy, cost-efficacy and pathophysiologic mechanisms (Bando 2016 Ricerca finalizzata; Project RF-2016-02363327)

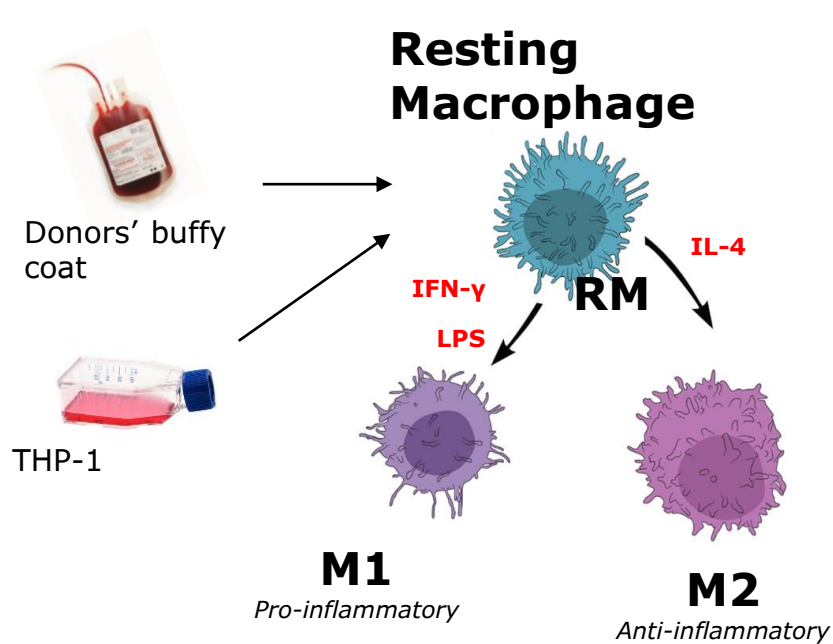


#### STUDY 3 - Food (poly)phenol metabolites and beta-cell mass and function (Research funded by the European Union - NextGenerationEU under the National Recovery and Resilience Plan; Project code PE00000003)



### RESEARCH LINE 2 - Pathophysiological basis of cardiometabolic risk Study design

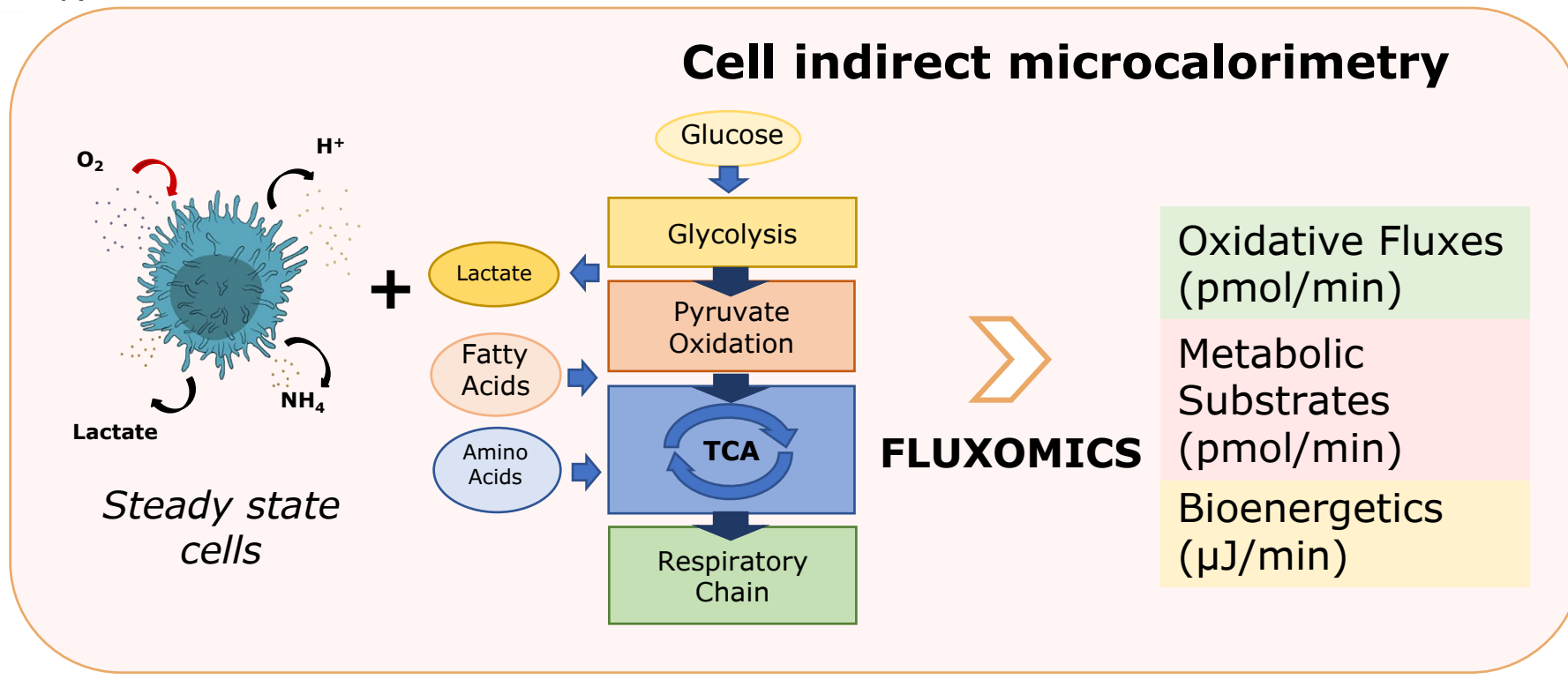
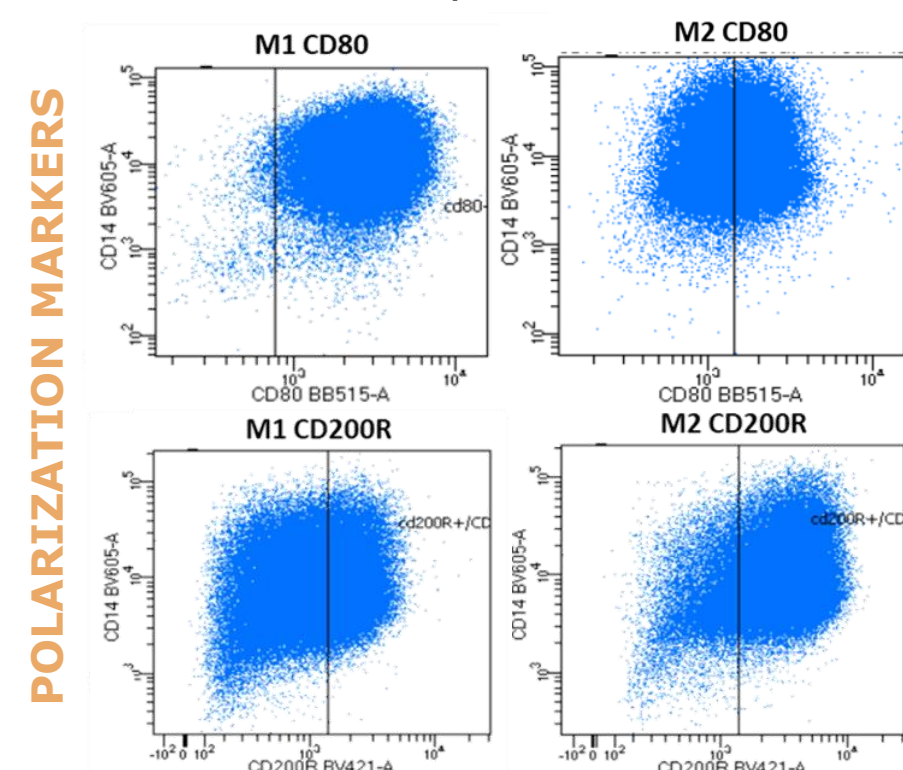
#### STUDY 1 - The macrophage as a cell model for the study of cardiovascular risk pathogenesis and therapeutic actionability in type 2 diabetes (PRIN 2020 project: Personalized approach for the prevention of diabetes progression and complications)



Study of the detrimental effects and their molecular mechanisms actioned by harmful metabolic cues, such as saturated fatty acids or high glucose, on inflammation and related metabolism (metaflammation) in polarized human primary macrophages

Investigation of the potential beneficial effects of some anti-diabetes drugs in restoring macrophage inflammatory balance and metabolic functions

- Phenotype (FACS/qPCR)
- Inflammation (qPCR)
- Metabolism (Cell indirect microcalorimetry)



Identification of specific metabolites associated with different β cell function and mass (i.e. different type 2 diabetes risk)

Identification of novel polyphenol- and metabolite-related β cell enhancers/disruptors

### COLLABORATION WITH OTHER RESEARCH GROUPS

The group actively collaborates with:

1. The **Laboratory of Phytochemicals in Physiology of the Department of Food Science** of the University of Parma (Prof. Daniele Del Rio and Prof. Pedro Mena) in *in vitro*, *in vivo* and translational researches aimed at evaluating the bioavailability of polyphenols following the ingestion of foods rich in these substances and their possible beneficial effect on diabetic intermediate phenotypes (Project: Food (poly)phenol metabolites and beta-cell mass and function)
2. The **Division of Nuclear Medicine** of the Azienda Ospedaliero-Universitaria of Parma, led by Dr. Livia Ruffini (Project: Assessment of pancreatic beta cell mass and function with the aid of positron emission tomography imaging in human diabetes mellitus).

### CONCLUSION

The Endocrinology, Diabetology and Metabolic Disease Research Group, placed at the crossroads of cardiometabolic risk traits and diseases, is ready to collaborate with different research groups and on diverse topics, especially those focusing on diabetes mellitus, "food", physical activity, cardiometabolic disorders and, more generally, on those areas of biomedical research in which metabolism plays a significant pathogenetic role.