The impact of T2DM on the bioavailability of microbial (poly)phenol metabolites: looking into the dynamics of lipoproteins and endothelial cells

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The incidence of diabetes on the worldwide population has tripled in the past 5 decades but even more alarming is the increasing incidence of diabetes among children and young adults. Intervention studies have shown that (poly)phenol-rich diets improve blood lipids and cardiometabolic markers in healthy and diabetic patients [1,2], supporting the implementation of nutritional strategies as valuable alternatives in the prevention and management of diabetes complications. Food (poly)phenols abundant in red wine, fresh fruits and vegetables modulate the lipoprotein's susceptibility/resistance to radical damage contributing to endothelial health. Despite this, very little is known about the distribution of ingested (poly)phenols in circulation and the impact of diabetes on its cargo.

Work conducted in our group designed to investigate the impact of type 2 diabetes mellitus (T2DM) on the cargo of circulating plasma (poly)phenols revealed that phenolic compounds are mainly transported by lipoproteins though heterogeneously distributed across lipoproteins. Results also showed that diabetes has a marked effect on the cargo of phenolics in circulation and consequently led to the decrease in the particle's antioxidant capacity. Despite the reduced bioavailability of (poly)phenol metabolites transported by lipoproteins, cell-based assays showed that sub-micromolar amounts of microbial (poly)phenol metabolites are still able to counteract the pro-inflammatory status in glucose-challenged endothelial cells [3]. Data from our study also revealed that other changes occurring with T2DM, such as the increase of lipoprotein's oxidative status along with changes in the lipid (micro)environment are likely to impact the particle's biophysical properties, their interaction with cholesterol-rich membranes of endothelial cells, the delivery of bioactive plant-based compounds to the endothelium in T2DM and vascular (dys)function.