Food matrix is known to interact with some dietary constituents and microconstituents during digestion. These interactions may potentially affect the metabolism and bioavailability of some compounds such as polyphenols, and as a consequence modulate their biological effects. The aim of this study was to examine the effect of the apple matrix on the bioavailability of flavan-3-ols and on the ability of these compounds to modulate the nutrigenomic response to a high fat challenge in minipigs.

### Methods
A randomized, cross-over nutritional intervention in minipigs.
- Wash-out period of 1 week between the intake of each 4 test meals.

### Results
Postprandial plasma kinetic of monomeric flavan-3-ols in minipig serum

![Graph showing postprandial plasma kinetic of monomeric flavan-3-ols in minipig serum](image)

3h-postprandial nutrigenomic response in porcine PBMCs

- 305 genes identified as differentially expressed in response to the supplementation with apple-derived products compared to HFM alone.
- The gene expression profile of “HFM+PP extract” group is more distinct than the profiles from the HFM+ raw apples and HFM+apple puree groups.
- A higher number of gene changes is observed when food matrix is present, with 59 overlapping genes with PP extract.
- Among the 93 genes in common between PP extract and raw apples or apple puree, 74 genes exhibited similar changes with respect to HFM+PP extract.

### Biological processes revealed as affected by the differentially expressed genes after bioinformatics analysis

The Top5 biological processes affected by the apple products are involved mainly in clotting cascade, acute inflammation and leukocyte transendothelial migration.

### Conclusion
The apple matrix reduced the postprandial bioavailability of flavan-3-ols without inducing any negative impact in the nutrigenomic response of PBMCs to flavan-3-ols. By contrast, additional genes were modulated in the presence of the apple matrix. Overall, the observed changes in gene expression could contribute to counteract the pro-inflammatory response induced by the intake of a high fat meal.