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Effect of Food Matrix on bioavailability and efficiency of apple polyphenols to modulate a postprandial lipidic stress in minipigs

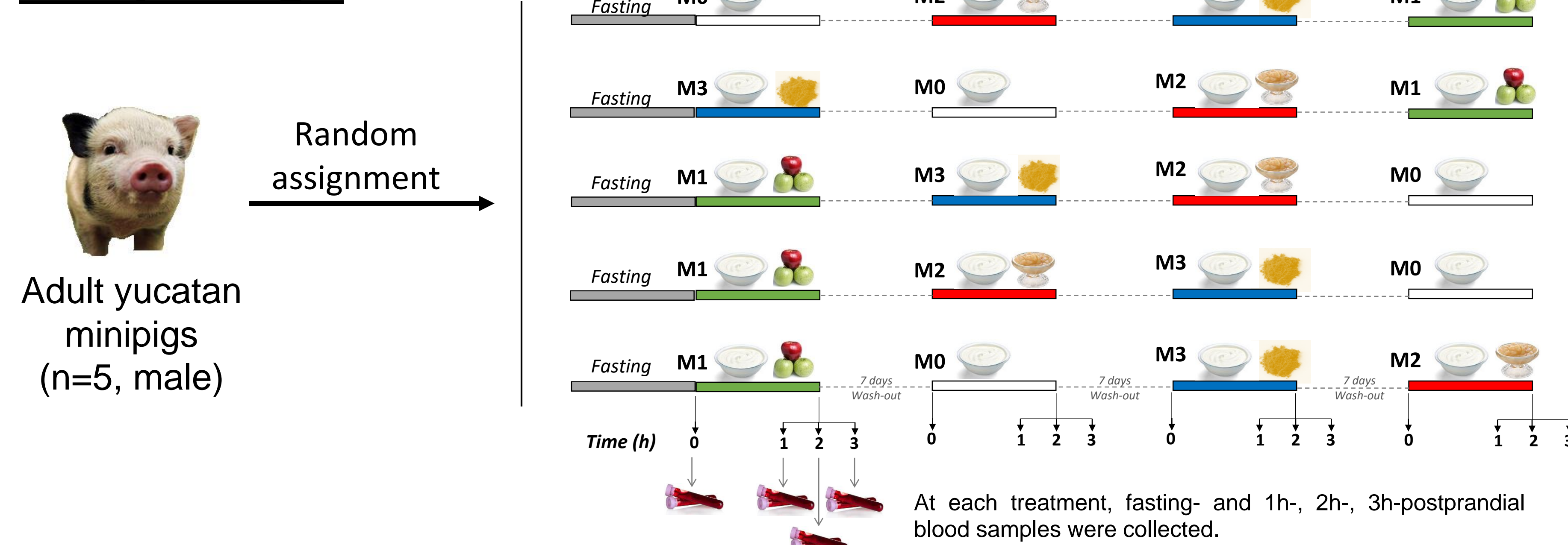
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Food matrix is known to interact with some dietary constituents during digestion. These interactions may potentially affect the bioavailability of plant foods bioactives, and as a consequence modulate their biological effects.

In this context, the aim of this study was to determine the effect of food matrix on the bioavailability of apple polyphenols and their ability to modulate the response of endothelial cells and immune cells to a postprandial metabolic stress induced acutely in minipigs.

Study design

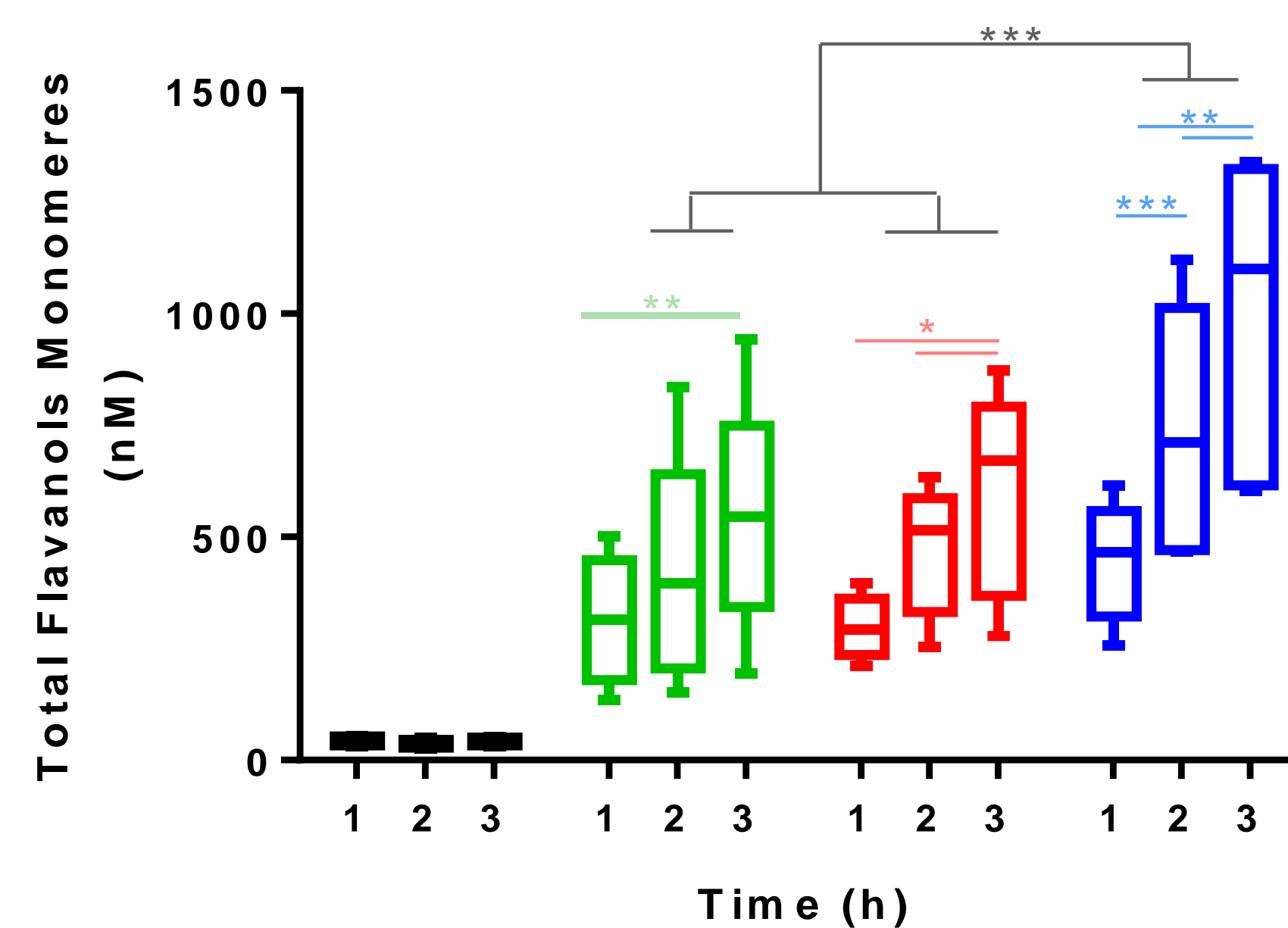
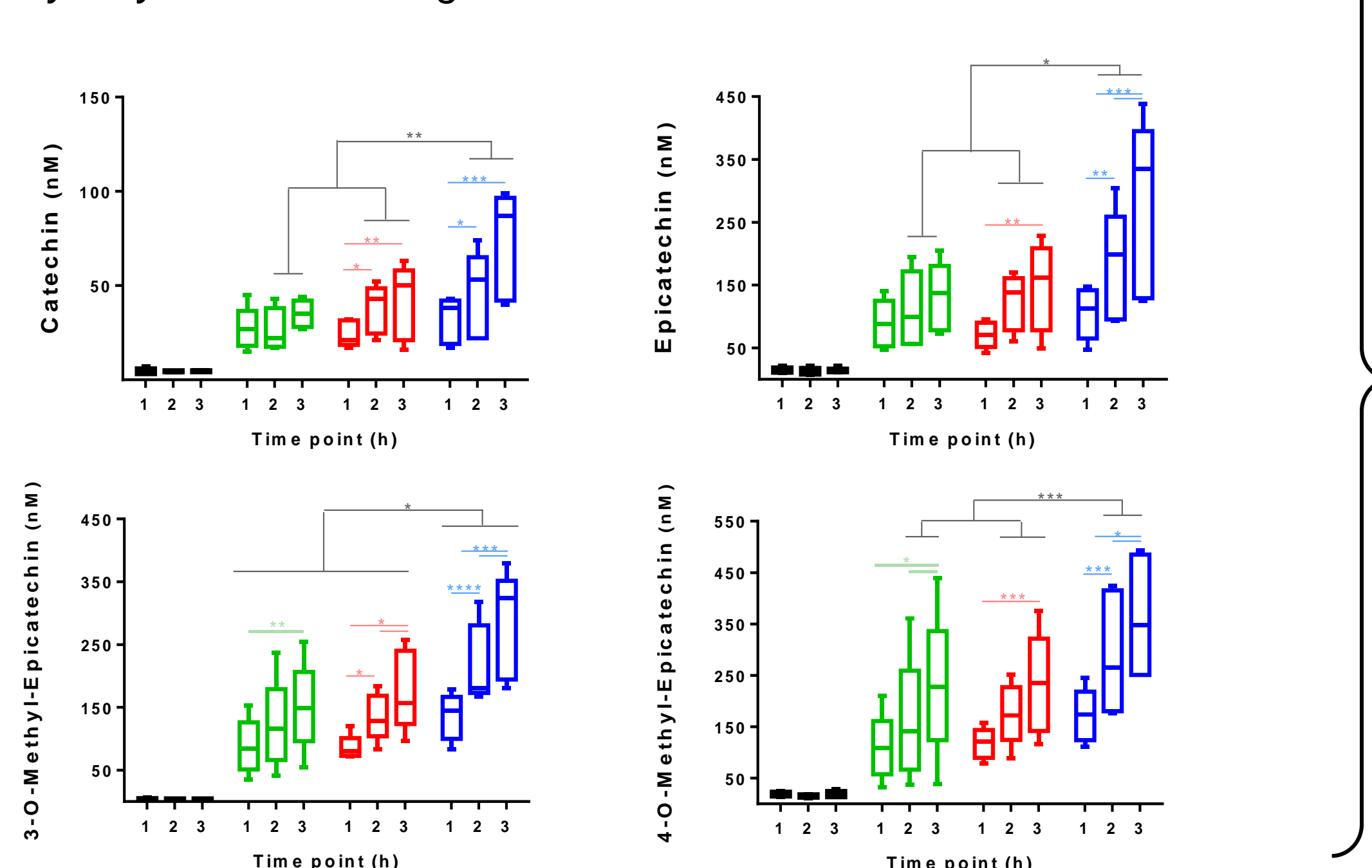


M0	Standard Meal + Saturated fat (100g double cream)
M1	Standard Meal + 250g Raw Apples (1 g total polyphenols)
M2	Standard Meal + 250g Mashed Apples (Purée) (1,25 g total polyphenols)
M3	Standard Meal + 1,4 g Apple Polyphenols Extract (1,2 g PPs totaux)

Results

1. Food matrix and bioavailability of apple flavanols

The concentrations in flavanol monomers were evaluated on hydrolyzed serum using UPLC-Q-TOF MS.



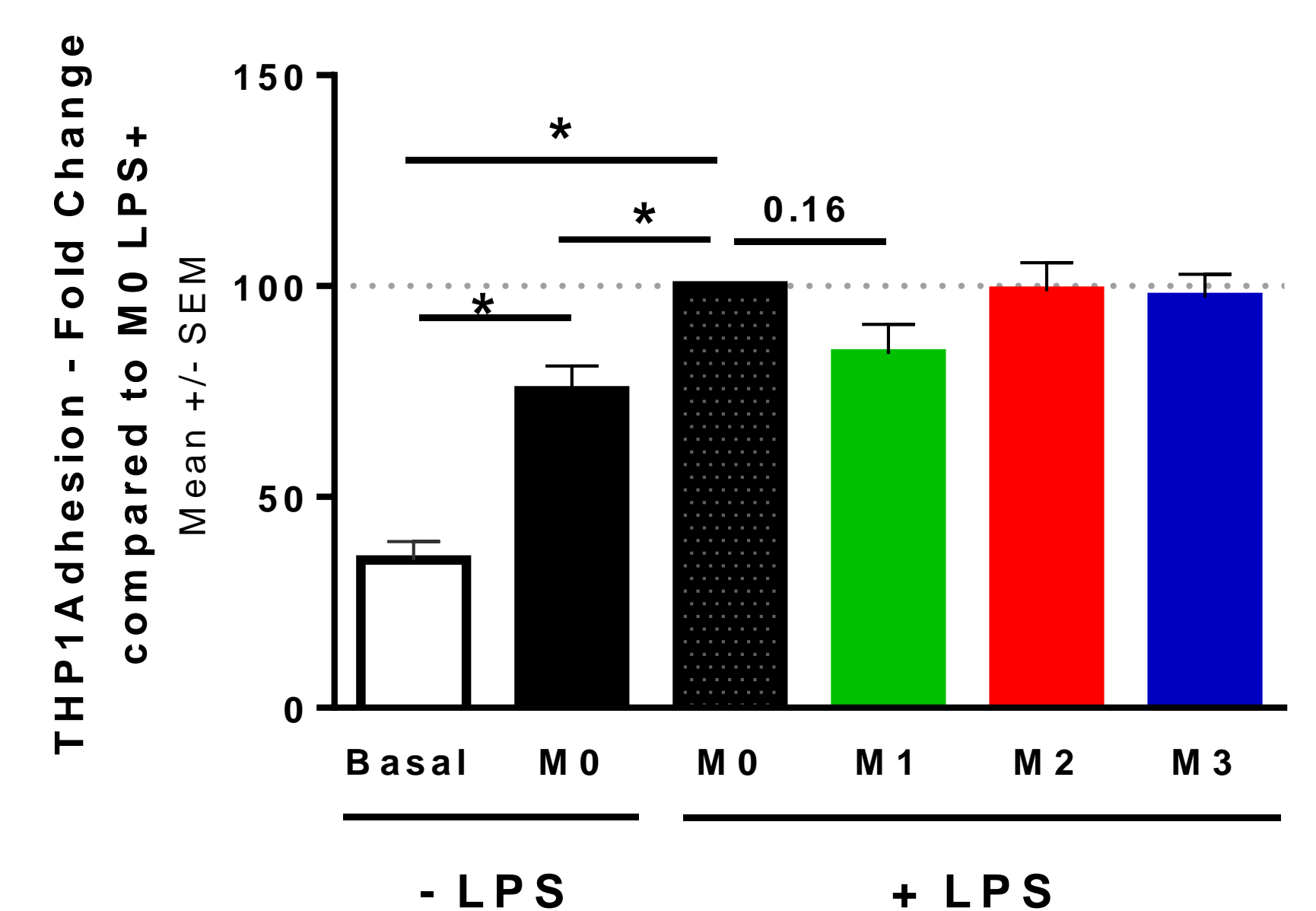
- Whatever the administration mode, the peak of flavanol monomers was observed at 3h after the intake.

- At 3h, >90% of the circulating forms are methylated forms (2/3) and unmethylated forms (1/3) of epicatechins.

- Food matrix (RAW, Purée) reduces the absorption of flavanols by 40-50%.

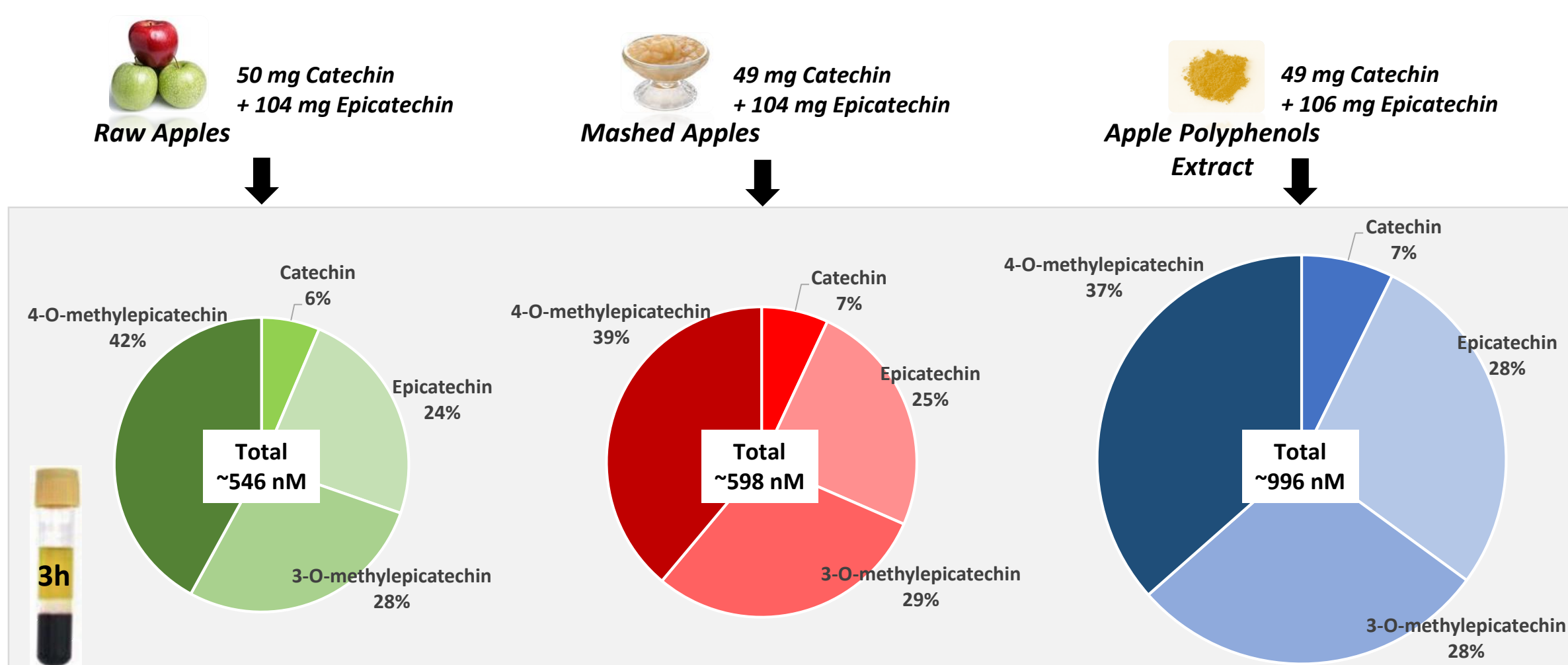
2. Capability of flavanols metabolites to counteract the activation of endothelial cells

Endothelial cells isolated from porcine aorta are exposed to fasting and 3h-postprandial sera (15%) and 100ng/ml lipopolysaccharide (LPS) for 4 hours prior to perform an adhesion assay of monocytes (THP1 cell line) to endothelial cells.



- 3h-postprandial lipidic stressed sera induce monocyte adhesion to endothelial cells.

- Sera from pigs with postprandial stress that have been given apples do not reduced significantly monocyte adhesion.



3. Modulation of gene expression profile by flavanols metabolites in PMBCs.

Gene expression profiles were assessed on peripheral blood mononuclear cells (PBMCs) from 3h postprandial blood samples using microarray. These experiments are still ongoing and results will be available soon.



In conclusion, our preliminary results demonstrate that food matrix affects the bioavailability of apple polyphenols. Future experiments are still needed to determine if food matrix may also modulate the biological effect of such compounds.