

# ORAL ABSORPTION OF RUMENIC, VACENIC AND ALFA-LINOLENIC ACIDS AFTER DIETARY INTAKE OF MILK FAT NATURALLY ENRICHED IN PUFA

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## Background and Objectives:

Milk fat naturally enriched in PUFAs have been tested in animals and humans reporting a positive effect on cardiovascular risk factors. Despite the evidences, little data exist about oral bioavailability of CLA, trans-vaccenic (TVA) and alfa-linolenic (ALA). This knowledge constitutes valuable information to adjust the dosage in future population and clinical studies. The aim of the present research is to know if the Rumenic acid (C18:2 c9, t11; RA) (the major CLA isomer in milk fat), TVA (C18:1 t11) and ALA (C18:3 c9, c12, c15) of an enriched goat milk fat (EGDF) after oral administration in rats are absorbed.

## Methods:

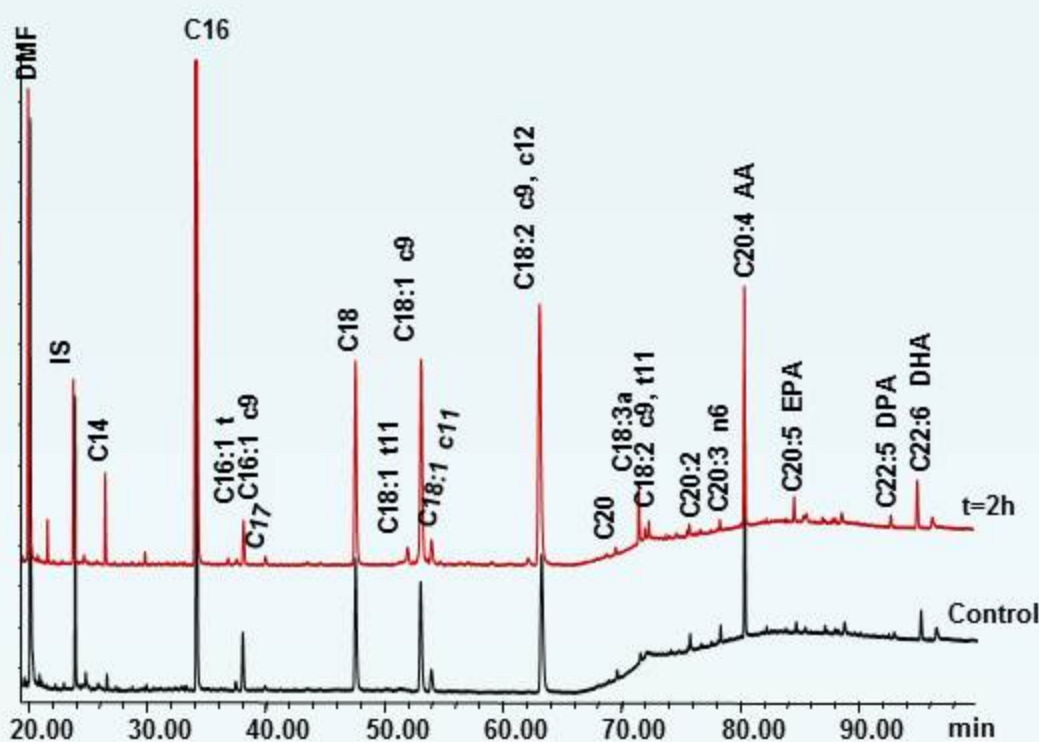
EGDF naturally enriched in RA, TVA and ALA was administered orally by gavage of 3000 mg/kg bw to Wistar rats (n=60). Serial blood samples were collected after oral administration (15 min, 30 min, 1 h, 2h, 4h, 6h, 8h, 12h, 24h, 48h). A group of animals not fed with EDF were used as control. Plasma concentrations of RA, TVA and ALA were determined by GC/MS after direct transesterification process of the samples.

## Results:

The analysis of the plasma samples revealed that the fatty acid composition ranged from lauric acid (C12) to docosahexaenoic DHA (C22:6) (Figure 1). In the control group, the main compound in the analyzed plasma samples was palmitic acid (612 µg/ mL plasma) while stearic (C18:0) and oleic (C18:1 c9) acids were found in similar concentrations (215 and 264 µg/mL plasma respectively). Among the polyunsaturated fatty acids (PUFA) linoleic (LA; C18:2 c9, c12) and arachidonic (AA; C20:4) resulted in the highest amounts into this fraction with 321 and 181 µg/mL plasma, respectively. Eicosapentaenoic (C20:5 EPA), docosapentaenoic (C22:5 DPA) and DHA were also detected in levels below 40 µg/mL plasma. While RA and TVA (C18:1 t11) were not detected in the control group, ALA was found at very low concentration (<10 µg/mL).

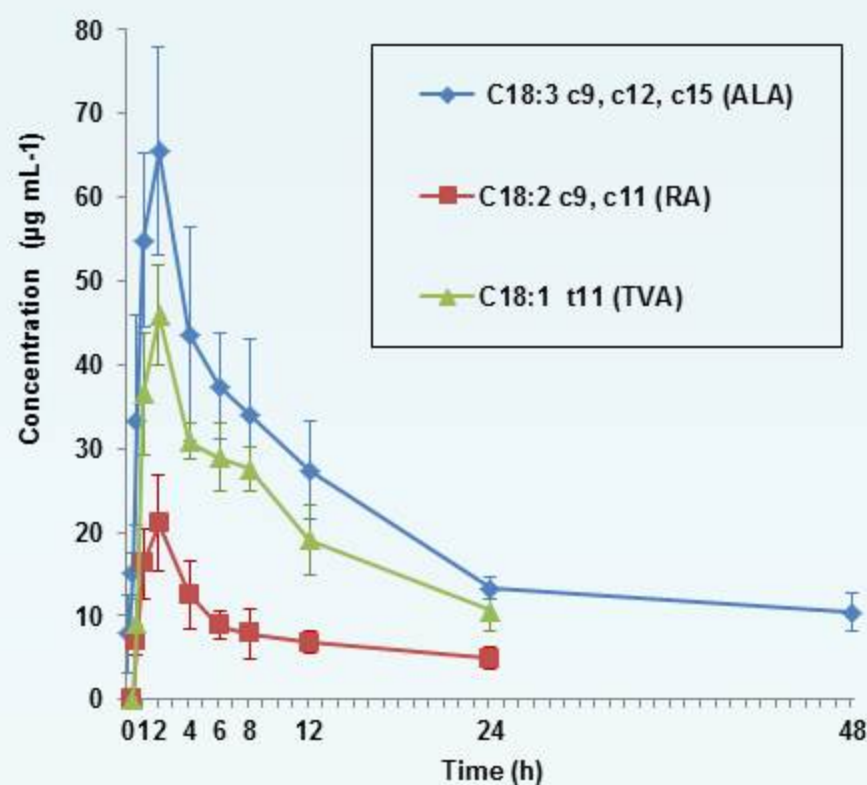
The administration of the EGDF in a dose of 3g/kg b.w. was equivalent to an intake of 153 mg of TVA, 46 mg of RA and 31 mg of ALA. These compounds were rapidly absorbed through the gastrointestinal tract in rats (Figure 2). The plasma concentration of those fatty acids appeared to reach a maximum at 2 h and the absorption grade was not dose-dependent. In addition, while both TVA and RA were detected only until 24 h after administration, ALA was still present at 48 h.

**Figure 1.** Fatty acid profile of rat plasma samples after administration of the EGDF milk fat (t=0h and t=2h) by GC/MS.



DMF: Dimethylformamide; IS: Internal Standard; t: trans double bond; c: cis double bond; AA: Arachidonic acid; EPA: eicosapentaenoic acid; DPA: docosapentaenoic acid; DHA: docosahexanoic acid.

**Figure 2.** Plasmatic levels (µg mL<sup>-1</sup>) of RA, TVA and ALA fatty acids in rats after oral administration of 3000 mg EGDF/kg b.w (0h-48h)



## Conclusions:

The present study indicates that when given orally a goat milk fat naturally enriched in RA, TVA and ALA, these compounds are absorbed and likely distributed throughout the body by the circulation blood to exert systemic effects. Further research is needed to complete the kinetic characteristics of those fatty acids in other tissues.

**Keywords:** Naturally enriched goat milk fat, fatty acid bioavailability.

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