# The nutrigenomic potential of a lysolecithin based product

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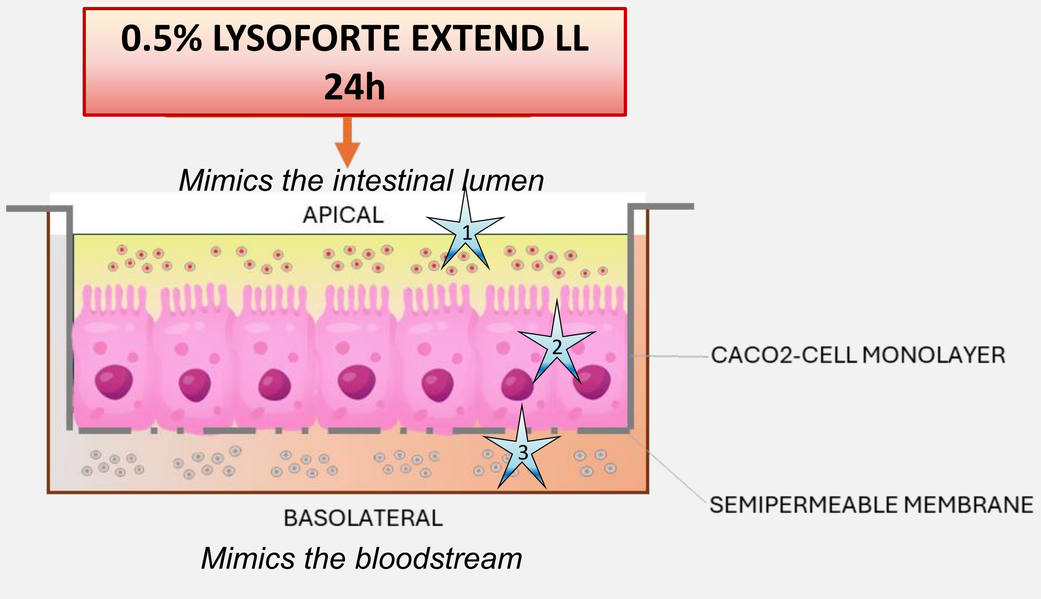
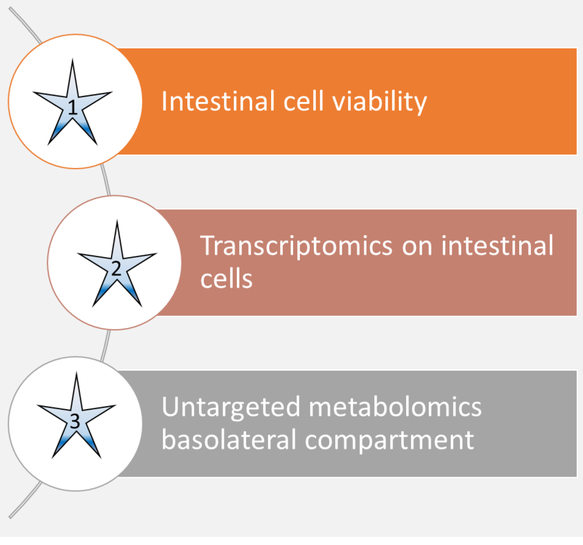
## Introduction

Lysolecithins (LL) from LYSOFORTE® can alter intestinal membrane fluidity and protein channel formation, increasing absorption of nutrients across the enterocyte membrane. They can also stimulate gene expression related to collagen deposition, which enhances villi length, gut integrity, and strength and increase intestinal absorption surface area by proliferation and differentiating pathways. These latter positive effects can, most likely, be explained by nutrigenomic properties of the LL. All these improvements in gut structure and function could explain the better utilization of the available dietary nutrients, including energy and protein, which subsequently may drive the improvements in performance efficiency and carcass yield. In this context, the effect of a soybean LL source on intestinal cells has been studied with a transwell cell culture setup via a triple approach, to elucidate the effects of the LL beyond surface chemistry.

## Material and methods

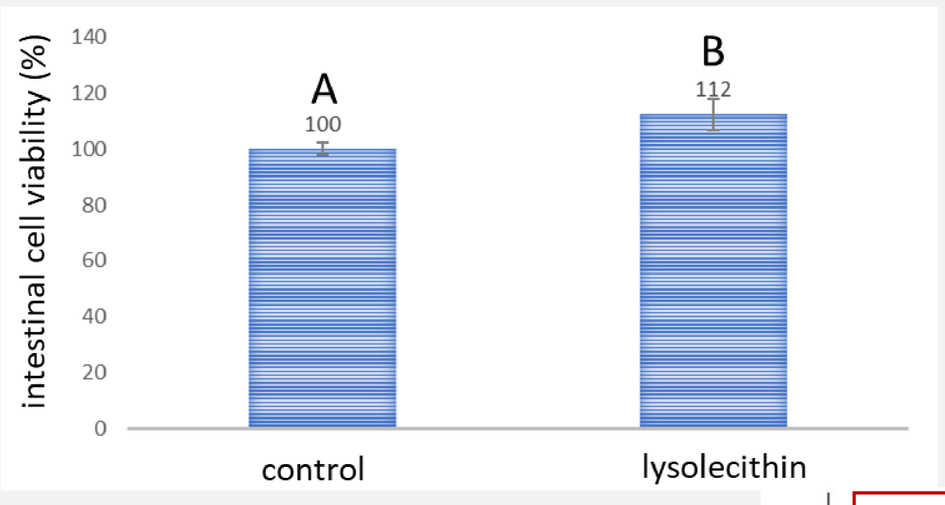



An in vitro cell culture trans-well assay with intestinal CaCo-2 cells was designed as shown in Fig. 1. The apical side mimicked the intestinal lumen, whereas the basolateral compartment represented the blood. Cells were treated for 6 hours with 0.5% lysolecithin solubilized in serum-free DMEM medium. For each analysis, 6 repeats per treatment were included. Intestinal cell viability (MTT test) and gene expression (RNAseq) patterns were revealed. Furthermore, transport of metabolites (UPLC-MS) from apical to basal compartment was characterized.

## Results

**Fig. 1.** Intestinal cell viability in response to 0.5% lysolecithin versus control. A and B indicate significant differences between treatments with P<0.05.



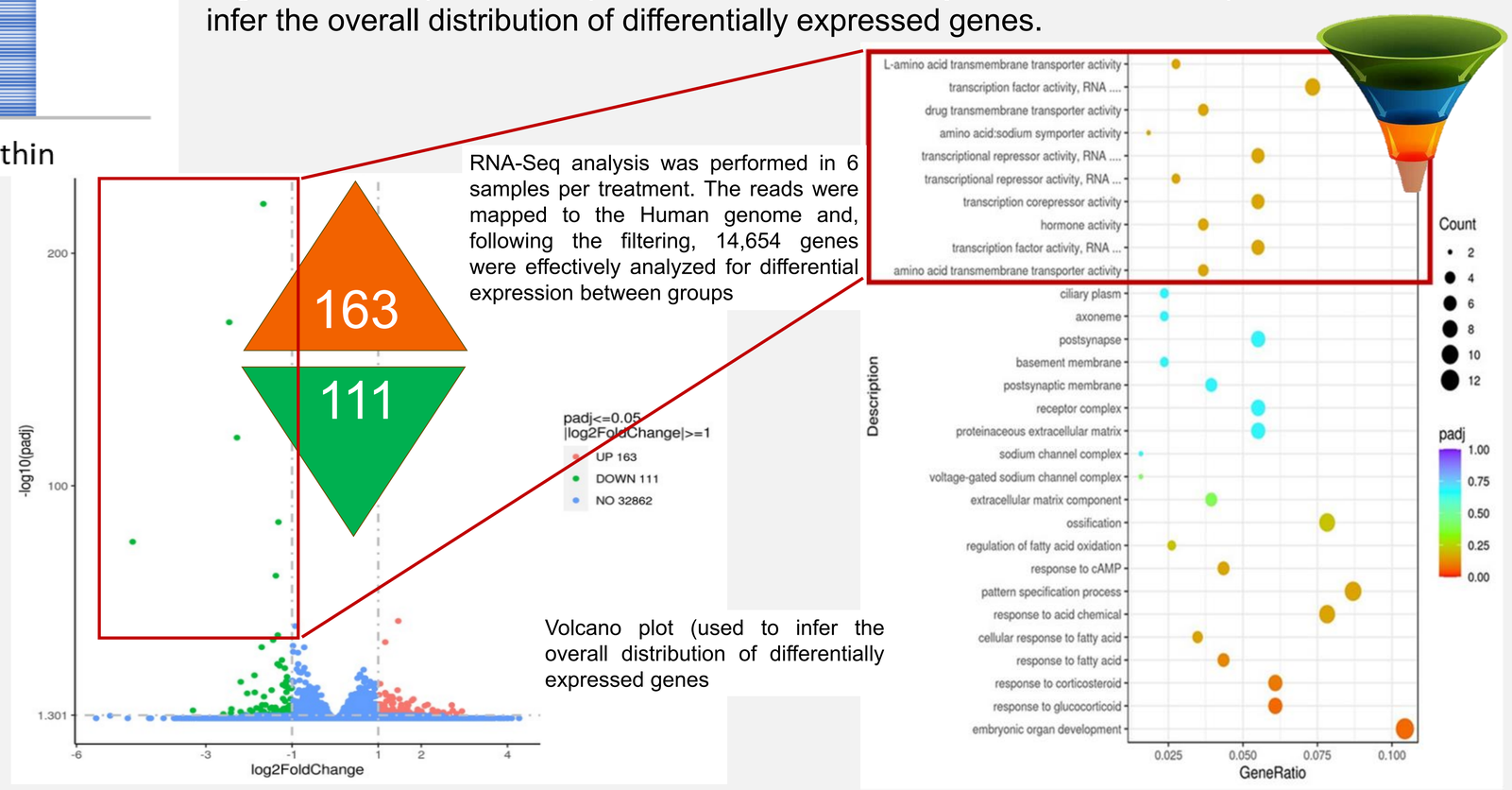

MTT assay is used to measure cellular metabolic activity as an indicator of cell viability, proliferation and metabolite treansport activities. The MTT reagent can pass through the cell membrane as well as the mitochondrial inner membrane of viable cells presumably due to its positive charge as well as its lipophilic structure and is reduced to formazan by metabolically active cells (Fig. 1)

**Lysolecithin effectively improved (p<0.05) cell viability compared to the control.**

It was revealed that 0.5% lysolecithins can trigger gene expression in a way that 163 genes were up-regulated by the lysolecithin treatment whereas 111 showed a down-regulated expression (Fig. 2). The increase of gene expression through triggering amino acid transporter as well as nutrient metabolite pathways is a very interestingly finding, as it clearly confirms lysolecithins have more functional properties beyond influencing surface chemistry.

**Lysolecithin increased amino acid transporter and nutrient metabolite pathways of treated cells compared to the control.**

**Fig. 2.** Volcano plot for comparison of control versus lysolecithin. Volcano plots are used to infer the overall distribution of differentially expressed genes.




## Conclusion

These data clearly show that the positive effects of lysolecithins in monogastric diets, their impact in the gut is not limited to only a surface chemistry action. New scientific insights increasingly clarify how lysolecition can also activate gene expression and intestinal cell function too which further strengthens its added value as a nutrient absorption enhancer.

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