

## 【学会発表】

演題名	$\alpha$ -Linolenic Acid Suppresses Cholesterol and Triacylglycerol Biosynthesis Pathway by Suppressing SREBPs Expressions in 3T3-L1 Adipocytes
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## 【発表内容】

### 目的

Flax (*Linum usitatissimum*) is one of the richest sources of  $\alpha$ -linolenic acid (ALA) (18:3n-1). Flaxseeds, which are an ingredient in multigrain breads and topping for breads, bagels and muffins in Europe, Canada and the USA, contain 37 % of its mass as oil of which 50 % is ALA. ALA has multiple functionality such as anti-cardiovascular and anti-hypertensive activities. However, the molecular mechanism and the genome-wide effects of ALA have not yet been investigated. In this study, we investigated the effects of ALA on the lipid metabolism and studied the possible molecular mechanisms behind the effects in 3T3-L1 adipocytes using DNA microarray analysis.

### 方法と結果

#### 2. Experimental

3T3-L1 preadipocytes were cultured and allowed to differentiate into adipocytes. 3T3-L1 adipocytes were treated with 300  $\mu$ M ALA from day 5 to day 12 after induction of cell differentiation. Sample preparation was carried out in accordance with the Affymetrix GeneChip 3' IVT Express Kit and samples were hybridized to the Affymetrix mouse 430 PM Array strips. Primary data analysis was carried out using the softwares Partek Express and Reactome. Real-time PCR was carried out to confirm the microarray analysis results.

#### 3. Results and discussion

Using DNA microarray analysis, we identified ten genes (SC5D, TM7SF2, CYP51, HMGCS1, SQLE, ACSL3, ABCA1, ACSS2, ADH1 and SULT1A1) associated with the metabolism pathway that were regulated by 300  $\mu$ M ALA. We were able to clarify that treatment with ALA caused a down-regulation in the expressions of genes involved in cholesterol and triacylglycerol

biosynthesis pathways in differentiated 3T3-L1 adipocytes. Using real-time PCR, SREBPs (SREBP-1c, SREBP-1a, SREBP-2) expressions were also significantly decreased by 300  $\mu$ M ALA treatment while the levels of the gene expressions of CPT-1a and leptin in 300  $\mu$ M ALA treatment were increased.

#### 4. Conclusions

ALA is likely to inhibit cholesterol and fatty acid biosynthesis pathway by suppressing the expression of the transcriptional factor SREBPs. Furthermore, ALA promotes fatty acid oxidation in 3T3-L1 adipocytes, thereby increasing its health benefits.