Effects of CLA1 and CLA2 on Polyunsaturated Fatty Acid Metabolism during Type 2 Diabetes

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Conjugated linoleic acids (CLAs) is a collective term for a mixture of isomers of conjugated dienoic derivatives of linoleic acid (LA). For the last years, CLAs have been studied extensively due to their ability to modulate cancer, atherosclerosis, obesity or diabetes. However, many discrepancies appeared in data concerning diabetes. There are evidences that CLA metabolism could interfere with metabolism and signalling of polyunsaturated fatty acid (PUFA). Delta-6 desaturase (D6D) is the first enzyme involved in mammals PUFA biosynthesis. In glucose intolerance state, changes in D6D activities are controversial. Therefore, it appears that relations between CLA, PUFA metabolism and glucose intolerance remain unclear.

To clarify these points, we decided to investigate PUFA metabolism in glucose intolerant rats, fed or not specific isomers of CLA. Wistar neonates received a single injection of STZ, control animals receiving a injection of vehicle. After weaning, experimental and control animals were randomly divided into 6 groups of 4 animals each, and they received 1% of either CLA1 (*cis*9*trans*11 CLA), or CLA2 (*trans*10*cis*12 CLA) or ISIO4 (balanced commercial oil).

Our results showed glucose intolerance in animals injected with STZ. No difference appeared when animals were fed CLA or ISIO4 oil. D6D activities remained unchanged after CLA feeding. D9D activity was inhibited by CLA, when STZ increased it. CLA1 did not affect D6D or D9D gene expression, whereas CLA2 exerted opposite effects between control and STZ rats. Because of the generation of downstream effectors, lipolytic enzymes PLA_2 are considered as important signalling enzymes. So, we then determined secretory and cytosolic PLA_2 activities in liver. Only $sPLA_2$ activity was modified by STZ injection or CLA feeding. Even if $cPLA_2$ was not affected, STZ injected animals fed CLA2 presented a strong inhibition of $cPLA_2$ IV and VI gene expression.

In conclusion, this study evidenced for the first time that CLA1 and CLA2 disturb PLA_2 activity and gene expression and strengthen the fact that the two can exert different effects on lipid metabolism.