

Abstract

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The function of porcine PPAR γ and dietary fish oil effect on the expression of lipid and glucose metabolism related genes.

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BACKGROUND: Peroxisome-proliferator-activated receptor γ (PPAR γ) plays a critical role in regulation of adipocyte differentiation and insulin sensitivity. To become functional, PPAR γ must be activated by binding an appropriate ligand. Polyunsaturated fatty acids (PUFA) are potential ligands for PPAR γ .

OBJECTIVE: The current experiment was designed to determine the potential for PUFA, particularly eicosapentaenoic acid and docosahexaenoic acid, to activate the function of porcine PPAR γ in vivo.

METHODS: Transgenic mice, expressing porcine PPAR γ in skeletal muscle were generated and fed with a high-saturated fat (beef tallow) or high-unsaturated fat (fish oil) diet for 4 months.

RESULTS: When transgenic mice were fed a fish oil supplemented diet, the expression of adipogenic and glucose uptake genes was increased, leading to reduced plasma glucose concentration. The PPAR γ transgene increased the expression of Glut4 in the muscle. This result suggests that there was increased glucose utilization and, therefore, a reduced blood glucose concentration in the transgenic mice. Also, the plasma adiponectin was elevated by fish oil treatment, suggesting a role of adiponectin in mediating the PUFA effect.

CONCLUSIONS: These results suggest that PUFA may serve as a natural regulator of glucose uptake in vivo and these effects are mainly through PPAR γ function.

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