

Effects of *trans*-10, *cis*-12 conjugated linoleic acid on gene expression and lipid metabolism of adipose tissue of growing pigs

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Genet. Mol. Res. 7 (2): 284-294 (2008)
Received December 14, 2007
Accepted February 6, 2008
Published April 1, 2008

ABSTRACT. The objective of the present study was to determine the effects of *trans*-10, *cis*-12 conjugated linoleic acid (CLA) in adipose tissue explant cultures of growing pigs on the following responses: lipogenesis (measured as rate of ¹⁴C-labeled glucose incorporation over a subsequent 2-h incubation in the presence or absence of insulin), lipolysis (release of non-esterified fatty acid over a 2-h incubation in the presence or absence of isoproterenol), activities of lipogenic enzymes, and mRNA abundance of fatty acid synthase (FAS). Adipose tissue explants from nine growing pigs (78 ± 3 kg) were cultured in 199 medium with insulin, dexamethasone and antibiotics for 4, 12, 24, and 48 h. The treatments were 1) control: 100 µM polyvinyl alcohol (PVA); 2) pGH: 100 ng/mL porcine growth hormone (pGH) plus 100 µM PVA; 3) CLA200: 200 µM *trans*-10, *cis*-12 CLA; 4) CLA50: 50 µM *trans*-10, *cis*-12 CLA, and 5) LA: 200 µM linoleic acid. Fatty acids were added along with PVA (2:1), respectively, for 24 h. Explants were collected after each culture period and assayed for lipogenesis. Transcripts of FAS mRNA were quantified by real-time RT-PCR after 24 and 48 h. Lipolysis and activities of FAS, glucose 6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, and NADP-malate dehydrogenase were determined after 48 h. As expected, glucose incorporation was decreased (P < 0.05) in response to pGH treatment (positive control). LA

had no effect on any parameter evaluated. Treatment with *trans*-10, *cis*-12 CLA decreased FAS activity ($P < 0.05$), but NADPH-generating enzymes were unaffected by treatments. Consistent with reduction in FAS activity, both lipid synthesis and FAS mRNA abundance were reduced with chronic CLA treatment, pGH increased baseline and stimulated lipolysis ($P < 0.05$) after 48 h of culture, while CLA treatment had no effect on non-esterified fatty acid release. Results of this study showed that *trans*-10, *cis*-12 CLA alters lipogenesis but has no effect on lipolysis in cultures of pig adipose tissue.

Key words: Conjugated linoleic acid; Adipose tissue explants; Lipogenesis; Bioactive fatty acid; Swine