



# Adenovirus-mediated interference of FABP4 regulates mRNA expression of ADIPOQ, LEP and LEPR in bovine adipocytes

S. Wei<sup>1,3</sup>, L.S. Zan<sup>1,2</sup>, H.B. Wang<sup>1</sup>, G. Cheng<sup>1</sup>, M. Du<sup>3</sup>, Z. Jiang<sup>3</sup>, G.J. Hausman<sup>4</sup>, D.C. McFarland<sup>5</sup> and M.V. Dodson<sup>3</sup>

<sup>1</sup>College of Animal Science and Technology, Northwest A&F University, Yangling, Shaanxi, P.R. China

<sup>2</sup>National Beef Cattle Improvement Center, Yangling, Shaanxi, P.R. China

<sup>3</sup>Department of Animal Sciences, Washington State University, Pullman, WA, USA

<sup>4</sup>United States Department of Agriculture, Agriculture Research Services, Athens, GA, USA

<sup>5</sup>Department of Animal Science, South Dakota State University, Brookings, SD, USA

Corresponding authors: L.S. Zan / M.V. Dodson  
E-mail: zanls@yahoo.com.cn / dodson@wsu.edu

Genet. Mol. Res. 12 (1): 494-505 (2013)

Received May 9, 2012

Accepted September 13, 2012

Published January 4, 2013

DOI <http://dx.doi.org/10.4238/2013.January.4.21>

**ABSTRACT.** Fatty acid binding protein 4 (FABP4) is an important adipocyte gene, with roles in fatty acid transport and fat deposition in animals as well as human metabolic syndrome. However, little is known about the functional regulation of FABP4 at the cellular level in bovine. We designed and selected an effective shRNA (small hairpin RNA) against bovine FABP4, constructed a corresponding adenovirus (AD-FABP4), and then detected its influence on mRNA expression of four differentiation-related genes (PPAR $\gamma$ , CEBPA, CEBPB, and SREBF1) and three lipid metabolism-related genes (ADIPOQ, LEP and LEPR) of adipocytes. The FABP4 mRNA content, derived from bovine adipocytes, decreased by 41% ( $P < 0.01$ ) after 24 h and 66% ( $P < 0.01$ )

after 72 h of AD-FABP4 infection. However, lower mRNA content of FABP4 did not significantly alter levels of differentiation-related gene expression at 24 h following AD-FABP4 treatment of bovine-derived preadipocytes ( $P = 0.54, 0.78, 0.89, \text{ and } 0.94$ , respectively). Meanwhile, knocking down (partially silencing) FABP4 significantly decreased ADIPOQ ( $P < 0.05$ ) and LEP ( $P < 0.01$ ) gene expression after 24 h of AD-FABP4 treatment, decreased ADIPOQ ( $P < 0.01$ ) and LEP ( $P < 0.01$ ) gene expression, but increased LEPR mRNA expression ( $P < 0.01$ ) after a 72-h treatment of bovine preadipocytes. We conclude that FABP4 plays a role in fat deposition and metabolic syndrome by regulating lipid metabolism-related genes (such as ADIPOQ, LEP and LEPR), without affecting the ability of preadipocytes to differentiate into adipocytes.

**Key words:** Adenovirus; Adipocyte; Bovine; FABP4; shRNA