

## MYOSTATIN DEFICIENCY INCREASES TYPE II FIBER FORMATION IN SKELETAL MUSCLE BY REGULATING THE EXPRESSION OF MYOD AND MEF2 IN NEWBORN MYOSTATIN-KNOCKOUT PIGS

**Mei-Fu Xuan, Jun-Xia Wang, Yonggyu Choe, Xi-Jun Yin**

Jilin Provincial Key Laboratory of Transgenic Animal and Embryo Engineering, China.

### Introduction

Myostatin (MSTN) is primarily expressed in muscle and plays an important role in muscle and fat development in pigs. The lack of myostatin leads to a muscle hypertrophy and increases fast fiber (type II) formation. Several reports suggest that myogenic differentiation factor (MyoD) is required for fast fiber formation and myocyte enhancer factor 2 (MEF2) is responsible for slow fiber (type I) formation. In order to elucidate whether MSTN gene could induce muscle fiber type change by these factors or not, myostatin-knockout pigs were analyzed.

### Materials and Methods

Three skeletal muscles, namely the biceps femoris (BF), diaphragm (DP) and semitendinosus (ST) were excised from newborn wild-type (WT), *Mstn*<sup>+/-</sup> and *Mstn*<sup>-/-</sup> pigs. Samples were examined by hematoxylin-eosin staining and ATPase staining for histomorphology analysis. Furthermore, expression patterns of MyoD and MEF2 were detected by quantitative RT-PCR.

### Results and Discussion

Hematoxylin-eosin staining revealed the muscle fiber cross-sectional area (CSA) in myostatin-knockout pigs is significantly larger than in WT pigs, but muscle fiber CSA of *MSTN*<sup>-/-</sup> is smaller than *MSTN*<sup>+/-</sup>; this result may be related to the birth weight. ATPase staining revealed increased type II fibers with a concomitant decrease in type I fibers in muscles of myostatin-knockout pigs. The composition rate of type II fiber in *MSTN*<sup>+/-</sup> pig is higher than in *MSTN*<sup>-/-</sup> pig. Quantitative RT-PCR results revealed that MyoD expression of muscle tissue was 1.3~2 fold greater ( $p < 0.01$ ) in *MSTN*<sup>+/-</sup> pig and 1.8~3.5 fold greater ( $p < 0.01$ ) in *MSTN*<sup>-/-</sup> pig compared with wild type. However, MEF2 mRNA levels were significantly lower in *MSTN*<sup>+/-</sup> pig compared with wild type pig ( $p < 0.05$ ).