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Acquisition of pig intramuscular preadipocytes through dedifferentiation of mature adipocytes and establishment of optimal induction conditions

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ABSTRACT. Intramuscular fat deposition is a major contributing factor to variations in pork quality. Understanding the mechanisms driving the differentiation and metabolism of muscle-derived adipocytes is important for regulating the fat deposition in muscle. Studies on intramuscular adipocytes commonly involve stromal-vascular (SV) cell cultures, which contain preadipocytes but also several other types of primordial cells. Hence, it is crucial to obtain pure intramuscular preadipocytes for investigating adipocyte differentiation and metabolism in muscle tissue. In this study, we established cultures of pure intramuscular preadipocytes that were derived from mature adipocytes of newborn pigs. Pure mature adipocytes were isolated from the longissimus dorsi (LD) muscle and allowed to dedifferentiate into fibroblast-like cells in ceiling culture. These fibroblast-like cells turned out to be preadipocytes; they exhibited the ability to redifferentiate into mature adipocytes when adipogenically induced *in vitro*. The redifferentiation process was confirmed by lipid accumulation

in the cytoplasm and expression patterns of peroxisome proliferator-activated receptor gamma 2 (PPARγ2), CCAAT/enhancer binding protein alpha (C/EBPα), lipoprotein lipase (LPL), and adiponectin genes, which were all similar to those observed in previous preadipocyte studies. We optimized the induction conditions for intramuscular preadipocytes by adding 0.25 nM dexamethasone (DEX), 5 μg/mL insulin (INS), and 0.1 mM 3-isobutyl-1-methylxanthine (IBMX). Therefore, this study provides a new model for studying the mechanisms of intramuscular preadipocyte differentiation and metabolism.

Key words: Mature adipocytes; Intramuscular preadipocytes; Dedifferentiation; Redifferentiation; Induction conditions

