

# Isolation and *In vitro* Validation of Cardiac Muscle-Specific Promoters in Pigs

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## Abstract

Identification of promoter sequences that can drive heart-specific expression of transgenes is essential to investigate gene function in the heart. The aim of this study was to identify heart-specific genes and their promoter sequences that can promote heart-specific transgene expression in pig primary heart cells. Gene expression profiles in the Gene Expression Omnibus (GEO) repository have been integrated and utilized to identify MYH6, TNNI3, and MYBPC3 as common heart-specific genes in the mouse and human. RT-PCR further confirmed heart-specific expression of the genes among various tissues in pigs as well as in mice and humans. Bioinformatics analysis predicted that their promoter sequences contain multiple binding sites for transcription factors involved in cardiogenesis and the promoter sequences were substantially conserved between pigs and humans. In addition, *in vitro* analysis showed that expression of (i.e., the green fluorescence protein (GFP)) reporter gene under the regulation of promoter sequences of MYH6, TNNI3, and MYBPC3 was detected in primary pig heart cells but not in other primary cells. These findings, along with the physiologic similarities between humans and pigs, suggest that these novel promoters may be valuable candidates for the regulation of heart gene expression in both humans and pigs for biomedical purposes.

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**Abbreviations:** 3

## Introduction

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