Korea University
Industrial & Cooperation Foundation

Title (Name of Technology)

Use of TRIM72 as a Target for Muscle and Heart Enhancer

Executive Summary

Dr. Young-Gyu Ko, a professor of Korea University, is practicing researches focusing on obesity, diabetes mellitus, and dystonia in particular, novel proteins resulting from those, has finally developed novel use of TRIM72 as a target for muscle enhancer and heart enhancer.

His results of research and development on TRIM72 are very interesting in terms of efficacy, safety and commercializing potential.

Korea University Industrial & Cooperation Foundation, a Technology Licensing Organization in Korea University, intends to enter into a technology transfer or licensing transaction with regard to target for muscle enhancer and heart enhancer. Terms of the transaction are not set, and interested parties may further discuss the details if they wish to enter into an agreement.

② Industry Sector:
Academic/Research: Pharmaceutical

③ Therapeutic Target:
Cardiovascular: Heart failure

④ Development phase: early stage

⑤ Type of business relationship sought (including licensing availability): technology transfer, or non-exclusive or exclusive licensing agreement

IP Owner Summary

Korea University Industrial & Cooperation Foundation

- TLO in Korea University

■ **Personal Description of Researcher**

- Name
  Young-Gyu Ko, Ph.D
- Present Position
  Professor
  College of life sciences and biotechnology, Korea University
- Office address
  Division of life sciences and biotechnology, Korea University
  , Seoul, Korea

Key Technology Highlights

□ Singificant use as a target for muscle and heart enhancer Efficacies

TRIM72 shows remarkable use as a target for muscle and heart enhancer which were verified in animal experiments using mice and rabbits. The efficacy of TRIM72 is a break-through innovation of a pre-existing insulin-like growth factor as muscle enhancer, thereby expected to developing into treatments for obesity, type 2 diabetes, muscle disease, cardiac hypertrophy, or the like.

A drug or genetic treatment using TRIM72 as target may lead to the treatment of obesity and type 2 diabetes, by promoting differentiation and hypertrophy of skeletal muscle and energy consumption in adipose tissue, and to a strong heart, by promoting physiological hypertrophy of heart muscle. Therefore, the muscle enhancer or heart enhancer may be developed into treatments for obesity, type 2 diabetes, muscle disease, cardiac hypertrophy, or the like. And a drug or genetic treatment using TRIM72 can be used for both prevention and treatment.

□ Little or No Side Effects

TRIM72 has effect not on other tissues but on skeletal muscle and heart. Therefore the inhibition of TRIM72 acts exclusively on skeletal muscle and heart muscle, but does not affect signaling pathway in other tissues. In animal tests, little or no side effects were observed for animals using TRI M72 as target .

□ Plentiful Animal Data

Many animal data for activities as a target for muscle and heart enhancer of TRIM72 peptides have been already obtained, permitting the speed of the product development to increase.

□ Strong IP Position

The use of TRIM72 as drug target have been filed for a patent application in a multitude of countries. The pending patent applications are anticipated to be patented in the near future.

Technology Overview

- **Technology Platform**

The core technology of Korea University is to provide promising target for muscle and heart enhancer, TRIM72. The TRIM72 exhibits utility as a target for muscle and heart enhancer by distinctly various actions.

Background and unmet needs: A multitue of approaches and researches have been made to prevent and treat o besity, type 2 diabetes, muscle disease, cardiac hypertrophy but have finally failed to find effective growth regulator.

Discovery and Achievements: Target for muscle and heart enhancer, TRIM72 of Korea University has been developed on the basis of findings that TRIM72 is specifically expressed in lipid rafts of skeletal muscle and heart and results in increased muscle mass during muscle differentiation.

The inventors isolated lipid rafts from C2C12 myoblasts and myotubes, and identified TRIM72, the function of whic h was never known yet, through comparative proteomics. TRIM72 has a (ubiquitin E3) TRIM/RBCC domain necessary for ub iquitin E3 ligase activity. TRIM72 is specifically expressed in lipid rafts of skeletal muscle and heart and results in increased muscle mass during muscle differentiation. TRIM72 overexpression inhibits myogenesis whereas TRIM72 knockdown enhances myogenesis, in other words TRIM72 is a negative regulator of skeletal muscle differentiation. TRIM72 regulates th e IGF-I/IGFR/IRS-1 signaling pathway by inhibiting IGF-I-mediated activation of IRS-1 through interaction with IRS-1.

Accordingly, TRIM72 acts only on skeletal muscle and heart, without affecting the IGF-I signaling pathway in other tissue. Therefore, cancer or other side reactions may be prevented. That is, a drug or genetic treatment using TRIM72 as ta rget may lead to the treatment of obesity and type 2 diabetes without side effects, by promoting differentiation and hypertroph y of skeletal muscle and energy consumption in adipose tissue, and to a strong heart, by promoting physiological hypertrophy of heart muscle.

Fig. 1. Result demonstrating that TRIM72 is a negative regulator of muscle differentiation.

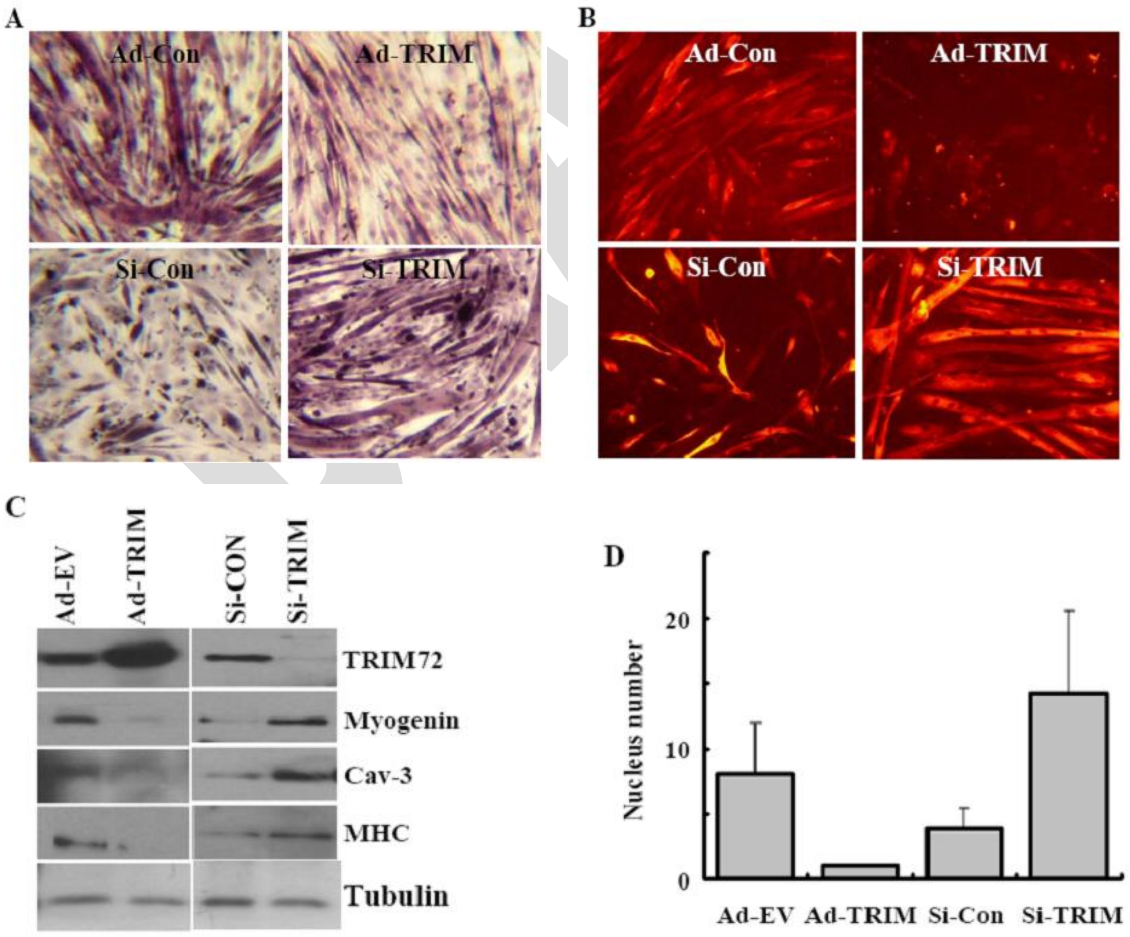

FIG. 1A, myogenesis was prevented by TRIM72 overexpression, but enhanced by TRIM72 knockdown. The degree of muscle differentiation can be identified from the degree of MyHC staining. Further, myogenesis was completely prevented by TRIM72 overexpression as determined by the expression level of myogenesis marker proteins, nucleus number per myotubes, and the like (FIGS. 1C and 1D), whereas TRIM72 knockdown enhanced muscle differentiation.

Key features and advantages:

(a) Significantly increased efficacies

A drug or genetic treatment using TRIM72 as target may lead to the treatment of obesity and type 2 diabetes by promoting differentiation and hypertrophy of skeletal muscle and energy consumption in adipose tissue.

And a drug or genetic treatment using TRIM72 as target may lead to to a strong heart by promoting physiological hypertrophy of heart muscle.

(b) Little or no side effects

TRIM72 acts only on skeletal muscle and heart, without affecting the signaling pathway in other tissue. Therefore, cancer or other side reactions may be prevented.

Patents and Publications

Korea Univerity have patents issued or filed for application in many countries with regard to target for muscle and heart enhancer, TRIM72.

TABLE. List of Patents for Anti-Obesity Agents

Country	Status	Patent, Publication or Appln. No.
Korea	Filed	10-2008-0087500
PCT	Published	PCT/KR2008/005234