



Journal of Receptors and Signal Transduction >

Volume 28, 2008 - Issue 1-2

482 | 45
Views | CrossRef citations to date | 0
Altmetric

Research Article

Metabolic Roles of the M₃ Muscarinic Acetylcholine Receptor Studied with M₃ Receptor Mutant Mice: A Review

DINESH GAUTAM, JONGRYE JEON, JIAN HUA LI, SUNG-JUN HAN, FADI F. HAMDAN, YINGHONG CUI, ...show all

Pages 93-108 | Published online: 10 Oct 2008

Cite this article <https://doi.org/10.1080/10799890801942002>



Full Article Figures & data References Citations Metrics

Reprints & Permissions

Read this article

Share

Abstract

The M₃ muscarinic acetylcholine (ACh) receptor (M₃ mAChR) is expressed in many central and peripheral tissues. It is a prototypic member of the superfamily of G protein-coupled receptors and preferentially activates G proteins of the G_q family. Recent studies involving the use of newly generated mAChR mutant mice have revealed that the M₃ mAChR plays a key role in regulating many important metabolic functions. Phenotypic analyses of mutant mice that either selectively lacked or overexpressed M₃ receptors in pancreatic β -cells indicated that β -cell M₃ mAChRs are essential for maintaining proper insulin release and glucose homeostasis. The experimental data also suggested that strategies aimed at enhancing signaling through

β -cell M₃ mAChRs might be beneficial for the treatment of type 2 diabetes. Recent studies with whole body M₃ mAChR knockout mice showed that the absence of M₃ receptors protected mice against various forms of experimentally or genetically induced obesity and obesity-associated metabolic deficits. Under all experimental conditions tested, M₃ receptor-deficient mice showed greatly ameliorated impairments in glucose homeostasis and insulin sensitivity, reduced food intake, and a significant elevation in basal and total energy expenditure, most likely due to increased central sympathetic outflow and increased rate of fatty acid oxidation. These findings are of potential interest for the development of novel therapeutic approaches for the treatment of obesity and associated metabolic disorders.

Key Words: :

Glucose homeostasis

Insulin

Knockout mice

Muscarinic receptor

Transgenic mice

Related Research Data

[Plasma Membrane Localization and Functional Rescue of Truncated Forms of a G Protein-coupled Receptor](#)

Source: [Journal of Biological Chemistry](#)

[Ringing the dinner bell for insulin: Muscarinic M3 receptor activity in the control of pancreatic \$\beta\$ cell function](#)

Source: [Cell Metabolism](#)

[Dual Roles for Glucokinase in Glucose Homeostasis as Determined by Liver and Pancreatic \$\beta\$ Cell-specific Gene Knock-outs Using Cre Recombinase](#)

Source: [Journal of Biological Chemistry](#)

[Uncoupling Protein-3 Is a Mediator of Thermogenesis Regulated by Thyroid Hormone, \$\beta\$ 3-Adrenergic Agonists, and Leptin](#)

Source: [Journal of Biological Chemistry](#)

[Muscarinic acetylcholine receptors: mutant mice provide new insights for drug development](#)

Source: [Nature Reviews Drug Discovery](#)

People also read

Recommended articles

Cited by
45

Information for

Authors

R&D professionals

Editors

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

Keep up to date

Register to receive personalised research and resources
by email

 Sign me up

  

  