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RESPONSIBLE EDITORS FOR THIS ISSUE
Production Editor: Zi-Hang Xu; Production Department Director: Xiang La; Cover Editor: Jin-Lei Wang.

NAME OF JOURNAL
*World Journal of Clinical Cases*

ISSN
ISSN 2307-8960 (online)

LAUNCH DATE
April 16, 2013

FREQUENCY
Thrice Monthly

EDITORS-IN-CHIEF
Bao-Gan Peng, Salim Surani, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati

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PUBLICATION DATE
March 26, 2024

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ONLINE SUBMISSION
https://www.f6publishing.com
Epinephrine also acts on beta cells and insulin secretion

Lina Zabuliene, Ioannis Ilias

Specialty type: Medicine, research and experimental

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report’s scientific quality classification
Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Jovandaric MZ, Serbia

Received: October 18, 2023
Peer-review started: October 18, 2023
First decision: January 30, 2024
Revised: January 30, 2024
Accepted: March 4, 2024
Article in press: March 4, 2024
Published online: March 26, 2024

Abstract

In a recent review examining neurotransmitter modulation of insulin secretion, the significant impact of epinephrine was not addressed. Its primary action involves inhibiting insulin release via alpha-adrenergic receptors, thereby reducing the response to insulin secretion stimulators, through the activation of K+ channels and resulting in membrane hyperpolarization in beta cells.

Key Words: Epinephrine; Insulin; Islets; Glucose; Human

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Core Tip: Among the neurotransmitters influencing insulin secretion, the role of epinephrine (EPI) might be underestimated. EPI mainly inhibits insulin release through alpha-adrenergic receptors, thereby attenuating the response to insulin secretion stimulators.

Citation: Zabuliene L, Ilias I. Epinephrine also acts on beta cells and insulin secretion. World J Clin Cases 2024; 12(9): 1712-1713

DOI: https://dx.doi.org/10.12998/wjcc.v12.i9.1712

TO THE EDITOR

We have reviewed with interest the concise examination by Kong et al.[1] of neurotransmitter influence on insulin secretion. While the authors extensively cover norepinephrine (NEPI), the role of epinephrine (EPI) is overlooked. Both EPI and NEPI, acting as neurotransmitters and hormones, are synthesized and released in the central
and peripheral nervous systems and the adrenal medulla[2]. Despite NEPI’s primary role as a neurotransmitter, the significance of EPI, which also functions as a hormone, should not be disregarded for its neurotransmitter functions. Hence, EPI’s impact closely parallels that of NEPI, though with more pronounced peripheral effects[2].

EPI can prompt insulin release via beta-adrenergic receptor activation, involving adenylate cyclase, cAMP generation, and the cAMP Response Element-Binding Protein pathway[3]. However, its primary effect, mediated by alpha-adrenergic receptor activation, inhibits insulin secretion through the Protein kinase A pathway. This inhibition significantly moderates the response to insulin’s strongest stimulants[4]. EPI achieves this by activating K+ channels, leading to hyperpolarization of pancreatic beta cell membranes[5,6].

The above concise overview of EPI's impact on insulin secretion complements the excellent and comprehensive review of neurotransmitter effects on insulin secretion[1].

FOOTNOTES

Author contributions: Zabuliene L and Ilias I researched for this work; Zabuliene L and Ilias I wrote the manuscript. Both authors agree to this publication.

Conflict-of-interest statement: Authors report that they have no conflict of interest to declare.

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REFERENCES
