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Original Research Article

Identification of Inhibitors of Cell Scavenger Enzymes

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Abstract

In this study, effort has been made to identify the chemical entities possibly inhibiting Na^+/K^+ ATPase and Na^+/Ca^+ Exchanger enzymes. For that, a formula was developed, validated and used to identify the natural regulatory chemical entities/enzymes. They have been identified to be- NEDD4L [1] (125kda), XIP [2] (3.49 kda) and Sphingosine Kinase 1[3] (46.9 kda). They regulate these enzymes. Therefore, drugs [4] can be identified to regulate it during ill health.

Keywords: Na^+/K^+ ATPase, Na^+/Ca^+ Exchanger enzymes, Delayed Cell death, Cell Scavenger Enzymes.

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INTRODUCTION

This work is about studying the causes of cell death and more precisely the non-functioning of Na^+/K^+ ATPase and Na^+/Ca^+ Exchanger enzymes. In this work, effort has been made to identify those chemical entities, which can inhibit above mentioned enzymes, other than ATP non-availability. These will help to identify drugs [4] that regulate these chemical entities during stress.

AIM

(1) To identify chemical entities inhibiting Na^+/K^+ ATPase enzyme.

(2) To identify chemical entities inhibiting Na^+/ Ca^+ Exchanger enzyme.

METHOD

For example: If enzyme "X" inhibits enzyme "Y"

First, a mathematical formula is developed and validated for the next step, that is the study itself.

From the molecular weight of "X", the molecular weight of regulatory domain of "Y" is to be identified. Formula developed and used is Molecular weight of "X" in kda)$^{2/3}$= molecular weight of regulatory domain of "Y" in kda.

Table 1: Molecular weights of Regulatory domain of enzyme "Y" derived from Molecular weights of enzyme/chemical entity "X" using the formula

S. No	Molecular wt of enzyme "X" in Kda	Molecular wt of Regulatory domains of enzyme "Y" in Kda	Enzyme "Y" in kda
1	PKA-240	38.6	Glycogen Synthase-80
2	Wee1 Kinase 94	20	CDK/Cdc2-34
3	Phosphorylase Kinase-325	47.2	Glycogen Synthase-80
4	Caspase 3 & 7-66.3	16.4	PARP-1-113
5	Caspase 3-32	10.1	Protein Kinase B(AKT/PKB)-56
6	Caspase 3 & 7-66.3	16.4	FAK-125
7	Protein Phosphatase I-35	10.6	Glycogen Phosphorylase(activated)-188

Data from the above-mentioned table validates the mathematical formula. So, the mathematical relationship between enzyme ('X") and regulatory part of chemical entity/enzyme('Y") is identified.

Further, to know the molecular weight of "X" from the molecular weight of regulatory domain of "Y"; the formula used is reverse, that is- (molecular weight of regulatory domain of Y in kda)$^{3/2}$= molecular weight of

"X" in kda. Using this formula, efforts are made to identify chemical entities inhibiting/regulating -(a) Na^+/K^+ ATPase enzyme, (b) Na^+/ Ca^+ Exchanger enzyme involved in cell death

REVIEW OF LITERATURE

Cell death mechanisms have been studied extensively and it is still being probed further. The biochemical changes that take place as a prelude to immunological and thus, physical destruction of a cell is under the study. This study is about the biochemical changes that cause the living cell to balloon and die. More precisely, the inhibition of functional scavenger enzymes of the cell-(a) Na^+/K^+ ATPase enzyme, (b) Na^+/ Ca^+ Exchanger enzyme. So, efforts have been made to identify chemical entities inhibiting the above-mentioned scavenger enzymes.

OBSERVATIONS

Molecular weights of enzyme/chemical entity "X" derived from molecular weights of Regulatory domain of enzyme "Y"

S No	Scavenger Enzyme("Y")	Regulatory/Actuator Domain(s) of Scavenger Enzyme("Y") in molecular weight in Kda	Mol wt of inhibiting chemical enzymes/entities in Kda with names ('X")
1	Na^+/K^+ ATPase enzyme	25	NEDD4L[1] ,125
2	Na^+/ Ca^+ Exchanger enzyme	2.3	XIP[2],3.49
		13	Sphingosine Kinase 1[3], 46.9
		17	None,70
		60	None,464.7

DISCUSSION

Exact chemical entities inhibiting both the enzymes are found. They regulate the scavenger enzymes with dual role of stimulating and inhibiting. If these enzymes are controlled during stress, cell death to a larger extent can be delayed. Drugs [4] can be also identified to regulate these enzymes or chemical entities.

CONCLUSION

This work is about finding the chemical entities inhibiting-(a) Na^+/K^+ ATPase enzyme, (b) Na^+/ Ca^+ Exchanger enzyme.

They are identified to be- NEDD4L[1] (125kda), XIP [2] (3.49 kda) and Sphingosine Kinase 1[3] (46.9 kda). Drugs [4] can be found out to regulate these chemical entities during stress.

Abbreviations

(1) NEDD4L- Neural precursor cell Expressed Developmentally Down regulated 4-like
(2) XIP-Exchange inhibitor peptide
(3) kda-Kilo dalton

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