

Casein Kinase 1's Function in Meiosis & It's Impacts

Ivan Kanev*

University of Nebraska, Medical Center, Omaha, NE, 68198-5440, Canada

ABSTRACT

Casein kinase 1 (CK1) is a protein kinase that belongs to the serine/threonine family. CK1 members, which are present in all eukaryotes, play a role in the regulation of various cellular processes such as cell cycle initiation, spindle dynamics, and chromosome segregation. Furthermore, CK1 regulates essential signalling pathways such as Wnt (Wingless/Int-1) and Hh (Hedgehog), which are considered to be crucial in tumour progression. Given the role of CK1 in correct cell division and tumour suppressor activity control, it is not shocking that scientific effort has skyrocketed. CK1 controls the transition from interphase to metaphase in mitosis in mammals. CK1 phosphorylates Rec8 subunits of the cohesin complex in budding yeast and fission yeast, regulating chromosome segregation during meiosis. Two cycles of chromosome division accompany a single cycle of DNA replication in meiosis, resulting in haploid gametes from diploid precursors. Any chromosome segregation error may lead to aneuploidy, which is one of the most prevalent causes of miscarriage, abortion, and a number of genetic diseases in humans. The expression and biological function of CK1 family members, especially their role in meiosis, are summarised in this study.

KEYWORDS: Down Syndrome, Trisomy 21, Chromosome Abnormality.

INTRODUCTION

Meiosis, which involves two rounds of chromosome division but just one round of DNA replication, is the cornerstone of sexual reproduction proliferation and inheritance. Aneuploidy is caused by errors in chromosome division, and is linked to oocyte maturation failure and can lead to aneuploidy or dysplasia in the embryo. To achieve high-quality matured oocytes and the capacity to sustain subsequent fertilisation and embryo development, a number of protein kinases control chromosome alignment and separation through phosphorylation and dephosphorylation pathways. Casein kinase 1 (CK1) belongs to the serine/threonine protein kinase family, which is found in all eukaryotes. The abundant CK1 enzymes are monomeric (34-55 kDa) and constitutively active enzymes. Within their kinase domains, both CK1 members are very homologous and strongly conserved, but they differ considerably in the length and primary configuration of their C-terminal and N-terminal non-catalytic domains, which is an extended tail in the case of CK1/ as compared to CK1, which has a short C-terminal domain, but CK1 isoforms vary in a longer N-terminal head. Despite the fact that CK1, CK1, and CK1 were both found in MTOCs or spindle poles, they were not the kinase responsible for Rec8 phosphorylation during mouse oocyte meiosis, implying that CK1 was not needed for mouse oocyte meiotic maturation [1]. The conflicting findings need to be looked at further.

CONCLUSION

Main regulatory molecules involved in the cell cycle,

transcription and translation, the cytoskeleton, cell-cell adhesion, and receptor-coupled signal transduction have been shown to be phosphorylated by isoforms of the CK1 family [2]. Given their function in essential cellular signalling pathways, it's not shocking that CK1 isoform dysregulation has been related to the occurrence of inflammatory and proliferative diseases, as well as neurodegenerative disorders. We are primarily concerned with cell division in this study. CK1 isoforms are involved in cell division during both mitosis and meiosis. CK1 regulates the transition from interphase to metaphase in mitosis in mammals. CK1 phosphorylates Rec8 subunits of the cohesin complex in budding yeast and fission yeast, regulating chromosome segregation during meiosis. However, the role of CK1 in mammalian oocyte meiosis is still uncertain, and further study is required [3].

REFERENCES

1. Matsuura S, Ito E, Tauchi H, Komatsu K, Ikeuchi T. Chromosomal instability syndrome of total premature chromatid separation with mosaic variegated aneuploidy is defective in mitotic-spindle checkpoint. *Am J Hum Genet.* 2000;67(2): 483-486.
2. Musacchio A, Salmon ED. The spindle-assembly checkpoint in space and time. *Nat Rev Mol Cell Biol.* 2007;8(3): 379-393.
3. Tuazon PT, Traugh JA. Casein kinase I and II-multipotential serine protein kinases: structure, function, and regulation. *Adv Second Messenger Phosphoprotein Res.* 1991;23(6): 123-164

*Corresponding author: Ivan Kanev, University of Nebraska, Medical Center, Omaha, NE, 68198-5440, Canada, Tel: +14025026865; E-mail: ikanev1997@gmail.com

Received date: Mar 03, 2021; Accepted date: Mar 20, 2021; Published date: Mar 30, 2021

Citation: Kanev I (2021) Casein Kinase 1's Function in Meiosis. *Journal of Down Syndrome and Chromosomal Abnormalities* 7:164. doi: 10.4172/2472-1115.21.7.164

Copyright: ©2021 Ivan Kanev. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

