TET1,2,3 oxidizes 5-methylcytosine to 5-hydroxymethylcytosine

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28/12/2022
Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references


Reactome database release: 83

This document contains 1 reaction (see Table of Contents)

https://reactome.org
TET1, TET2, and TET3 each oxidize the 5-methyl group of 5-methylcytosine (5-mC) in DNA using molecular oxygen and 2-oxoglutarate as substrates and Fe(II) as a cofactor to yield 5-hydroxymethylcytosine (5-hmC), carbon dioxide, and succinate (Tahiliani et al. 2009, inferred from mouse in Ito et al. 2010). As inferred from mouse, sodium ascorbate (vitamin C) is required for full activity of these enzymes, presumably to maintain the ferrous state of iron (Fe2+) by acting as a reducing agent (Blaschke et al. 2013, Minor et al., 2013). The crystal structure of TET2 indicates that it binds specifically to 5-mC in CG dinucleotides and flips the base out of the helix into proximity of the catalytic Fe(II) where it is oxidized (Hu et al. 2013). TET3 is expressed in murine oocytes and zygotes and is implicated in demethylation of the male pronucleus after fertilization (Iqbal et al. 2011). As inferred from mouse, TET1 and TET2 appear to participate in differentiation of stem cells. TET1, TET2, and TET3 are involved in establishing the increased level of 5-hmC that is characteristic of adult neurons (Guo et al. 2011, inferred from mouse in Hahn et al. 2013). TET2 is expressed in hematopoietic cells where it appears to act as a tumor suppressor (Ko et al. 2010).

**Literature references**


**Editions**

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<td>Authored, Edited</td>
<td>May, B.</td>
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<tr>
<td>2014-01-29</td>
<td>Reviewed</td>
<td>Pfeifer, GP.</td>
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<td>2014-02-21</td>
<td>Reviewed</td>
<td>Mukherji, M.</td>
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