Telomere C-strand synthesis initiation

Blackburn, EH., D'Eustachio, P., Price, C., Seidel, J.

European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

The contents of this document may be freely copied and distributed in any media, provided the authors, plus the institutions, are credited, as stated under the terms of Creative Commons Attribution 4.0 International (CC BY 4.0) License. For more information see our license.

16/09/2019
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: 70

This document contains 1 pathway and 2 reactions (see Table of Contents)
DNA polymerases are not capable of de novo DNA synthesis and require synthesis of a primer, usually by a DNA-dependent RNA polymerase (primase) to begin DNA synthesis. In eukaryotic cells, the primer is synthesized by DNA polymerase alpha:primase. First, the DNA primase portion of this complex synthesizes approximately 6-10 nucleotides of RNA primer and then the DNA polymerase portion synthesizes an additional 20 nucleotides of DNA. There have been reports that TRF1 inhibits this activity at telomeres, though the mechanism and physiological relevance of this inhibition remain to be elucidated.

**Literature references**


The primase component of DNA polymerase:primase synthesizes a 6-10 nucleotide RNA primer on the G strand of the telomere

**Location:** Telomere C-strand synthesis initiation

**Stable identifier:** R-HSA-174425

**Type:** transition

**Compartments:** nucleoplasm

The complementary strand is synthesized by the polymerase primase complex using conventional RNA priming.

**Followed by:** The polymerase component of DNA polymerase alpha:primase synthesizes a 20-nucleotide primer on the G strand of the telomere

**Literature references**


**Editions**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Author</th>
<th>Reviewed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-03-09</td>
<td>Authored</td>
<td>Blackburn, EH., Seidel, J.</td>
<td></td>
</tr>
<tr>
<td>2006-07-13</td>
<td>Reviewed</td>
<td>Price, C.</td>
<td></td>
</tr>
</tbody>
</table>
The polymerase component of DNA polymerase alpha:primase synthesizes a 20-nucleotide primer on the G strand of the telomere

**Location:** Telomere C-strand synthesis initiation

**Stable identifier:** R-HSA-174427

**Type:** transition

**Compartments:** nucleoplasm

The complementary strand is synthesized by the polymerase primase complex using conventional RNA priming (Dai et al. 2010).

**Preceded by:** The primase component of DNA polymerase:primase synthesizes a 6-10 nucleotide RNA primer on the G strand of the telomere

**Literature references**


**Editions**

<table>
<thead>
<tr>
<th>Date</th>
<th>Author</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-03-09</td>
<td>Blackburn, EH., Seidel, J.</td>
<td></td>
</tr>
<tr>
<td>2006-07-13</td>
<td>Reviewed</td>
<td>Price, C.</td>
</tr>
</tbody>
</table>
Table of Contents

Introduction 1

Telomere C-strand synthesis initiation 2

- The primase component of DNA polymerase:primase synthesizes a 6-10 nucleotide RNA primer on the G strand of the telomere 3

- The polymerase component of DNA polymerase alpha:primase synthesizes a 20-nucleotide primer on the G strand of the telomere 4

Table of Contents 5