Characterization of novel proteins interacting with phosphorylated CTD of RNA polymerase II

2001 Fiscal Year Final Research Report Summary

Characterization of novel proteins interacting with phosphorylated CTD of RNA polymerase II

Research Project

Project/Area Number

12680672

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Molecular biology

Research Institution

Kanazawa University

Principal Investigator

HIROSE Yutaka Cancer Research Institute, Assistant Professor, がん研究所, 助手 (00218851)

Project Period (FY)

2000 – 2001

Keywords

gene expression / transcription / mRNA processing / phosphorylation / RNA polymeragse II / WW domain / cell cycle

Research Abstract

The carboxy-terminal domain (CTD) of RNA pqlymerase n (Pol II) largest subunit is consist of multiple repeats of 7 amino acids peptide (Y-S-P-T-S-P-S). Phosphorylation of the CTD has been suggested as an important signal for recruitment of pre-mRNA processing factors to transcription sites to coordinate each step of mRNA synthesis. To approach to the molecular mechanism in which transcription couples with pre-mRNA processing, I have identified and characterized novel human factors that can directly bind to the phosphorylated CTD (P-CTD). One such protein is novel and named as PCIF1. The other is Pin1, which has been implicated in cell cycle regulation. The WW domain in PCIF1 and Pin1 was responsible for the specific interaction with P-CTD. In this research, I got following findings. (1) PCIF1 mRNA was ubiquitously expressed among various human tissues. (2) Transiently expressed recombinant PCIF1 was co-immunoprecipitated with endogenous hyperphosphorylated Pol II (Pol IIO) from human cell extracts. Confocal microscopic analysis showed association of PCIF1 with Pol IIO. (3) Overexpression of PCIF1 or Pin1 in human cultured cells could strongly repress trans-activation of the reporter gene expression driven by various transcription activation domains. (4) Several nuclear factors involving in gene expression were identified as targets of PCIF1 and Pin1 in yeast two-hybrid screening and GST pull-down experiments from human cell extracts. PCIF1 WW domain could bind several human proteins recognized by a phosphorylated substrate specific antibody. (5) PCIF1 WW domain could preferentially bind to a CTD peptide phosphorylated at only Ser 5 position against a CTD peptide phosphorylated at only Ser 2 position. In contrast, Pin1 WW exhibited same affinity to botji CTD peptides.

Research Products (2 results)

All Other

All Publications

[Publications] Hirose, Y., Manley, J.L.: "RNA polymerase II and the integration of nuckar events"Genes & Development. 14. 1415-1429 (2000)

[Publications] Hirose, Y. and Manley, J. L.: "RNA polymerase II and the integration of nuclear events."Genes & Development. 14. 1415-1429 (2000)

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-12680672/126806722001kenkyu_seika_hokoku_

Published: 2003-09-16