Patel et al. (2017) Can J Biotech, Volume 1, Special Issue, Page 110
https://doi.org/10.24870/cjb.2017-a96

Canadian Journal of Biotechnology

ISSN 2560-8304

Poster Presentation **OPEN ACCESS**

Category: Functional Genomics

CGGBP1-CTCF dynamics in regulation of chromosomal interactions

Divyesh Patel[1], Manthan Patel[1], Prasoon Agrawal[1] and Umashankar Singh[1*]

[1]Biological Engineering, IIT Gandhinagar, near Palaj village, Gandhinagar, Gujarat 382355, INDIA

Presenting author: divyeshkumar.patel@iitgn.ac.in; [*]Corresponding author: usingh@iitgn.ac.in

Abstract

Genome organisation and gene expression is regulated by specific DNA sequences that include "insulator elements". Insulator proteins, such as CTCF bind to insulator elements to block spreading of silent chromatin *in-cis* or inhibit interactions between transcriptional enhancers and promoters. By binding to insulators in a methylation-sensitive manner, CTCF establishes and maintains contrasting transcription patterns on either side of the insulator elements [1]. Though details of CTCF-insulator activities have been worked out, mechanisms of regulation of insulator activity by other proteins is unknown. CTCF-binding insulators are retrotransposon-derived, the same elements to which CGGBP1 binds making CGGBP1 a candidate insulator regulator factor [2]. Objective is to explore role of CGGBP1-CTCF dynamics in regulation of insulator activity. 1064Sk skin fibroblasts were grown in presence or absence of CGGBP1 in growth stimulated or starved condition. ChIP-seq was performed to identify CGGBP1-binding DNA sequence motifs [3]. We have observed a strong overlap between binding sites of CTCF and CGGBP1 [4, 5]. CGGBP1 and CTCF seem to share the retrotransposons-derived M1 and M2 motifs. Unlike in quiescent cells, growth factor-stimulation increased CGGBP1 binding to CTCF-CGGBP1 binding sites with decreased CTCF insulator activity. The distance between CGGBP1 M1 and M2 motifs was longer in quiescent cells as compared to growth stimulated cells. Our results suggest that CGGBP1 negatively regulates CTCF insulator activity in normal cells in a growth signal-dependent manner.

References

[1] Ong, C. and Corces, V. (2014) CTCF: an architectural protein bridging genome topology and function. *Nat Rev Genet* 15: 234-246. https://doi.org/10.1038/nrg3663

[2] Singh, U. and Westermark, B. (2015) CGGBP1-an indispensable protein with ubiquitous cytoprotective functions. *Ups J Med Sci* 120: 219–232. https://doi.org/10.3109/03009734.2015.1086451

[3] Agarwal, P., Enroth, S., Teichmann, M., Jernberg Wiklund, H., Smit, A., Westermark, B. and Singh, U. (2016) Growth signals employ CGGBP1 to suppress transcription of Alu-SINEs. *Cell Cycle* 15: 1558–1571. https://doi.org/10.4161/15384101.2014.967094

[4] Schmidt, D., Schwalie, P.C., Wilson, M.D., Ballester, B., Gonçalves, A., Kutter, C., et al. (2012) Waves of retrotransposon expansion remodel genome organization and CTCF binding in multiple mammalian lineages. *Cell* 148: 335–348. https://doi.org/10.1016/j.cell.2011.11.058

[5] Ziebarth, J., Bhattacharya, A. and Cui, Y. (2013) CTCFBSDB 2.0: a database for CTCF-binding sites and genome organization. *Nucleic Acids Res* 41: D188-D194. https://doi.org/10.1093/nar/gks1165

Citation: Patel, D., Patel, M., Agrawal, P. and Singh, U. CGGBP1-CTCF dynamics in regulation of chromosomal interactions [Abstract]. In: Abstracts of the NGBT conference; Oct 02-04, 2017; Bhubaneswar, Odisha, India: Can J biotech, Volume 1, Special Issue, Page 110. https://doi.org/10.24870/cjb.2017-a96