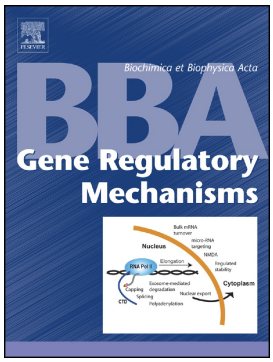
Accepted Manuscript



Polycomb/Trithorax group-dependent regulation of the neuronal gene Lim3 involved in Drosophila lifespan control

Olga Y. Rybina, Yakov M. Rozovsky, Ekaterina R. Veselkina, Elena G. Pasyukova

PII: S1874-9399(17)30403-0
DOI: doi:10.1016/j.bbagrm.2018.03.006
Reference: BBAGRM 1241

To appear in:

Received date: 14 November 2017
Revised date: 18 February 2018
Accepted date: 14 March 2018

Please cite this article as: Olga Y. Rybina, Yakov M. Rozovsky, Ekaterina R. Veselkina, Elena G. Pasyukova , Polycomb/Trithorax group-dependent regulation of the neuronal gene Lim3 involved in Drosophila lifespan control. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Bbagrm(2018), doi:10.1016/j.bbagrm.2018.03.006

Polycomb/Trithorax group-dependent regulation of the neuronal gene *Lim3* involved in *Drosophila* lifespan control

Olga Y. Rybina [a, b]*, *Yakov M Rozovsky* [a], *Ekaterina R. Veselkina* [a], *Elena G. Pasyukova* [a]

[a] Institute of Molecular Genetics of Russian Academy of Sciences, Kurtchatov Sq. 2, Moscow, 123182, Russia

[b] Federal State-Financed Educational Institution of Higher Professional Education, Moscow State Pedagogical University, M. Pirogovskaya Str. 1/1, Moscow, 119991, Russia

*Corresponding author:

Institute of Molecular Genetics of Russian Academy of Sciences, Kurtchatov Sq. 2, Moscow, 123182, Russia/ Federal State-Financed Educational Institution of Higher Professional Education, Moscow State Pedagogical University, M. Pirogovskaya Str. 1/1, Moscow, 119991, Russia.
Tel.: +7-499-196-1909

flybee@mail.ru

Abstract

Molecular mechanisms governing gene expression and defining complex phenotypes are central to understanding the basics of development and aging. Here, we demonstrate that naturally occurring polymorphisms of the *Lim3* regulatory region that are associated with variation in gene expression and *Drosophila* lifespan control are located exclusively in the Polycomb response element (PRE). We find that the Polycomb group (PcG) protein Polycomb (PC) is bound to the PRE only in embryos where *Lim3* is present in both repressed and active states. In contrast, the Trithorax group (TrxG) protein absent, small, or homeotic discs 1 (ASH1) is bound downstream of the PRE, to a region adjacent to the *Lim3* transcription start site in embryos and adult flies, in which *Lim3* is in an active state. Furthermore, mutations in *Pc* and *ash1* genes affect *Lim3* expression depending on the structural integrity of the *Lim3* PRE, thus confirming functional interactions between these proteins and *Lim3* regulatory region. In addition, we demonstrate that the evolutionary conserved *Lim3* core promoter provides basic *Lim3* expression, whereas structural changes in the *Lim3* PRE of distal promoter provide stage-, and tissue-specific *Lim3* expression. Therefore, we hypothesize that PcG/TrxG proteins, which are directly involved in *Lim3* transcription regulation, participate in lifespan control.

Key words: lifespan; transcription; embryonic development; Polycomb/Trithorax proteins; Polycomb/Trithorax response element; *Drosophila melanogaster*