

Performing a genetic screen to identify factors that promote lncRNA-dependent gene repression

Chrishan M. Fernando, Cecilia Yiu, Sara Cloutier, Siwen Wang, and Elizabeth Tran
Department of Biochemistry, Purdue University

ABSTRACT

Long non-coding RNAs (lncRNAs) were once thought not to have useful functions in organisms but rather to be products of aberrant transcription. However, roles are being found for lncRNAs in beneficial processes such as controlling gene expression. In some of these cases, lncRNAs form R-loops *in vivo*. R-loops are nucleic acid structures consisting of hybridized strands of single-stranded DNA (ssDNA) and single-stranded RNA (ssRNA) as well as the displaced strand of ssDNA. Formation of these R-loops is important for gene regulation by the lncRNAs. However, factors that promote formation of lncRNA R-loops are not known. The gene *PHO84* is being used to study this matter. *PHO84* encodes a phosphate transporter in *Saccharomyces cerevisiae*. Two lncRNAs are transcribed in the antisense direction across *PHO84* and repress *PHO84* gene expression. This phenomenon may be due to the formation of R-loops. A genetic screen is being performed in *S. cerevisiae* to identify genes that suppress gene expression on *PHO84* when overexpressed. The effects of these genes will then be studied in more detail. Then, more work will be done to determine how these genes may interact with lncRNAs.

KEYWORDS

R-loop, RNA-DNA hybrid, lncRNA, *PHO84*, gene repression