SCIENCE FOR THE BENEFIT OF HUMANITY

A Novel Technique to Identify RNA Targets of RNA-Binding Proteins and Ribonucleoprotein Complexes

RU # 902

Technology Summary

The transcription of DNA into RNA is an essential step in the expression of the genes contained within the DNA genome. The resulting RNA transcripts are then subject to several maturation and regulatory processes, including RNA splicing, polyadenylation, targeting of the transcript to specific locations within the cell, control of mRNA stability and rate of translation into protein. How are pre-mRNA and mature mRNAs recognized and regulated in a sequence-specific manner by more than a thousand cellular RNA-binding proteins (RBPs) and non-coding RNA ribonucleoprotein (RNP) complexes? How can one identify in an experimentally precise and transcriptome-wide manner the mRNA regulatory sites? This is a daunting task, given the specificity of expression of many of these regulatory RBPs and non-coding RNAs and their targeted transcripts. Changes in these interactions can lead to several complex and multifaceted diseases including metabolic diseases (like Diabetes), neurological diseases (like Fragile X syndrome) and cancers. Identification of the binding sites in RNA transcripts *in vivo* will shed considerable light on the biology of post-transcriptional gene control, and relevance of the interaction on disease.

Our scientists have developed an efficient method to identify RBP and RNP binding sites on RNA transcripts based on the use of modified nucleotides deliverable to cells in combination with immunoprecipitation and deep sequencing. This method allows the identification of RNA transcripts and their interaction sites related to the disease, and can serve as a tool for the discovery of regulatory sites useful for developing decoys or antisense inhibitors to control posttranscriptional gene expression.

Area of Application

- Research tools in RNA biology and gene expression
- Target identification
- Discovery and development of siRNA and antisense therapeutics

Stage of Development

This technique has successfully identified regulatory sites on RNA transcripts

Lead Inventor

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Patent Information & References

- U.S. Patent 8,841,073 (issued Sept. 23, 2014)
- Hafner, et al. 2010. Cell, 141:129-141.

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