



SCIENCE FOR THE BENEFIT OF HUMANITY

Nidhi Sabharwal, Ph.D.
Assistant Director
Technology Transfer
(212) 327-7092
nsabharwal@rockefeller.edu

A Novel Ligase-Based System to Efficiently Label or Sequence-Tag MicroRNAs

RU 830

Technology Summary

MicroRNAs are small RNA molecules (21 – 23 nucleotides in length) that act as regulators of gene expression in plants and animals, including humans. There is a need to characterize the expression patterns of these miRNAs in specific tissues and cell types in both healthy and disease states. One of the approaches for detecting miRNAs is based on microarray hybridization, which requires fluorescent labeling of the miRNA sample. Some of the current labeling methods use RNA ligases and fluorescently labeled donor nucleotides, but there are undesirable side reactions that result in a sequence dependent formation of circular miRNA species thus leading to a labeled pool that does not correctly represent the composition of the biological sample. Alternative to fluorescent labeling of miRNAs, adapter oligonucleotides may be ligated to the miRNA 3' end to facilitate small RNA cDNA library preparation followed by deep sequencing.

Our investigators have developed a novel system using a modified RNA ligase molecule and corresponding protocol to minimize the side reactions during the labeling reaction. This allows direct labeling or adapter sequence tagging of natural 5'-phosphorylated microRNAs without the need for additional processing before the ligation step.

Advantage/Innovation

- **High Accuracy:** The novel components in this system increase the yield of the desired linear species of labeled miRNAs and give a labeled pool that is a better representation of the composition of the biological sample, thus allowing a precise quantitative evaluation of the microarrays.
- **Reduced Background Signal:** System uses pre-adenylated substrate, thereby reducing non-specific product formation and increasing the specificity of signal.
- **Rapid Results:** No additional processing is needed before labeling thereby reducing total reaction time.
- **Multiple Labels:** This labeling and sequence-tagging technique also allows the incorporation of multiple labels in that may increase detection sensitivity.

Areas of Application

- The detection and visualization of labeled miRNAs is useful for **life sciences research**
- Specifically, this system can be employed for more accurate and efficient **microarray** processing and
- **Small RNA cDNA** library construction.
- This system can also be successfully used for **diagnostic applications** or **sequencing systems**

Stage of Development

- This ligase-based system has been used successfully to label model miRNA sequences.

Lead Inventor

- Dr. Thomas Tuschl

Patent Information

- U.S. Patent 8,383,370.

The Rockefeller University Office of Technology Transfer
502 Founders Hall
1230 York Avenue
New York, NY 10021-6399
www.rockefeller.edu/techtransfer