



## Let-7 Isoform Real-Time PCR Assay Kit

Catalog Number CL-0006

(For Research Use Only)

### Introduction

Let-7 family is known to regulate proliferation and differentiation processes in species ranging from *C. elegans* to human. The mature forms (designated let-7a through let-7i) differ at one to four positions from the let-7a sequence. The expression level of the isoforms is variable, which may play a diverse role in organ development and disease etiology. To distinguish these isoforms will help to elicit the mechanism of Let-7 function. Based on its proprietary technology, Signosis has developed a highly sensitive and discriminative real-time PCR assay method for measuring miRNA expression of let7 isoforms (Let-7a, Let-7b, Let-7c, Let-7d, Let-7e, Let-7f, Let-7g and Let-7i) simultaneously. U6 includes as an internal control. The assay implements oligo-ligation and SYBR green based real-time PCR, which can be used for quantitative analysis of miRNA expression in either total RNA or cell lysate without cDNA conversion.

### Principle

In the assay, a target miRNA molecule is hybridized with two oligos to form a RNA/DNA duplex. When the sequences are perfectly matched, these two oligos are aligned with the miRNA target. The joint of the two oligos can be ligated with DNA ligase. A single nucleotide difference among miRNAs will block either the hybridization or the ligation. After the pair of oligos is ligated, the ligated molecules are subjected to real-time PCR analysis. In addition, a unique tag sequence is assigned to one specific miRNA. Different isoforms such as miR-19a and miR-19b can be differentiated during PCR when the tag sequence is used as one of amplification primers.

### Material required but not provided

Cell lysis buffer (CL-0001, Signosis)  
Magnetic stand  
RNase free water  
Real time PCR machine  
0.2ml PCR tube or plate

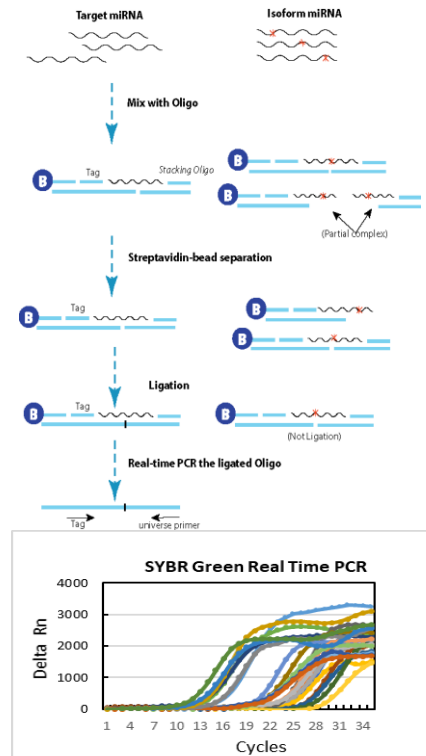


Diagram of Let7 Real-time PCR Assay

### Materials provided

- Let-7 Oligo Mix
- Annealing buffer (RT)
- Magnetic streptavidin beads (4 °C)
- Beads binding buffer (RT)
- Bead wash buffer (RT)
- T4 DNA Ligase (-20°C)
- Ligation buffer (-20°C)
- 2x SYBR Green PCR Master Mix (-20°C)
- 8 miRNA and U6 qPCR Primer (-20°C)

## 1. Sample preparation procedure

Either total RNA or cell lysate can be used for the assay.

- (1) Total RNA preparation  
We recommend using Trizol reagent or similar products to prepare total RNA. Small RNAs including miRNAs are co-precipitated with other sizes of RNA during isopropanol or ethenolof total RNA.
- (2) Cell lysate
  - a. Estimate the number of cells. The number of cells should be between  $10^4$ - $10^5$  cells. Wash the cells with 200ul ice cold 1XPBS and add 100ul ice-cold Cell lysis buffer and then subject to snap-frozen at  $-80^{\circ}\text{C}$ . If the cell number is between 2000-10,000 cells, add 50ul Cell lysis buffer instead.  
**Notes:** Keep the cells on ice during the procedure.
  - b. Incubate with cell lysis buffer on ice for 10 minutes, and centrifuge at 10,000g for 2 minutes. Transfer the supernatant to a fresh tube.  
Optional: Add 0.25-1u DNase I, and incubate at  $37^{\circ}\text{C}$  for 10 minutes and inactivate at  $75^{\circ}\text{C}$  for 10 minutes.
  - c. Heat the supernatant for  $75^{\circ}\text{C}$  for 15 minutes, and put on ice. The cell lysate is ready for use or can be stored at  $-80^{\circ}\text{C}$  for the future usage.

## 2. Annealing of oligos with miRNA

- (1) Annealing reaction:

X  $\mu\text{l}$  50ng-1ug total RNA or cell lysate  
3  $\mu\text{l}$  Let7 oligo mix  
15  $\mu\text{l}$  Annealing buffer  
X  $\mu\text{l}$  ddH<sub>2</sub>O  
-----  
30ul

- (2) Incubate on a PCR machine at  $72^{\circ}\text{C}$  for 5 minutes and  $53^{\circ}\text{C}$  for 60 minutes.
- (3) Beads washing
  - Resuspend the beads by gently tapping the tube to obtain a homogeneous suspension.
  - Transfer 4  $\mu\text{l}$  beads to a 0.2ml PCR tube (the size of the tube that should fit into the magnetic stand.
  - Add 50  $\mu\text{l}$  of annealing buffer to the tube, place onto the magnetic stand for 30 seconds.
  - Aspirate out the liquid.
  - Remove the tube from magnetic stand.
- (4) Beads selection
  - Add 30  $\mu\text{l}$  of Bead binding buffer to 30  $\mu\text{l}$  annealed miRNA/oligo hybrid from Step 2-(1), transfer to the washed beads and resuspend the beads in the solution.
  - Incubate at  $37^{\circ}\text{C}$  for 30 minutes.
  - Place the bead mixture on the magnetic stand for 30 seconds and aspirate the buffer. The beads will remain on the side of tube.

- Remove the tube from the magnetic stand, add 100  $\mu\text{l}$  of Bead wash buffer, pipette gently up and down to resuspend the beads, place the tube on the magnetic stand for 30 seconds and then aspirate the buffer. Repeat the washing step once.

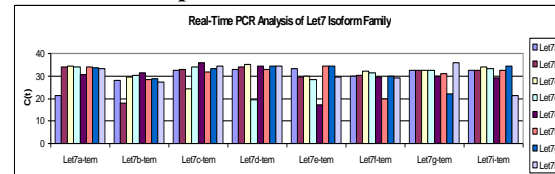
## 3. Ligation of annealed oligos

- (1) Equilibrate beads with 50  $\mu\text{l}$  of Ligation buffer and resuspend the beads pipette gently up and down. Place the tube on the magnetic stand for 30 seconds and aspirate the buffer.
- (2) Remove the tube from the magnetic stand. Add 20  $\mu\text{l}$  of ligation buffer to resuspend the beads, then add 1 $\mu\text{l}$  ligase to the resuspended beads and incubate at  $37^{\circ}$  for 90 minutes.
- (3) Add 100  $\mu\text{l}$  Bead washing buffer directly to 20  $\mu\text{l}$  ligation reaction mix from Step 3-(2), place the tube on the magnetic stand for 30 seconds, and aspirate the buffer.
- (4) Remove the tube from the magnetic stand, add 20ul ddH<sub>2</sub>O and resuspend the beads. Heat at  $95^{\circ}\text{C}$  for 3 minutes on a PCR machine with heated lid on to release the ligated molecule from the beads.
- (5) Place the reaction tube on the magnetic stand for 30 seconds. Immediately transfer the solution to a fresh tube. The ligation mixture is ready to use.

## 4. Real-time PCR

- (1) Mix the following components for one reaction  
10  $\mu\text{L}$  2X SYBR Green PCR Master Mix  
8  $\mu\text{L}$  ddH<sub>2</sub>O  
1  $\mu\text{L}$  ligation mixture  
1 $\mu\text{L}$  Specific miRNA primer  
Note: The master mix can be made by multiplying the volume with reaction number, and then add specific miRNA primer
- (2) Proceed PCR cycles:  
Heating the reaction at  $94^{\circ}\text{C}$  for 10 mins.  
Proceed PCR 35 cycles as follows:  
 $94^{\circ}\text{C}$  30 seconds  
 $55^{\circ}\text{C}$  30 seconds  
 $72^{\circ}\text{C}$  30 seconds

### Data of example



Analysis of Let-7 Isoform Family with Real-Time PCR. 1fmol of 8 synthetic DNA (tem) for Let-7a, Let-7b, Let-7c, Let-7d, Let-7e, Let-7f, Let-7g and Let-7i were used as a template and incubated with Let7 oligo mix respectively. After the ligation, the individual ligated molecule was subject to real-time PCR analysis with 8 Let-7 specific primer respectively.