molecules into individual physical containers. The approach is practical, and after labeling, a simple detector device such as a microarray with complementary probe sequences to the labels can be used to identify and count the number of labels present. In addition, when stochastic labels are attached to DNA molecules that are prepared for DNA sequencing readouts, the labeling sequence can serve as discreet counting tags for absolute quantitation or as unique identifiers to distinguish each originally tagged template from its amplified daughter molecules (Kinde et al. Proc Natl Acad Sci USA 108:9530-9535(2011)).

SUMMARY OF THE INVENTION

[0006] In one aspect, there is provided a method for determining numbers of occurrences of mRNA molecules in a sample comprising:

a. stochastically labeling occurrences of mRNA molecules of a plurality of mRNA molecules in a sample with a plurality of oligonucleotide tags to produce a plurality of labeled-mRNA molecules, wherein:

i. the plurality of mRNA molecules comprises mRNA molecules of different sequences;

ii. each oligonucleotide tag of the plurality of oligonucleotide tags comprises an oligo dT sequence, an identifier region, and a universal primer binding site;

iii. the plurality of oligonucleotide tags comprises at least 5 oligonucleotide tags having identifier regions of different sequences for determining the numbers of occurrences of the mRNA molecules of the plurality of mRNA molecules; and

iv. the number of oligonucleotide tags having identifier regions of different sequences in the plurality of oligonucleotide tags is at least 5 times greater than the number of occurrence of any mRNA molecule of the plurality of mRNA molecules;

b. conducting a first strand synthesis reaction by contacting the plurality of labeled-RNA molecules with a reverse transcriptase enzyme to produce a plurality of single-stranded labeled-cDNA molecules;

c. amplifying the plurality of single-stranded labeled-cDNA molecules to produce a plurality of double-stranded labeled-cDNA molecules;

d. conducting a nested PCR reaction on the plurality of double-stranded labeled-cDNA molecules to produce a plurality of nested PCR labeled-amplicons; and

e. detecting at least a portion of amplicons of the plurality of nested PCR labeled-amplicons to determine the number of different identifier regions associated with each of the plurality of labeled-mRNA molecules, thereby determining the numbers of occurrences of the mRNA molecules of the plurality of mRNA molecules in the sample.

[0006a] In another aspect, there is provided a method comprising:

a. contacting an original sample comprising a plurality of nucleic acid molecules with a plurality of oligonucleotide tags to produce an original labeled sample comprising a plurality of labeled-nucleic acid molecules;

b. treating the original labeled sample with a uracil DNA glycosylase (UDG), thereby generating a treated labeled sample;

c. amplifying the treated labeled sample by using one or more labeled-nucleic acid molecules from the treated labeled sample as a template parent molecule, thereby producing one or more samples comprising clonally replicated molecules originating from the template parent molecule; and

d. determining a count of a first molecule from the original sample by determining a number of different clonally replicated molecules comprising the first molecule from a first sample of the one or more samples.

[0006b] In another aspect, there is provided a reverse transcription method comprising:

a. hybridizing a plurality of RNA molecules with a plurality of oligonucleotide tags to produce a labelled-RNA molecule, wherein:

L the plurality of RNA molecules comprises at least 2 mRNA molecules of different sequences;

ii. the plurality of oligonucleotide tags comprises at least 2 oligonucleotide tags of different sequences; and

iiL an oligonucleotide tag of the plurality of oligonucleotide tags comprises an oligodT sequence and a unique identifier region;

b. conducting a first strand synthesis reaction by contacting the labelled-RNA molecule with a reverse transcriptase enzyme to produce a labelled-cDNA molecule;

c. amplifying the labelled-cDNA molecule by conducting a polymerase chain reaction on the labelled-cDNA molecule to produce an amplified double-stranded DNA molecule; and

d. detecting the amplified double-stranded DNA molecule by hybridizing at least a portion of the double-stranded amplified DNA molecule to a solid support.

[0006c] In some embodiments is a digital reverse transcription method comprising: a) contacting a sample comprising a plurality of RNA molecules with a plurality of oligonucleotide tags to produce a labeled-RNA molecule, wherein: the plurality of RNA molecules comprise at least 2 mRNA molecules of different sequences; the plurality of oligonucleotide tags comprises at least 2 oligonucleotide tags of different sequences; and the plurality of oligonucleotide tags comprises an oligodT sequence; b)conducting a first strand synthesis reaction by contacting the labeled-RNA molecules with a reverse transcriptase enzyme to produce a labeled-cDNA molecule; and c) detecting the labeled-cDNA molecule by hybridizing the labeled-cDNA molecule to a solid support.

[0007] In some embodiments is a stochastic label-based hybridization chain reaction method comprising stochastically labeling one or more nucleic acid molecules with a plurality of hairpin oligonucleotide tags, wherein the hairpin oligonucleotide tag comprises an overhang; and the one or more nucleic acid molecules act as initiators for a hybridization chain reaction.

[0008] At least a portion of the hairpin oligonucleotide tag may hybridize to at least a portion of the one or more nucleic acid molecules. The hairpin oligonucleotide tag may comprise an oligodT sequence. The one or more nucleic acid molecules may comprise one or more adapters. At least a portion of the hairpin oligonucleotide tag may hybridize to at least a portion of the one or more adapters. At least one hairpin oligonucleotide tag of the plurality of hairpin oligonucleotide tags may comprise one or more labels. At least one hairpin oligonucleotide tag of the plurality of hairpin

oligonucleotide tags may comprise two or more labels.

[0009] Each hairpin oligonucleotide tag of the plurality of hairpin oligonucleotide tags may comprise one or more labels. Each hairpin oligonucleotide tag of the plurality of hairpin oligonucleotide tags may comprise two or more labels. In some instances, the hairpin oligonucleotide tag does not comprise a label.