

CHOLESTEROL-DNA LABELING OF EXTRACELLULAR VESICLES FOR AMPLIFICATION QUANTITATION

Tech ID: 31736 / UC Case 2020-070-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,339,291	06/24/2025	2020-070

BRIEF DESCRIPTION

Quantifying specific subpopulations of extracellular vesicles is a critical challenge in liquid biopsy and disease monitoring. Researchers at UC Berkeley have developed a highly sensitive method that uses deoxyribonucleic acid oligonucleotide tagging to label and quantify these vesicles. The technology employs lipid-tagged single-stranded DNA that embeds itself directly into the lipid bilayer membrane of the vesicles. Through a combination of anchor, co-anchor, and detection oligonucleotides, a stable and programmable label is formed. Once specific subpopulations of vesicles are captured using antibody-antigen binding, the single-stranded DNA labels are released using restriction enzymes and measured via quantitative polymerase chain reaction. This approach provides a quantitative readout that is directly correlated with the number of captured vesicles, enabling the detection of specific biomarkers from complex biological fluids.

SUGGESTED USES

- » Disease Diagnosis and Staging: Detecting and monitoring conditions such as sepsis, traumatic brain injury, heart disease, and various cancers through blood or urine samples.
- » Neurodegenerative Disease Monitoring: Tracking the progression of Alzheimer's disease or dementia by quantifying specific neural-derived vesicles.
- » Personalized Medicine: Evaluating an individual patient's response to cancer treatments by monitoring changes in vesicle subpopulations over time.
- » Drug Discovery: Assaying the impact of new therapeutic compounds on cellular health and vesicle secretion in laboratory models.
- » Multiplexed Biomarker Discovery: Simultaneously quantifying multiple different types of extracellular vesicles in a single sample to identify complex disease signatures.

ADVANTAGES

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INVENTORS

» Sohn, Lydia Lee

OTHER INFORMATION

CATEGORIZED AS

- » **Biotechnology**
- » Health
- » Other
- » **Medical**
- » Diagnostics
- » **Research Tools**
- » Other

RELATED CASES

2020-070-0

High Sensitivity: Utilizing quantitative polymerase chain reaction allows for the detection of extremely low concentrations of vesicles that traditional methods might miss.

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Specific Subpopulation Targeting: The integration of immunocapture ensures that only the relevant vesicles expressing specific surface antigens are measured.

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Stable Membrane Anchoring: The use of self-embedding lipids and complementary DNA base pairing prevents the labels from dissociating during the capture and washing steps.

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Direct Correlation: The signal generated by the DNA amplification provides a precise numerical count that corresponds directly to the physical number of vesicles present.

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Versatile Sample Compatibility: The method is effective for vesicles isolated from a wide variety of sources, including blood, saliva, urine, and cell culture media.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ [Mechano-Nps \(Node Pore Sensing\)](#)



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