Fluorescent Nanoprobes for Live-Cell RNA Imaging (#4513)

Nanoscale probes and imaging strategy that allow for sensitive RNA imaging

Georgia Tech inventors have created a nanoscale probe and strategy for single molecule sensitive imaging of RNA. The nanoscale probe is a multiply-labeled tetravalent RNA imaging probe (mTRIP) that is highly sensitive and versatile. The probes bind rapidly to RNA and allow for single RNA sensitivity using fluorescence microscopy techniques by being delivered into the cell via cell membrane permeabilization or microinjection. The strategy developed in conjunction with the probe is to identify RNA by enhanced signal-to-background ratio achieved through binding of multiple probes per RNA. The nanoscale probe and strategy are applicable to both live and fixed cells.

Benefits/Advantages

- **Sensitive —** can image single molecules with multiple emission wavelengths
- **Fast —** probe is multivalent and bind to RNA in less than 10 minutes
- **Low cost —** the alternative dual-label probes are more expensive
- **Versatile —** applicable to both live and fixed cells

Potential Commercial Applications

- RNA imaging
- Disease pathogenesis
- Gene modification and regulation

Background/Context for This Invention

Visualizing RNA is essential to understanding regulatory mechanism of RNA processing and, therefore, gene expression. A variety of strategies exist to measure expression levels of RNA in fixed cells and live cells, such as molecular beacons and serial analysis of gene expression. In these existing strategies, molecular sensitivity, speed, and ease of implementation are qualities that need improvement.

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More Information

International Patent Issued - 8,785,615

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/fluorescent-nanoprobes-live-cell-rna-imaging

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the

branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot