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Methods for detecting disease-related RNA using luminescent nucleotides

Researchers at Stanford's Kool lab have developed a rapid, accurate, and inexpensive method to detect RNA, including SARS-CoV2 RNA. While the current gold standard for COVID-19 detection is polymerase chain reaction (PCR), the assay relies on fluorescent detection that is prone to high background, burdensome instrumentation, and long protocols that are difficult to standardize in a point-of-care setting.
Stanford inventors have created an isothermal polymerase-based assay that signals in real time with luminescence, enabling greater sensitivity, faster run times, and detection on handheld devices. The Kool lab's detection system uses ATP-releasing nucleotides, which free an ATP from a synthetic nucleotide upon its incorporation into a PCR product. ATP levels can be quantified in real time or later by assay of choice, including luciferase. The inventors have optimized the assay on SARS-CoV2 RNA, but it can be applied to detection of any viral RNA or disease-relevant mRNA.

Applications

- Rapid COVID-19 diagnosis
- COVID-19 treatment monitoring
- Viral diagnostics (influenza, EBV, others)
- SNP diagnostics in mRNAs

Advantages

- High sensitivity
- Short runtimes

- Potential for point-of-care diagnosis
- Simplified instrumentation requirements
- Decentralized analysis of COVID-19 samples

Patents

- Published Application: WO2022115435
- Published Application: 20230416849

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