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RNA Detection Tool without Amplification

RNA plays a central role in almost all living organisms and as such detecting its presence or overexpression can be useful in a wide range of clinical diagnostics and other analyses. Traditional methods for detecting RNA include amplification schemes to increase the detection signal. Recent efforts have utilized real-time RT-PCR methods to detect RNA, which requires specialized equipment and involves multiple thermocycling steps and is thus time-consuming, taking up to 2 days to yield results. Alternative techniques, though rapid and highly efficient, are expensive since they require multiple primers, enzymes, nucleotides and other associated materials. Because most RNA detection methods are expensive and time-consuming, they are unsuitable for point-of-care (POC) applications and limited in their utility for other analyses.

Prof. Shengxi Chen, at the Biodesign Institute of Arizona State University, has developed a low-cost, highly-sensitive and highly-specific rapid tool for detecting RNA at room temperature. Although this tool does not utilize any kind of RNA amplification schemes, it can detect a few to thousands of RNA molecules in each sample. Detection signals are amplified via unique chain reactions to increase sensitivity instead of target amplification. Because the chain reactions can be initiated by sunlight, specialized equipment is not required. This tool, from start to finish, can qualitatively detect RNA in about one hour making it much more suitable for POC applications. It can be used for DNA detection as well.

This new tool enables equipment-free, rapid, low-cost, highly-sensitive and highly-specific nucleic acid detection making it ideal for POC diagnostics and many other applications in the biotechnology and healthcare sectors.

Potential Applications

- RNA or DNA detection
 - o Diagnostics
 - o Environmental analysis
 - o Food analysis
 - o Research
 - o Monitoring therapeutic efficacy/drug treatment

Benefits and Advantages

- Low-cost
- High sensitivity and specificity
- Rapid – can detect nucleic acids in about one hour
- Reactions take place at room temperature
- Does not require specialized equipment or personnel
- No target amplification needed
- Suitable for POC applications
- Can detect a few to thousands of RNA molecules in each sample
- Positive RNA detection can be confirmed visually

For more information about the inventor(s) and their research, please see

[Dr. Chen's departmental webpage](#)