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Ratiometric Method to Enable Inexpensive, Point-of-care Diagnostics

Stanford researchers have developed an innovative nucleic acid amplification method that enables low-cost, multiplexed detection while quantitatively maintaining the original ratios of target genes after amplification.

Many diseases, including tuberculosis, sepsis, HIV, and cancer, are increasingly identified using multi-gene signatures from blood, saliva, or urine. However, current approaches require expensive instruments, trained personnel, and centralized labs, making them inaccessible in many settings.

The current technology addresses this gap by combining isothermal amplification (e.g., NASBA, LAMP) with a strategy that preserves gene ratios during amplification. In simple terms, it maintains the original balance between genes, rather than distorting it during the amplification process. Importantly, while existing low-cost amplification methods can detect nucleic acids, they do not preserve gene ratios and therefore cannot support ratiometric diagnostics. As a result, the assay can deliver meaningful ratiometric readouts using a simple, low-cost format and without the need for complex equipment or electricity.

By enabling accurate, low-cost measurement of multi-gene signatures at the point of care, this platform opens the door to accessible molecular diagnostics at a global scale, particularly in resource-limited environments.

Stage of Development
Proof-of-Concept

Applications

- Point-of-care diagnostics based on multi-gene expression signatures
- Infectious diseases (e.g., tuberculosis, sepsis, HIV)
- Cancer detection and monitoring
- Chromosomal abnormalities and prenatal diagnostics
- Blood-, saliva-, or urine-based testing in decentralized and low-resource settings

Advantages

- Enables low-cost, point-of-care molecular diagnostics
- Preserves gene expression ratios during amplification
- Fast, simple, and inexpensive
- No specialized equipment or electricity required
- Compatible with multiple sample types (blood, saliva, urine)

Patents

- Published Application: WO2020223626
- Published Application: 20220195509

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