Pilot validation of an enzymatic assay with lateral flow readout for long-term PrEP adherence

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BACKGROUND

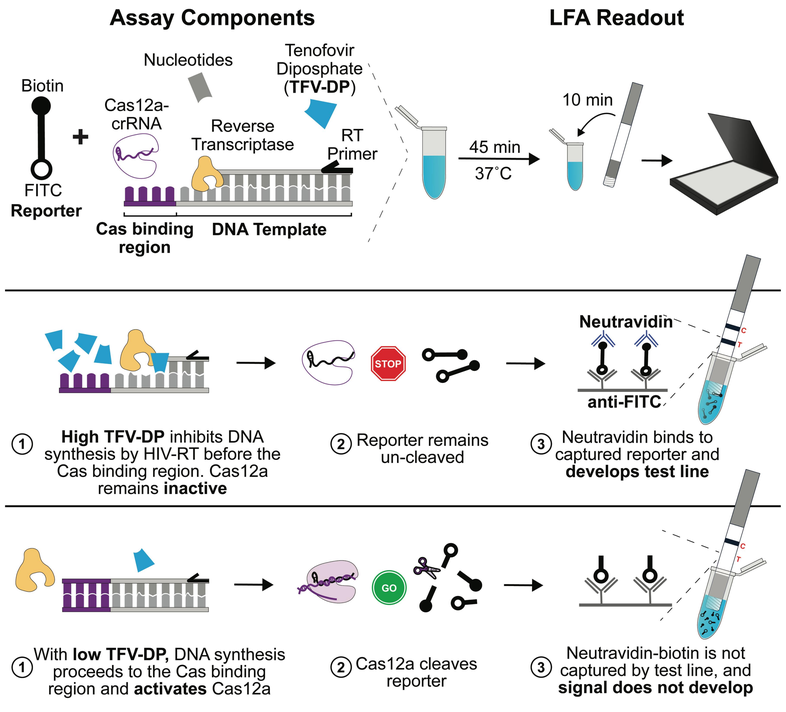
Regular and rapid **drug concentration feedback (DCF)** provides objective information about HIV medication adherence, treatment failure, and drug resistance.[1,2]

Current methods for HIV DCF have limitations that prevent point-of-care use especially in resource-limited settings.

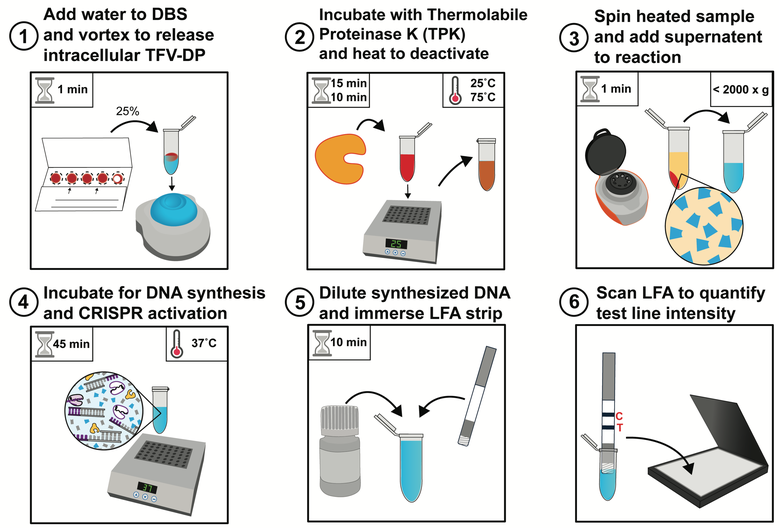
	Rapid turnaround time	Differentiates short- and long-term adherence	Low cost (USD)	Lateral flow readout (LFA)
Liquid chromatography tandem mass spectrometry (**LC-MS/MS**)[2-4]	✗ (~1 month)	✓	✗ ($200/test) ($30,000-$300,000 instrument)	✗
Urine TFV Rapid Assay (**UTRA**)[5]	✓ (~15 min)	✗	✓ ($2/test)	✓
REACT with CRISP**R** **(REACTR)**[6]	✓ (90 min)	✓	✓ (~$3/test)	✓

Tenofovir Diphosphate (TFV-DP) is a Nucleotide Reverse Transcriptase Inhibitor (NTRI) and has a 17 day half life in red blood cells, indicating adherence over the last 1-3 months.[7]

METHODS: REACTR Assay Overview



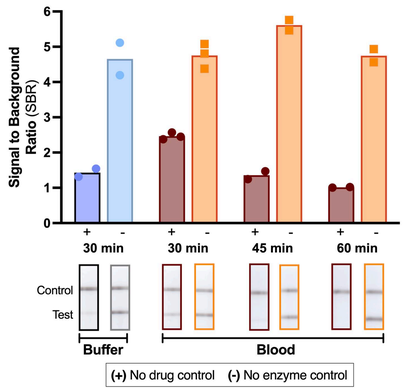
METHODS: Experimental Workflow

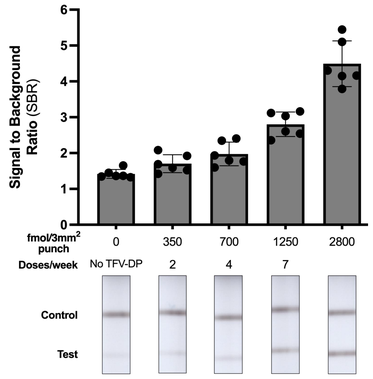


RESULTS: Assay Calibration

We quantified test line intensity using signal to background ratio (**SBR**) and optimized assay time.

We also validated REACTR in spiked blood from 3 donors not receiving antiretrovirals.



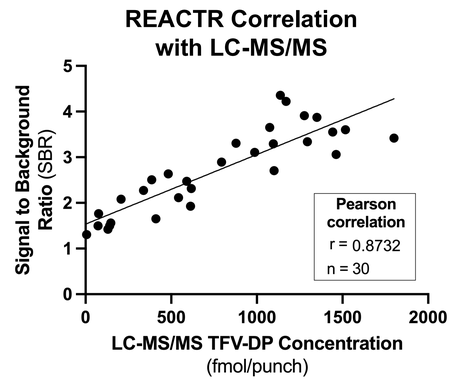


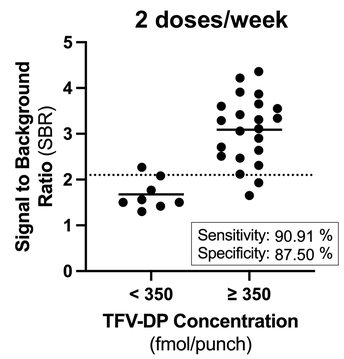
PLAIN LANGUAGE SUMMARY

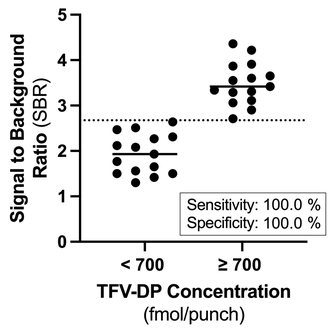
We developed a simple test to measure how active HIV drugs are in a person's blood to determine if they have enough medication in their system over the last 1-3 months. Our test could be useful in clinical trials or routine care to improve health outcomes.

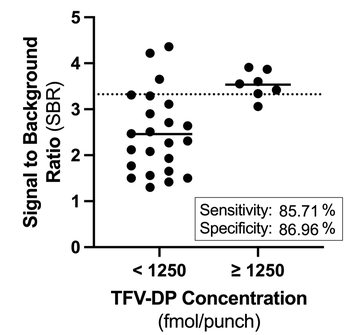
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RESULTS: Clinical Samples









REACTR correlates with LC-MS/MS and accurately distinguishes between samples at different adherence thresholds.

CONCLUSIONS AND NEXT STEPS

REACTR may be suitable for rapid adherence measurement and as a triage tool prior to drug resistance screening for people with virologic failure.

Ongoing work will:

1. Validate with clinical samples from people on ART
2. Streamline blood collection, processing, and testing.

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