



Abstract 1268
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Tenofovir Stability in Urine At Variable Temperatures

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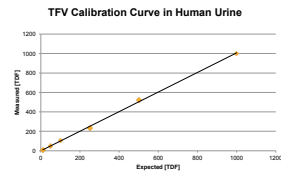
The Children's Hospital of Philadelphia⁴,



Background

- The effectiveness of TDF/FTC taken as HIV pre-exposure prophylaxis (PrEP) is limited by poor adherence
- A previously validated liquid chromatography/tandem mass spectrometry (LC-MS/MS) test measures tenofovir (TFV) levels in urine to monitor adherence to PrEP
- Urine samples for this test were previously stored and shipped at -80°C
- We determined the stability of TFV in urine at different temperatures to assess ease of incorporation into variable clinical settings

The assay



Tenofovir (TFV) calibration curve in human urine over a concentration range of 10 to 1000 ng/mL. A known concentration of TDF was injected into a human urine sample (x axis) and measured using LC-MS/MS (y axis). [TFV] = tenofovir concentration.

- This assay determines TFV concentrations in log₁₀ categories between 0 ng/ml to > 10,000 ng/ml.
- TFV was detected over 7 days later in urine after one dose of TDF/FTC
- Urine TFV is cleared in a log-linear fashion, with a direct correlation of urine levels to time since last dose.
- Urine assay is 2 logs more sensitive than serum over 7d

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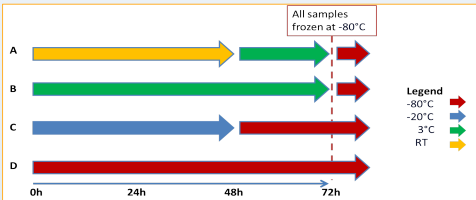
Objective

- To simulate national/international storage and shipment conditions by measurement of the stability of urine tenofovir concentration over varying time and temperature conditions

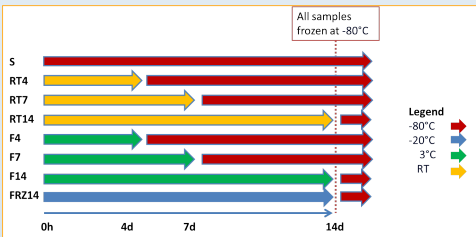
Methods

- Two temperature control tests were conducted on urine samples collected from patients receiving daily PrEP with TDF/FTC at a community-based clinic

Temp Stability Test 1: Proof of Concept



Temp Stability Test 2: 14 day study



Results

Temp Study 1		Temp Study 2		
Subject and Sample Time/Temp Condition	Urine TFV Concentration (ng/mL)	Subject and Sample Time/Temp Condition	Urine TFV Concentration (ng/mL)	
Subject 1	A	>10000	S	>10000
	B	>10000	RT4	>10000
	C	>10000	F4	>10000
	D	>10000	RT7	>10000
Subject 2	A	>1000	F7	>10000
	B	>1000	RT14	>10000
	C	>1000	F14	>10000
	D	>1000	FRZ14	>100000
Subject 3	A	>100	S	>1000
	B	>100	RT4	>10000
	C	>100	F4	>10000
	D	>100	RT7	>10000
Subject 4	A	>10000	F7	>10000
	B	>10000	RT14	>10000
	C	>10000	F14	>10000
	D	>10000	FRZ14	>1000
Subject 5	A	>10000	S	>1000
	B	>10000	RT4	>10000
	C	>10000	F4	>10000
	D	>10000	RT7	>10000
Subject 6	A	>10000	F7	>10000
	B	>10000	RT14	>10000
	C	>10000	F14	>10000
	D	>10000	FRZ14	>10000
Subject 7	A	>10000	S	>1000
	B	>10000	RT4	>10000
	C	>10000	F4	>10000
	D	>10000	RT7	>10000
Subject 8	A	>10000	F7	>10000
	B	>10000	RT14	>10000
	C	>10000	F14	>10000
	D	>10000	FRZ14	>10000
Subject 9	A	>10000	S	>10000
	B	>10000	RT4	>10000
	C	>10000	F4	>10000
	D	>10000	RT7	>10000
Subject 10	A	>10000	F7	>10000
	B	>10000	RT14	>10000
	C	>10000	F14	>10000
	D	>10000	FRZ14	>10000

- Urine was obtained from 10 total study participants.
- 60 1.5ml aliquots analyzed
- Bold test labels represent standard of care practices, where samples were frozen immediately at -80°C
- Urine TFV concentrations in both studies were 100% concordant at all temperatures and times.

Conclusions

- TFV is stable in urine samples for up to 14 days at RT and with standard refrigeration
- Urine PrEP adherence monitoring is accessible to providers with minimal laboratory facilities and shipping capabilities worldwide.

Future Steps

- Will real-time adherence monitoring with urine TFV lead to clinically significant and sustained increase in adherence to PrEP?
- Will the availability of simple and reliable adherence monitoring techniques influence worldwide PrEP uptake?
- Can the urine assay be further developed into a point of care test?

References

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